

Lectures on the ordinary agents of life : as applicable to therapeutics and hygiene, or, the uses of the atmosphere, habitations, baths, clothing, climate, exercise, foods, drinks, &c.; in the treatment and prevention of disease / by Alexander Kilgour, M.D.

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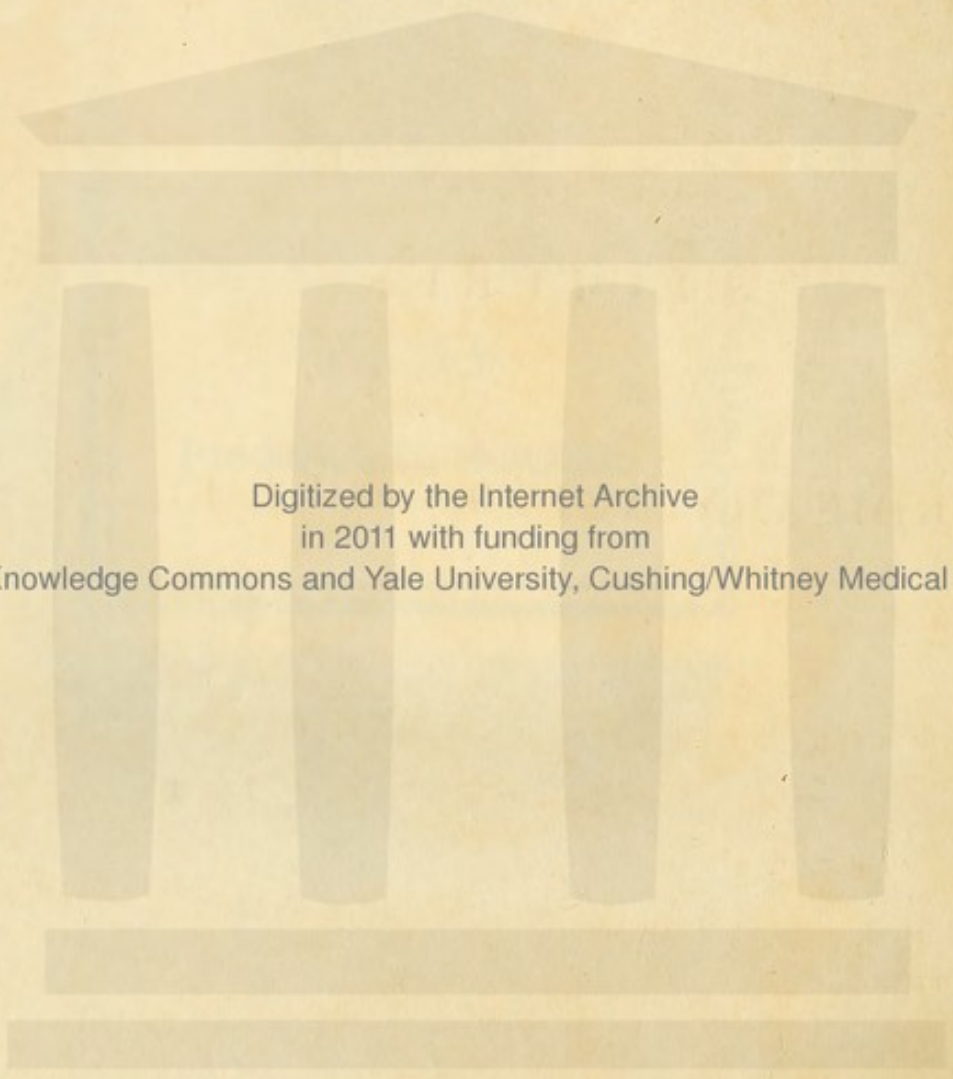
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LECTURE

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LECTURES
ON THE
ORDINARY AGENTS OF LIFE,
AS APPLICABLE TO
THERAPEUTICS AND HYGIÈNE.

LECTURE

ORDINARY

THEORY AND PRACTICE

LECTURES

ORDINARY

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ON THE
ORDINARY AGENTS OF LIFE,
AS APPLICABLE TO
THERAPEUTICS AND HYGIÈNE ;

OR
THE USES OF THE ATMOSPHERE, HABITATIONS, BATHS, CLOTHING,
CLIMATE, EXERCISE, FOODS, DRINKS, &c. IN THE TREATMENT
AND PREVENTION OF DISEASE.

BY ALEXANDER KILGOUR, M.D.
MEMBER OF THE ROYAL COLLEGE OF SURGEONS, LONDON.

Ἐν δ' ἔχει νοσεόντων μὲν ἐπιστάτειν, ἕνεκεν ὑγιείης· ὑγιαίνοντων δὲ
φροντίζειν, ἕνεκεν ἀνοσίης· φροντίζειν καὶ ὑγιαίνοντων, ἕνεκεν
ἐυσχημοσύνης.

HIPPOCRATES.

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THESE are the things which I have seen and heard, and which I have written down for you, that you may know the truth of the things which I have told you. For I have seen the things which I have told you, and I have heard the things which I have told you, and I have written down the things which I have told you, that you may know the truth of the things which I have told you.

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PREFACE.

IN submitting the following Lectures to the Medical Profession, I hope my brethren will give me credit for at least a desire to do justice to a much neglected branch of Medical education in this country. There are not wanting Books directed to this subject ; but had I been obliged to follow in their track, looking at the same objects in the same way, it is not likely I would have attempted the journey. I believe they are neither much read nor much valued by the Medical student ; not so much because they are addressed more to the Public than to the Profession, as because they are based on no scientific principles, because they are nothing more than a bare collection of precepts—"Thou shalt do this," and "Thou shalt not do that"—a mode of instruction which was equally valuable to the intellect, and more pleasing to the ear, in the doggrel lines of the School of Salerno. I grant the antiquity of many of these maxims, but I think it hard that, notwithstanding our greater knowledge of the human body and the agents to which it is exposed, we should still be compelled to receive as fixed the rules

which Hippocrates or Galen have given with regard to Health. We have not hesitated to abandon much of their physiology, pathology, and physical science ; but we still cling to their knowledge of Health, and the things promoting it, as perfect. We have nearly removed stone by stone the foundation—the science of their times—on which their Hygiène was built ; and yet labour to support the tottering fabric, instead of re-building it on more correct principles.

I do not wish to put the *result of experience*, which these precepts are often no doubt intended to convey, below its real value ; but I say this, that even granting that these rules possess this merit, rules without an explanation of the principles on which they are founded are never satisfactory ; and that in a practical science like medicine, where so many exceptions must occur, and where the judgment of the practitioner must so often guide him, it is of essential importance that the principles should be well understood, otherwise he can never modify these general rules to suit each particular case. Where an explanation, therefore, is tendered by Hippocrates or Galen of the action of these agents on the human body, we have no more reason to believe it correct than we would an explanation of the action of any medicine in a disease ; and this we seldom do.

I have taken Physiology, Pathology, and Physics, as settled by accumulated experiments and observations ; and I have endeavoured to point out the relations between them—the

relations between certain external agents, and the structure and functions of the living body, both in its healthy and diseased state ; and to deduce the proper manner of using them in the one case and the other.

And although my object is principally to apply these to the invalid, or to THERAPEUTICS ; yet as we ought to know the healthy man, and the means of preserving him in that state, before we can know thoroughly the diseased one and the remedies, I have viewed them likewise as *prophylactics*—as preserving and guarding the health of the individual—and also as the means of rearing the human body with the most perfect physical vigour. Included here, therefore, there are two subjects for consideration—the means which will be taken by Communities—or by the Government—for the public health ; and the means which each individual will pursue for the preservation of his own health—or PUBLIC and PRIVATE HYGIÈNE.

Though I do not enter at length into Public Hygiène, yet I trust my occasional remarks upon it will be found of some use to the student, if it be only in directing his attention to the subject. There is a remark of Foderé which ought to be engraved on the mind of every Medical writer, and much more on that of every Legislator—and that is, “ *J’ai voyagé, j’ai habité à dessein différens pays ; j’ai médité sur la condition des hommes dans les diverses circonstances de la vie ; j’ai vu qu’il étoit au pouvoir des gouverne-*

mens, de leur faire infiniment plus de bien que tous les livres de médecine ensemble." (Tom. v. chap. i. p. 3.) To that opinion I most religiously subscribe. There is a great department in the science of Government,—the application of Legislation to relieve the physical necessities, extend the physical comforts, and improve the physical condition of the human race—in short to make the public healthy, vigorous, and virtuous, in so far as moral perfection depends upon, or is connected with, the healthy condition of the body. That department rests upon a knowledge of the human frame, its capabilities of improvement and deterioration, and the agents producing both. Now the Legislator has it in his power to operate on these agents, to check or increase their effects, and this power he frequently exercises for financial purposes, without keeping equally in view the alterations he may produce on the health of the community. In a country, such as ours, where large taxes must be raised, the importance of knowing where these can be derived by *least* trenching on the public health must be manifest. In a country, likewise, such as ours, where so many trades and occupations are certain to injure the health, but where such trades cannot be put a stop to without ruin and injury to the public at large, the study of means to palliate what we cannot cure is a matter of national concern. I do not wish to convert Doctors into Political Economists, nor to demand a minute knowledge of human physiology, from Legislators; but I think it would be well if Medical men would make some use of their opportunities of

observing the effects of the *Non-naturals* on the public health, as well as the effects of the articles of the *Pharmacopœia* on disease. It has been cast as an opprobrium on the dexterous surgeon, that he removes the limb which he cannot cure, and that therefore his is but a very inferior merit. I will not say that the mere man of pathology is not a most invaluable member of society ; but he often contracts his view too much, and seeks solely to cure the individual, instead of extending his knowledge to remove the cause of disease from others. Of late, Medical men have had to give evidence on subjects connected with public Hygiène ; and, from their answers, many of them would appear to have only thought of it for the first time when in the witness' box ; and besides to have thought it strange that they who had considered it their exclusive business, from their knowledge of the sick body, to prescribe for disease, should, from their knowledge of the sound one, be asked to prescribe for health. There would have been less discrepancy in their opinions, had they been early accustomed to direct their minds to the subject.

But I have a special reason, in regard to Therapeutics, for introducing the influence of these Physical Agents on nations. I thus get the most striking and convincing illustrations of their influence on the human body. On the individual their effects are certain but slow, and, therefore, frequently not observed ; whilst, on the other hand, the articles of the *Materia-Medica* acting powerfully and speedily

are conspicuous to every one. When we observe and compare the two together in the individual case, the mind readily grants the potency of the one agent, but doubts as to that of the other. But when the Non-naturals are pointed out in the bold, distinct, and prominent marks which they produce by their continued operation on masses or nations, the student has a demonstration of the influence of these agents impressed upon him by its magnitude. In the same way, the expert chemist can operate upon the fraction of a grain, and swear to the result of his analysis; but when operating before pupils he will prefer, for their sakes, to use larger bulks, in order to accommodate himself to their inexperience, and satisfy their less practised senses.

I have a thorough contempt for all those Medical Works which are published for the "General Reader"—for those not initiated regularly, and by long study, in the Science of Medicine, and this opinion I do not entertain from the reasons so lugubriously stated by Baglivi, against the use of the vernacular, "*Vetulas docent, e culina cum ipsis etiam Medicinæ Principibus arroganter disputare;*" nor praying with him that Latin should be the language of Medicine in order that it may not be permitted, "*Mulierculus discere disputare, et Impostores nostris gladiis discere nos confodere;*" but because it is my faith that those "Domestic Medicines," "Medical Guides," "Popular Systems of Medicine," and all the minor squad of quackery and imposture which are to make Physicians of plain people, by a little reading, do an immense deal of harm

to the public. I have frequently seen a man hypochondriacal, and supremely miserable, in the belief that he was afflicted with nearly all the most deadly ills to which flesh is heir, from reading a popular work on Medicine ; and I have known a fine family physicked to death owing to the father or mother having taken to the study of a “ Domestic Medicine,” in order to doctor their children. Every Physician who has felt, and has the candour to allow, how often, notwithstanding all his knowledge and experience, he is at a loss, midst the many conflicting and shifting symptoms, in making his *diagnosis*, must be of the same opinion with me. Dr. Baynard well observes, in regard to publications intended even for the profession : “ Men ought to be very just in what they publish and assert in that tender and nice Concern of Life ; for all things in reference thereunto ought to be considered well and treated with the greatest Caution ; for *there lies no Writ of Error in the Grave*, but the sick man is finally concluded by the Knowledge or Ignorance of his Physician.” And the same writer has again made the following remark, which ought to be duly weighed by those who, without the requisite knowledge, tamper with human life : “ Man is a sort of Musical Instrument, and the strings of Life and Death are tuned or disordered on more keys than a Welsh Harp or a Scotch Bagpipe, especially when an ill Fiddler plays on his own Carcass.” Now the majority of men are ill fiddlers on their own carcasses ; and they are the most abominable and jarring scrapers on those of others, unless they have devoted much time and a good judgment to acquiring a knowledge

of the instrument. Whilst they play upon their own bodies, however, though they may sometimes annoy us when they get us within their hearing ; yet, upon the whole, they are only tormenting or injuring themselves, and therefore they may pore over the books on " Indigestion," " Diseases of the Stomach," " Diet," &c. which are the " Introductions," the " First Lessons," the " Vade Mecums," to such music, as long as they please : but the case becomes much worse when they set a-practising on the healthy, the young, and the unresisting, on the authority of a " Domestic Medicine."

Although, therefore, I consider that the attempt to make the curing of disease a popular science, is attended with more bad effects than can be counterbalanced by any good, I have not the same opinion with regard to Hygiène, or the preserving of the health. Richerand, whilst he strongly condemns the attempts to convert medicine into a Domestic Art, allows that those who have laid themselves out for this duty might have been of some service, if they had confined themselves to the *Preservative*. (*Des Erreurs Populaires relatives a la Médecine*, p. 370.) The papa who reads a Domestic Medicine, and doses his son with Physic whom he has previously stuffed with roast beef and fat pudding ; and the mamma who binds her daughter in tight stays from her earliest infancy, and sends her to a fashionable boarding school to sit sixteen hours out of the four and twenty in the acquisition of *accomplishments*, and then lays her on her back for years at the suggestion of some Spine Doctor, begin their

studies at the wrong end ; for did they know and obey the influence of air, clothing, exercise, and food, the child would require neither nauseous medicine nor an unnatural and painful posture, for it would continue healthy. The " Guides to Health," " Means of Preserving Long Life," &c. are, therefore, if properly written, useful to the public generally ; whilst those which treat of disease and the poisonous substances which are there used, can only be safely in the hands of those who know the dangers of these remedies, and the when and where to apply them. We may compare the one to Harlequin's lath weapon, and the other to a two edged sword. And the comparison is the more apt in so far as the non-naturals do often, according as they are used, exhibit the magic virtues, making a man altogether change his character, and raising him, as if supernaturally, from a lean and withered pantaloon, to beauty and vigour, and in other cases converting him into the sport of his friends, by sending him on a fool's errand seeking that health which, under Divine Providence, he possesses to perfection. The objection is not to the weapon, but to the manner in which it is applied by an ignorant author or an insane reader. These works are frequently composed for the use, or abuse, of the " General Reader," by those who are unacquainted with the Physiology of the Human Body, and we may apply to many of them what Belzac says of Aristotle: " They are a second Nature, for they have nothing to do with the first."

As the Medical practitioner, and still more the Medical

pupil, is imbued with a large share of professional exclusiveness, he cares not for taking a part of what is dished up by an indifferent cook for the mob. There are few, therefore, as I have mentioned, of the *popular* works on Health which he is inclined to read, even were they likely to repay him for the trouble. From finding the subject not prepared for himself he is apt to despise it, or to think that it forms no necessary part of his professional lore. When a sick person says to him : " What shall I do to obtain Health," he is ready to furnish him his aid ; but when one sound in body says : " How shall I conduct myself in order to preserve health, and attain a vigorous old age," he immediately puts him down as a hypochondriac ; or conveys to him all that he himself knows on the subject, in the absurd remark, "*sano corpori omnia sana.*"

I know many are inclined to despise the *prophylactic*—and I have as much contempt for the twaddling maxims of old women,—for the scale-and-weight feeding,—and the daily close-stool examinations, as any one ;—but it must be recollected that man has not been provided with instincts to guide him through the world ; he has been left to the light of his own reason ; and if any one should feel a consciousness to himself of his inability to see the path, or if he should distrust the common beaten track—one which fashion, whim, or caprice, has several times turned from the straight line—who ought to be so able to direct and guide him as the man who knows the human body—what it can do with advantage to itself,

and what it can suffer with impunity? We all march to the grave, but, like Peter Pindar's rogue on the penance to the shrine, it may be as well to boil the pease—to keep the body comfortable and easy; for on that will mainly depend our healthiness of mind, and consequently the amount of good we can confer on our fellow-men, and the calmness and serenity with which we can meet our latter end. If the “blessed Hygieia” (one of her Poets addresses her, Πρεσβιστῶ μακαρῶν) is now despicable in the eyes of the Physician, he has himself to blame for her state; for he left her in bad company, where she has been seduced and corrupted, and become more a bawd to our foolish passions than a guide and directress to our reason.

These Lectures form part of a Course on Therapeutics; and I have been induced to publish them, because, though we have works on some of the separate parts, (and few even of these modern), I know of none in our language including so much of the subject, and intended for the Medical Student. Though frequently using the term NON-NATURALS, I have not followed out all the parts comprehended under that old and absurd term; nor have I followed the old arrangement of them. The influence of the MIND, as preserving health or removing disease, I think from its magnitude deserves a work to itself. I might have divided the subject according to the structures or organs interested, or according to the physiology, or functions of these organs. The valuable work of Xavier Bichat, on General Anatomy,

would have been a guide in the one case ; and the work of Bostock or Richerand would have furnished me with the divisions of the subject in the other. But it appeared to me there would be as few repetitions by taking the physical agents and explaining their action upon the different structures and functions, as by taking the latter and explaining the action of the different agents upon them. In either case a little repetition was unavoidable. Intending these Lectures as supplementary to the *Materia Medica*, the present arrangement appeared best to me.

Besides the Authors whose names I have given when quoting their words or sentiments, I have to acknowledge my obligations to that valuable repertory of Medical knowledge, the *Dictionnaire des Sciences Médicales*. It might be expected that I would have consulted the *Traité d'Hygiène appliquée à la Thérapeutique* by Barbier, and I have done so ; but I think there is rather much there of old theory ; and the see-sawing between *heat, cold, dryness, and moisture*, is too much of the school of Galen for the English Student, and more prominently than usefully put. I have occasionally made use of an illustration from the useful little work of Mr. Belinaye, on the "Sources of Health and Disease in Communities." Since these sheets were in the press I have seen Dr. Combe's work on "Physiology applied to the Preservation of Health," and as a popular treatise, to the extent to which it goes, it is most sensible and judicious ; but as it gives instructions in Anatomy to the common reader,

much of its space is occupied with what is well known to the Medical student. A work by Dr. Bisset Hawkins, connected with Medical Police, has, I believe, been announced as in the press. His "Medical Statistics" have been the means of exhibiting to the English Physician, the great importance of Statistics in a medical as well as political view; and judging from the diligence there displayed I anticipate much from his new labours. With respect to the Greek writers, I have struck out much from my Lectures which I had either picked up at second hand, or noted down during my own reading of them, lest I might myself have been guilty of what I blame in others. I have merely retained some short passages where their experience lends a strong support to the views I entertain in accordance with a more correct physiology and pathology. Excepting Aretæus, (and of necessity Hippocrates) these writers are quoted from the *Medicæ Artis Principes* of Henry Stephens, including Galen as excerpted by Oribasius, as I had not copies of the originals beside me. If the English student wish any further information with regard to the ancient use of the non-naturals, either in Therapeutics or Hygiène, he will find all that he can desire in the learned and laborious commentary appended by Mr. Adam to his excellent translation of the books of Paulus Ægineta: But the student would do well to take this along with him—that what was suited for the climate of Greece may not be equally suited for that of Britain.

I hope in this age of Useful Knowledge, and rather short

cuts to it, it will not be objected to me that I have made use of an illustration where the bare annunciation of the fact would have been sufficient. The economy of animated nature around him is the school where man gathers a store of information which he may apply to his own wants and necessities. He is sent into the world naked and helpless, to rule all animated things, but first to learn from them. In this view, I trust that my occasional allusions to the habits and instincts which have been implanted in the lower animals for their safe passage through life, will not be considered as misplaced. Nor have I hesitated occasionally to notice some of those vagaries (the very mention of them being sufficient to condemn them) in which writers on HEALTH have too often indulged. Antyllus tells us, that to relieve the sickness from a dose of hellebore, the patient should be entertained with some funny little story. Oftentimes a Medical work is as sickening as a dose of hellebore, and the student has reason to pray that the Author had introduced occasionally the *lepida fabella* for him as well as recommending it for his patient. I have not always walked on the professional stilts; and if the non-professional person attempt to read my work, I hope he will not find that I have catered to the diseased fancy of hypochondriacs, or called up an awful array of rules for health, as if death was in every pot, and destruction in every mouthful of air. I would wish to look on the subject in a cheerful light, and whilst I think it well that the Medical student should know it thoroughly, I would wish that the "*homo sanus, qui et bene valet, et suæ spontis est,*"

should really and truly believe "*neque medico, neque iatralipta egere.*" And this he is most likely to obtain by knowing the laws of his own constitution. Indeed it appears to me strange that men who are so desirous of knowledge, should have a distaste towards the study of their own bodies, the knowledge of which would not only be something of itself, but would be of immense practical value to them in the different relations of life. It is easy to get by heart the string of *antitheses* from Celsus and Seneca on the methods of preserving health ; but it appears to me that the more rational way would be first to *know their own frame*, and then to get the *cause* why they should do this or that. Were this the case, there would be an end of those absurdities which they receive on the authority of persons as ignorant as themselves, and there would be an end likewise to much mental misery entailed on many individuals by some writers on Health.

The professional reader will see nothing improper in the way in which I have treated the last Lecture ; and to the non-professional one, if censorious, I would beg to notice the excuse which Sterne made to a Lady who complained of the character of his works : pointing out her young heir rolling on the floor in his white tunic, the more witty than wise parson said, " my works are like the infant there, who shews more than he ought to do, but it is all in the way of innocence." Now I treat of nothing more than what I ought to do, and what I write is not to suit any particular taste, but in the humble hope of affording information.

The father of physic has told us, in the words which I have placed on my title page, what are our duties ; and to the two last of these I have endeavoured to direct the attention of my brethren, as being as much the province of their profession, or their philanthropy, as the first. The *ἐυσχημοσύνη* of the mind has been the care of philosophers and divines, whilst that of the body has been almost totally neglected ; but we are now getting more correct ideas on the subject, and having seen the mutual connection of mind and body, and their dependence on each other, we acknowledge the truth of Democritus' remark to Hippocrates that "*Health enlarges the understanding,*" and are at length seeking to afford equal attention and cultivation to both.

SEPTEMBER, 1834.

LECTURE FIRST.

INTRODUCTION.

THE ancient physicians divided the Science of Medicine into the following branches :—Φυσιολογια, 'Υγιεινη, Παθολογια, and Θεραπευτικη. The first comprehended the knowledge of the body in its natural state—its structure and its functions. It therefore included Anatomy and Physiology, in the sense in which the latter term is now understood.—This constituted, according to Galen, the knowledge of the "*res naturales*." The second comprehended those things which are not part of the body, and yet essential to its existence ; such as, Food, Drink, Air, Motion and Rest, Sleep and Watching, Retentions and Excretions, and Passions of the Mind.—To these Galen gave the name of the "*res non-naturales*." The third comprehended all things præternatural to the body—the causes, symptoms, and stages of Disease.—Galen termed these the "*res extra-naturales*." The fourth comprehended the "*indicaciones curativæ*," or theory of the treatment of all Diseases by certain agents ; and, consequently, a knowledge of these agents, of their physical properties, their actions on the human body, and the manner or forms in which they are to be used.

To all of these divisions the ancient writers gave equal attention : not so the moderns. When Latin ceased to be the medium of medical knowledge, *ὑγίεινη* ceased to have a place in systems of medicine ; at any rate such is the case in England, for this branch of the science has not even received a *name*, and it is not known in the schools as a part—even as a minor one—of a medical education. This is, though singular, true ; yet it is easy enough to point out the cause of the inattention to this branch in this country ; for it must be allowed that it is not by any means neglected on the Continent.—But it will be better, in the first place, to point out the importance of the subject, so that the student may not have an apology for his neglect in an ignorance of its value.

The non-naturals are Food, Drink, Air, Exercise, Rest, Sleep, Watching, Excretions, Retentions, and Passions of the Mind. These are what are necessary, or at any rate belong, to man's existence. There are, however, other things which, though not actually essential, yet cannot, in the present state of society, be dispensed with. They are intimately connected with the former, and are used to modify or graduate their influence. Thus Cooking affects our food ; and Climate, Habitations, Clothes, &c. modify the effects of the atmosphere. There are many who would be of opinion, that the attention given by the old writers to this subject was a very strong presumption at least of its value. Triflers to an extraordinary degree they must otherwise have been. But the Greek physicians knew very well that the greater number of diseases arose from some error in regard to these agents, and that the first step in checking the disease was by removing the cause of it. A host of diseases depends on the quality or quantity of our food and drink, and an equal number have their origin in some faulty state of the excretions or retentions. The state of the atmosphere, as to heat and coldness, dryness or moisture, gives rise to a great num-

ber of complaints. The seasons of the year in their rotation furnish many periodical diseases, whilst the atmosphere, loaded with certain effluvia, begets those called endemical and epidemical. Unless, therefore, we know thoroughly the action of the non-naturals on the system, we cannot say with certainty what is the derangement which causes the complaint, and we cannot expect to cure the patient whilst he continues exposed to the same exciting influence. "*Si enim id quod morbum facit non transmoveris, augebitur*"—a very sensible and just remark, and one which ought to be engraven on the mind of every physician.

But the advantages derived from a knowledge of the subject are not confined solely to this. We can do more; we can make them therapeutic agents, and render them as useful in the cure of disease, as the lancet, or the substances commonly called medicinal. We can use the one as a corrective to the injurious effects that have been left on the system by some error in another. A man who has been seized with inflammation in consequence of exposure to a moist and cold atmosphere, will not be cured by removal from that atmosphere; but the injury he has thus sustained may be in no small part remedied by his food. Why do we recommend a mucilaginous diet to a person in pthisis, an animal one to a person afflicted with diabetes, or an acidulated one to a patient in hæmoptysis? Why do we recommend exercise to the student, whose stomach and bowels have become functionally diseased? Why do we send those predisposed to pthisis to a warm climate? Merely because these agents produce an alteration in the human system, which we cannot so well, so easily, and so safely bring about by any medicine in the Pharmacopœia. It was in laying hold of these as therapeutic agents that the Greek physicians principally excelled. The food, the drink, the materials of the couch, the moisture or dryness of the atmosphere, the baths, and

the exercises, were all scrupulously attended to by the follower of Hippocrates. Now-a-days we trust to powerful medicines; and if we do not cure, we kill, and that too speedily. Ours is the fleetness of the spurred racer, that goes over the ground to the exhaustion of all his strength, and yet may not win; theirs the steady pace of the staid, undeviating animal, that knows he has a long journey to perform, and works it slowly out.

If, however, it is not the intention of the physician to await the slow progress of a cure by these means—if he is to attack the disease vigorously by the Pharmacopœia—if he despise the non-naturals even as adjuvants,—he must take care that what he thus rejects as an ally, does not covertly join the enemy, and rout him who previously scorned the proffered aid, with confusion and disgrace. He may be priding himself on his *active* treatment; but a beef-steak or a glass of porter may outwit him, and be more than a match for digitalis and the lancet. The importance of these agents is a piece of knowledge which the young practitioner only acquires, in general, by some sad experience and bitter disappointment. Whilst he is pondering on the case, weighing accurately in his mind the action of each medicine he is exhibiting, and watching with intense anxiety for its expected sanatory effect, the patient will quit this world with the medicine very likely in his bowels, but along with it some solid and substantial article that would require the digestive powers of the healthiest stomach. A hard bed is a hard thing to a healthy person, and more especially to a fat female dowdy who measures all others' comforts by her own; and where rest might be life, death is hastened by following the advice of this feeling-hearted soul, in moving the patient for the purpose of shaking up his bed. A free ventilation might soon put him on his legs, and it would for certain expel effluvia; but open windows let in the cool air, and cold air

is better felt than contagious effluvia ; so the windows being kept shut, and the bed-curtains drawn close, the patient has the happiness of dying in an atmosphere of his own creating, raised to a proper putrifying temperature by means of a blazing sea-coal fire. What can we think of the man who, in circumstances like these, calls for paper, pen, and ink, in order that he may scrawl a receipt, in indifferent Latin, for worse medicine, and knows not to order that which would relieve the patient without pain or expense ? He is not only guilty of the patient's death, but of his death aggravated by severe torments. Fortunately, there are occasions when this ignorance is discovered ; and he who piques himself on knowing thoroughly the patient's complaint, and on writing a most scientific prescription for it, often looks blank enough when the simple but important question is put : What is the patient to be allowed to eat ?

Having therefore seen where we will most likely discover the cause, and not only this, but furnish the cure, or, at any rate, a most powerful ally or enemy of the disease ; it must appear singular that so little attention should be given to this branch of science. But it is easily accounted for. The Mariner's compass, Botany, and Chemistry, have usurped its seat in the temple. New countries have been discovered, and new medicines belonging to them ; and these latter, along with the new compounds of modern Chemistry, are being daily added to our Pharmacopœia. Baglivi, one to whom the science of medicine is not a little indebted, has left us the rough draught of a chapter. "*De methodo curandi morbos, musica, saltatione, equitatione, navigatione, venatione, rusticatione, debitoque sex rerum non naturalium usu, sine inutili remediorum acervo.*" If this *inutilis remediorum acervus* was applicable to his times, how much more so is it to the present ? If there was then a heap of useless medicines, there is now a mountain. And the sick mind is ever prone to have

confidence in the *acervus remediorum*, each particle of which makes itself to be felt in his body. Many there are who are ever seeking health, but only in the Apothecary's shop, and not in a change of their way of living. To give up long-indulged habits is not only very disagreeable to all persons, but painfully insufferable almost to some; and a man will rather stare death in the face than give up his hot joint and few glasses of wine. It is a hard matter to treat such a patient. He will have health, but he cannot see how it is to be obtained by depriving him of his usual rations. He eats and drinks, he thinks, little enough already; and to him it would appear like deliberately planned murder, to be deprived of the food his already weak body can take. He will swallow pills by the gross, and mixtures by the dozen, provided you do not interfere with his dinner. His legs he thinks are only able at present to carry him from the dining-room to the library, if a literary man; or to the counting-house, or the bank, if a commercial one; and he has no time, and less ability, to tramp about through dirty roads or dewy fields. Of sleep he gets plenty, for he sleeps twelve hours after going to bed at night, and he has, besides, his two hours doze after dinner. The atmosphere he delights in is one filled with carbon and hydrogen: And as to his bowels—what business has he with his bowels? they mind themselves, and he goes to stool after the second or third call, on or about the third day. This is the man that will pay, with a hearty good will, a long bill for drugs, instead of a smaller than usual bill for butcher meat, wine, and beer. It is difficult, impossible often, to bear the murmurings, the pinings, and the discontents of such a patient. The physician, in disgust, gives up the case, and is succeeded by one of those ardent spirits that are daily discovering new medicines, or raking up old ones, and who promises to cure all diseases by these alone. This chemical practitioner tries these for a

while, and, being unsuccessful, leaves his patient to the regular quack, who promises still more, and who sends him to the other world dosed with brandy and opium, or mercury. And both these last men will find credit with the patient, and his friends, whilst he who laid down rules as to food, drink, clothing, &c. will be looked upon as nothing better than an old woman. It is this dread of being considered an old woman which makes many a physician prescribe a sharp dose of medicine, instead of a particular food, or air. It is this dread of being considered an old woman which often makes the otherwise honest physician throw around him the mantle of mystery, instead of exhibiting himself clothed in his plain good sense. The faith in drugs is like superstition in religion: the greater the ignorance of the devotee the deeper is his belief. Whenever you find physicians or patients neglecting the non-naturals, and trusting to an array of pills and mixtures, as the true preserves and defenders of life, rest assured that whatever may be their rank and station, they are ignorant people, not ignorant in this point alone, but *generally* ignorant.

In England, the article of diet is held of some importance. But even the acquaintance with this one is not complete. The practitioner knows that, in acute disease, his patient should not have beef, nor beer, nor strong soups; but this is about all he does know on the subject. Low diet and perfect starvation are with him almost synonymous terms; and what he, at the very utmost, understands by a change of diet, is merely a transition from beef to bread, and from soup to gruel. Of the effects of the different kinds of food he knows nothing. It is the same, in so far, of the other physical agents. Of the extremes he may have some idea, but of the nicer divisions he knows little and regards less. If, however, the practitioner has not seen their effects on the sick, he may have seen them in this country strongly illus-

trated in that practical science—*training*. It is usual to consider this as peculiar to prize-fighters and jockeys ; and so perhaps it, at present, is ; but, nevertheless, it is the non-naturals reduced to practice by practical men. Did he observe the rough and shaggy coat of the horse, changed into a fur, smooth to the touch as velvet ; did he see the bloated, heavy, and ungainly carcase of some sot connected but slightly, as it were, with the human form, changed into a clean, well-knit, active, and even graceful man ; he would say to himself may not disease be removed in this way, and may not the labour of digging into the bowels of the earth, or of compounding the poisons of its plants, be spared to me, and the danger and uncertainty of such powerful medicines be spared to my patients. The training of the invalid will not perhaps remove or cure organic disease ; but will the internal exhibition of medicines do it ? Will tubercles of the lungs, tubercles of the liver, or tumours in the brain be removed by means of medicines ? But may not the system be kept in such a state as that these local affections, if not removed, may at least be quiet ? It would require a power equal to that which created the body with these local diseases in it, to remove them ; yet, if we cannot make the body radically sound, we may keep it easy.

Whilst the attention of the British practitioner is so little directed towards the effects of the non-naturals, in no other country in the world does the state of society, and the habits and customs of the people, give such an intensity to their operation. In none other are there so many strong meats and drinks used ; in none other do we find a national tune celebrating the viands like, “ Oh ! the roast beef of Old England ;” in none other is there such a love of conviviality in eating and drinking, (for we still show ourselves the descendants of the men with whom it was “ *diem noctemque continuare potando nulli probrum ;*”) in none other are there

so many large towns filled with so many inhabitants in such circumscribed space ; in none other is there a third of the noxious vapours arising from manufacturing processes ; in none other does the love of Mammon lead so many persons to submit to confined and sedentary occupations ; in none other do a greater love of form and a fastidious delicacy pervade all ranks ; and in none other is there such a free field to ambition, and such prospects of reward to the most vigorous mental exertions.

But the ancients did not apply their knowledge of the non-naturals solely to the sick or the invalid. The science of *hygiene* was not only directed to cure the diseased, but to preserve and improve the sound. It was applied also not only for the ease and happiness of the individual, but for the welfare and prosperity of the State. There are, therefore, three distinct objects to which an acquaintance with the influence and effects of these agents is necessary.

I.—To cure and relieve the sick.

II.—To protect and preserve the health of the individual.

III.—To protect and improve the health of communities.

To the first the name of *Regimen* is sometimes applied, though that term is more commonly used with respect to two only, Food and Exercise. A writer has well observed “ The art to govern the sick man in all his relations, external and internal, to trace for him, in an exact manner, the conduct he ought to pursue in each of the circumstances in which he finds himself placed, is that which constitutes the true physician more than formulæ or medicines. It is this tact which distinguishes the observant physician from the ordinary crowd who give all to hazard and trust to it alone.”

To the second, adopting from the French, the name of *Private Hygiene* may be given. It contains rules as to the manner in which the man who wishes to preserve his health ought, according to his age, his constitution, and the circum-

stances in which he is placed, to make use of the non-naturals.

The third has received the name of *Public Hygiene*. It is to the mass what Private Hygiene is to the individual. It is to the influence of diet, air, dress, and exercise upon large masses that we owe national temperament or character. It is to these physical causes, principally, that one nation differs so much both mentally and physically from another.

To the Physician, an acquaintance with national temperament, and its causes, is of the highest importance. Why do we sneer at the ptizans and lavements of the continental physicians? Why do we hold up the lancet as the only means of curing acute disease? It is the effect of our ignorance. If the inflammation of the Frenchman or Portuguese can be cured by ptizans—why use the lancet? But, says the Englishman, my countrymen would die in inflammatory disease without the free use of the lancet; and he is right, though ignorant of a reason for it. Look at the difference of the two patients! the hale, round, ruddy-faced, plethoric, beef-eating and beer-drinking John Bull; and the thin, dried, spare-living, sober Frenchman; and it will be at once seen that food, air, climate, and manner of life, make a great difference in the constitution of individuals, and consequently induce a difference in the treatment of their diseases, “*Unacuique regioni sua est medicina, sua methodus*,” observes Baglivi.

To the Legislator, and the Political Philosopher, as the physicians of the State, the knowledge of this science is imperative. In modern times, Governments do not interfere farther in the matter of Hygiene than by laying down such regulations as will prevent the entry of contagious disease into the country, or remove those sources of disease which are, in a most marked manner, visible. Quarantine is enforced, nuisances of all kinds are removable by law, and, on extraordinary occasions, the sick are separated, compulsively, from the healthy. Means are not sought to improve the

strength, but to prevent the naturally strong and the weak becoming exposed to those influences which would exert a diseased action on the body. It is the principle of life itself which is the care of the state, and that life is as much protected, when tenanted in a weak and deformed body, as when encased in the most Herculean frame. The most miserable object of corporeal deformity may do the State as good service as he who can perform the most laborious work of husbandry, or can march fully accoutred to repel the nation's foes. Thebes did not expose her deformed offspring, and the fame which *Æsop* gave her was worth that of her bravest hero. He who is strong, and valiant, and bearded like the pard, may nevertheless owe his subsistence to the crooked and feeble citizen who faints at the sight of a drawn sword.

The ancient Legislators laid down the most strict laws for the rearing of a hardy and vigorous people. They made physical force paramount to every thing else; and looked upon the strongest man as the best citizen. Considering the state of society at the time, this was necessary. Where nations are small, where they are close to each other, and where mutual jealousies and antipathies are bringing them into constant collision, powerful and expert soldiers are required, and every citizen must be a soldier. The cultivation, therefore, of the physical powers, was incorporated with the well-being and freedom of the nation, and was carefully provided for by the laws. The deformed and weakly offspring were troublesome in the rearing, and useless when arrived at manhood. The principal care was devoted to the healthy, and the death of the weakly and deformed was received without regret. It is still the same where hostile tribes, or small nations, exist. In savage life, although there are no codes of laws, yet the impossibility of procuring food, except by the most laborious bodily exertions, begets an active and powerful race of men, and fits them, as well as training in the gymnasium, for

opposing their foes. But, if policy made the Greeks desirous of a race possessed of great physical power, humanity, as well as policy, teaches us to preserve the weakly and to cure the sick. The best gymnasium of antiquity sinks into insignificance before the pile which individual or public beneficence has raised for receiving the sick and the maimed—for furnishing to them the means of recovery—and for sending them back sound and useful members of society. What is the bath of Caracalla, or of Dioclesian, compared to Guy's Hospital? or the most perfect of the Grecian gymnasia to St. Thomas' or Bartholomew's?

Experience has demonstrated the superior value of our practice. Notwithstanding the greater number of diseases of a contagious nature to which mankind are exposed; notwithstanding the greater number of diseases to which, from their luxurious habits and manners of life, the people are liable; notwithstanding the close labour to which so many of the poorer classes are obliged to submit, in order to obtain a livelihood; notwithstanding the greater size of our towns, and the noxious atmosphere breathed by the inhabitants of our manufacturing and populous cities—the amount of life is much above what it was in Greece and Rome. In England, the average of life is forty-five years, whilst in Rome it was only thirty. And all this we owe to our feeding the hungry, clothing the naked, and helping the sick and broken-hearted; to our preventing the intercourse of the contagious with the healthy, and to our providing all the circumstances of cleanliness, warmth, ventilation, &c. by the neglect of which the health of communities always suffers.

It is to the Crusades that we are indebted for the institutions for the separation of the sick from the healthy, and for the reception and curing of the diseased. The irruption of the Barbarians into the Roman territories made an end of those habits and customs which had been considered requisite for

preserving the health of an enervated and luxurious people. There was no occasion for a gymnasium to those whose very existence depended on constant labour and exertion. Their whole life was a struggle, and the broad canopy of heaven the covering of their gymnasium. They transmitted their strong powerful bodies, and their warlike dispositions to their sons ; and the almost continual wars kept aloof enervating luxury. When the descendants of these same Barbarians assumed " l'armi pietose ;" when they buckled on the armour to fight for the Holy Land, although often beaten back and foiled in the object they had in view, yet out of misfortune came good ; they returned with much of the lore of the East, and with many of the practices and customs of their enemy. The enthusiasts brought with them the Leprosy, but they brought the antidote as well as the bane. The disease disappeared, (more perhaps from the effects of climate than any medical treatment,) but the *maladeries* remained, as the seed from which sprang the Lazarettoes, the Infirmarys, and the Hospitals. In still later times, the Hospitals and Infirmarys were followed by Dispensaries for furnishing medical advice and medicines to the sick-poor at their own houses. The cause of humanity has yet gone farther, and the advantages of the division of labour, in scientific knowledge, has been given to the sick in hospitals adapted for certain ailments. What are the lying-in-hospitals, hospitals for lunatics, diseases of the eye, the chest, the skin, &c. but furnishing to the poor the medical aid of those who have the best knowledge of these diseases ? The science of medicine, according as it has marched forward in the great career of improvement, has picked up the invalid, and made him sound who formerly would have been left by the way-side as incurable. Thousands are sent back to society from the hands of the physician and surgeon, who would have formerly been allowed to pass uncared for to the grave.

But, though hospitals and medicine have done much, we have still other causes for the greater population of modern times. The small-pox had been for centuries a scourge to Europe, and during every generation had passed over it, laying the hand of death upon thousands, and tens of thousands, and leaving thousands more to spend a diseased life, a torment to themselves, and a pain to the feelings of others. At last an English lady deprived this pestilence, in a great measure, of its virulence and fatality. Lady Mary Wortley Montague, whilst travelling with her husband to his embassy at Constantinople, witnessed inoculation, and, with all a mother's hopes, and without a mother's fears—for her strong mind easily comprehended the nature of the practice—she submitted her children to the operation. It succeeded, as was expected, and the result of this success, when made known in Britain, was the means of saving many lives. Yet the practice of inoculation had many and great disadvantages. England, however, gave birth to one incomparably farther a benefactor of his race. The illustrious Jenner, by his discovery of vaccination, has put to flight a loathsome and deadly disease, and added, whether for good or evil, nearly a fifth to the human race.

And may I not mention yet another—a child of England too—one who spread his love for his fellow-men over the civilized world. Howard saw in our prisons but dens of misery, disease, and loathsomeness—too frequently a grave for those confined, and a hot-bed of infection for those who visited them. He taught that the object of a prison was not to ruin the health of the prisoner, and to confirm him in his ways, but to reform him and send him back an improved member of society, and he shewed that cleanliness is compatible with security and punishment.

Another cause of improvement in the health of the people has been the extension of agriculture, the turning down of

the decaying part of vegetables, the mixing the excretions of animals with the earth ; and more especially the draining of the wet and marshy lands. Even in our country, the improvement of the public health, from these causes, has been very great ; but in our colonies their effects are manifest to the most superficial observer. No one can read the early history of the Spanish and English colonies, without sickening at the fearful lists of death. In general a number was sacrificed on the voyage from ignorance of the principles of naval Hygiene ; but, when the vessel at last arrived at the destined port, those who had been spared from the ravages of disease on board, rushed ashore to fall under the disease of the place. More than once have colonies been given up by the remaining few as uninhabitable. Yet did the thirst of gold, adventure, and suddenly acquired treasure, urge the bold, the imaginative, and the desperate, to seek again and again their fortunes in these deadly climes. Whilst they landed merely as the soldiers of fortune, and the oppressors of the natives, endemic disease was the avenger of their cruelties ; but when they sought riches from the soil, when they ploughed down the rotten and corrupting parts of the luxuriant vegetation of the climate, they not only gained wealth in return, but they preserved health. The more they cultivated and improved the land, the more healthy the country became.

The voyage was always deadly. The ship was dreaded as a house of pestilence, and the enterprising adventurer considered his chance of death as not less on board the vessel than on the swampy shore. In 1726, Admiral Hosier, in a voyage to the West Indies, buried his crews twice over, and died himself of a broken heart. Who now dreads a voyage to the West Indies ? It is one of pleasure instead of terror. Captain Cook lost only one man, and he was previously sickly, in a voyage of three years duration round the world. To this great navigator we are indebted for teaching us that

human life is as safe from disease on board of ship as on shore. The rules of naval hygiene have required few alterations since he promulgated them.

By the congregating men together, in armies, disease has frequently broken out with great virulence. But the cause of this has almost always been from some gross inattention, or ignorance of the principles of hygiene. Military hygiene is not now disregarded by the medical officer, and, in the last war, the army under Sir James M'Grigor was a perfect model with respect to attention to preserving the health of the soldier.

In a very great degree the superiority in the public health depends upon the extension of knowledge and science, and the improvement of the arts amongst the community. Injurious habits, and practices inimical to health, but resting on antiquated prejudices, fly like shadows of night before the extending light of knowledge. All that is bad will be thrown away, when the possessor of it fully knows that it is doing him an injury. Every new discovery again, or invention in the arts, is giving something additional to the general prosperity and comfort. By every improvement a man makes in his own situation in life he is giving something to others. Every stroke of the steam-piston which is doing the work of ten or forty men, is adding nearly ten or forty times to the common welfare and good ; for by how much the more cheaply and plentifully every necessary is procured, by so much is the public health improved. The ten or the forty men deprived of the work now done by the steam-engine, will find employment in improving and extending other arts and trades ; and instead of looking on the steam-engine as the enemy of the poor man, we ought to look upon it as his best friend, and place Watt as the next benefactor to the human race to Jenner.

But without a moral culture, without a knowledge which

teaches them that they have duties to perform to their fellow-men ; and without a religious culture, without a knowledge which teaches them that they live not for this world alone, the most artificial education, and the finest physical training will neither preserve them in political power, nor raise them in the scale of humanity. In the latter years of ancient Greece, when the sun of her glory was in its descent, and when her children were enjoying the luxuriousness and dissipation to which they had contrived to find a recommendation in the pure and beautiful maxims of the Philosopher of the Garden, even then the cultivation of mind and body was not forgotten. The Greek was the best orator in the forum, and wrestler in the gymnasium ; but the Greek was a self-abased, a trodden upon, and abject slave, “ for soul was wanting there,” which had any ennobling and worthy object in view ; it offered itself as a glittering toy, and it became, as it deserved, the misused and abused play-thing of barbarians.

Nor can I omit here the influence of civil government upon the health of the community. Wherever liberty is enjoyed without licentiousness ; wherever there is the most perfect freedom in accordance with laws that protect or controul all equally, there the public health will be found better than where the laws are the will of a despot, or are framed by the rich for permitting the excesses of themselves, and for grinding and oppressing the poor. Let a country be rich in every article which could nourish and support the lives of a people, let the heavens and the earth be bountiful towards it, and the blessings of land and sky be within the reach of the humblest, and let but the blighting hand of tyranny be spread over it, and all these blessings are of no avail.*

* Hippocrates points out, with great beauty and truth, the superiority of those nations who are *αὐτονομοί* to those who are governed by the breath of a tyrant ; and he thus concludes, *ούτως οἱ νομοὶ οὐχ ἥκιστα τὴν εὐφροσύνην ἰσχυροῦνται. De aere, aquis, et locis.*

It has, however, been almost exclusively the fashion to consider the freedom of person, and the freedom of conscience, or civil and religious liberty, to be the only objects desirable in a nation. These unquestionably are of the first importance. But there is a species of freedom, which, whilst it benefits the individual who is most directly concerned, benefits, at the same time, the nation at large, for every one is concerned more or less in it—the freedom of trade. It may vex my spirit and weigh down my mental powers to know that my body is liable to be incarcerated for publishing the results of the investigations performed by my mind, though satisfied of their immutable truth ; this disturbs my mind and my health only through it ; but, when I am not permitted to purchase those things which are necessary for my health, and which the country in which I live cannot furnish me with, the law which thus interferes with my capital, which says, that I shall not make use of the fruits of my labour in a way that I consider the most to my advantage, is as much injuring my health as if it were to send my body to jail, or submit me to a slow but certain cause of death. It is the duty of government to demand of the public the necessary support for the State, but the government which prefers to raise the requisite national income, by indirect taxation, has a very nice and difficult task to perform ; and the nation at large pays much more in this round-about way. But direct taxes make a government unpopular, and will ever be offensive to the avaricious and the ignorant. For the avaricious man resolves to evade taxation by denying himself the articles on which taxes are laid ; and the ignorant man does not see that a tax upon his tea or his sugar is as much out of his pocket as if he paid the same in hard cash at once to a government collector. Since, therefore, the system of indirect taxation is likely to continue, it behoves the government not to tax articles necessary for the health of the com-

munity to such an extent as will place them beyond the reach of the poor.

And, although government must afford protection, in some cases, to interests or occupations in the country which involve a large number of individuals ; yet this bolstering up of one interest is always at the expense of another, and should be as seldom as possible called into operation. Let every incumbrance be removed, let every freedom and facility be granted to enterprise and speculation ; but let not others supply, from their pockets, an equivalent for the fertile earth or the warm sun. When this country will not furnish what we want, let us seek it in another. If Britain will not grow the vine, why should I be compelled to injure my health by drinking ardent spirits in place of wine ? Let me send to France for it. But, say some political philosophers, France will not take our produce, and we will not take her's. This is, in other words, we will do a silly thing because others do it. We will do an injury to ourselves, because France, in her ignorance, does one to herself. Because a Frenchman chooses to tear his meat with his fingers rather than cut it with a Sheffield knife ; because he chooses to go dirty and half naked rather than take a covering of Manchester cotton and Leeds cloth, we must deprive ourselves of the wines of France which we find good and agreeable. If he will not take the British goods, but only gold for his wine, I will give it to him if I can, and the greater fool is he that expects to gain wealth by discouraging an exchange of commodities. It is commerce which brings civilization—which brings wealth—and which brings health and prosperity, by bringing together from the east and the west, from the north and the south, all those things which are not to be found at home, and which can minister to the comfort, the welfare, and the health of the community. If this commerce compels us to hard

work ; if it binds us to the loom, the furnace, and the mill ; if it deprives us of the moments which we ought to devote to sleep, to mental improvement, or to recreation, it contains in itself the cure for these evils. Oppressively taxed, and over-worked, as we are, England is still the healthiest country of the world. Denied by nature of many advantages of soil and climate possessed by France and Italy, she yet surpasses them—even Italy herself—in the healthiness of her subjects. The period of human life is greater in the town of Birmingham with all its smoke, and all its noxious vapours, and its close and hot manufactories, than in the city of Paris or Naples itself. And what is the reason of this ? Why is it that under so many confessed disadvantages the labourer lives longer than his fellow in France or Italy ? It is because, as has been stated, that trade in which he is occupied furnishes him with all the aids to his health from other countries—it is because he is better fed and better clothed than the Frenchman or Italian—it is because his mind is supported by freedom of person, freedom of thought, and freedom of speech ; and his body furnished with all its wants by freedom of trade.

But let me not be mistaken. When I call for freedom of trade—for the unfettered use of capital—I do not mean to assert that the health of a state is to be sacrificed to the wealth of it. The State is the guardian of the public wealth, and, to the best of its judgment, it fulfils the trust. Perhaps its fostering attentions have here, like those of a foolish, old-fashioned, positive nurse, done more harm than good. Had the infant been left to the freedom of its own will, had it been less tied down, less tightly swathed, less forced to walk in this manner or in that, it might have been healthier. Not less is the State the guardian of the Public Health, and here certainly she has seldom interfered. The King is the curator of idiots—of those who cannot think for themselves.

He will not permit the rich infant to be despoiled of his property ; but is he as careful that the *poor* infant be not despoiled of that which is to him *his* property—his health ? Capital may buy labour, but not so as to deteriorate the public health. Wealth must not be allowed to squander away for her own ends solely

“ A healthy populace a country's pride.”

The infant who cannot judge for itself, must not be sacrificed at the shrine of wealth and luxury, whether through the wants, or oftener the cruelty, of its parents ; nor must the adult be compelled to work out, uncared for, a life inevitably destined to be shortened of its natural term by the too severe labour of the mills. In one word, the State ought not only to legislate as to the hours of work in manufactories, but enforce the best means which science and experience can devise, for ameliorating the existing causes of disease in these establishments. The pernicious effects of long continued daily labour in a close manufactory, in the midst of dust, and in a high temperature, on the young, has been at last forced on the notice of the public, and met in so far with correction ; but there are many other occupations in which the health of the young, and the full-grown, are not less injured than in those of manufacturing cotton, flax, or wool. In one trade for instance, that of a working jeweller, the employment is entered by the boy at thirteen or fourteen years of age, and he is worn out and obliged to abandon it at forty or fifty. The following remark is given in Thackerah's excellent work on “ The Arts and Professions as affecting health.” A master observes “ the men drop off from work (that of a jeweller) unperceived and disregarded. I am quite at a loss to know what becomes of them. When they leave off working they go and are seen no more. Some, perhaps, become applicants for charities ; but so few have I

known of the ages of sixty or seventy, that leaving work, they seem to leave the world as well—a solitary one appearing at intervals to claim some trifling pension, or seek admission to an alms-house.” What a melancholy tale, and how true ! They go and are seen no more !

And what can remedy this ? Something on the part of masters, viz. : not working them too many hours daily, and affording airy workshops ;—something on the part of men, viz. sobriety and cleanliness—seeking the open and free air during their leisure hours, instead of the ale-house ;—and much on the part of the State. The State cannot legislate upon the working hours of all trades, and it would be not less unfair than puerile to attempt it. The State must go to the bottom of all the mischief. It must, by reducing the public burdens, by lightening the load of taxation, enable us to have a fair competition in trade with our neighbours. It must destroy that *dura necessitas*, which compels the master to keep down his men, in order to keep his own head above water, and the men, in their turn, to fly to the ale-house as a stimulus to support their over-exertions, and, as a stifler to the conviction that they must, in misery and want, quit this life without enjoying a “ green old age.” The village and much of the rural life of our father’s times have passed away. England is no longer the merry England of our old poets. We exist in a new and an artificial state of society ; and it is absurd to hope that the habits, and the occupations, and the amusements of our forefathers will, or could, be restored in this densely peopled manufacturing country. Yet it is consoling to find that there are Legislators anxious to palliate what they cannot cure ; and as they cannot give the operative the green fields and the shady lanes of former days, they offer him promenades and ornamented walks. It is nature in a laced waistcoat, but even that is something to the pallid careworn operative. May they succeed !

LECTURE SECOND.

ATMOSPHERE.

THE atmosphere is possessed of the essential properties of matter, and of certain accidental qualities which, more or less, according to circumstances, affect the human body. The air may be heavy or it may be light ; it may be in motion or it may be at rest ; it may be warm or it may be cold ; it may be dry or it may be moist ; it may contain more or less of light and electricity ; and it may hold, within a certain extent, and arising from local sources, effluvia or emanations.

The ancients knew the greater number of these accidental qualities, but they believed air itself to be a simple substance. Mayow, in the end of the 17th century, ascertained that the air was altered by respiration : but it is to the splendid experiments of Priestley, Black, and others of the same era, that we owe the demonstration of its composition. The discovery was loudly hailed, and eagerly laid hold of by Physicians ; and the most extravagant opinions were entertained as to the result. The physiologist supposed he had found the key which was to open to him the door to some of the most singular of nature's operations. He ascertained the

changes produced on the air in the lungs, on the surface of the body, and in the different cavities to which it had access. The importance of the Oxygen of the air to animal life was soon manifest to him ; and it was likewise evident that to this gas was owing the conversion of venous into arterial blood. The necessity for this gas he perceived ; the *quomodo* of its action on the blood is still a matter of dispute. The Therapeutist too, supposed he had gained a great deal by the discovery of the composition of the air ; but he rather counted without his host. Nothing could be easier than to manufacture an air suited to the patient, and such a practice was attempted by Dr. Beddoes, assisted in the mechanism of the requisite apparatus, by James Watt ; but experience did not support the expectations of theory, and the pneumatic treatment of disease stands as one of the follies which warn the student against a reliance on speculative doctrines. One thing, however, of great value, the therapeutist obtained from the discovery of the composition of the air, and that was, that in all countries its composition was the same ; and that it differs not, in this respect, to him who breathes it, in England, under the equator, or near the poles.

By our knowledge of its composition little or nothing has been obtained as to the influence of the air in the producing or in the curing of disease ; and to the properties and qualities already mentioned, to the Density, the Motion, the Caloric, the Moisture, the Light, the Electricity, and the Effluvia contained in it, the physician was again obliged to refer all its effects (with the exception of the change of the blood) on the body.

I. DENSITY AND LIGHTNESS.—The heaviness and lightness of the air are scarcely perceptible in their variations, except when carried to an extreme degree, as in ascending to a great altitude by climbing up a mountain, or rising in a balloon, or by descending below the usual level, as descend-

ing into a mine. Any variation in the gravity of the atmosphere will be accompanied by a change in another of its properties, namely, Caloric. Air, by ascending, enlarges in bulk, and by a consequent increase in its capacity for Caloric, cold is produced. But this same air does not feel cold, as is commonly supposed, when it descends from this altitude; for, from the increased density in consequence of the descent, the quantity of specific Caloric is lessened, and the air has the same temperature as the surrounding portion.

Besides this effect, there are others depending upon the gravity of the atmosphere solely. In a rarified atmosphere the breathing is quick and panting, the pulse is accelerated, there is a general uneasiness over the whole body, frequently vomiting, often hæmorrhage from the nose or lungs, and always great thirst. The quickness of the breathing arises from the lungs not receiving the requisite quantity of Oxygen, and therefore requiring more inspirations. The acceleration of the pulse is in consequence of the heart's sympathy with the lungs; and the general uneasiness depends upon the deficient pressure at the surface of the body. The vomiting and the hæmorrhage arise from the expansion of the gas, or fluids in the stomach, and of the blood in the vessels, and, in this last case, the consequent rupture of a vessel at some weak part now without its usual support of atmospherical pressure. The thirst is owing to the increased evaporation from the body, and especially from the mouth and throat—evaporation being, as is well known, promoted by rarifying the air, or diminishing its elastic force. These symptoms are much severer in ascending a mountain than in rising in a balloon, in consequence of the great fatigue from motion. It is an observation sufficiently well known, that the inhabitants of high countries are much more liable to hæmorrhages from the nose, lungs, or stomach, than those who inhabit lower countries.

Increase of density produces symptoms the reverse of these, but as the descent can be to no great distance, the symptoms are not very perceptible. They are only felt in deep mines, and then may be confounded with the exhalations of the place. The heaviness of the air, and its closeness, and warmth, in valleys, are well known.

II. AIR AT MOTION AND AT REST.—When the air is at rest, we are affected by its Caloric or moisture ; but when the air is in motion, the intensity of these is greater, and the air itself exercises a direct influence. There is a constant *friction* on the parts exposed to it, which acts as a stimulus ; the system is roused to oppose it, more strength is felt, and this atmosphere therefore acts as a *Tonic*. When the air is at rest, we are surrounded with an atmosphere which has acquired the same temperature as our bodies ; but when in motion, a much greater quantity of Caloric must, of course, be carried off. An agitated air, provided it is dry, much more rapidly carries off the perspiration than one which is at rest. In consequence, therefore, of the renewed contact of new portions of this air, and the evaporation it occasions, its action, in producing cold, must be intense. Mr. Fisher, Capt. Parry's Assistant-Surgeon, states that the men felt much more comfortable when the Thermometer was—51° Fahrenheit, and the air calm, than when at 0° Fahrenheit, and the air agitated.

When air is artificially put in motion in the production of sounds, it does not appear to have almost any effect, except upon the organ destined to receive it. We sometimes see that, in consequence of the percussions of the air on water, the fish die : this happens sometimes in the neighbourhood of sieges. It has been stated that loud noises will affect very sensible parts ; thus great torture is sometimes felt in wounds, and more especially in amputated extremities, when near to an engagement. It is principally, however, the organ of

hearing that suffers directly, and the body indirectly. The hearing of persons engaged near machinery, as in mills, is injured by the noise ; and the ears of artillerymen often bleed whilst the men are engaged in serving the guns during a continued firing. The influence of sound, as a stimulant, is principally visible on the sick. A continuance of some distinct and unchanging sound will often cause such restlessness and irritation as to end in fever. The muffled knocker, and the slowly raised latch, and the stealthy step across the floor, and the low whispering and interchange of words, are the necessary accompaniments to the cold grate, the blinded window, and the cool drink.

III. ATMOSPHERIC CALORIC.—The variation in the quantity of Caloric of the atmosphere is, to a certain extent, as cognizable to our bodies as to the Thermometer. Caloric, however, does not exhibit the same law upon animate as upon inanimate matter. In the latter case all substances must be in equilibrium with respect to Caloric ; but the temperature of the human body undergoes almost no variation whether exposed to a great heat or cold. We know that although the temperature, in many countries, is at times much above 98° Fahrenheit, which is blood heat, yet in no country which is inhabited does the mean temperature of the year approach, by 12° that of 98° Fahrenheit. Dr. Edwards states, upon the authority of Dr. Davy, that in countries under the equator, the animal temperature ranges from 1° to 2° above that of the temperate zones. We know also that when the body is exposed for some time to an artificial heat, there is a still farther rise of from 1° to 2° . Such was found to be the case in some experiments made by Gregorius, in the baths of Berlin. The temperature of the human body may, notwithstanding these exceptions, be taken at 98° Fahrenheit ; and it might at first appear to us as very likely,

that we would feel the sensation of cold when the Thermometer is below this point, and the sensation of heat when it is above it. Such is not, however, the case. By a wise decree of Providence, we feel the sensation of heat long before the surrounding temperature has risen so far. The degree at which we experience neither heat nor cold is $63^{\circ}.50$ Fahrenheit. This may be taken as the average, for it must, in a special manner, be recollected, that the effects of heat or cold, on the human body, will vary to a small extent according to the age of the individual, and the strength or weakness of his system.

The effect of a high temperature is to produce a relaxation of the solids, and an expansion of the fluids, a copious perspiration, and consequently great thirst, and a disposition to avoid motion. There is a great acceleration of the pulse, and of breathing, pain in the head, and general uneasiness until the perspiration breaks out, when relief is felt. The evaporation which takes place of the perspired fluid immediately cools the body. The perspiration, therefore, is of advantage in two ways. *First*, by relieving the vessels of a part of their contents; and *Second*, by supplying the surface of the body with a fluid which will carry off the superabundant caloric, by means of evaporation. It has been affirmed, by some writers, that perspiration is more abundant in the dark native of tropical climates, than in Europeans when residing in the same climate. Of this we have no positive proof from experiment. We know very well that in the dark race a larger quantity of *unctuous*, or *oily* matter, is secreted by the skin, than in the white; and it would appear that this secretion is of great influence in moderating, in some way or other, the great heat to which they are exposed. Dr. Currie is of opinion that the negro bears the warm climate better than the European, in consequence of the unctuous lubricat-

ing perspiration being less easily dissipated, and therefore keeping the body always moist; and he proposes it as a matter of consideration, whether the practice of anointing the body might not be followed by the European when living within the Tropics. The Palm Oil is, by some tribes, smeared over the body, in addition to their own secreted oil; and the use of oil or ointments, in order to protect the person from atmospheric influences, was common enough with the Greeks and Romans. The answer of the very aged soldier to Augustus, on his asking him how he had contrived to live so long, is well known, *Extus oleo, intus mulso*.

When the temperature descends below 63° Fahrenheit, the effect of the cold is to diminish the volume of the body, to lessen the amount of loss by perspiration, and to increase the tone of the muscular fibre without diminishing its mobility. The inspirations are deeper and sometimes more hurried, and a greater quantity of Caloric is evolved in the system. The internal heat is greater than that at the surface, and the secretions of the stomach increased, hence the greater appetite and power of digesting food.

When the cold is very great, or long continued, the perspiration by transudation is stopped, the respirations are fewer, the pulse is slower, the skin thick and hard, the muscular fibre strongly contracted, and the motions are sluggish and impeded. Eventually drowsiness, and then coma take place, death ensues, and the body remains stiff and rigid. If, on the other hand, the cold be suddenly removed, and artificial heat applied, a reaction either takes place over the whole system, which sometimes proceeds so far as to constitute *fever*; or in some part or organ previously predisposed to disease, as the joints, the throat, the lungs, &c.

IV. ATMOSPHERIC MOISTURE.—When there is but a small quantity of water contained in the atmosphere, the air carries

off from all the parts of the body to which it has access, the humours and secretions ; but this action is opposed, as it were, by the system ; a degree of repulsion, and, hence, of increased vigour is experienced, and a dry air is therefore a Tonic. If the air be very dry it occasions severe thirst, from the evaporation of the fluids of the mouth and throat, and from the increased perspiration. Almost the same intolerable desire for drink is felt by the traveller, in the deserts of Africa, under a burning sun, and the traveller in the wilds of Canada, during the frosty and clear winter. When the dry air is likewise warm, so great is this evaporation from the throat, and respiratory passages, that it is accompanied with pain of the chest, in persons with weak lungs. Dr. Oudney experienced this whilst travelling over the sandy deserts of Africa ; and the practice of placing a vessel of water in a highly heated workshop or apartment is well known. The Sirocco, which is a very heated and dry air, in consequence of its losing its moisture in its passage across the African desert, creates severe pain in the chest, and difficulty of breathing. On the moral faculties, a dry atmosphere is always beneficial. When moderately cold, this air produces a great degree of liveliness and vigour of thought. When much heated, its effects are more stimulating, and so influential was it believed to be in this respect, that at one time, in Italy, a less punishment was allotted for crimes committed during the Sirocco than during the ordinary state of the atmosphere—the inhabitants being, at that time, held not to be possessed of their natural judgment.

When the atmosphere is moist, the breathing and pulse are slower, the perspiration is diminished, and all the other secretions, excepting those from mucus surfaces. The moisture is deposited in all the parts of the body to which it has access ; and it would appear that the absorbents take part of

it up.* A very great relaxation of the system is produced by this state of the atmosphere. Moisture likewise increases the influence of atmospheric caloric upon our bodies. A warm day is, to our feelings, warmer when moist, and a cold day colder when moist.† A thaw following a severe frost and snow in winter, feels much colder to us than the previous frost, though we are quite well aware that there is at the time much more caloric in the atmosphere, as indicated by the rising of the thermometer, and melting of the snow. The explanation of this formerly given was, that the animal fibre contracts with the dry cold, but the moisture relaxes the system, and allows the cold to pass better into it, or to come more in contact with the nerves. The fact is now explained in this way, that moisture is a better conductor of caloric than dry air, and therefore, in a cold moist day, the caloric

* Coleridge makes this fact of absorption, especially that from the skin, tell beautifully in one of his singular poems.

“My lips were wet, my throat was cold,
My garments all were dank,
Sure I had drunken in my dreams,
And still my body drank.”—*Ancient Mariner*.

It is narrated of a boat's crew, who were suffering intense thirst, that becoming completely drenched by heavy rain they were immediately relieved. They took the hint, and each man afterwards, when he felt thirsty, dipt his shirt in the sea, and then put it on. The absorbents took up the water, but not the salt contained in it.

† “L'air humide, a temperature egale ou superieure, produit une sensation speciale de froid qui differe non par sa intensite mais par sa nature. Elle est aussi plus profonde ; elle parait penetrer toute l'economie, et dispose particulierment a la paleur et au tremblement. A ces caracteres, je n'ai pu meconnaître un genre de refroidissement qui consiste dans la diminution de la faculte de produire de la chaleur.

Dans l'air sec, au contraire, ou eprouve une sensation qu'on appelle *froid vif*, et qui designe plutot la nature que le degre de la sensation ; de plus elle est superficielle, et lorsque l'abaissement de la temperature n'est pas trop grand, on eprouve un surcroit d'activite ; la peau rougit, et dans les cas extremes, les membres tendent a se roidir au lieu de ceder a ces mouvements irreguliers et involontaires qui constituent le tremblement.”—*Edwards*.

of the body is more rapidly carried away from it ; in a moist, warm, or close day, the caloric is more rapidly brought to the body.

Moisture increases the spontaneous decomposition of bodies ; and frequently renders emanations more sensible to us. More particularly is this the case if moisture is accompanied by heat. Who has not felt the delightful fragrance of the fields and gardens after a summer's shower, or in the warm closeness of the dewy evening ? Who is not sensible of every bad smell in a close and warm room, or in a low and crowded part of a city ? It assists, to a great extent, in producing miasmata, and, at the same time, it renders the human body more liable to be affected by them. It is the cause of intermittents, remittents, dysenteries, dropsies, and catarrhs.

From what has been stated, it appears that the quantity of fluid lost is increased both by a cold and a warm atmosphere, provided only they are dry. It must be observed, however, that this applies solely to the physical process of *Evaporation* ; not to *Transpiration*. A large quantity of fluid, principally water, is separated from the living skin and the lungs ; in the same way as, in dead animal matter, an evaporation takes place from those parts with which the air comes in contact. To the perspiration, both insensible and sensible, some Physiologists have applied the term *Transudation*, to distinguish it from the loss by *Evaporation*. It has likewise been placed as a vital function, whilst the latter is the effect of the evaporating power of the atmosphere.* The reduction of

* Dr. Edwards has principally pointed out this difference between *Transudation* and *Evaporation*. The summary of his opinions is thus concisely given by Bostock. " He (Dr. Edwards) begins by making a distinction between what is carried off from the body by *evaporation*, and what is removed from it by *transudation* ; the first depending upon a mere physical operation, in which a substance is converted into vapour, by the addition of heat, whilst transudation is a vital process, of the nature of secretion or excretion. He observes that the terms evaporation and transudation are not

the weight of the body will be much greater by sweat than by any increased *evaporation*, in so far as the first always contains a quantity of the solid parts dissolved in it. A warm and moist air will diminish the *evaporation* from the surface of the body, and the lungs; but, on the other hand, the sweat will sooner appear, as the heat is more active in consequence of the moisture. As, however, there is not a speedy evaporation of the sweat, it becomes, in some measure, a covering or protection to the body.* It is, during the night, when the atmosphere contains the miasmata now condensed by the cold and near the earth, and when the body is without the protection of the sweat, that it is most liable to infection. Is it, as Dr. Currie says, that the oil separated, along with the perspiration, from the skin of the negro, is of service by impeding the evaporation? Is it thus that the European by the want of this oil, and the consequent greater evaporation of the sweat, or absorption of it

synonymous with the insensible and sensible perspiration respectively of the old writers, because a part of what is removed by transpiration is first transuded and then evaporated. Evaporation may take place from the dead body, while transudation can only take place from the living body; transpiration is, therefore, properly, an operation of an intermediate kind, where the fluid is furnished by a vital function, whilst it is removed from the body by a mere physical process."—*Elements of Physiology*, vol. ii. p. 235. Bichat allows of no such process taking place, as that of evaporation from the body, except of the fluid exuded from its surface as a secretion. C'est sous ce point de vue qu'il faut envisager l'action de l'air sur l'organe cutané qui transpire. Il n'enleve rien dans cet organe; il n'a sur lui aucune action réelle; il prend seulement ce que ses vaisseaux rejettent. La dissolution est une chose purement accessoire, qui n'est jamais que consecutive à l'exhalation, et qui n'a aucun rapport avec elle." *Anatomie Generale*, tom. ii. p. 682.

* The body continues to give forth additional fluid, even when covered, with sweat. "Si la dissolution n'a pas lieu, le fluide s'accumule sur la peau qui reste humide; mais cette humidité ne bouche pas les pores exhalans, n'empêche pas à une humidité nouvelle d'y joindre."—Bichat.

by his clothes, is more weakened, and therefore more liable to infection, than the native? In those cases where the European conforms himself to the native in dress, food, and habits, he becomes much less obnoxious to endemic disease. "In the months of April, May, and beginning of June, at Calcutta, the heat is considerably greater than during the subsequent rainy months; but perspiration, though profuse enough, is steady and pretty uniform, and the only diseases are those from increased secretion of bile. From the middle of June, on the other hand, the close, humid, and sultry atmosphere is attended with an absolute exudation from every pore of a European's body; in which state the chilling application of rain, the raw, nocturnal vapours, or the atmospheric variations of autumn, will produce fever, dysentery, or both. It is on this account that the Bengalese are observed to be more *assiduous in using oily frictions at this period* than at any other. They know, from experience, that by such precautions, they are enabled to maintain a more *uniform* discharge from the pores, to check profuse perspiration by day, and to obviate the effects of rain or cold by night."—Johnson, on Tropical Climates, p. 171.

V. LIGHT.—Light exercises a very great influence on living animal matter, as well as upon vegetable. The action of the rays of light upon colour is sufficiently well known. The parts exposed to them are always of a deeper tint than those which are covered, and the union of the two is distinct; they never shade into each other. It is the same with vegetables as with animals. A flower will spring from a plant kept in total darkness, but it is perfectly white; whilst again the flowers of the tropics are all distinguished by the extreme brilliancy and depth of their colours. By the continued exposure to the light, not only does the skin get darker, but it likewise gets thicker, coarser, and harder. It would seem as if, in warm climates, nature, in some measure, balanced

the heat with the light ; and that the latter was the preventive of the too great perspiration and relaxation produced by the former. The light increases likewise the solidity and tension of the muscular fibre, and it is owing to these circumstances that one sweats more in the shade than under the direct rays of the sun,* and that the labourer is, comparatively with the idler, as hardy in the tropics as in the temperate regions. In no way is the influence of light better distinguished from that of heat, than by what we find in warm countries, where we perceive that the man who lives in the shade, covered with garments, is of a soft and flaccid habit of body, inactive and lazy ; whilst he again who is obliged to labour almost entirely unclothed in the face of the burning sun, is strong, active, and vigorous. Witness the Chinese Mandarin, and the Arab. When light, especially accompanied with heat, is very intense, it excites inflammation under the form of erysipelas ; and when it strikes suddenly it occasions inflammation of the brain, and sometimes death, as in the well known instance of the *coup de soleil*. It is frequently, likewise, the exciting cause of mania. Esquirol states that the greatest number of cases of madness occur in summer, fewer in spring, fewer still in autumn, and the least in winter. Deformity, and more especially that arising from rickets in young children, has been ascribed to the deficiency of light. It is well known, to medical men, that scrofula, in all its varieties, is most frequently met with amongst the inhabitants of narrow streets and lanes. Dr. Edwards is of opinion that light assists most materially in developing with regularity the body ; and he states, on the authority of Hum-

* This fact was not unobserved by Hippocrates, though he accounts for it in a different way. He tells us that when a man is walking or sitting in the heat of the sun, ἵματιον ἔχων, the sweat does not appear on the parts exposed, but when he comes into the shade, ἅπαν το σῶμα ὁμοίως διαίει οὐ γὰρ εἶσι ὁ ἥλιος ἐπιλαμπει.

boldt, that few or no deformities of the body are found amongst the tribes who do not use clothes. Humboldt, however, should not have lent his name to such a superficial, if not very unsatisfactory, explanation of a well-known fact. Deformity may be, in a great degree, prevented by free exposure of the body to the light ; but the absence of deformity, amongst savages, is owing to this, that neither the congenitally malformed, nor the weak and delicate children, are able to endure the trials incidental to the rearing of the young savage, even if the polity of the tribe allows them to have this chance. The deformed are exposed, or, in some other way, eased of life, for if reared even with all the care required for such a class in the most civilized countries, they would be but incumbrances.

But light is not solely a stimulant or a tonic in consequence of its rays falling on the body. It acts likewise as such by its application to the eye. This organ is exercised by it, in the same way as the limbs are exercised by walking, and the benefit of this exercise is distributed over the whole body. A person gets as much fatigued, and perhaps more painfully wearied, by too long exercise of light, as by too long walking. The eye too of the person accustomed to examine minute objects becomes stronger from this constant exercise, as the right arm of the blacksmith becomes much more vigorous by the constant use of the sledge hammer. In the cell which, to the man who has just quitted the blaze of heaven's day, appears filled with impenetrable darkness, the wretched and miserable prisoner can distinguish every object, and can watch the labours of the spider, or follow, with his eye, the track of the loathsome worm.

After every operation on the eye, or in every case of acute disease of that organ, the light is carefully excluded. And this, it may be said, is right, because the light affects the organ directly. But have we not the darkened chamber, in

every acute disease? And what is the reason of this? It is because the light affecting the eye becomes, indirectly, as much a stimulant, and consequently highly injurious, as heat applied to the body, or brandy taken into the stomach. More deaths take place during the night than during the day. Fourtere says that nearly two-thirds die during the night. What is the reason of this? but that the weakened body deprived of every, the slightest, stimulus—of the stimulus conveyed by one of the acutest of the senses, sinks fairly exhausted into everlasting rest!

VI. ATMOSPHERIC ELECTRICITY.—The electricity of the atmosphere might, with most propriety, be considered under two views—its direct effects upon the body, and its indirect in consequence of the alterations it may produce upon the other physical states of the atmosphere. In neither of these cases, however, are our knowledge and experience such as to be of any practical service. Numerous experiments have been made of the effects of electricity applied artificially to the body, and from these it would appear that its action is that of a stimulant to the nervous system.* We have been able, however, to infer almost nothing from these experiments, as to the effect of *atmospheric* electricity. We know that its presence in the atmosphere, when not sensible to us in any of its great variations, will affect some persons, and they are sensible of a thunder storm even when it occurs at a very great distance. This cannot be produced, in this case, by any fear or trepidation, but is intimated to them by an extreme degree of restlessness, amounting, in some cases, to actual pain.

* L'électricité et galvanisme manifestent sur le corps animal des effets excitans que l'on observe primitivement dans le système nerveux, et secondairement dans les tissus où les nerfs vont se terminer. Ces puissances, en effet parcourent les nerfs, et vont déterminer un surcroît de contractilité dans la fibrine de l'appareil musculaire et dans la gelatine de l'appareil vasculaire. Broussais, *Traité de Physiologie applique a la Pathologie*, p. 40.

VII. ATMOSPHERIC EFFLUVIA.—Although the different gases composing the atmosphere exist in the same proportion, yet, from local causes, there may be a deficiency of some of them ; or some foreign gas added. These depend upon local causes ; thus, a crowded assembly of living animals, a collection of flowers, and many of the operations in manufactories will vitiate the air, by taking from, or giving something to, it. This variation, and the presence of foreign gases, may be ascertained by the eudiometer. But there exist constantly in the atmosphere, a vast number of emanations or effluvia which cannot be detected by any chemical means. Of their presence, however, there can be no doubt. Many of them are cognizable to us by our sense of smell, and exert a considerable influence on the system. The poet was not so far wrong when he said, in satire, of a fashionable female, that she would

“ Die from a rose in Aromatic pain ;”

for many emanations, animal as well as vegetable, produce asphyxia in some constitutions.

As I have already spoken of the darkened and quiet bedroom on the sick ; I may likewise here add that of the sweet-smelling one—the bouquets of newly pulled flowers which some hand has placed on the pillow of the helpless sufferer. The odour conveyed from these may either act as a stimulant to the patient,* or as a narcotic. We are told that a pillow of hops will induce sleep when other narcotics have failed ; and that hyoscyamus will lull the patient to rest by its odour. There are instances given where the odour of this plant, the *altercum* of the Romans, has caused violent quarrellings and fights. In the *Encyclopedie Methodique*, we have an account of a man and his wife who immediately set a fighting when they entered a certain room to their work. They were a

* *Sunt enim quasi spirituum animalium pabulum hujus generis corpuscula.*—Mead. *Monita*, p. 193.

loving and affectionate couple in all other places, and the apartment was believed to be bewitched. At last it was discovered that the cause of this disturbance was attributable to no witchcraft, but to a parcel of hyoscyamus seeds, which were placed near a stove. They were removed, and peace followed. This, however, must be taken *cum grano salis*. We have all heard of the Indian tree near which no bird or beast approaches, and below whose deceitful branches the traveller, if he lays himself down for shelter and repose, rests for ever. Historians, too, have handed down as the belief of the times, that great personages, as Henry VI. of Germany, the wife of Henry IV. of France, a Prince of Savoy, &c. were cut off by wearing articles of perfumed apparel which had been presented to them. If the cause of death had been ascertained in these cases, it would have been, if arising from any poisonous substance, rather found in the food than in the clothes. It has been stated, upon what authority I know not, that in an island in the Indian seas there exists a valley surrounded by mountains, within which no living thing can survive, and that the numerous bones visible within, attest the fate of those who have entered it. If there is such a spot in reality, it is likely that death is occasioned by a quantity of carbonic acid from some cause or other collected there, in the same way as the death of the dog in the *grotto del cane*, or the brewer who incautiously descends into a vat which contains the evolved gas of fermentation—the carbonic acid.

According to some, the portly and good looks of our butchers are owing to a most healthy emanation, which proceeds from newly-killed meat. A better cause, however, for their good looks, and their healthy and powerful bodies, will be found in the frequent eating than the smelling of the flesh, in the exercise they have in following their trade, and in the potations of good drink with which they wash down their

well-cooked steak. It is likewise stated "that the artists who are obliged, during the time of the malaria, to live in Rome, take lodgings near the Pantheon, a low situation, and surrounded by butchers, poulterers, and fishmongers." The impression conveyed here is, that they thus fatten on the exhalations from the flesh, fish, and fowl, but it is fully as likely that the situation is preferred from its being "low," and consequently most likely cheap. It has been observed, likewise, that those persons named "knackers," who are engaged in cutting up and making the most, so to speak, of a dead horse, are very healthy. The long lives of tanners is notorious, but the cause of this is imputed to the *tan*, and not to the dead animal matter, with which they work. The inhalation of the breath of young persons has always been considered sanatory to the aged. David was cherished in his old age by a healthy virgin lying in his bosom;* and Boerhaave related in his lectures that an old and infirm German Prince being advised to lie between two young virtuous virgins, grew so lusty and vigorous that it became necessary to remove his companions. Bruyerin gives us an instance where blood flowed from the nose in consequence of smelling an apple; and the same effect is recorded of another patient, by Rhodius, in consequence of smelling a rose: these, however, must be held as idiosyncracies. All the ancient philosophers, and eastern poets, looked upon the organ of smell as one of great importance in the animal economy, and in the nose they placed the seat of mental irritation, of anger, wrath, derision, and contempt.

There are some substances inappreciable to the eudiometers, and to our senses, but which we must believe to be pre-

* M'Kenzie considers this practice as very proper, "when kept within the bounds of decency and innocence," and as justified by Galen, Ægineta, Lord Verulam, and Boerhaave.—Hist. of Health, 3d ed. p. 70.

sent in the atmosphere, from their effects upon the human body. These are malaria, miasmata, and contagious effluvia from the bodies of the sick. In some periods of severe epidemics, it has been affirmed, that the presence of contagious effluvia was perceptible to the senses ; thus Sarconne observes that in the desolation which ravaged Naples in 1764, when the malady was come to its height, a fetid and disagreeable vapour surrounded the patient, and that often the habitation was plunged in a thick cloud which was plainly perceptible by an odour to those that were at some distance. And it is stated by some of the writers on the great plague of London, that in opening the dead bodies a fetid gas or vapour was perceived to arise.

THE ATMOSPHERE AS AN AGENT IN THERAPEUTICS.

It is singular how different have been the opinions of medical men, with regard to the influence of the qualities of the atmosphere, especially during disease. One cares nothing at all about it, he trusts that the Lord will temper it, and the patient gets it as it comes. Another looks upon it with no feeling of kindness, and excludes it with the greatest possible care. Another merely considers it as an excellent diluent of contagious effluvia. He admits it on the same principle as he does a servant maid with a broom and a towel, to brush away what is disagreeable, to clean and to purify. If nitrous acid gas, or chlorine, could answer the purpose, the patient would be little troubled with fresh air. The early medical writers again cared less what a patient eat than what he breathed. The first he took but in small quantities, and at distant intervals ; the latter was surrounding him, and constantly filling every open part of his body. They knew nothing of Oxygen, but they saw that pure air was the best medicine for the patient, and they acknowledged the

importance of attending to its heat, moisture, and motion. They expelled atmospheric water by strong fires ; they induced it by placing the patient in an underground habitation surrounded with branches of vines and myrtles sprinkled with cold water ; and they used a fan to agitate the air. They, too, spoke of the influence of the heavenly bodies upon the sick ; but Hippocrates, when he advises his son Thessalus to study Geometry, does not allude to any *occult* influence of the sun, moon, and stars upon the human frame, as the astrological physicians of the middle ages did. In his treatise, "*De aere, locis, et aquis ;*" he tells us, that we must study the *seasons* and the influence of the heavenly bodies upon them.* Mead was more worthy of our laughter, when he said, that the moon acts upon the fluids of our body as it does upon the waters of the ocean ; and that the diseases occurring during full moon, should be treated by depletion, for they are diseases of repletion. We can account for the moonlit madness of the brain in a more satisfactory way than by an attraction between the full moon and the blood of the body, viz. : by the stimulus or excitement of constant light. Esquirol very properly states that the moon has no influence except when at its full, and then merely in consequence of its light. He excluded the light of the moon from the apartments of maniacs who were always worst at full moon, and found that they remained perfectly quiet. Andral holds the same opinion on this matter as Esquirol. The man that studies the solar and lunar influences not solely upon the human body directly, but rather indirectly, as acting by atmospheric changes which they produce, and bestows the result of his experience and observation on the profession,

* He then says, " εἰ δὲ δοκεῖσι τὶς ταῦτα μετεωρολογικὰ εἶναι, εἰ μεταστῇ τῆς γνώμης, μαθοῖεν ὅτι οὐκ ελαχίστον μέρος συμβάλλεται ἀστρὸνομίῃ εἰς ἰατρικὴν, καλὰ πᾶν πλεον."

will do more good than all the labours of the astrological physicians, with those of Mead and Balfour united.

The necessity of a pure atmosphere for the preservation of health is readily admitted ; but how few persons provide themselves with that which they acknowledge to be beneficial to them ? The man who takes, on some special occasion, a walk into the open fields, feels an exhilaration of spirits, and a lightness and vigour of body as he inhales the pure ether. But he seems to think that a pure atmosphere is only to be obtained or enjoyed in the country, and that in his dwelling house, or his workshop, the atmosphere within the walls is better than that without. How few ventilate their apartments, how few workmen seek to give exit to the vapours and odours, separated from the materials of their trade, provided that has to be done by sending a current of cold air through the workshop. There is nothing in nature but is undergoing a decomposition, nothing which is not giving off something to the atmosphere, or taking some of its constituents. It has been said that air, by stagnation, may corrupt itself, and become a subtile poison. It is more correct to say, that air cannot exist in any place without acting or being acted upon by that perishable matter which encloses it. The air of a room which has been long closely shut, has a smell which is well known. That air has been loaded with the decaying matter around it, and the more extensively that the air becomes deteriorated, the more rapidly does decomposition of all things around, or in it, advance. The foul air in an old well, or in a common sewer, does not arise in consequence of the stagnation of atmospheric air inducing decomposition of the particles by action upon each other ; but in consequence of that air being decomposed by the chemical affinities of the bodies to which it is exposed. Habit has a very great effect in reconciling the constitution to a vitiated state of the air. The countryman soon feels the pernicious effect of the air

which appears to have little or no effect on the workman who has breathed it for years.

There is a practical remark here of great importance. Children suffer from a vitiated air, in proportion to their youth.* The great mortality amongst the children of the poor has been ascribed not so much to a deficiency of food as to a deficiency of pure air. Sir John Sinclair affirms that one-half of the children born in London die before two years of age, in consequence of the impurity of the air of that city. "In the lying-in-hospital of Dublin, the proportion was found still greater; for, in the space of four years, ending anno, 1784, no less a number than 2,944 infants, out of 7,650, died within the first fortnight after their birth." It was fortunately discovered that this melancholy circumstance arose from their not having a sufficient quantity of good air to breathe. The hospital, therefore, was completely ventilated, the consequence of which was that the proportion of deaths was reduced to 279. Hence there was reason to suppose that out of 2,944 who had died in the space of four years before, no less a number than 2,655 had perished solely from want of a due supply of fresh air.

Paulus Ægineta says, "*ambiens nos aer mutat temperamenta, sive immoderate calidior, sive frigidior, aut siccior aut humidior fiat.*" Lib. iii. cap. xxxv. But the atmosphere is never in any *one* of these states. It may be warm or cold, but it must, at the same time, be dry or moist. The influence of each of these states on health and disease has already been alluded to generally, but for the sake of more connectedly impressing it on the reader, a few remarks may be made on each of them separately.

* Un air pur est encore plus nécessaire aux enfans qu'aux grandes personnes; le tissu tendre et délicat de leurs pumons toujours directement en contact avec de fluide; la sensibilité e la mobilité exquisés de leurs nerfs, les rendent nécessairement plus susceptibles de l'influence d'un air vicie que dans l'age avancé.

I. A WARM AND DRY ATMOSPHERE is decidedly a stimulant: the action of the heart and lungs is increased, and the secretion from the skin abundant. Digestion is easy, and the food preferred is mild and cooling: the body is lean and meagre, and the contractility of the muscular fibre is greatly increased, but its tonicity diminished. The sensations are acute, the intellectual faculties fervid and excited.

Acute diseases prevailing during this atmosphere are, according to an aphorism of Hippocrates, severe in their symptoms, and rapid in their course. Aph. 7, sec. 3. The diseases to which it predisposes are those of a nervous character. The diseases in which it is beneficial are Chronic Rheumatism, Gout, Scrofulous Diseases, Catarrh, Bronchitis, and all diseases of the mucous membranes attended with copious discharges. The diseases in which it is injurious are Fevers, and Inflammations of all kinds excepting those of mucous surfaces.

II. A WARM AND MOIST ATMOSPHERE is debilitating and relaxing: the pulse is feeble and slow, and the respirations fewer. The evaporation from the surface of the body and the lungs is diminished, but in consequence of the greater action of the warm vapours upon the skin, the transudation or sweat is increased. The fluid poured forth in this way, as likewise that from the mucous surfaces, is not so rapidly carried off in consequence of the air being already loaded with moisture. Unless, therefore, the air be agitated, there is an accumulation of fluids in the body. "*Retenta intus pondus corporis augent tum ad sensum tum ad stateram.*" Besides, there is a positive addition made to the body by the absorbents. It is stated in the Philosophical Transactions, by Linnings, that the body increases in weight one pound in an hour, by passing from a dry to a moist atmosphere. Robinson found, that, though he took less nourishment, his weight increased considerably in a moist or cloudy atmos-

phere.* The quantity of fluid absorbed in this way, will, however, depend upon the previous state of the system as to moisture. The digestion is always weak, and requires, as we see in the natives of warm and moist climates, a mild and digestible food, and the aid of stimulating spices and peppers—for example, the rice and the cayenne. In those whose skin is not dark, this atmosphere appears to exert a peculiar action on the liver. The secretion from it is always increased, and is the cause of many of those diseases so common to Europeans resident in these climates, but which have so little effect on the native black. It is the opinion of Dr. Copland, (Medical Dictionary) that in the European the liver exercises the functions which the skin does in the native, and eliminates by it those materials which are produced or rendered effete by the great heat. The contractility of the muscles is lessened. “*Austrinæ constitutiones corporibus motum difficilem faciunt.*” Hip. The general sensibility is much diminished, the intellectual faculties are muddled. Persons with this temperament can neither conceive, reason, nor decide. They are the easy dupes who, from their mental imbecility, readily yield to the opinions and dicta of those who come in their way.

The diseases to which this state of the atmosphere predisposes are fevers of the worst character. The natives are not so subject to these diseases as strangers, and when they do attack the indigenous inhabitants they are not of equal severity as on others, and not, by any means, so fatal. Dysentery and disorders of the chylopoietic viscera are common, especially in those not accustomed to the climate.

The diseases to which this atmosphere is beneficial, are inflammations of the respiratory organs and passages—Pneu-

* Quæ in aere sub vaporis specie circumvolitant aquæ particulæ, a cute nostra attractæ, cum sanguine commiscuntur et corpus pondere augent.”
—Keil. Aph. Stat.

monia, Bronchitis, Hæmoptysis, Phthisis, &c. It is the nature of many of the diseases of these parts to relieve themselves by an increase of the natural discharge from the membrane, or by pus ; and the safest practice has been, by lenient measures, and especially the application of heat with moisture, to relax the vessels and promote this discharge. A warm and dry atmosphere likewise promotes the secretion, but it is rapidly evaporated, and in inflammatory diseases, such an atmosphere acts as a stimulant on the viscera of the chest. On the other hand, the state of the system induced by a warm and moist air, and the deleterious diseases that may be substituted for those which we are desirous to get rid of, are more than sufficient to induce us seldom to recommend such an air to the patient. The febrile eruptions make a most extensive and fearful progress amongst the coloured population residing within the influence of such an atmosphere.

III. A COLD AND DRY ATMOSPHERE is a Tonic : the capillary vessels are contracted ; and a larger quantity of blood is thrown upon the heart, which, in its turn, exerts itself to re-open these vessels. Heat excites the irritability of the heart, cold its tonicity ; the pulse is full and strong, but slow. The respirations are diminished in number, a less quantity of Oxygen is therefore taken in, and a less quantity of Carbonic acid given out. The sleepiness which all animals experience, when exposed to a great degree of cold, is owing to the diminished quantity of Oxygen consumed in the lungs. The secretion from the kidneys, and likewise those from the chylopoietic viscera are increased, and to the latter is to be ascribed the powerful appetite and digestion common during this atmosphere.* The bowels are constipated, "*aquilo ven-*

* " Lorsque la temperature de l'atmosphere engourdit la tonicite cutanéé, celle du system muqueux recoit un accroissement d'énergie remarquable. Voila pourquoi en hiver et dans les climats froids, ou les fonctions de la peau sont

trem astringit," is a remark as old as the father of Physic. The ancients said that by the cold the heat of the body was sent to the internal parts, and hence the intestines were dried up ; but it is better accounted for by the great activity of the absorbents on our better digested food. There will be no increase of transudation or sweat, but the evaporation from the moistened surfaces, and from the pores of the body may be considerable. There is not an increase of fluid, but an increase of solid matter, the muscular fibre has much more tone, but less contractility, and the body is able to endure great fatigue. The sensibility is diminished. The intellectual faculties correspond to the strength of the body. Imagination may not be great, but clearness of conception and accuracy of reasoning are exhibited in a wonderful degree.

The diseases which prevail, during this state of the air, are principally inflammations. Owing to the contraction of the capillaries, the blood is sent upon the viscera, producing congestion or inflammation in them. How comes it that inflammations are so frequent after a previous warm atmosphere ? Just from this, that the vessels of the viscera not only have their own blood but that of the superficial vessels likewise, which is thrown upon them ? The putrid and cahectic diseases are those to which this state of the air is most serviceable ; fevers of all kinds are rendered much milder, and many contagious diseases altogether disappear. The febrile cutaneous eruptions are not nearly so fatal during a cold air as during a warm one. The diseases of the skin, however, when accompanied with fever, are as changeable and inconstant, as those unattended with fever are steady and permanent. The exanthemata frequently recede, and universal experience has

singulierment bornées, toutes celles de ce systeme s'accroissent en proportion. De la, une exhalation pulmonaire plus marquée, des secretions internes plus abondantes, une digestion plus active, plus prompte a se operer, et par consequent l'appetite plus facile a etre excite."—Bichat, tom. ii. p. 532.

declared that the sudden recession of all eruptive diseases, more especially those with fever, is accompanied with extreme danger. Much are we indebted certainly to those who changed the practice in those diseases from the warm to the cool regimen, but it well becomes every one here to recollect the maxim "*in medio tutissimus ibis*;" and therefore, whilst we eschew that baneful practice of the 17th century, of stewing up our patient with an eruption on his skin in an apartment heated like an oven, let us not follow those again who running too far to the opposite extreme would place him in an ice-house. There is not only danger, but often death, from exposure of a patient too much to this air, when ill of an eruption with fever. For many of the cachectic diseases, no better remedy can be proposed than a free, cold, and dry air. This is the case with many scrofulous diseases, and all those which require to be treated with tonics.

Again, as this state of the air is frequently the remote cause of inflammatory diseases, it must be injurious in the treatment of them. They require a relaxant, and cold is not one unless carried to a very low degree, and long continued; and even then it rather produces torpidity than relaxation. A partial application of cold to an inflamed surface irritates and renders it worse; a steady and continued application of it deprives the part of its caloric, its tone, and lastly, its vitality.

IV. COLD AND MOIST ATMOSPHERE.—Cold alone is, within a certain extent, a tonic; but cold with moisture is a debilitant. The pulse, during the action of this atmosphere, is soft and weak, the respiration slow and laborious, evaporation is diminished, and almost no loss takes place by transudation. The secretion of the mucous surfaces appears greater, whether from an increase of secretion from the relaxed vessels, or from the natural secretion not being removed by the humid atmosphere. An absorption likewise takes

place of the watery particles. The digestion is weak and inactive. The body is large from the accumulation of humours ; the solids are but badly nourished, and there is neither contractility nor strength in the muscular fibre. The functions of the mind correspond with those of the body. The temperament is that which is known in the schools by the name of the *leucophlegmatic*. The inhabitants of a cold and moist country are always unable for great bodily labour, are subject to many diseases, and are invariably short lived. They are fond of a stimulating food, and are insatiably addicted to ardent spirits. The Dutch, by means of cleanliness, ventilation, warmth, and nourishing food, counteract their cold and moist climate, but the leech-catchers in some parts of France and Italy, the inhabitants of the marshes of Tuscany, and the rice-growers, are a most wretched people.*

The diseases which prevail are slow in their progress, "*In siccitatibus febres acutæ fiunt, in pluviosis autem longæ.*" They are, *Intermittents*, *Diarrhœa*, *Dysentery*, *Dropsies*, *Rheumatism*, *Catarrhs*, *Asthma*, *Fluor Albus*, *Mœnorrhagia*, and *Scrofulous Diseases*. The diseases which it can benefit are but few, and it is more to be dreaded than desired. On account of the moist air more readily conducting off the caloric by contact with the skin than the dry air, it will be of service in diseases, accompanied with increase of animal temperature, but in these cases we prefer the direct application of cold and moisture by bathing or sponging. And the latter

* Ceux qui vivent dans les lieux humides ont besoin d'une nourriture tonique et stimulante, et de faire usage de boissons spiriteuses, qui sollicitent les secretions et les excretions ; l'instinct seul met assez cette verite dans tout son jour, car il se consomme une beau coup plus grande quantité de vin et d'eau de vie, et il y a sans comparaison un bien plus grande nombre d'ivrognes dans les pays humides que dans les pays sec.—Fœdere. tom. v. p, 147.

As a remedy to the dishealth arising from the state of such a country, he proposes that governments should allow a mutual exchange with the products of drier and warmer countries without any duty.

is more effectual, for we have not only the cold produced by the contact of the water, but also that from the evaporation of the water from the surface of the body.* Contagious diseases are prevalent during this atmosphere, as well as those which depend upon miasma.

V. SUDDEN ALTERATIONS OF ATMOSPHERIC CALORIC AND MOISTURE.—Though the above states of the atmosphere have these distinct effects, still the most frequent and exciting cause of disease, is the rapid change from the one to the other, and more particularly the change of temperature. The constitution is taken by surprise. It had accommodated itself to the season, the heat on the surface or in the internal parts was in accordance with the external temperature, and cold occurring unexpectedly sends the blood on the unprepared internal viscera, producing congestion or inflammation; whilst unexpected external heat brings the blood to the unprepared vessels of the surface. We have here, therefore, the cause of the colds and catarrhs of an early winter, and the cutaneous affections of an early spring. We observe the fatality amongst those who pass rapidly from one climate to another, and the comparative security of those who gradually bring themselves from the one to the other. We all know the greater health of the British troops by being gradually carried from station to station, until they are eventually able to bear the hot and miasmatic climate of the East Indies. The most injurious sudden change is that from warm to cold. This cannot take place without a deposit of moisture—the capacity of the air for water being lessened by the alteration of temperature. The worst state of the atmosphere, that of

* Alexander Trallian gives us the following advice; “*Non solum autem refrigeriis, quæ extrinsecus admoventur; sed etiam aeris mutandi ad frigidius, artificio auxiliari tentabimus. Si igitur æstas fuerit, in subterraneo domo æger decumbet, et pavimento aqua frigida copiose conspergatur, ut aer hinc frigidior evadat.*”—Lib. xii. cap. iv.

cold and moist is then present. This change produces a contraction of the skin, with a feeling of pain in the part most exposed to the air. There is an irritation over the skin, and a general shivering. This irritation is conveyed to those parts most predisposed to disease, and excites the diseased action in them. The gouty, the rheumatic, the phthisical, the asthmatical, always suffer from this change, and provided the change be sudden, it has the same effect although the variation in the thermometer may not be great. A falling of 10 degrees at once will produce it.

The change from cold to heat is not accompanied with such injurious effects, except in those cases where a very great cold has been previously applied. The effect, in more moderate cases, is merely to produce an expansion of the fluids. This sometimes gives rise to hæmoptysis, epistaxis, or apoplexy. Inflammation may be excited in any organ predisposed to it by changing rapidly from cold to heat. Exposure to a heated apartment, after leaving a very cold air, sometimes is the cause of pneumonia.

Such being the "skiey influences" to which we are servile, and such the manner in which they affect us in health and disease; have we any means of correcting the state of the atmosphere, or of preventing its injurious action upon the human body? We have both. We may correct the moisture, the dryness, caloric, and motion of the air, by *draining or irrigation*, by the extension of *cultivation*, and by the *rearing or cutting down of trees or forests*. Or we may defend ourselves against its influence by *habitations*, by *artificial heat*, by *ventilation*, by *baths*, by *clothes*, and by *cleanliness*. Besides these two, we have that remedy which nature herself offers us in a change of *climate*, for these atmospheric qualities differ very much in different parts of the world.

LECTURE THIRD.

ATMOSPHERE, &c.

I.—Means of Correcting the State of the Atmosphere.

I. DRAINING OR IRRIGATING THE SOIL.—A country may owe its moist atmosphere to a number of marshes, lochs, and such like ; where a large quantity of water is spread out and exposed to the action of the air. These we may be able to drain, and on their removal the air will become dry. Marshy places are invariably unhealthy, and generally subject to an endemic disease, but by draining they become salubrious. The fenny counties of England are daily improving by draining ; and the ague, at one time so prevalent in them, is fast disappearing. The Pontine marshes in the neighbourhood of Rome were drained by Julius Cæsar, and by Sextus V. ; and, at both times, Rome was rendered much more healthy.

Running waters again may be spread through land in warm countries, and thus serve not only to supply moisture to the ground ; but, by the greater surface exposed to the sun, to keep the air cooler, for by passing into the state of vapour water absorbs a great deal of caloric. In many of the high parts

of South America an advantage is taken of the water in this manner, the rivers or streams being carried off in small rills, and distributed through the grounds for the sake of cultivation and coolness. Running waters do not engender disease, principally, it is supposed, on account of no putrefaction of vegetable matters going on in them, and because they do not give such a surface for evaporation in one portion of country as marshes or lakes. A large expanse of water will keep a country cool in summer by absorbing the caloric, and warmer in winter by giving it out again.

II. CULTIVATION.—Vegetation, when assisted by human contrivances, is the best possible means of improving the air, and rendering a country fitter for the abode of mankind. Cultivation removes the corrupting and decaying vegetables ; and by turning them under the earth makes them nourish the ground instead of poison the air. Many of our colonies, at one time so deadly, are now healthy, not so much from the care of the new-comer in avoiding the remote causes of disease, as from the greater number of these causes being removed by cultivation. I mean here, by *cultivation*, that treatment of the land by which it will furnish the largest possible quantity of food for man, and the domestic animals he employs. Wherever we find the *cerealia* capable of growing, that country is, or, by human labour, may be made, healthy. Cultivation, likewise, always renders a country *warmer* ; for a larger quantity of vegetable matter is raised on a given space ; and what is vegetable life but the conversion of certain gases, oxygen, hydrogen, azot, and carbonic acid into solid matter, and a change of form—an alteration from a rarer to a denser state—which must be accompanied with the extrication of heat ? What is it that makes living vegetables so difficult of being frozen, compared to dead ones, but this constant formation and existence of caloric in them ? As an example of the evolution of heat, by the process of ve-

getation, it may be mentioned that on looking into a wood in spring, we will find the small plants more advanced in size and strength than those on the plains. In the woods of North America small berries are found much sooner ripe than in the cleared lands.

III. REARING OR CUTTING DOWN OF TREES.—A very important point in vegetation, as regards the health of the community, is the proper management of trees and forests. They may be made to ward off miasma by being placed around marshes ; and by placing them in certain directions, according to the usual currents of wind in the country, they may become of the utmost service in warming or ventilating portions of land. In Holland, the banks of the canals are planted frequently with tall poplars, in order to confine the miasma. The Romans planted forests in order to defend the city from the South East wind or Sirocco ; and Pope Clement the XI. prevented the cutting down the trees about Cisterna and Sermoneta, because they, in part, kept off the miasma arising from the Pontine marshes. Trees should not be planted too closely, nor in places not well exposed to the sun. The experiments of some chemists (Merger and Ingenhousz) go to prove that the more trees are exposed to the action of the light, and the less the ground on which they are planted favours the decomposition of their leaves, the more healthy they are ; but, in circumstances the reverse of this, the air is vitiated instead of being purified. Objections, on this ground, have been made to trees in the small gardens of London. Not receiving a sufficiency of light and sun, they do not evolve the quantity of oxygen which, in other circumstances, they would do ; and they keep up a moist atmosphere—a state of the air certainly not by any means deficient, in that city, almost at any season of the year. Extensive forests always render a country moist, on account of the want of a proper

circulation of air, and consequent evaporation.* If the climate is moist, within the tropics, the woods will be cooler than the open fields ;—but if in a high latitude, and dry, the reverse is the case, as mentioned above.

But whilst we must grant the eventual and permanent advantages of cultivation, and the clearing of land ; it is necessary, at the same time, to be aware, that during the time of passage from the one state to the other, and even for some time after, endemic diseases, the result of miasma, are much more common. The trees confined it in some measure ; and when these are removed,—when the mass accumulated for ages of corrupted and corrupting animal and vegetable matter is stirred,—the poison escapes in its fullest force, and for years after, as the rich soil is ploughed up, it steams forth the deadly air. Such we see is the case in America.

II.—*Means of protecting the Body against the injurious action of the Atmosphere.*

I. HABITATIONS, little used by the first races of men, are now become indispensable for mankind. They not only defend him from the influence of atmospheric changes, but they afford him, in some measure, the means of correcting the air, so as to suit himself. In building a house there are three things to be taken into account. *First*, Its situation ; *Second*, The materials of which it is built ; *Third*, The size of the different apartments, and their ventilation.

First, It will be readily allowed, as a general rule, that a high situation is better than a low one, and a dry than a moist. The neighbourhood of a marsh should, by all means, be avoided ; but if this is impossible, then that side of it should

* “ *Præterea regio plantis consita minus perflatur, minusque a sole lustratur quam nuda ; quocirca per hyemem umbrosa est ac frigida ; per æstatem vero difficulter a ventis perflatur, suffocansque est.*”—Athenæus.

be chosen *from* which the wind is found most frequently to blow. By this precaution we, as much as possible, shun the miasma. The gorges of mountains, as also woods, are ill ventilated. The former are subject to standing waters or inundations, and the latter are always moist. In countries subject to avalanches, torrents, or earthquakes, we must be guided by experience in choosing a site. An exposure to the sea will not be so warm as an inland one, but it will not, like an exposure to a marsh, be unwholesome. "Of all the physical qualities of the air," says Clarke, "humidity is the most injurious to human life; and, therefore, in selecting situations for building, particular regard should be had to the circumstances which are calculated to obviate humidity either in the soil or atmosphere. Dryness, with a free circulation of air, and a full exposure to the sun, are the material things to be attended to in choosing a residence. A person may, I believe, sleep with perfect safety in the centre of the Pontine marshes, by having his room kept well heated by a fire during the night."* The higher that the dormitory, or sleeping apartment, is from the ground, the healthier it is in moist countries, or those much subject to dews. The poor and wretched woodcutter, on the banks of the Mississippi, has his house raised upon posts as high as he can; and the Guanaco, or inhabitant of the marshy Delta of the Orinoco, lives in the loftiest palm trees, kindling his fire in a mat filled with clay. Both thus in so far protect themselves against their moist climate. Houses are built, with no habitable part below the surface of the earth, with a part below, or with the whole below it.† Those entirely below the ground belong only to

* "The Influence of Climate in the prevention and cure of Chronic Diseases."

† *Solent et subterraneos specus aperire, eosque multo insuper fimo onerant, suffugium hyemi et receptaculum frugibus, quia rigorum frigorem ejusmodi locis molliunt.*—Tac. de Mor. Germ.—See also Pomp. Mela. ii. i.

some savage tribes placed in the coldest countries. Such habitations are warm, but, unless on high grounds, damp. Kitchens or cellars below ground are always damp, and if houses are to be still built with kitchen, pantries, &c. below ground, they should be wholly surrounded with a wide area.

Second, Some stones absorb moisture, and will therefore always keep a house damp. Others again are bad conductors of caloric. Brick walls are warmer than those of stone, but the bricks ought to be well burnt, and not in the least porous. Earthen or mud walls are still warmer than those of brick, but absorb moisture ; as a covering to a house, thatch is warmer, being a worse conductor than slates or tiles ; but it does not keep out humidity so well. It is the most proper covering where we wish to retain caloric or exclude it ; and is therefore used for cold situated dwelling houses, and for ice houses. Wood partitions are warmer than lime walls, being worse conductors ; but they are much more apt to absorb and retain contagious effluvia. Varnished wood is more impenetrable to contagion than unvarnished ; and the hard woods than the soft. Plaster is sooner penetrated by damp than wood ; but it is, upon the whole, much more durable, and by washing with quick lime can be effectually cleaned. Papered rooms are warmer than painted ; but the latter can be kept much cleaner. For hospitals, jails, and such like, where numerous individuals are congregated together, stone and lime walls are most suitable ; because they can be so easily purified. A wall of plaster and lath in a room always looks, and is, cold and cheerless ; and the snug sombre well-pannelled apartment will by many be preferred as the best opponent to our cold and dreary climate.

Third, Low roofed rooms are worse ventilated, and much more unwholesome than high roofed. Moderate sized rooms are much more equable in their temperature, than very small or very large rooms, and do not require such an expenditure

of fuel as either of the former. In some cases the size and height of rooms are carried too far, and they are thus rendered cold and cheerless for the inmates. The draught of cold air is always great in a large room ; and many of our hospital wards are highly dangerous to the sick inmates from this circumstance. It would be very easy to ventilate wards, jails, school-rooms, and public rooms, with air raised to any required temperature. Square rooms are not so easily warmed as oval. Bed-rooms ought to be spacious, and well-aired daily. We are beginning to recover from that absurd plan of cramming our beds into small closets, in order that they might be out of sight, and out of the way. Architects and the public seemed to think, some few years ago, that the public rooms could not be too large, nor the bed-rooms too small, provided only a dressing closet was attached. A third part of the twenty-four hours at least we spend motionless, and exhaling the rankest and most fetid part of our cutaneous and pulmonary secretion, in a small and confined bed-room, in order that we may shiver and starve in large dining or drawing-rooms during the rest of the day that we remain in the house ! How often does the physician have to regret the confined bed-room in which his patient is placed ? Often it is impossible to ventilate it by raising the window, without risking the full draught of cold air on his patient. I have more than once seen the convalescent from fever cut off by pneumonia, from being exposed to the current of cold air, from a window raised a little in order to refresh him, or to ventilate the room. Alcove beds are improper, from retaining the foul air. The bed should stand in the middle of the room, and not in a corner, but yet not so as to be in the draught from door to window or chimney. Windows ought to be very large, so as to admit plenty of light. The relative position of doors to windows or fire places ought to be well attended to, in order to secure a proper ventilation when no other

special contrivance for ventilation has been made. Water closets in dwelling houses, although convenient, are not to be commended. Let the supply of water be ever so abundant, they often go wrong, and emit a bad odour. They cheat the land of its due, stink our houses, and pollute our rivers or low grounds where the sewers terminate.

II. TOWNS AND VILLAGES.—Besides these considerations, with regard to preserving the health of the inhabitants of separate houses, we have to take into view the influence of houses when congregated and built close to each other. Insulated houses are of course much better aired than contiguous ones. In the country where the houses are much separated, the air is sharper and colder, and the temperature more variable than in towns. In the latter the air is milder and warmer, but not so pure. In towns epidemics depending upon some particular state of, or ingredient in, the air are less frequent, but more fatal, than in the country. Walls and ramparts are very injurious to the health of towns, by preventing a proper circulation of air. Hippocrates (*Epid. S. iii.*) always found the diseases of those living near the walls of a city much severer than those living in other parts of it. Where walls are necessary, the openings for the cannon ought to be numerous in order also to ventilate the town. If the wall is surrounded with a moat, this is as noxious as a marsh. Gardens are proper on account of the open space they occupy; but trees should not be planted in them unless the ground is extensive; nor should trees be planted near or against houses, as they retain too much moisture.

Streets or lanes are what Huxley called the lungs of towns. They ought to be spacious. Winding streets are not so well aired as straight, and the direction of these ought to be regulated according to the direction of the most healthy currents of wind. Blind alleys, and narrow courts and closes, are receptacles for vitiated air. Houses ought to be built on the

same line, and of the same height. The solidity of the building, and the fixtures to it, ought to be such as will not endanger passengers. The cleanness of the streets must likewise be carefully provided for, and strictly enforced. Wherever filth exists, especially if accompanied by dampness, there disease prevails. Diseases of a very fatal character have arisen from permitting animal substances to putrify near human dwellings. It is stated by St. Augustine, that in the kingdom of Massanissa in Africa, 80,000 inhabitants died, and 20,000 out of 30,000 soldiers who garrisoned Uttica, in consequence of an immense number of dead grasshoppers that covered the earth. The putrifying body of a whale once caused a great mortality in Holland. If any waters run through a city, they should be kept very clean and free from all putrifying substances, or, what is much better, contracted and covered up. A liberal supply of water, for all the purposes of cooking and cleaning, is of the very first importance. Man, woman, and child, should have so many gallons allowed a day. The common sewers demand the most strict attention. Ash pits and privies ought always to be under the power of the police, for no man has a property in that which may be injurious to the community. Instances are daily occurring where disease has been occasioned, or, at any rate, rendered worse by inattention to the sewers. In Marylebone Workhouse, such numbers of children were attacked, of a sudden, by disease, that it was considered to be cholera. This was not the case: the disease arose from the filthy state of the sewers, and was removed with the removal of the cause. In one of the Paris hospitals it was observed that the cases (venereal) in a certain corner of the ward were much worse than in any other. On inquiry as to the cause, it was found that this part of the ward was close to the temple of Cloacina. The patients were removed, and the sores immediately put on a healthy appearance. The manufactories which cannot be ex-

cluded from towns ought to be under such regulations as will best provide for the health and safety of the public at large. The houses of the poor should be regularly inspected by a local board of health. A low and avaricious landlord has no more right to let a damp, crumbling-down, ruinous house to a set of poor and wretched inmates, than a manufacturer to raise a smoky work in the middle of a populous neighbourhood. The public will put down the latter as a nuisance, but the former, not being immediately under the eye and the nose of the rich man, is allowed to continue a hot-bed of fever, the centre where disease is never absent, and from which it every now and then ramifies through the city. Indeed the manufacturer's smoke is not nearly so deleterious to a town as these low and ruinous hovels, which are allowed to bring a return to their landlord of more than twenty times their worth.*

Much has been said with respect to the burying the dead within towns, and, though still common in this country, the practice has been almost universally condemned. Many are of opinion that the main reason for objecting to the burial of dead in populous places, is the injury to the feelings of the living. But when life is extinct putrefaction commences ; gases are formed during the progress of decomposition, and evolved, and these must be more or less injurious to the living. According to two French surgeons, the plague in Egypt is owing to this that the dead are almost constantly exposed to the atmosphere : they are only covered with a little earth, which cracks and falls off during the heat. Numerous instances might be given where disease has arisen in consequence of exposure to the vapours from decaying human

* In fact the letting of ruinous houses is a good speculation to some landlords, and brings them much more in proportion than good houses will. The poor take them because they think, from the state they are in, they must be cheap.

bodies. If, however, it be wrong to bury the dead within towns, what can be said to burying them in the churches? The honoured dead do often deserve all the honours we can confer upon them; but there is no reason why the living should suffer by them in their death, because they were benefited by them in their life. "Our dead," says Mr. St. John, "are interred in our temples; and putrid exhalations float like a desolating mist through those aisles which should be sacred to praise alone. Men feel a sinking of the spirit on entering them; but it is caused not by any accession of penitential feelings, but by inhaling a fetid unwholesome atmosphere; and through life a certain cadaverous scent is associated with every reminiscence of a church." The law of the twelve tables, said "*hominem mortuum in urbe ne sepelito, neve urito.*" The ancients forbade the burying of the dead within the cities; but they honoured them notwithstanding; and whilst they hid or completely destroyed that which was noxious—the putrifying body—they raised monuments to commemorate that which could never decay nor spoil—the deeds of heroism and of virtue.

III. MANAGEMENT OF FIRES.—Next in importance to the site and the material of which a house is built—and even perhaps before both these, as they can be remedied by what we are now to treat of—is the proper management and application of caloric, as procured from combustible substances. Caloric may be made use of for drying, for warming the air of an apartment, and for ventilating it. Caloric is usually distributed through apartments in one of three ways, by a common fireplace, by a stove, or by a chafing-dish. In this country, and in some others, the common grate or fireplace is used. It is the best for ventilating apartments; for the atmospheric air is constantly drawn to the fire, the oxygen consumed, and the nitrogen, carbonic acid, and any foreign ingredients that may be present, sent up the chimney; a new

portion of the external air being supplied by the door or windows. The construction of the fireplace is a matter of great moment. A well-burning fire may not warm a room ; and a fire that consumes little fuel may make an apartment very warm. The construction ought to be such that, first, there will be no smoke thrown into the room ; and next, that there be the greatest reflection or radiation of heat. Oval shaped fireplaces are better than square, because they send the rays off in more directions. Clear polished backs and sides would be better than black, because they would reflect better : but it is impossible to keep them clean, and consequently black ought to be preferred as radiating best. Open grates make the fire burn well, but consume a large quantity of fuel. They are best adapted for ventilation, but are expensive.

Stoves prevent the annoyance of smoke, and warm the apartment sooner on account of the metal being the best conductor of caloric ; but they consume a large quantity of fuel, and a considerable portion of the caloric goes up the chimney. Sometimes the opening into the stove is in a different room. By this contrivance, the apartment in which the body and pipe of the stove is placed is much sooner warmed, and at a much less expense of fuel, but the ventilation is not nearly so perfect. These stoves are sometimes used in very cold countries ; and the ventilation is kept up by a small opening at the lower and upper part of the room at opposite corners. Manufacturing houses are frequently warmed by pipes conveying steam. They speedily warm the room, and ventilation must be kept up by two openings.

Chafing-dishes are the least proper methods of any of warming an apartment. They are used by some nations situated in cold and moist countries ; but they do not warm well ; and they allow a large quantity of carbonic acid to accumulate. Death from asphyxia has more than once fol-

lowed the sleeping in a room with a chafing-dish burning in it. The women in some parts of Holland and the Low countries, are in the practice of placing their feet on a chafing-dish, whilst sitting at any occupation. Hippocrates tells us that the women of cold and moist countries are subject to fluor albus, and that they are also often barren, not naturally, but from disease. The Dutch women are not barren, because they take means to oppose the influence of their climate ; but the constant use of a chafing-dish, in this way, is injurious instead of beneficial, and is by many ascribed as the principal cause of the fluor albus, and dropsies of the extremities, so common amongst the females of that country.

SUGGESTIONS.—Before concluding this part of the subject, we may be allowed to hope that the time is not far distant when the British government will take stronger measures, with respect to the police of towns and villages. As yet, all improvements, in this department, have come from without the government. The people themselves have merely sought the support of Parliament towards enforcing what is necessary for cleanliness. Ignorance and avarice have even opposed this much ; and there have been found men in the British Parliament who protected filth, because the means proposed for removing it were attended with expense to individuals, who would bear every discomfort, and run every chance of disease, rather than lay out their share of the expense of the removal. Not only should every facility be given to the passing of Police Acts, but every improvement added to them. It is likely that these acts at present go as far as the information of the public in general extends on the subject ; but Legislators ought to be well acquainted with the sources of disease, and it is their duty to remove them.* There is

* The Scripture figure as to the beam and the mote would not be inapplicable here. If men will breathe, in all defiance of Hygiene, the air of the present House of Commons, how can we expect that their ordinances

not the same reason, as in ancient times, for having the population confined in a small space. We have now no walled towns, nor need for them. All streets, therefore, should be of a certain specified width. No dwelling houses should be allowed to be built in courts or alleys. It ought to be compulsory on persons opening new streets to have them running in a direct line. Every house ought to have as much vacant ground behind it as the breadth of the street before it. The houses ought to be all of one height, and built in one line. All pools and stagnant waters ought to be contracted, drain-

will be attended to, when their own example is so bad. It is now several years since Sir John Sinclair (I believe) pointed out the deleterious air generated in the present small and confined house, and yet the building of a place more suitable for the health of men engaged in the great duties of legislation has been opposed. *Association of ideas* is the ground of opposition! Destroy the place in which Pym, Vane, Burke, and Pitt thundered forth their eloquence! Association of ideas will possibly support some men against the pain of certain noxious physical agents for a while; but *all* the members are not possessed of this mental operation and the emotions consequent on it to the same extent, whilst all breathe alike the mephitic air; and therefore many must, and do, suffer severely. Such an air not only eventually undermines the body, but it injures the understanding for the time. We all feel the lassitude and want of attention in an ill-aired and crowded church, or in an assembly, a lecture room, or even a theatre, after the place has been heated, and the vital air consumed. To what should men come with their minds in so full strength and vigour as to the business of Legislation? Will the mantle of Pitt or of Fox descend only in the old chapel of St. Stephen, or is *it* of so much value to the public now, that the lives of several representatives should be sacrificed yearly in waiting for its descent to the shoulders of some vain aspirant to the great honour? Hereafter, when posterity reads that our Legislators settled the laws of the nation at the dead of night, and in an apartment crammed, in every possible spot, with human bodies, and blazing with lights, they will possibly think of the ancient Germans, who first considered their new laws whilst drunk, and then reviewed them when sober; and they will prefer their system of legislation to ours, in so far as they had the excited and sharpened intellect, occasioned by the stimulus of drink, in addition to the cool and dispassionate judgment of sobriety; whilst our Legislators have the effects of the soporific and mind-dislocating mephitic air added to the natural and clamant demand of the mind and body for rest and sleep.

ed, and covered, at the expense of the proprietors. They are injurious in themselves, and a receptacle for every species of filth. As the dwelling houses of the poor may become as much the source of disease as stagnant water, or filth on the streets ; and as they must always be the nests in which disease, if not begotten, is nurtured, fed, and cherished, until it has acquired its fullest force and vigour, the proprietors should be compelled to keep them wind and water-tight, and to whitewash the walls twice a year ; and the public should be taxed for the cleansing and purifying these houses. It is compulsory on us to feed and clothe the poor, for their sakes. It ought to be no less compulsory on us to keep them clean, and free from all the causes of disease, for our own sakes. It has been said that the Boards of Health, recently established for the taking means to prevent the extension of cholera, have not worked well. They have done some good ; and that they have not done more is owing to the circumstance that they are but of new invention, and that the errors of the machinery have not been corrected by experience ; and that in this free country they appear to the filthy and the avaricious to interfere with the liberty of the subject. Time will correct the first, and the hollow and interested patriotism of the latter will be soon exposed.

In every town a space of ground should be appropriated to the inhabitants, for the purpose of recreation or exercise. The common of old served in part to support the labourer, by furnishing food to his cow ; it ought now to be left untouched in order to furnish him with fresh and wholesome air, at such times as he can escape from the impure and unwholesome atmosphere of the workshop or manufactory, in order to enjoy what is now to him a luxury. If fine squares and gardens are laid out before the doors of the rich, let it not be said that

“ Even the bare-worn Common is denied,”

to the children of toil and labour. Let us preserve that remnant of the patriarchal policy of our ancestors. Let the "Common's fenceless limits" be the temple consecrated to the goddess of health. The Act of Parliament which encloses, for agriculture or building, the Common belonging to the town or village, is the utmost stretch of patrician tyranny, over poverty and industry. It takes from the poor man, by force, his birthright—the pure air of Heaven on the ground which belonged to him.

LECTURE FOURTH.

BATHS.

Bathing.

By the term Bath is meant some fluid in which the body, or a part of the body, is immersed for a longer or shorter time. The fluid which is commonly used, is either water alone, or water holding some substances in solution. Occasionally, the medium in which the body is immersed, is an elastic fluid, and sometimes a substance reduced into the state of powder.

The antiquity of bathing, as a means of preserving and of restoring health, is very great. The Egyptians, the Persians, and the Greeks made extensive use of the bath ; and by the latter the warm springs were honoured as the mark of an especial favour of the Gods to men, were worshipped and dedicated to Hercules as the God of strength.

The Romans, according to their early history, sought no bath but the Tiber ; but when they became a nation of imitators, they copied the plan and system of the Grecian baths ; and, in the days of the Emperors, they had very far surpassed their instructors, in the construction of these public

edifices. They had cold, tepid, and warm water baths, and dry and vapour baths, all contained within one spacious building. The warm bath was, (according to the description given by Mercurialis) similar in construction to ours ; but sufficiently large to contain six or eight people. Some went into the bath and washed themselves ; others sat on the edge of it, and had water poured over them by the slaves, their bodies being afterwards rubbed with a flesh-brush. When satisfied with this rubbing, the body was anointed with oil or an unguent. The apartment for the warm bath was the most frequented ; and there the bathers remained the longest time. On quitting the warm apartment, or *laconicum* as it was called, the bathers went into the *frigidarium*, a cool and fresh apartment, in which the body was well wiped and dried. If the bather was inclined, as was generally the case, he then walked into the division for the cold bath, the *piscina*, and frequently the *piscina natalis*, from its being so capacious as to allow the exercise of swimming. On coming out of the cold bath, the body was again well dried, and the bather then went into the *apodyterium*, or the place where he had at first deposited his clothes. The hour for the bath was after the gymnastics and exercises, and before the supper meal. In general the bath was used only once a day, but many took it oftener—some going the length of even six or eight times. The warm baths of the Greeks were so temperate that Alexander the Great, when ill of a fever, once slept in one ; and we are told likewise, that the wives of the ancient Gauls were in the practice of feeding their children, whilst in the bath. In the time of Plutarch, however, they were used of a very high temperature, and he loudly censures them on this account.

The vapour bath was sufficiently simple. A vessel of water having a very heavy lid to which a lever was attached, was placed upon a stove ; and, when the vapour had been

sufficiently compressed, the lid was raised by a slave by means of the lever, and the vapour allowed to escape into the apartment. In the walls of this apartment were numerous apertures, through which a person might put any particular part of his body, when he did not wish to expose the whole of it to the vapour.

During the better part of the Roman Empire, the public baths were merely means for promoting or restoring the health of the citizens, and were overlooked by the Ediles, to whom the charge of them belonged ; but in the course of time, they became the scenes not only of luxury but of the greatest profligacy and indecency.

Amongst modern nations, we find nothing of the luxuriousness and richness of the ancient baths. Many do not at all follow bathing as a general practice ; and others are altogether unacquainted with public or artificial baths, and use only the bath which nature offers them in her rivers and seas. The modern nation which, using the artificial baths, is the most singular in the construction and management of them, is the Russian. The Russian bath consists of a chamber built of wood, against the wall of which there is a metal stove, and around the chamber are several raised benches covered with a mattress filled with hay or straw. The heat on entering is, to one unaccustomed to it, very distressing. The Russian, however, does not experience this ; and he undresses and lays himself down on one of the benches. The stove has a great number of rough river stones in it, which are nearly entirely covered with the fuel, and are consequently very hot. Cold water is thrown upon these stones, and a thick vapour immediately rises, and surrounding the persons in the bath, causes a copious sweat. The water is continued to be thrown on for about ten minutes, and the thermometer at the time ranges from between 122° to 133° Fahrenheit. At the end of this time, the body is well flogged

with a leafy branch ; and then rubbed over with soap, which diminishes the perspiration. The bather is then washed with tepid water, and lastly with cold—several pailfuls being dashed over his head. Frequently, in place of using cold water in the bath, the Russian quits the vapour bath to throw himself into a river, or to roll himself in the snow. The bather, if rich, then takes a drink composed of English porter, white wine, toasted bread, sugar and lemons, and reposes upon his bed ; if poor, he takes a glass or two of spirits and resumes his work. The Russians make frequent use of these baths. They are considered one of the necessities of life, and a bath for the public is to be found in every village.

In Finland, baths very similar to those of the Russians are used, but the temperature is greater. The natives enter them frequently once a day, but more commonly once every second day ; and men, women, and children have recourse to them.

In Turkey, the use of the bath is very common. The baths are generally built of freestone, and paved with marble. They are warmed by means of flues passing round and across the building, so that all parts may be warmed equally. They resemble more the dry bath, for the bather seldom goes into the warm water. Having first undressed, he wraps himself in a cotton cloth, and puts his feet into sandals, in order not to be incommoded by the heat of the floor. He then walks into the bath, is washed, dried, well rubbed with a piece of camlet, and then anointed. He remains in the bath-apartment half an hour in winter, and a quarter of an hour in summer. On leaving the bath he reposes himself, and generally takes coffee or sherbet. The women use the dry bath daily, the men seldomer. It is necessary, however, by the law, for the Turk to take the bath of warm water always after connexion with a woman, and for the female to take it after her menstrual discharge. In India more attention is

paid to exercising the body. The bather is laid on a board and warm water poured over him. He is then shampooed, that is, his joints are all cracked, friction soft and agreeable is made on his skin, and the muscular part of his body is struck. The body is then rubbed hard with a kind of hair-glove ; it is anointed, the beard is shaven, and, if required, the hair of the head cut. The Indian women take the same kind of bath, and spend a much longer time in it than the men. The Egyptian baths are somewhat similar to those of Turkey and India, but are more of the nature of a vapour bath. They are highly perfumed. The Egyptian women, like those of Turkey and India, are passionately fond of the bath, and spend a great deal of their time in it.

The Baths used for the preservation of health, or the removal of disease, are either Cold or Warm, and of these are varieties.

I. COLD BATH.—It is commonly termed a cold bath, when the temperature is between 32° and 65° Fahrenheit. The first effect of the cold bath on the body, is to produce a shivering, a contraction and roughness of the skin, and an irregularity of the breathing—the inspirations and expirations being convulsive. By and by these symptoms go off, the skin becomes red, and the pulse and respiration steadily accelerated. The shivering arises from the rapid abstraction of the caloric by the water—it being a much better conductor than the air. The contraction of the skin is owing to the blood being sent inwards ; and the acceleration of the breathing depends upon a preservative principle in animals that, when exposed to cold, there is more atmospheric air taken into the lungs, and more caloric evolved in the body,—in fact the faculty of producing caloric is increased. The roughness of the skin is, from its resemblance to that of the goose, called the *cutis anserina*. It arises from a projection of the various

roots of the hairs, in consequence of the contraction of the skin. If, however, the cold is very great, or a low temperature is continued for a length of time, the power of the body to supply caloric is exhausted and overcome. The shivering again comes on, the pulse becomes less frequent, the respirations fewer and more laborious, and the skin and muscles become shrunk and contracted; and this contraction is as visible in the parts of the body out of the water as in those in it. The features are shrunk and sharp, and a ring which was tight on the finger before going into the bath, will now drop off. A particular heaviness is felt in the head, irregular contractions, first tremulous, and then tetanic, take place in the muscles, especially in the hollow muscle—the bladder;* and at last the limbs become swollen, stiff, and rigid. These effects are more or less distinct, according to the state of the person's constitution, or the coldness of the water.

The train of symptoms commonly named the *shock*, which takes place on entering the cold bath, I have ascribed principally to the effect of the cold on the vascular system; but it is proper to state that many are of opinion that the shock depends upon the action of the cold on the nervous system, and that the shiverings and the irregular muscular contractions, are the consequence of the impression of the cold on the delicate nerves of the skin. The effect of cold water on the irritability of the muscular fibre is considerable, even where the circulation has ceased. The cutting or scoring of newly killed fish, and then immersing them in cold water is

* Contraction sometimes takes place in other hollow muscles. Polydore Virgil relates of Etheldred, the son of King Edgar:—" *Is dum baptizabatur, cum subito in sacrum fontem confecti cibi reliquias ex alveo emisisset, traditur Dunstanus prædixisse ita futurum ut ille quandoque ingens patriæ incommodum dedecusque afferret.*" In these times the whole body was immersed. The prediction was a little ebullition of wrath on the part of the Saint at the *ingens dedecus* though involuntary, of the young Prince to the sacred fount.

an illustration of the power of cold in producing muscular contraction by its action on the irritability ; and the *bracing* effect of cold on the human system has been explained in the same way. This muscular contraction, or bracing, is the primary and exclusive effect of the cold bath : all the other advantages of this bath, as a tonic, are common to it with the warm bath.

In general, a person in good health on quitting the cold bath, and drying himself, feels an agreeable glow of heat over his skin ; but this is not from an actual increase of caloric, for the thermometer, when placed in contact with the skin, rises more slowly than at other times ; and Dr. Edwards proves to us that the application of cold continues to act on the faculty of the body to produce caloric for some time after the cause has ceased ; and therefore the temperature of the body is really lower—nor is it so much from the medium itself being warmer, for the difference betwixt the water (I speak here of the sea,) and air does not extend, on an average, to six degrees in summer—but it depends upon the air being a much worse conductor of caloric than the water : it is the same feeling which we experience on a warm and dry day succeeding a cold and moist one.* This may

* There may be cases, however, in which the remaining in water, and more especially salt water, will be better than remaining exposed to the action of the air, especially if there be wind and the person's clothes be wet. In shipwreck in winter (Dr. Currie shows to us) he has a better chance who has his body, for the greater part, immersed in the water, (for the sea is then warmer than the wind, and there is no evaporation from the body,) than he who must be motionless in wet clothes, and is out of the water. The surface of the sea, especially in cold climates, and in winter, is always warmer than the superincumbent air. He ascribes something also to the salt. He says : "By the stimulating effects of sea salt on the vessels of the skin, the debilitating action of cold is prevented. Persons immersed in salt water preserve the lustre of the eye, and ruddiness of the cheek longer than those in fresh water of the same temperature, and exhibit the vital re-action stronger, when removed from it."

appear a contradiction to what has been stated before ; but it must be observed, that the increase in the generation of the caloric of the body to oppose cold, depends on the strength of the constitution, and continues for a longer or shorter time only according to that strength. When a weak and feeble person goes into a cold bath, he continues shivering, pale, and heavy, from the time he enters until he comes out ; and it is a long time before he becomes warm, or recovers the previous power to generate caloric. The increase of caloric, in any case, only for a time, is rapidly carried off by the cold medium, whilst the diminished action of the calorific function which follows continues long after the cold has been removed.

The effect of the cold bath is this : Provided the temperature be not too low, or provided the bather does not remain too long in the bath, or provided his body is not very weak, it is a tonic : but, in the opposite circumstances, it diminishes the intensity of the vital functions, and acts as a debilitant. Galen says, "it either strengthens, or it overpowers the faculties of the body, and induces torpitude."

To very young or newly-born children, the cold bath is injurious. There must be an amazing obliquity of perception in that man's intellect that would counsel the plunging the human being in its tenderest possible state, and which has left its mother's womb of the temperature of 98° Fahrenheit, into a cold bath of any degree between 32° and 65° Fahr. Such a man would not feel very much at his ease in the midst of a freezing mixture ; and yet his body is about as well able to endure that, as a new-born infant's to endure a cold bath. The skin of the child gets hard, dry, and cracked ; and those healthy rashes and cutaneous eliminations which should take place during lactation and dentition, are driven upon the bowels, the windpipe, or the brain, with fatal effects. Besides this mere action on the skin, it is a fact, that the younger

the child is, the less is its temperature and its faculty of generating caloric; and it must, therefore, be much more affected by a low temperature than an adult in whom this power of the system is at its fullest force. To use the cold bath to new-born children, or to young children, is a part of that *hardy-rearing system* which has been so much cried up by people of more imagination than knowledge and sense. The water which is used, night and morning, to wash the child may be not so *very* cold to the nurse; but her callous hand, or even her tender skin supposing she dips her *arm* in it, can be no test of the effect of that temperature on the system of an infant. Children born before the full time, would much more frequently survive, if the temperature in which they were kept were made sufficient to counterbalance the less faculty they have of generating caloric at so early an age.*

Well would it be that we who pretend to know so much of nature, would oftener take a lesson from her. She sends the infant into the world covered with an oily mucus to protect it from the influence of the atmosphere; and we remove this coat in a cold bath.†

* In the article *Baptême*, in the "*Dictionnaire des Sciences Medicales*," M. Marc severely reprobates the practice of carrying young children to church for baptism, instead of getting it done at home. He likewise informs us, that in some parts of France the baptismal water is warmed—both circumstances are worthy of notice to some persons in this country. Hippocrates gives all due praise to the Greeks for washing the young children with warm water.

† Το δε ψυχρον σπασμους, τετανους, μελασμους και ριγια πυρετωδεια. Το ψυχρον πολειμιον οσειοισιν, οδωσι, νευροις, εγκεφαλω, νωτιαιω μυελω, το δε θερμον αφελιμον.—Aph. Lib. v. 16, 17. How common are diseases of that nature amongst children, and we have every reason to believe with Hippocrates that cold is the cause of them. "Aussi ne puis je regarder qu'avec pitié le conseil donné par quelques auteurs de tremper les nouveau nes dans l'eau froide, a l' imitation de quelques peuples sauvages; ils avaient meconnu que nous avons besoin de conserver autant les enfans faibles que les enfans forts, et que les sauvages au contraire sont bien aises de se debarrasser de ceux que ne peuvent pas resister a cette épreuve."—Foedere, tom. v. chap. i.

It has been stated that the faculty of the body to generate caloric, is depressed by an exposure to cold, and this depression continues for a time. The same law holds with regard to heat, for by exposure to a high temperature, the faculty of the body to generate caloric continues after that temperature is much reduced. A person is cooled the less quickly, by how much the longer he has been exposed to a previous high temperature.

Keeping this in view, we are led to the detecting a popular error which exists with regard to the cold bath. It is a common rule not to go into the cold bath, *whilst warm*. When the invalid attends to the rule, and lingers about until the effect of his walk has worn off—until he feels himself cold—the stage of excitement does not make its appearance, and the sedative or benumbing effect of the bath takes place, and he is worse instead of better of it. The Russian rushes from his vapour bath to throw himself into the river, or to roll himself in the snow, and his bath is thus to him a tonic, and defends him against his cold climate. Every one, therefore, who uses the cold bath, should enter it whilst his body is warm ; and the invalid should, first, by smart walking or by artificial heat, have the faculty of his body to generate caloric stimulated ; and the cold bath, provided he does not remain too long in it, will then prove a tonic. The Knight of Litchfield, Sir John Floyer, informs us that “ none of the noble structures for their *hot-baths* were made by the Romans, without a *cold bath* or *Piscina* ;” and he then adds, “ the use of *cold bathing* after sweating in the *hot-bath*, is not yet commonly practised in England.” It is now more than an hundred years since he wrote, and the same is the case still. Indeed the general belief is, that the body cannot be too cool before entering the cold bath.

But whilst correcting this popular error, at the same time care must be taken that the excitement has not ended in

weakness, that the exercise has not been carried to *debility*. When Alexander, covered with dust and sweat, and *fatigued* with a day's march, rushed into the *Cydnus*, he nearly paid for his rashness with his life ; but Alexander would have just run the same risk, had he lingered about the bank until he was cooled and then entered the cold water. There would have been no healthy re-action. He would have shivered and fevered.

VARIETIES OF COLD BATH.—The cold baths most commonly had recourse to are the sea, a running water, and the domestic bath.

I. *Sea-Bathing*.—Much has been said about the superiority of sea-bathing, and there are certainly cases in which it possesses considerably the advantage. The temperature of the sea is generally below that of any river, both from the salts which it holds in solution, and from, owing to its greater depth, not being so much heated by the sun's rays : Its greater density is well known to every boy, by his body being more buoyant in it than in fresh water. By holding these salts it is more stimulating, and therefore in many diseases, as in scrofulous swellings of the glands and joints, or, in other cases, where we wish a discutient, we use sea water as we would use a solution of muriate of ammonia or any other stimulating salt. It is a matter of general observation that getting the clothes wet with salt water, and remaining in that state, is much less dangerous than getting wet with rain. Sailors and fishermen are very healthy, and declare they never catch cold from getting wet with the sea water. Captain Bligh's opinion corresponds with that of Dr. Currie as to the stimulating effects of sea water, and he tells us in his Narrative, " As I saw no prospect of getting our clothes dried, I recommended it to every one to strip and wring them through salt water, by which means they received a warmth that, while wet with rain water, they could not have, and we were less liable to suffer from colds or rheumatic complaints ;" and

again, "I would recommend to every one the method we practised, which is, to dip their clothes in salt water, and wring them out, as often as they become filled with rain: it was the only resource, and was, I believe of the greatest service to us, for it felt more like a change of dry clothes than could well be imagined." The greater power of cold salt water in crimping fish is well known. Perhaps, however, the principal value of the sea is, that the coast is more equal in its temperature than inland, and the invalid may owe as much to the air as to the bathing.

II. *A running Stream or River*.—Here we have the friction and percussion which the running water gives to the body, (an advantage, however, still more decided in the waves and tide of the sea coast,) and the coolness from the constant change of the particles of the water. Rivers are seldom of so low a temperature as the sea. Some *springs*, however, when covered over, are much colder, being below 50° Fahr. in summer, whilst the sea, at that time, is seldom under 60° Fahrenheit, on the coast.

III. *Shower Bath*.—Of the domestic cold baths, the best is the shower bath. It gives more of the percussion and friction than even the river bath. It ought to be the only domestic cold bath for the healthy person, or the sick one who is desirous of regaining health. It can be erected for a few shillings, and no house ought to be without one. To the delicate, the water can be raised in temperature to suit their feelings.

IV. *The Douche*, as it is termed by the French, is a cold or warm stream of water, of a certain diameter, applied commonly to one particular part of the body, and falling upon it from a greater or less height. It is of the diameter of the twelfth of an inch to three or four inches, and from one foot high to twelve. It is much more effectual than the immersion of the part in water, on account of the powerful per-

cussion. Although a local application, yet its effects upon the general system are very great; and, in some cases, it is preferred to the plunge bath, or the cold affusion, on account of the severe shock which it produces on the nervous system. According to the height from which it falls, and the length of time which it is continued, it may either prove a local tonic, or *stimulant*, or a sedative. The vessels of the part contract, and the blood disappears from them, and if the application of the cold cease, it returns with greater force and the skin becomes redder and hotter. By continuing the stream for a longer time, re-action does not take place, and the part remains colder and paler than it was. Although the *douche* is commonly applied from above, yet sometimes the stream is directed from the side, or laterally, and sometimes from below. In this last manner it is sometimes used in diseases about the anus and vagina.

USES OF THE COLD BATH.—The diseases in which the cold bath may be successfully used are numerous. The application of cold water to the surface of the body, in fever, is sufficiently well known. The practice was carried to its greatest extent by Dr. Currie. He placed the patient in the middle of the floor, and poured several buckets of cold water over him. This could not, however, be followed on all occasions in private practice, and in place of it, the body or parts of the body are sponged with water, or vinegar and water. By Dr. Currie's treatment, it was believed that the fever was overcome by the sudden shock given to the system, whilst the sponging again is merely palliative, and to assist the cure. The patient feels cooled and invigorated after the sponging, as one feels cooled and invigorated after washing himself in the morning. The proper time, however, for the application of the cold bath, or the cold sponging, must be attended to, and it will be known, by keeping this remark in remembrance, viz. : that the cold water should never be applied

in the cold stage of fever, when the patient is complaining of cold, or shivering, or when his skin is cold and clammy, and his pulse weak and quick. An increased heat, and a dryness of the skin indicate the proper time for it. Nor is there any occasion to consider the character of the fever, provided only there is an increased evolution of caloric. The cold affusion has been used very successfully by some practitioners in the hot stage of intermittent fever. In common continued fever, in typhus, and in plague, or, in fact, wherever the heat of the skin is above natural, it may be used. It reduces the temperature, and diminishes the faculty of the body to create heat. Indeed, it is only a greater extension of that modern improvement in the treatment of these acute diseases which substituted cleanliness, ventilation, and cool air, for filth, a foul atmosphere, and a corrupting heat ; and it is superior, in as much as the moisture reduces the temperature of the body more than dry air. Cold moist air, compared with cold dry air, abstracts caloric from the body in the ratio of 330 to 80 ; with cold water, as being a denser medium, the ratio will be greater. But there is still a greater difference in the effect of cold air and water, in so far that the former increases the evaporation of the fluids of the body, and therefore must diminish its volume—whereas the cold affusion may give a part of the water to it, by means of the absorbents ; hence its effect in alleviating the intolerable thirst of fever. A still farther difference exists, as mentioned in the Lecture on air : moisture and cold are relaxing, and very debilitating both to the nervous and vascular systems, cold and dry air is, on the other hand, if not long continued, exciting and stimulating. We see therefore the use of cold affusion in the early and hot stage of fever, and of an occasional but not continued application of cold air in the latter stages. A patient of Sydenham's, in small pox, was laid out as being dead. The body was laid in a cold air, and the dead man shewed signs of life, and eventually recovered. The cool air

here was a stimulant ; cold affusion would have extinguished the remaining spark of life. A wider difference still exists in this, that the cold affusion removes the impurities thrown out by the exhalants, which impurities may even clog up the mouths of the vessels, and be a mechanical obstruction to the escape of the fluids. Perhaps the value of the cold affusion is not less in this way than as merely removing the caloric.

Many prescribe the cold affusion in the fever which precedes the *exanthemata*, but I would have some hesitation in using it during the time that the eruption is appearing. I am afraid that in some cases it would repel it, and occasion danger ; and the cases in which this would take place we cannot easily distinguish from others in which it would be beneficial. In the delirium of fever, when not depending upon exhaustion, but on excitement, and in the delirium of phrenitis, a more powerful remedy cannot be conjoined with the use of the lancet. The furious variety of mania will likewise receive a check by the application of the cold bath, but in this case as well as in the former, the cold must be continued until its sedative effects have taken place. The maniac must be held below the pump, or shower bath, until he be rendered cold and torpid. In rheumatism, and in gout, the application of the cold bath has been recommended by Hippocrates and others amongst the ancients, and by many of the moderns ; but in both cases it must be very frequently dangerous. A recession of the gout to some of the viscera may be produced, and the patient's toe will be cured at the expense of his life. In the interval of the attacks, however, it will be proper. In the treatment of a great many chronic diseases we trust much to the use of the cold bath, and the object in these cases is not the abstraction of caloric, but the excitement and tone which follow the application of the cold water. To general feebleness or weakness of the system, whether constitutional, or the consequence of disease, or of

debauchery, we have a powerful remedy in cold bathing. It is frequently the case that patients are restrained from using the cold bath, in consequence of the depressing and sedative effect of the cold taking effect on them from the moment they go into the water, until some time after they have come out. But when the cold bath has been prescribed as a remedy, they ought not to give it up because it affects them in this way. They should, on the other hand, fortify themselves against the too powerful action of the cold by going into the water in a full glow of heat, and remaining only for a minute or two; or by gradually reducing the temperature of the tepid bath until they come step by step to enjoy the cold bath. The means thus used will assist in bringing the body to a better state of health, in which the cold bath will then confirm and preserve it. There is another circumstance which the invalid, and even he who is using the cold bath in order to preserve health, should attend to, and that is, the proper time of the day for taking the bath. The morning is recommended by many, but is decidedly improper for delicate persons, for two reasons; *first*, because the air and the water are both colder at this time than in the forenoon; and *second*, because the body, in consequence of its previous entire rest during the night, has not yet recovered the full activity of its different functions, more especially that of evolving caloric, and therefore it is more liable to be chilled or less fitted for producing the stage of re-action. Many persons could bathe with great advantage in the forenoon who are injured by morning bathing.*

* Dr. Buchan, in his "Treatise on Sea Bathing," states that on dry warm days, and a sandy beach, he found the sea to be, at high water in the forenoon, ten or twelve degrees higher than at low water, or than in the morning. He attributes this to the sand having acquired heat from the sun during the forenoon, and giving it to the water as the tide rises. It is an important consideration for the invalid. The sea, on our coasts, is warmest in the months of July and August, being at that time generally about 63° Fahrenheit.

In amenorrhœa depending upon weakness, the cold bath strengthens the patient, and brings back menstruation ; and in menorrhagia again, from the same cause, it restrains the discharge. To impotency, *languida Venus*, as Sir John Floyer terms it, it is frequently a cure, and in it we have also the best antidote to that dangerous habit, too often the consequence of the imprudence of youth, nocturnal emissions. The benefit from it, in fluor albus, is known to most females afflicted with that complaint, and its great efficacy in the cure of *lacrymæ Veneris*, or gleet, is familiar to every practitioner. Habitual perspirations depending upon a relaxed state of the cutaneous vessels, and a great many diseases depending upon a scrofulous state of the constitution are cured by it—diseases of the joints, white swelling, scrofulous sores, and strumous glands. To those females subject to, or threatening, abortion, the accoucheur has nothing equal to the cold bath which he can prescribe. A course of cold bathing will hardly ever fail to strengthen the general system and the uterus likewise. Whyte found the greatest advantage from the cold bath in many nervous diseases, especially hypochondriasis and melancholy ; and in chorea, epilepsy, and hysteria, it is of the most decided benefit. It has been used in tetanus, but not with the same success as the warm bath ; and as might have been expected it has had its trial, like every thing else, unsuccessfully, in hydrophobia. Although condemning, in the strongest terms, the bathing of newly-born children with cold water, yet I think it likely (and I believe it has been found successful) that a sudden dash of a little cold water on the body of the infant born apparently dead, would be more successful even than the warm bath in restoring animation. Such is the case in fainting, the shock rouses the system, if a spark of life be present, to opposition. Does not rubbing the child's thorax with spirits, as recommended in such a case, owe most of its value to the cold produced by evaporation ?

The effect of the cold water in producing muscular contraction, is sometimes turned to account in some cases of retention of urine ; cold water is suddenly dashed on the body, which is followed by a contraction of the bladder.

On the other hand, in all the inflammations of the viscera, with the exception of that of the brain, the use of the cold bath will be injurious on account of its producing congestion in these viscera ;—as for example, pleuritis, hæmoptysis, peritonitis, and such like. In the inflammation of the mucous membranes, it will be even worse than in the inflammation of the serous membranes, for it checks or prevents that increase of the natural secretion by which inflammation of these membranes terminates. If, however, the increase of the discharge should continue from relaxation or weakness, after the inflammation has ceased, then the cold bath will materially assist in stopping it. In tendency of blood to the head, the cold bath is sometimes dangerous. The sudden cooling of the extremities and body, and the unexpected flow of blood to the unprepared cerebral vessels may occasion a rupture of a vessel. In some cases, however, the cold shower bath may be used with great advantage where the plunge bath would be accompanied with great danger. In phthisis, or in the predisposition to it, the cold bath must not be allowed on account of the greater quantity of blood sent upon the lungs, and the acceleration of breathing, and hence the great chance of bringing the tubercles into activity.*

* A person with a small confined chest, or with weak lungs, often feels a pain in the chest on going into a bath, whether cold or warm. This does not depend upon the greater quantity of blood sent to the lungs, for that does not take place in the warm bath, but from removing the surface of the body from the influence of the air, so that the lungs only are acted upon by it. That the same changes take place in the air, at the surface of the body, as in the lungs, is unquestionable, and the importance of this function of the skin, for the welfare of the individual, is more visible in other animals than in man, but the above circumstance of the pain in the chest, so far shews

In cutaneous diseases, many practitioners use the cold bath freely ; whilst, by others, it is as much eschewed in the fear that it would repel the eruption, which would be followed by dangerous symptoms. The same practitioners recommend women not to bathe during the time of the menstrual discharge ; and neither men nor women to bathe during the existence of a hæmorrhoidal flux, or periodical discharge, or of any of those cutaneous diseases which so frequently make their appearance at regular periods. The physician had better not adhere to this, nor the reverse, as a general rule, but be guided by the peculiar circumstances of each case.

Partial Cold Bath.—The cold bath is sometimes applied to particular parts only of the body. President Jefferson, and Dr. Letsom, bathed the lower extremities every morning in cold water, and to this they ascribed their uninterrupted good health. In therapeutics, the manuluvium, or bathing of the hands in cold water, is had recourse to in epistaxis and fainting. Cold water is applied to the anus and hips, in cases of hæmorrhage from piles, or in hæmorrhage following lithotomy, or any other operation where the bleeding vessel cannot be tied ; and it is applied to the vagina, to the back, and to the belly, in cases of flooding from the uterus.* It is applied likewise in cases of burns or scalds, in inflammation following external injuries, and in frost-bites. In all these

it. We take advantage of this property of the skin in cases of fainting. The pulse is scarcely to be felt, and the breathing can scarcely be perceived. When that is the case, what is done ? The body is uncovered as much as possible, and exposed to the cool air. The cold air does not act solely by being a stimulant. The skin *breathes* and becomes an assistant to the lungs.

* Bichat, in pointing out the intimate sympathy which exists between the mucous membranes and the skin, takes, as his example, the effect of cold applied to the latter in restraining hæmorrhage from the uterus and nose. “ Dans les hemorrhagies de la surface muqueuse de la matrice, des narines, &c. un corps froid appliqué dans le voisinage sur la peau, crispe cette surface et arrete le sang.”—Tom. ii. p. 532.

cases, the colder the bath is the better, and the use of it should be continued until the object in view has been attained. In delirium arising from increased vascular action in the brain or its membranes—the use of the partial cold bath, especially the *DOUCHE*, is of the happiest effect. The patient's head is to be laid over the edge of the bed, and a steady stream, small or large, of cold water, allowed to fall on it from a height of from one to three feet. The *douche* is frequently used in order to give tone and strength to the muscles and tendons which have been overstrained, in the case of a sprain. It is often likewise used for local swellings and inflammation, and is much more effectual in discussing them than the simple application of a wet cloth.

THERMAL BATH.—To water at a temperature above 65° Fahrenheit, the term warm bath may be applied, because at that temperature the body does not feel cold in it; but by medical men, the warm bath is commonly divided, according to the degree of heat, into Tepid, Warm, and Hot Bath. The tepid bath is of a temperature between 65° and 85° Fahr.; the warm bath between 85° and 98° Fahrenheit; and the hot bath is of any endurable temperature above 98°. Fahr. or blood heat, being most commonly 109° Fahrenheit. It will be as well to treat first of the hot bath, as exhibiting most strongly the effect of heat on the body.

I. HOT BATH.—The first feeling on entering the hot bath is that of a constriction of the skin, similar to what is felt on entering the cold bath, but without any shivering. This contraction, or constriction, passes away very quickly, the skin becomes red, its heat is increased, and the body is sensibly swelled, for a ring previously slack on the finger now feels tight. The parts out of the bath are affected in the same manner, for the face is flushed, swelled, and feels warm; the pulse is frequent, the respiration is accelerated, the heat seems greatly augmented, the bather feels uncomfortable, a

sweat breaks out, and he becomes very thirsty. If he continue in the bath longer, these symptoms become much more intense, the perspiration pours down over the face, the arteries of the head are felt beating strongly, palpitations of the heart come on, and this is followed by vertigo, general weakness, and syncope. On leaving the hot bath these symptoms, and especially the perspiration, continue for some time. The bather feels weaker than before, his stomach digests less powerfully, and he is not able to endure fatigue. The faculty to evolve caloric is augmented, and continues for some time after the source of the heat has been removed. The temperature of the body continues for some time to be higher than what it was before going into the bath.

The effect of the hot bath is this ; provided a person leave the hot bath immediately after getting into it, it may be considered a tonic, for it excites a state of the system similar to that which follows a plunge into the cold bath, but if he continue any time in it the skin becomes opened and relaxed, a great loss is experienced by perspiration, and the hot bath is eventually a powerful debilitant.

USES OF THE HOT BATH.—The hot bath is not very much prescribed by the medical attendant. It is sometimes used in order to bring out eruptions which have been repelled, and which have been followed by dangerous symptoms. In this case the patient must be kept in the bath for only a very short time. We want excitement here—not debility. We administer the warm bath with the same view that we give warm brandy internally. The patient must be removed when the perspiration appearing indicates that the skin has been opened, and that the debilitating effect is about to come on. In some spasmodic diseases, as in tetanus, we desire its debilitating and relaxing effects, and we must keep the patient in the bath until these have taken place.

The *partial hot bath* is more frequently prescribed than the

general one. It is frequently used, in the form of fomentation, in cases of inflammation of the viscera of the chest, abdomen, and pelvis. It is used in those cases, because it relaxes the vessels of the skin, and brings the blood from the inner to the outer parts. It is likewise used in cases of phlegmonous inflammation, to assist the suppurative stage.

We have recourse to the pediluvium in many cases, for we find that the application of either heat or cold to the extremity of the circulation, so to speak, has very frequently more influence than when applied to the centre of it. The bathing of the feet, in hot water, will often bring out a cutaneous eruption which has been driven in, or which is struggling, to the injury of the system, to get out. This treatment will often bring back a receded gout; and, in suppression of the menses, painful menstruation, or suppression of the lochia, we do not possess a better remedy. In amenorrhœa, especially in young females who have not had an appearance of the menses, the bathing of the extremities frequently in hot water will sometimes have the effect of bringing on menstruation. In a tendency of blood to the head we trust much to a revulsion, by bathing the feet in hot water.

WARM BATH.—By the term warm bath is understood, as mentioned, a bath of a temperature between 85° and 98° Fahrenheit. This bath produces a most agreeable feeling of heat over the whole body. The pulse and the respiration are not increased. All unusual muscular motion, and all nervousness are repressed or calmed down, the skin is softened and relaxed, and the epidermis is in part detached. A person feels so comfortable in the warm bath, that he is unwilling to quit it. This feeling remains sometime after leaving the bath; he is easy, refreshed, and if not vigorous and powerful, yet active and alert both in body and in mind. As one of the effects of this bath is, to remove the epidermis, it consequently must make the body more liable to be affected with

atmospheric changes, especially that from warm to cold. And this is the case when one remains long in it, but, by a short continuance, the faculty of the body to develop caloric is stimulated, and consequently the system can better endure the cold.

It is stated, by some writers, that there is a great cutaneous absorption in this bath ; and Falconer has concluded from his experiments that about forty-eight ounces are absorbed in the hour. The absorption, however, depends upon the temperature of the bath, and upon the state of the system. If the temperature is high, the quantity of fluid perspired will exceed that absorbed ; and, in any temperature, if the body is already saturated with fluid, there will be no absorption.

USES OF THE WARM BATH.—As the warm bath is at first a stimulant, and as its relaxing effects do not take place for some time, it is not suited for inflammation of serous membranes. Hippocrates recommends it in pleurisy, but the practice is not followed. Celsus used it in dysentery, and in this disease as well as other inflammations of the mucous lining of the viscera of the abdomen and pelvis, we very frequently prescribe it.* In chronic rheumatism, it is the remedy in which we have most faith, and in syphilis, and in many cutaneous diseases, we trust very much to it, especially when containing salts or sulphuretted hydrogen. Whatever be the nature of the cutaneous disease, (and certainly the pathology of many of them is very little understood,) we never fail to prescribe the warm bath when the case is obstinate ; and it is very seldom that we find ourselves wrong. In spasmodic dis-

* “ Dans diverses affections des membranes muqueuses, les bains qui relâchent et épanouissent le peau, produisent souvent d’heureux effets.” Bichat, tom. ii. p. 532. Keeping in view that the natural termination of inflammation in mucous surfaces is by an increase of the discharge, whatever relaxes the ducts must ameliorate the symptoms. An intimate sympathy exists between the cutaneous and mucous surfaces, and where the one is relaxed so is the other.

eases great reliance is placed on the warm bath. It is the common application in the epilepsy of children ; and it is used in cases of ileus, and in colica pictonum. In children, the sympathy between the viscera and the skin appears to be greater than in the adult, and in all their diseases we find the relaxing of the surface, and the opening up of the exhalants, by means of the warm bath, of the most decided advantage. No one prescribes the cold bath, or even cold affusions in the febrile diseases of the infant. It is of great service in aggravated cases of hysteria in adults ; and in nervous fever, melancholy, hypochondriasis, chorea, &c. where the cold has been found on trial unsuccessful, the warm bath should, by all means, be tried. Where a person has been fatigued or worn out by great exertion, the warm bath refreshes and recruits the system, and the bather, on leaving it, feels almost his usual degree of lightness and activity. It allays irritability of the system, and frequently conduces to sleep. It has been recommended in the first stage of labour when the progress of dilatation is very slow ; but, in this country, it is not used. It has likewise been recommended to women of a particularly dry and irritable habit of body during gestation.

The great value of the warm bath, both general and local, is well known in surgery. We have recourse to it for bringing on that relaxation of the system which is so frequently desired by the surgeon for some particular purpose. He sometimes does not proceed to reduce a dislocation of the thigh or shoulder of a strong or powerful man, without previously subjecting him to the relaxing effect of the warm bath ; and he always gives a trial of the advantage to be derived from it, before he proceed to the operation for hernia. In these cases it is the debilitating effect that the surgeon desires, and therefore the patient must be kept a sufficient time in the bath in order to produce this. In diseases of the urinary organs, in retention of urine whether from disease of the kid-

neys, stones in the ureters, or spasm of the urethra, and in calculus, the greatest relief is often afforded by it.

TEPID BATH.—The tepid bath is generally of a temperature between 65° and 85° Fahrenheit. The tepid bath is seldom used generally, except to accustom the body, gradually, to bear the cold bath. The application of tepid water, in the form of a partial bath, is very common in fever. It is used in those cases where the heat of the skin is not very great, in cases of extreme weakness where the patient's constitution might not be able to endure the cold sponging, and in the cold stage, or the stage of collapse, where the application of cold water would be improper. By sponging with tepid water, the heat of the skin will be moderated, the pulse and respirations more regular, and the vessels of the skin relaxed, so as to give a healthy moisture. The patient, after this bathing, feels in every respect more comfortable; and this much may be said with regard to this species of bath, that there is no kind of fever, and no stage of it, in which it can do harm. By substituting the tepid water for cold, the system does not suffer any immediate abstraction of caloric, as in the application of the latter, but in consequence of the higher temperature of the first, its evaporation from the surface of the body is sooner completed, so that, by frequent renewals, its power in reducing the animal heat may be nearly equal to that of cold water.

VARIETIES OF THE WARM BATH.—1st. There are many *warm springs*, and there are many of these which contain a quantity of salts dissolved in the water. They are found of different temperatures, and holding different salts in solution. Where the saline warm baths can be found in the natural state, they should by all means be preferred; and where they cannot be obtained, the sea water, raised artificially to the required temperature, should be used, in preference to fresh water, as a tonic, in diseases of the skin, and

in all cases, indeed, where our object is not to obtain its debilitating effects. In some cases the principal substance may be an alkali, and the water therefore will have a more cleansing and opening effect on the skin ; or it may be aluminous or chalybeate, and in either case it will be more astringent and better adapted for diseases of debility attended with discharges.

2d. There are many springs which contain some preparation of sulphur, and, like the saline springs, some of these are found warm. The *sulphuretted waters* are much more powerful in opening the skin than the saline waters, and hence the sulphuretted waters, either as they are found warm, or raised to the proper temperature, are most frequently used in those diseases which have their cause in some irregularity of the function of the skin. In rheumatism, sciatica, gout, and cutaneous diseases, the warm sulphuretted waters will often succeed when every thing else has failed. The effect of both the saline and sulphuretted warm baths is much assisted by the internal use of the waters at the same time.

3d. Some waters contain an *animal matter* similar to gelatine, which renders them unctuous to the feel, so that they have received the name of soapy waters. Warm baths of vegetable and animal substances were at one time in considerable repute. Baths of water with marsh-mallow, baths with oil, with milk, *bains des tripes*, &c. have all been used, and have had their admirers amongst fanciful and whimsical men. Baths holding chlorine and the acids are prescribed in some cases.

VAPOUR BATH.—Next in extent of use to the bath of warm water, is that of water in the state of vapour. The temperature of vapour baths is much higher than those of water, because our bodies are much more affected by hot water than by hot vapour. The Russian will sit for an hour in a vapour bath of 150° Fahrenheit ; but the highest temperature of the hot water bath that can be endured is 113° Fahrenheit, and

that, according to the experiment of Lemonnier, could only be endured for 7 or 8 minutes. The inhabitant of Finland will sometimes remain more than half an hour in a vapour bath at 167° Fahrenheit.

The weight lost by perspiration, in a vapour bath, is much less than that lost in a hot water bath at a much lower temperature. Berger found, on weighing himself, four minutes and a half after quitting a vapour bath, at 122° Fahrenheit, in which he had remained twelve minutes and a half, that he had lost ten ounces and one grain; but Lemonnier found that, after remaining about eight minutes in a water bath at 113° Fahrenheit, he had lost twenty ounces. The effect of the vapour bath on the system is the same, according to the temperature of it, as the hot or warm water bath.

USES OF THE VAPOUR BATH.—It might be supposed that it would be merely a matter of convenience whether the water or vapour bath was used. The last, however, is preferred by many, and has been found to succeed where the other had failed. It is considered much more efficacious in many diseases of the skin, especially venereal eruptions, and in nodes, pains of the joints, &c. following that disease or the abuse of mercury. It has likewise been found more effective in the cure of rheumatism, and in paralysis, and impeded muscular motion. A vapour bath can be erected at a very small expense, at less even than a warm water bath.

DRY WARM BATH.—The atmospheric air raised to a higher temperature forms the last kind of bath. As the body can endure a vapour bath of a higher temperature than it can a water bath, so can it endure dry air raised to a much higher heat than it can humid air. A water bath at 113° Fahrenheit can be less easily borne than a vapour bath at 167° Fahr., and than a dry heat of 260° Fahrenheit. Blagden remained in a dry heat between 240° and 260° Fahrenheit, during eight minutes; but others have remained in a higher heat, and for

a much longer time.* Persons have exhibited themselves who could remain in an oven until a joint of meat was roasted. Had a cup of water been thrown in, they would have been obliged to beat a speedy retreat. The reason of this is, that dry air is a bad conductor; but vapour becoming condensed on the body conveys to it more readily the caloric.

The effects of this bath will depend upon the temperature at which it is used, and will correspond accordingly, in so far, with those of the hot or the warm water bath. There is, however, a difference in their action. The dry air bath is more stimulating to the surface of the body. It draws the blood to the skin, but it is not followed by the suppleness and the relaxing effects which are experienced from the vapour or water bath. It is applied commonly to the body surrounded with some covering; and as the air, prevented from escaping, becomes saturated with the evaporated sweat, it soon becomes, to all intents and purposes, a vapour bath. This is the reason why, whilst Blagden could remain at a very high heat in an *apartment*, a temperature of 98° to 100° Fahrenheit, given to the air, is found sufficient, in the ordinary bath, to produce copious perspiration, and to keep it up. Berger and Delaroche found that a dry heat of from 150° to 190° Fahrenheit, produced all the severest of the symptoms caused by the hot water bath of the highest degree which can be borne; but for therapeutical purposes, this heat is seldom necessary, and, from the way in which the bath is used, could not be endured for many minutes.

USES OF THE DRY-WARM BATH.—The dry heat is not much used in this country. As it is a stimulant to the skin, without, at the same time, being a relaxant; and, as the patient's skin is not removed from the oxygen of the air,

* Persons who subject themselves to great heats for money contrive to sit opposite a small aperture, through which they breathe the cold air. They likewise put on much woollen clothing, which serves as a defence.

this kind of bath would unquestionably be much better than the warm bath in cases of suspended animation from drowning, and in the suspended animation in newly-born children. Warmth is used in both these cases as a stimulant to excite or assist respiration ; and this action of the lungs would, in no trifling degree, be aided by the respiration of the skin, which cannot take place in the bath of hot water. What is the use of the friction which is used so steadily, and continued so long, in cases of asphyxia from drowning, if it be not to excite and open up the vessels of the skin, so that the atmospheric oxygen may have more action upon them ? In collapse of the system, the hot air bath, in consequence of its powerfully stimulating effects, and its power of restoring the blood to the vessels of the surface, will be found eminently successful. In the stage of collapse in cholera, it is the most efficient remedy. There is the advantage too in the warm air bath, that it is not necessary to move the patient. A wicker frame, or three or four pieces of hoop, serve to keep the bed-clothes sufficiently far off, and a stream of air heated as it passes along a tube, the end of which is inserted below the bed-clothes, may be directed upon the body. The whole of the body is not generally subjected to the hot air. The head is excluded, so that cold air is taken into the lungs.

The *partial* application of heat from a solid is often successfully used. The application of bottles of warm water, of warm brick-bats, of warm sand, of warmed flannel, &c. to the feet, the stomach, and other parts of the body, is well known, and frequently enough had recourse to, in cases of sinking of the powers of life, in the cold stage of fevers, and in local inflammations or spasms. These, in consequence of their density, are much better conductors of caloric, and cannot be used except at a temperature not only below dry air, but at a temperature even below that of the warm water bath. The greater the conduct-

ing power of any solid, and provided it be elevated to a temperature above that conveying the sensation of heat, the effect will be the greater. Sand will convey the sensation at a lower actual temperature than flannel ; a bottle of hot water at one lower than sand ; and a tin case of hot water at one still lower than the glass.

PRECAUTIONS WITH RESPECT TO THE DIFFERENT BATHS.

First. The importance of attending to the *period of the day*, both on account of the state of the body itself, and the temperature of the fluid to which it is exposed, has been already alluded to.

Second. Attention is demanded to the process of digestion ; and it may be taken as a general rule, that no kind of bath can be used except to the injury of the patient, at the time that the stomach is converting the food into chyme, or whilst there is “ a cargo of wine and good cheer in the belly,” as Baynard has it. During the progress of this operation, the blood is drawn from the surface to the abdominal viscera ; and there is a chilliness on the skin. If the cold bath is used at this time, re-action does not take place to a sufficient extent ; whilst, at the same time, the process of digestion is interrupted by the abstraction of the heat required by the stomach ; and headache, restlessness, and rigors are produced by the food laying in an organ which can neither perform its own functions nor get rid of the load in any other way. The warm bath is not so injurious, because though it brings an increase of fluid to the surface, it does not deprive the body of its heat, but bestows an additional quantity on it. The crapulous Romans sometimes used the hot bath, especially the hot air bath, with the view of stimulating digestion ; a copious perspiration was produced, the system made a demand upon the stomach, and it, excited too by the heat, speedily sent a supply of prepared food. But it was thus doing double duty, it was working double tides, and the sooner exhausted itself eventually. The warm

bath is occasionally of service in indigestion and dyspepsia, but it requires caution : the cold bath seldom is beneficial in these diseases.

Third. A matter of some importance is the sudden or gradual immersion of the body in the fluid. In cases where we desire that the shock of the cold bath shall be very powerful, the sudden immersion of the whole body will be the most effectual for that purpose ; but it is a practice not unattended with danger, and it has proven instantaneously fatal in some convulsive diseases where it has been tried ; and in some diseases of the large vessels, the sudden collection of blood at the diseased part has been followed by a rupture and death. The gradual immersion of the body both in the cold and the warm bath is preferable for *invalids* ; and in both also the head should be immersed for a short space as well as the rest of the body. In some cases headache is occasioned by immersing the head. Where that happens, of course, the practice is to be given up. The cold shower bath sometimes produces too powerful a shock, and it may therefore be necessary to diminish the height, to lessen the foramina, and to make the water somewhat tepid, or to make the invalid stand with his feet in warm water. In the case of the vapour and the hot air bath, the head is sometimes included, and sometimes not, so that the lungs may or may not be affected by the immediate contact of the fluid. In the case of inhaling the warm vapour, the heat of the body will be increased not only by contact with this fluid, but by the pulmonary exhalation or evaporation being diminished in proportion to the external moisture. By inhaling the warm dry air again, the evaporation from the lungs is increased, and consequently the body will endure a higher heat without sweating. The practitioner must be guided in each of these points by the effect on the patient. In most cases of pulmonary disease, the inhalation of dry hot air will be painful and injurious.

Fourth. A matter deserving of observation is the keeping up the same temperature, from the commencement to the termination of the time that the body is kept in the bath. This is especially to be observed with regard to the warm water, the vapour, and the hot bath. Frequently by the person not watching the thermometer the heat is raised too far. This frequently occurs in the vapour and dry hot-air baths, and in these last it is the more liable to happen from the heat being applied after the body has been placed in the bath.

Fifth. The period of time during which any one should remain in any of the baths, will depend upon the object for which the bath is prescribed, and the Physician will give his decision according as to whether he claims the assistance of the bath as a refrigerant, stimulant, tonic, sedative, relaxant, or debilitant. Where the stimulating and tonic properties of the cold bath are wanted, the patient should be removed from the bath before the stage of re-action is over. This may be the case in from three minutes to fifteen or twenty, according to the strength of the constitution. When the refrigerant and sedative effects are what we require—and that is the case generally when the animal heat is morbidly raised as in fever—the application of the cold water must be continued, until the heat of the skin and the strength and frequency of the pulse have been reduced. The stimulating, tonic, or soothing effect of the varieties of warm baths generally takes place from within ten to thirty minutes; extended beyond that, there is a likelihood that they may relax and weaken; but of course this will depend upon their temperature.

Sixth. The propriety of rest or exercise after the bath will depend upon the nature of the complaint. In general, exercise is to be recommended after the cold bath, in order to keep up or assist the stage of re-action; whilst rest has been always recommended after the use of the warm bath. Careful attention must be paid to the other non-naturals; and the remark

of Baynard, as to the use to which even the temporary benefits of bathing are turned by indiscreet patients, ought to be kept in the mind of the Physician, and the patient duly cautioned on this, and all similar errors: He says, in his usual broad way, of the cold bath, "It braces the nerves and relaxed membranes, and so fits their drum to beat a march to the next tavern, where they sit like so many *Turks* in their napkin turbans, and with Anti-Christian discourse over Christian wine, carefully spill nothing but their healths, and so, God knows, *mar many a good cure.*"

ACCESSORIES TO THE BATH.—There have been, in different nations, different practices accessory to the bath: thus, in this country, we only dry the body, or rub it with a hard towel or flesh brush, for a longer or a shorter time, after quitting the bath; in others again, the body is flagellated; in others, shampooing is had recourse to; and in others, ointments and cosmetics are applied to it. Friction, after the cold bath, keeps up the stage of excitement, or when it is past, the friction of the skin tends very much to restore the caloric of the body. Flagellation has the same effect. In the warm bath friction and flagellation stimulate the skin, and bring out the perspiration sooner. The rubbing of the skin, the pressure and kneading of the muscular parts of the body, and the stretching of the joints is entirely an eastern practice, and is performed by the attendants on the bath. It begets a most remarkable feeling of lightness, satisfaction, and pleasure, which continues for a long time, and increases the luxury of the bath. The anointing with ointment before going into the warm bath, once much practised, was intended to prevent the too copious perspiration; and this, as also soap, when used after the bath, was for the purpose of preserving the softness and suppleness of the skin. After being anointed, the body was carefully wiped, in order to remove the superabundance of the oil or grease which, by becoming rancid,

might engender disease of the skin. Epilatories, or ointments for destroying the hair, were in very common use after the baths of the ancients, and still are so in some of the Eastern countries. They are made of orpiment (yellow sulphuret of arsenic,) and chalk. They corrode the hair, but do not destroy the bulb and thereby prevent its growing again. Being so corrosive a substance, it would have been frequently dangerous had it not been applied in a very diluted form, and whilst the perspiration was very abundant so as to dilute it still more.

I cannot close this Lecture without referring to the valuable work of Dr. Currie, on the use of cold and warm water in Febrile Diseases. In that work, the author has occasion frequently to mention the leading theorists of the schools at the time—Cullen, Brown, and Darwin—and he is pleased to say, of the Zoonomia, that there is only “one mortal part in that immortal work.” The fashion and spirit of the age carried Currie along with them thus far, but whilst he spoke and argued on the theories of others, he was no theorist in his own sphere of observation and practice. It is now nearly forty years since his work first appeared ; and whilst those of Cullen, Brown, and Darwin, as tiresome as they are useless, are deservedly neglected, the student bends over the experience of Currie, with the same delight as the traveller in the desert rejoiceth over the solitary fountain which quenches his thirst, and makes one green and refreshing spot in the arid wilderness around. Nor, though disagreeing with many of the opinions in the *Ψυχρολογισμὸς* of Floyer and Baynard, can I omit noticing that most singular work, the “*History of Cold Bathing*,” which though more than a century and a quarter old, still deserves the perusal of the student. He will there find the cold bath supported by many most remarkable cures, as well as by many ingenious arguments, and not a little learning ; and added to these, he will have the benefit of the opi-

nions of Dr. Baynard, one of the most witty and caustic writers, of that age of wits, not only on bathing, but on the sources of health and dishealth generally. A glorious fellow he must have been, a wit and a scholar, and a fearful enemy to all shop-slops, nostrum-mongering, quackery, and professional charlatanry. To have "drunk a *bottle*," or "a cup of humming good liquor" with him, as did his friends Drs. Hodges and Panton, must have been a treat indeed.*

* Whilst these sheets were in the Press, a Medical friend pointed out to me a most valuable suggestion in Dr. Combe's Work, on "The Principles of Physiology applied to the Preservation of Health," viz. :—that, in the manufactories where there is an abundant supply of warm water, it would be advisable to have a bath or two erected for the use of the work people. I hope to see this followed up. It would be of immense service, and I have not the least doubt would give great satisfaction to the work people. Dr. Combe says, "Not only would these be useful in promoting health and cleanliness, but they would, by their refreshing and soothing influence, diminish the craving for stimulus which leads so many to the gin-shop; and, at the same time, calm the irritability of mind so apt to be induced by excessive labour." Ready as I am to acknowledge the benevolent intentions of the Legislature in every clause of the Factory Act, yet I believe the tepid or warm bath would be as beneficial to the children as *compulsory* attendance at schools, and I am sure they would prefer it. I have had a good deal of experience, from being attached to a public Medical Institution in a large manufacturing town, of the habits, as well as the diseases, of the manufacturing classes, and also the arrangements of the mills with regard to the health of the inmates; and I have always observed that where encouragement was given to personal cleanliness, and where neatness and cleanliness were enforced, in the machinery and the building, there was little sickness, and the work kept pace with the health. In many of the mills there are apartments appropriated as dressing rooms, so that the people may change their clothes on coming into and leaving the mill—there are water closets—a basin and towel and mirror for every so many girls--and a liberal supply of cold water for drinking and washing. I hope these liberal and humane manufacturers will add next a few warm baths from the steam of their engines. The steam engine has made those gorgeous and magnificent cloths and fabrics, which the poor labourer in the East once prepared for the high and the noble, the covering of almost the lowest peasants of Britain: What, if this same engine, whilst it clothes the British labourer with garments as rich and fine as those worn by the Kings of Tyre and Sidon, should likewise give him what was the next Eastern luxury and refinement---the warm bath!

LECTURE FIFTH.

CLOTHING.

THE object in clothing the body is, to prevent the abstraction of its caloric, to keep from it the rays of light and the heat of the sun, or to conceal such parts as modesty or fashion has declared improper to be exposed. The preventing the abstraction of the caloric will depend upon the conducting and radiating power of the clothing used, and the preventing the action of the caloric of the sun will depend upon the capacity of the clothing to conduct and absorb caloric. A very great deal will depend likewise, as to the warmth of the clothes, on the form in which they are made.

The substances used as clothing, from the *animal* kingdom, are fur, wool, silk, and prepared or dressed skins; from the *vegetable*, cotton and lint.

I. POWER OF THE DIFFERENT SUBSTANCES USED AS CLOTHING TO CONDUCT CALORIC.—Count Rumford was, I believe, the first who proved from experiment, that the different substances used for clothing have not the same conducting powers, and therefore that the worst conductor of caloric is the warmest clothing. The substances on which he tried his experiments were eider-down, hares' fur, beaver's fur, raw

silk, sheeps' wool, and cotton wool. The method in making the experiments was this. A mercurial thermometer whose bulb was about $\frac{5.5}{10.0}$ of an inch in diameter, and its tube about ten inches in length, was suspended in the axis of a cylindrical glass tube about $\frac{3}{4}$ of an inch in diameter, ending with a globe $1\frac{6}{10}$ inch in diameter, in such a manner that the centre of the bulb of the thermometer occupied the centre of the globe; and the space between the internal surface of the globe, and the surface of the bulb of the thermometer being filled with the substance whose conducting power was to be determined, the instrument was heated in boiling water, and afterwards being plunged into a freezing mixture of pounded ice and water, the times of cooling were observed and noted down. The tube of the thermometer was divided at every tenth degree from 0° or the point of freezing, to 80° that of boiling water. He found that the time required for the thermometer, surrounded with sixteen grains of each of these substances, to descend from 80° to 10° was as follows;

Hare's Fur	-	-	1,315 seconds
Eider-Down	-	-	1,305 „
Beaver's Fur	-	-	1,296 „
Raw Silk	-	-	1,284 „
Sheeps' Wool	-	-	1,118 „
Cotton Wool	-	-	1,046 „
Scrapings of fine Linen			1,032 „

whilst the thermometer, surrounded with air, descended from 80° to 10° in 576 seconds: and, the warmth of a body depending upon its power of resisting the passage of caloric, of course the substances which are longest of cooling in the above table are the warmest.

But, besides this, Count Rumford also proved that the conducting power increases with the density of the substance, the quantity of matter being the same. Sixteen grains of raw silk cooled from 80° to 10° in 1,284 seconds; but the

same weight of silk threads, cut into lengths, required only 917 seconds ; and the same weight of the silk thread wound closely round the thermometer bulb required only 904 seconds. Sixteen grains of lint required 1,032 seconds for the descent of the thermometer from 80° to 10° ; sixteen grains of linen thread wound round the bulb required 873 ; and sixteen grains of linen cloth wrapped round the bulb required only 783 seconds. The same was the case with the other substances in proportion. The harder, therefore, that the thread is spun, and the closer that the cloth is woven, the less warm it is, for it becomes by these means a better conductor of caloric.

The principal value of any cloth as a covering is, in Count Rumford's opinion, not so much in its non-conducting power, as in its retaining the *air* which has already acquired the temperature of the body. Now it is seen by the above experiments, that the warmest substances are the furs, and they are so, because they contain a large quantity of air intermingled with their fibres, which, when warmed, cannot get escaped so readily as from a smooth surface. In the same way a cloth with a nap upon it, is warmer than one which is smooth ; and consequently a cloth made of fibres which lie close together, as for instance linen, must be colder than one which has the fibres not adhering closely, as for instance woollen cloth, for the less the fibres adhere together the more non-conducting air will be amongst them.

According to Count Rumford, air is a non-conductor of heat ; for, though the particles of air are capable of *transporting* heat, yet as a fluid whose parts are at rest with each other, it is not capable of *conducting* or giving it a passage. The truth of this conclusion is not altogether admitted, but experiments prove that whatever obstructs the motion of the particles of air, renders the propagation of heat slower, and no-

thing can so much prevent the motion of the air as the fibres of fur. The finest furs, therefore, must be warmer than the coarser, because of the greater number of fibres on the same space, and the greater hindrance to the passage of the air.

The farther we advance towards high latitudes we find the fur of the different animals much longer and much closer, as for example, the Greenland dog and the hare. It is finer too in its filaments than the hair of the same animal in warm countries, which will allow of its being closer, and consequently the better prevent the passage of the air. Observe the difference in the covering of the African and the European sheep—the one is coarse hair, the other the finest wool. The European dog frequently loses his hair when carried to a very warm climate. Count Rumford is of opinion that an *attraction*, and a very strong one, actually subsists between the *particles of air* and the *fine hair or fur* of beasts, the feathers of birds, wool, &c. as appears by the obstinacy with which these substances retain the air in contact with them, even when immersed in water, and put under the receiver of an air pump. From the presence of the air amongst the fibres of the fur, we see how the beaver, the otter, and the bear, are able to take the water in the coldest weather, for the air not being dislodged, but merely compressed, not only assists to buoy the animal up, but prevents the abstraction of the caloric, by not allowing the cold water to come in contact with the body. We find in all the water-fowls—more especially those belonging to the arctic seas—that there is a very fine down below the feathers, or between them and the body of the animal, and this is particularly the case on the breast—the seat of the living fire.

In the different animals we likewise find that the hair on the belly is the most downy, and consequently the warmest; whilst on the sides and the back it is stronger and directed downwards, so as to prevent the escape of the air which other-

wise, from its elasticity, would soon take place, and consequently be succeeded by a fresh portion of cooler air. The whale, the walruss, the seal, and the bear could ill endure the cold of the polar seas, had nature not provided them with an armour of defence. The seal and the bear have their thick and hairy skins, the walruss and the whale have likewise their thick skins, and the two latter, as occupying more permanently a colder medium, have a layer of fat—a very bad conductor—ten times thicker around their flesh than the former.*

When it is said, however, that the harder the thread is spun, and the closer it is woven, the colder is the cloth, this is meant to apply to the same *weight* of the substance; for the thicker it is, or the greater quantity of material in the same space, the warmer it is. Count Rumford inclosed thirty-two grains, and then sixty-four grains of eider-down, in the same space in which he had inclosed sixteen grains in his first experiment, and found that the one required 1,472 seconds to cool from 70° to 10° , and the other 1,615 seconds. If, however, the thirty-two grains of eider-down, or the sixty-four, had been less closely packed, it would have been warmer, for it would have contained more non-conducting air.

II. POWER OF DIFFERENT SUBSTANCES USED IN CLOTHING, TO ABSORB, RADIATE, AND REFLECT CALORIC.—But, besides the conducting powers of the different substances used as clothing, we have to consider their powers of absorbing, radiating, and reflecting caloric, for on these, as well as on their resistance to the passage of heat, will depend their value as articles of clothing. It has been proven by the experiments of Franklin, Leslie, Davy, and others, that the

* “As all fat bodies are bad conductors of caloric, it contributes to the preservation of that of the body. Full persons in general suffer little, in winter, from cold.”—*Majendie's Physiology*, by Milligan, p. 446.

absorbing power of a substance mainly depends upon its colour, or at any rate that dark coloured substances absorb heat most. The experiment of placing pieces of different coloured cloth on the snow in the sun's rays is well known. The greater vegetation in a black mould over a calcareous or clayey soil, arises from the circumstance that the black soil is warmer from having absorbed a larger quantity of the rays of the sun, and the night during the vegetative period of the year being shorter with us than the day, the whole of the caloric is not radiated during the sun's absence. The vegetation is always ranker in valleys, low grounds, and the embouchures of rivers, in consequence of the soil, generally moist in these places, being a better absorbent of heat than a dry soil. The same Philosophers have likewise proven that, according to the power of a body to absorb caloric, is its power to radiate it, or that bodies which absorb heat most effectually radiate it in the same proportion. It has likewise been proven that the substances which are the best radiators of heat are the worst reflectors.

On these principles, therefore, light-coloured clothes ought to be worn in summer, and so indeed they are, but the wearers are wrong when they ascribe their coolness exclusively to the thinness and lightness of the stuff of which they are made. Philosophical tailors ought to inform their customers that the greater coolness of these garments depends upon their not absorbing the heat of the sun, but rather reflecting and turning it off. The public, however, err in using black or dark-coloured clothes in winter, for these radiate caloric to the greatest extent, and whilst they were improper in the heat of summer when the temperature of the air was higher than what was agreeable to the body, by *bringing* the heat to it, they are equally improper now when the temperature of the air is so much lower, by *carrying off* the caloric of the body. The funeral and professional garb of black therefore ought,

on true science, to be cashiered, and winter be decked out in the same light livery as summer. And we see nature herself illustrate the fact to us. The furs and the feathers of the quadrupeds and fowls of the arctic regions are, in general, white—or, at any rate, if they are coloured at their extremity, are white towards their root, and near the animal's skin; whilst in warm climates the furs and feathers of the same species are generally more or less coloured. We all speak of the "*golden* plumage of the East." In the Polar seas, and regions near to them, the furs change in some degree their hue, and the coat of the rein deer of Lapland, as well as of the Polar bear, becomes of a lighter colour when winter puts on her covering of white. The ermine, the hare, and the weasel assume a whiter fur, according as the severe coldness and snow of winter set in. Many of the birds and quadrupeds of cold regions have a fine light-coloured down close to the skin, distinct from the feathers or coarse hair. This is the case with most of the water fowls. The Cashmere goat is a singular example of the same. This is not so necessary to the beaver, and such as can inhabit the water, for they are, whilst in the water in winter, in a higher temperature than in the air. By this means these animals are defended from the great heat which sometimes occurs in the arctic region from the reflection of the sun's rays, and the length of his continuance above the horizon, and from losing their caloric by the great cold of winter. The earth too, which absorbs the caloric of summer, and consequently radiates it in proportion, would be entirely deprived of this caloric in winter, were it not that the snow which covers it for the greater part of that season in places where the air is coldest, is in the first place a bad conductor, from the quantity of air it contains in its loose texture, and in the second place the worst possible radiator. The caloric therefore is confined in the earth, and whilst the thermometer may be below 32°

Fahrenheit in the air, it will never, a little way below the earth's surface, sink below 58° Fahrenheit. While the air in Siberia, has been 70° below the freezing point, the surface of the earth protected by its covering of snow has seldom been colder than 32° Fahrenheit. It is by this wise provision of nature that the cold is prevented from destroying the roots of plants: and from the same cause, we explain how the wind blowing over snow or ice is so much colder than that blowing over the naked land or water. The traveller too in the Canadas will wrap himself in his cloak, and digging a hole in, or covering himself with, the snow, sleep soundly for hours, and rise refreshed and ready to continue his journey.

III. FORM OF CLOTHING.—With respect to the form in which the clothing is worn, we have, *first*, to consider its effect on the warmth of the dress; and, *second*, its influence on the healthy action and motion of the different parts of the body.

First. Dresses are divided into close and open. The open dress is worn by all nations situated in warm climates who use clothing, and the close by all those situated in cold climates. But a dress which sits quite close to the body is not so warm as one which is wider, for the latter contains in it a large quantity of air which will prevent the escape of the animal caloric. But it must, at the same time, be observed, that such clothing must be close at the upper parts, otherwise the rarefied air would escape and be succeeded by a fresh portion. The female lower dress must therefore be warmer than we at first suppose, for being fastened round the waist the air cannot escape, and rarefied air will not descend. The women of cold nations always make the *cinctus* tighter than those of warm nations who suspend the dress from the shoulder. In very cold countries, as for example Davis' Straits, the females use the same close dress as the males, as being the warmest. The

Germans who wore a close dress did not use a warm dress, unless we suppose that, as is the case with all those using the close dress now, it was tight only at the joints of the body so as to confine the air contained in it. The great object in the form of the dress is that it may be so made as to prevent the escape of the warmed air.

Second. In almost every nation pre-eminence of station in society is marked by the addition made to the body by dress. Nations differ in the forms of the different parts of the clothing, but in general that form is most preferred which can best conceal the person, and add most to the apparent size of it. A tight dress is despised, but a wide and flowing dress, especially robes, is considered fitting for the high and mighty. The only exception to this in a barbarous people, was the Germans, with whom, according to Tacitus, the chiefs and nobles were distinguished by their dress sitting close to, and showing the shape of, their bodies. The elevation of the body, or the overtopping every other person, has always been considered as the great mark of superiority; and although the head has a covering of its own, a hat may claim priority in invention to a pair of shoes. It will be long before a savage will cover his feet, but the head will generally be found, in the most uncivilized people, ornamented in some way or other. In the female race we find this passion, to increase the size of the person, most prominent, and although in the first fashion of our own country hoops and high head dresses have disappeared, they have only given place to deeply flounced gowns, and feathers in the hair. The dress of the European male is loudly censured, by those who pretend to a taste in these matters, as being *angular*, and they prefer, as the most becoming, the costume of the East. The present European dress is the close dress or the war dress of the ancients. If it be an objection in the eyes of the women that a handsome body should be shewn off to the best advan-

tage, then, by all means, let the males endeavour to accommodate themselves to the wide and flowing, and inconvenient and expensive dress of the East.

Dr. Willich, in his book on "Diet and Regimen" is a great enemy to tight dressing, and he ascribes a long list of disorders to this cause. He brings forward, in support of his opinions, a whole regiment of soldiers who were more cut up by their Colonel's admiration for stocks, tight waistbands, and garters, than by the play of the enemy's batteries. On the subject of breeches, the Doctor is particularly eloquent, and hauls forward a German who appears to have considered this article of clothing as one of supererogation, and from having perhaps lost his breeches, metaphorically speaking, wrote a whole book to prove that the garment is entirely useless. "Many of the remarks already suggested," says Willich, "respecting the form and substance of other parts of dress are likewise applicable to the article of breeches. Yet the ingenious observations lately published on this subject by Dr. Faust, an eminent physician in Germany, are by no means so conclusive, as to induce us to abandon an article of dress not only rendered necessary by the laws of decorum, but which, when properly constructed, is even of considerable service." Good heavens, give up our bréeches! No, neither for Dr. Faust, nor the still greater Mephistopheles; neither for Faust the disciple of the Devil, nor this Faust the disciple of Folly. "Tight and contracting leather breeches, purposely contrived to display an elegant shape of the limbs, are extremely inconvenient, occasion numbness and chilliness all over the hip and thigh, and a painful pressure of the pudenda." On the subject of shoes, Dr. Willich is equally minute, and here he gets hold of a Low German, the celebrated anatomist Camper, who, admiring the profession of King Crispin, wrote "a particular book," as Willich calls

it, on the proper form and size of shoes. One improvement which Dr. Willich takes the merit of, is the introducing the shoes made to the shape of each foot,—a little bit of mistake by the bye this assumption on his part. Yet there can be no doubt that much mischief and disease are occasioned by tight dressing. Formerly children were tied up like a hard bundle, as if nature had sent them into the world like a collection of loose threads; as if she had slung the parts of the human frame slackly together, and intended that the midwife should bouse all tight. “But now to tell,” says Baynard, “how many children have been destroyed by *Swathing* and *Rowling*, is a *black scene*. Hence most diseases of the Chest and Lungs, *Asthmas*, short *Breathings*, *Consumptions*, and all the coughing *Tribe*. Hence *crooked Backs*, *Buckle Hams*, *Baker Knees*, &c. Observe a child when it is *loose* and *unrowl’d*, before the nurse puts it to bed, how it plays with its little hands and legs, and is so pleas’d; and how sour and forward, when it is *buckl’d* up for a whole night’s *pain* and *torment*.” We have fortunately got nearly rid of all this. Protection is now given to the infant whilst it is without the aid of a glimmering of reason, but no sooner does it begin to shew symptoms of being able to judge for itself, no sooner does it begin to enjoy and make use of its muscles for its own benefit, than art is substituted for nature, and support tendered where artificial support is not required. Fortunately for themselves boys are left to chance and nature, but there is one part of a female’s dress which it is necessary to notice at some length, from its influence in begetting or keeping up disease, viz. stays. Dr. Fothergill has loudly anathematized tight stocks as the cause of apoplexy; but no part of dress has so often been called in question as the cause of disease, as tightly laced stays.

To know properly the injurious effects of tight stays, it is

necessary first to know something of the structure of the female chest, and of its motions in respiration.* A woman's waist always *appears* smaller in proportion to her size than a man's; but it is only in appearance, for we view it along with her chest and her pelvis, both of which are broader than the same parts of the male. The breadth of the female pelvis is well known, but the greater breadth of her chest than that of the male is contrary to the common opinion;† yet such is the fact, the chest is much broader anteriorly than the male's; but this breadth is not so much in the space contained within the ribs, as in the greater length of the clavicles, which, throwing the shoulders farther out, allow more room for the development of the female breasts.‡ A fine woman has no occasion for stays. There is an elegance given her by nature.

“ She is small by degrees, and beautifully less,
From the soft bosom to the slender waist;”

and then again, in a greater proportion does she expand, that the great object of her being may, with safety to herself, and to the child she is to give to the world, be fulfilled. The natural waist is that which is seen in the *Venus de Medici*, and agrees with the description given above; the waist which is so highly prized for its slimness, is that which is seen on too many of our most prized modern belles, and is the work not of nature but of art. Look narrowly, however, on this

* For the best description, see Soemmering “*De Corporis Humani Fabrica*,” tom. i. p. 56; and Bichat “*Traité d' Anatomie Descriptive*,” tom. i. p. 255 and 263.

† Soemmering notices it, ---“*Thorax supra vel ad quartam costam usque paullo amplior.*”

‡ A man's shoulders are broad, a woman's narrow, but, on the other hand, the space from acromion to acromion anteriorly is greater in the woman, so that her chest is broader before. This structure of the upper part of the body of the male gives him a great advantage in his arms, as to strength and propulsive force, over the female; but she again has, from the same cause, more grace. A woman throwing a stone, or fighting, is awkward, because

fine waisted lady, and you will find that her chest is thrown out anteriorly ;* or her belly projects considerably, or she is sallow and sickly. The chest is naturally wider from side to side than it is from before to behind, but, by compression, the sides are brought nearer together so as to make the chest round. The lower part is most compressed, and the upper part and the belly are forced forward. To understand how the belly is made to project, it is necessary to know the dilatations of the chest in respiration. They are three. The chest dilates from side to side, from before to behind, and from above to below. The two first are connected together, and are the most extensive and important. The ribs are raised by the intercostals, their lower edges are turned more outwards, and, at the same time, from their connexion with the sternum, their motion gives it a tilt forward, especially at its lower part. This is the transverse and forward motion. At the same time with the dilatation in these two ways, the lateral fleshy part of the diaphragm is descending and enlarging the chest perpendicularly.

Now, when the chest is strongly girt with stays, the two first motions are destroyed, and the female breathes by means of the diaphragm alone ; in the same way as a person breathes who has fractured a rib and is tightly bandaged, or who dare not breathe fully and naturally owing to the pain occasioned

she was not made for these purposes, but the bend, or curve, of her arms, when opening them to receive the object of her love, is beautiful.

* The breasts are confined and flattened, and she is unable frequently to nurse. Baynard says, " these deficiencies in a Mother are chiefly owing to her *Parents*, who must have Miss fine, and tight lac'd, for a *slender* Waist, or a *Ball*, or a dancing *Bout*, &c. ; hence the nipples are squeezed in, and the whole breast laid flat, when young. Thus the glands are pressed and injured, and made incapable, *fungi officio*, in lactifying and sweetening the blood into that delicate *Juice* called milk, and sometimes worse accidents attend these tight lacings, as *Cancer*, *Schirrous*, and hard *Tumours* in the Breasts."—Hist. of Cold Bathing, 4th ed. p. 339.

by the displacement of the fractured ends of the bones. As the diaphragm, therefore, has the sole duty of enlarging the chest, it must descend lower ; and hence pressing unnaturally on the viscera, it causes them to push forward the parietes of the abdomen as the most yielding part, and this pressure ultimately must beget disease in the viscera themselves. This is evil enough of itself : no one, with a tumour pressing almost constantly on important organs like the stomach and liver, can be well. But the greatest mischief is still to be mentioned. The free expansion of the lungs is impeded, and the breathing is short and quick. A sufficiency of air cannot get an entry. The blood, therefore, is not sufficiently oxygenized. Here then we have, from the pressure on the abdominal viscera, those affections of the stomach, the liver, the spleen, and the uterine system : here too, we have, from the compression of the lungs, and un-oxygenized blood, phthisis, hæmoptysis, sallowness and paleness of the skin. Dr. Bree informs us that asthmatics are colder than other individuals. What is the cause of this ? It is because the organization of the chest or its contents do not admit the quantity of air to keep up the healthy temperature. A fine lady is an artificial asthmatic. She is pale and more subject to the effects of external cold, because her lungs cannot get enough of oxygen, and she is cold for the same reason, and because she is pale, for it is proved by Dumas and Prevost that the animal heat is in proportion to the quantity of red globules in the blood.*

But we are not yet done with the sins of stays. Why do so many fashionable ladies “stand awry ?” Why have we

* The lower temperature of Ceruleans, or those with whom the *foramen ovale* remains open, is well known. When, from any cause, the conversion of the venous into the arterial blood is impeded, the temperature falls—such is the case, according to Hunter, in fainting, and according to Godwin in drowning ; the same likewise follows breathing carbonic acid.

so many crooked spines? It comes of wearing stays. The muscles that support the spine are strong and powerful ; and the more they are exercised by the frolicking and free motions of growing youth, the stronger they become. When Miss is bound in stays, these muscles, like those of a bandaged leg, are diminished in size and strength ; and she certainly has a slimmer body : but no mechanical contrivance of support is equal to God's handiwork ; stays are not equal to muscles. Miss's head, though in one sense perhaps light enough, is now too heavy for her vertebral column to bear, and she bends under it. Or, if she will add accomplishments to a slim waist, leaning over the harp or the portfolio, she speedily gives the spine, now composed merely of bones slightly bound together, a hitch to one side.

There is not one boy in a thousand with crooked spine. Nor is it likely to be so, for other reasons besides exercise of muscles. With man whose lot is to labour, the broad articulating surfaces of the different bones are kept in their proper places by strong ligaments, and the powerful tendons of muscles. In the girl, again—in the female intended by nature for the most free and beautiful motions, for the agile, flexile, and most lovely bendings and writhings, the articulating surfaces are small, the ligaments lax and supple, but the comparative weakness of joints is compensated for by the fineness of poise given by muscles governed by the most acute and delicate nervous sensibility. Destroy these muscles, (or injure that fine nervous sensibility,) which had another use besides giving mere roundness and beauty of mould, and the woman becomes, in reality, an ill-jointed machine ; she shakes and falls to this side or that according to the laws of gravity.

Much was said lately about the distortions caused in the different manufactories, by men who knew only about the matter from their reveries in their own closets. I have very seldom seen distortions in the mill people, and these almost

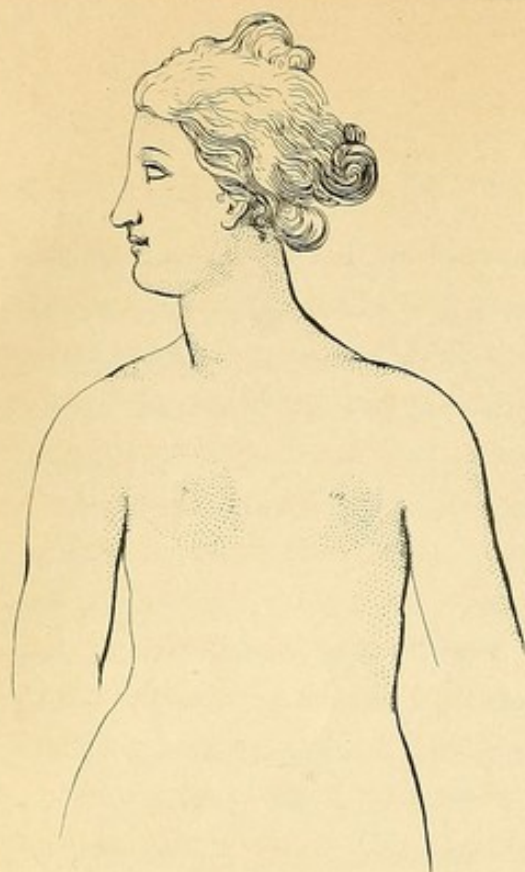


Fig. 1

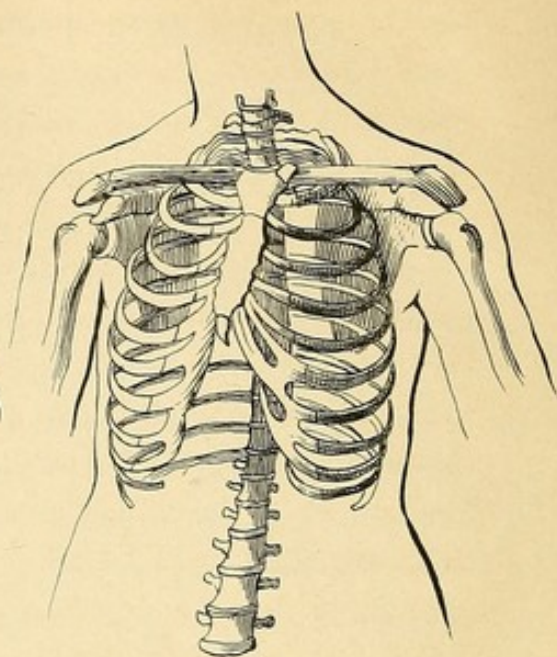


Fig. 2.



Fig. 3.

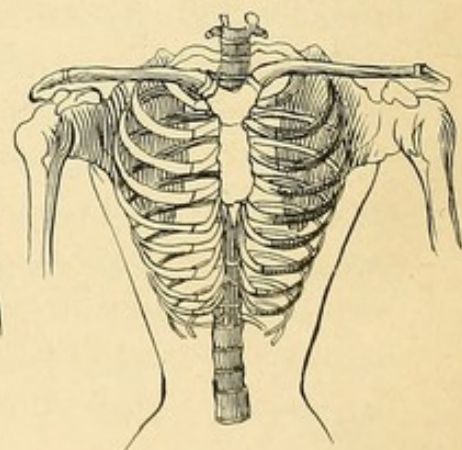


Fig. 4.

Fig. 1 is an outline of the famous statue of the Venus de Medici, and may be considered as the *beau ideal* of a fine female figure.

Fig. 2 is the skeleton of a similar figure, with the bones in their natural position.

Fig. 3 is an outline of the figure of a modern "boarding-school miss," after it has been permanently remodelled by stays.

Fig. 4 is the skeleton belonging to such a figure as No. 3.

S. Leith Lith.

invariably belonged to the individual before going to the work ; whereas it is now a matter of notoriety, that there is scarcely a young girl in a fashionable boarding school whose spine is not morbidly crooked. All the girls in the mills are engaged more or less in muscular exercise, and most of them are obliged to work with their clothes *free* and *loose* upon them, so as not to impede their exertions. Many of them possess a finer carriage than a young lady who has squandered much of her money as well as her health on the Posture Master. It is not distortion of the person that is to be dreaded in the mills ; it is exhausting labour, and a vitiated atmosphere. Yet I hold a young lady in a boarding school, as many of these institutions are at present conducted, as in a worse condition than the Factory girl ; for continued mental irritation, (miscalled application,) close confinement, tight stays, slops and hashes, are more injurious than even ten hours labour.

The accompanying figures exhibit the effect of the long-continued use of stays in altering the shape of the female chest. In making *post mortem* examinations of young women, I have frequently had occasion to point out to those around me at the time, the alteration from the natural conical shape of the chest. The figures are given in the Penny Magazine for February, 1833 ; and are copied from a work by Soemmering on the effects of stays.* Dr. Willich's complaint with respect to tight dressing in the army was at that time deserved ; soldiers stiff and firm as pasteboard were the order of the day. Now we are come to somewhat more correct notions ; and it is discovered that the finest looking fellows in the service are those whose different muscles have been most extensively called into play by different exercises. Even yet, how-

* See his *Anatomia*, tom. i. p. 82, where he also refers to his work,—
“ Von den Schnürbrüsten, ed. secund, 1793.”

ever, there is room for improvement, more especially as regards the soldier's dress in the different climates of our Colonies. It ought to be considered whether the weighty dress used in Britain is suited for the West and East Indies.

SUBSTANCES USED AS CLOTHING.—I. *Fur*.—Fur is the worst conductor of heat, and consequently the warmest substance. Furs, however, cannot be easily washed; and as they must be frequently renewed, they never can be adapted to general use. They contain, besides, a disagreeable oil, amongst the roots of the hair, or in the hair itself, which cannot be removed in many cases without altogether spoiling the fur: owing to this, and to their absorbing the perspiration, they cannot be worn near the skin, for any length of time, without becoming of a very disagreeable smell, and ultimately irritating to the surface of the body.

The prepared skin, or the skin of the animal with the hair removed, is sometimes an article of clothing. The chamois leather is the most commonly used, especially as a substitute for flannel. It does not produce the itching and irritation which flannel sometimes does; but it is not so warm as the flannel. It does not absorb the perspiration so well and safely, and it keeps the moisture as well as the air at the surface of the body. I have known patients subject to chronic rheumatism find much more benefit from the chamois leather than from flannel; and it may be explained by the circumstance that the *exhaled moisture* is by it retained as a warm vapour around the skin.

II. *Silk*.—The silk, in its unspun state, is not a good conductor of caloric, yet when spun it is not nearly so warm as the clothes made of sheep's wool, or cotton wool, for its fibres lie closer in the thread, and consequently being denser it must conduct better. Besides it is too expensive, and will not easily wash. It is not suited for a dress near the skin.

III. *Wool*.—The wool of the sheep is manufactured into

what is called, *par excellence*--Cloth. The cloth is of different fineness, depending in part upon the wool, and in part upon the spinning, weaving, and dressing of it. The merino sheep, which affords the finest wool, will give, on an average, only two pounds, or two and a half; the coarser breed will give three, four, or five pounds. The difference is owing to the fineness of the separate filaments. The thread spun from the coarse wool may be as slender as that from the fine, but it will not be so soft nor so strong. The cloth made of the fine wool will therefore be much superior to the coarse, and as in its internal structure it is not so hard, the fine cloth will be warmer than the coarse, provided their weight is equal. But, however fine the wool is, or however closely it is spun and closely woven, still the filaments of the wool cannot be made to lie close together; they stand out irregularly, and give the texture formed of it the appearance of only a fine short fur. It is this which makes it so valuable as an article of clothing. Occasionally the *hair* of the goat is met with, so fine and soft as to be equal to wool in warmth: thus the Cachemire goat gives a fine hair or down below its long hair, which is even superior to the wool of the finest merino sheep.

IV. & V. *Cotton* and *Linen*.—These are both better conductors of caloric than the preceding, and therefore colder, but they contain no oil in them, and they are easily cleaned, and hence they are preferred, especially as the covering immediately in contact with the skin. The cotton is warmer than the linen, because its fibres do not lie so close together, or because it is not so dense.

FLANNEL NEXT THE SKIN.—Much has been said and written about the substance to be applied next the skin. Medical men were at one time divided into flannelists and anti-flannelists, and even yet, the public are not at one upon the subject. Were we to be guided in this point by common sense, and the common practice of those who have nothing

but common sense, and their own feelings to guide them, the question would soon be settled ; but we are the blind worshippers of science, and unfortunately too often trust to the follies which are sent forth from those who pretend to be her priests. Those who are left to their own choice, would have recourse to flannel as being comfortable and warm ; but some learned physicians finding that, in many of those who wear flannel, cutaneous diseases and vermin have made their appearance, have denounced flannel as the cause ; and all the mob have eschewed flannel in order to avoid cutaneous diseases and lice. This error in practice depends upon a very lousy observation. It is not denied that cutaneous diseases and vermin have appeared in those who wear flannel ; but they have also made their appearance in those who use linen. Perhaps they do not occur so often, and the reason is, that linen is oftener changed, because dirt is more readily seen upon it. Those who discovered cutaneous diseases and lice amongst the poor who wore flannel piqued themselves upon their discovery ; but the want of a washing tub and soap never entered into their heads as the cause of these diseases ; flannel, clean and dirty, suffered their anathema alike, and, instead of oftener changing the flannel, the public gave up this covering, and all the advantages belonging to it.

But the enemies of flannel required to give some reason why flannel should beget cutaneous disease ; and they said it was because it promoted perspiration. The student, however, is well aware that cutaneous diseases do not arise from increased perspiration, but in ninety-nine cases out of the hundred have their origin in suppressed perspiration ; and he knows too that the medicines in such cases are those that will increase the perspiration—antimony, mercury, the warm bath, &c. The explanation, therefore, is as incorrect as the fact assumed. Flannel, provided it is kept clean, (and really from its absorbable texture it ought to be oftener changed

than even now-a-days it is,) no more begets cutaneous disease than linen or cotton.

It is very true, that, when applied for the *first time* to the skin, flannel creates in some a feeling as if animalcules were crawling upon the body, in others it begets an itching and uneasiness, and in others with a very delicate or irritable skin it sometimes sends out an eruption of papulæ: this arises from the projection of its fibres, and the irregularity with which they touch the skin. It only occurs in those who put on flannel after they have grown up to the adult state, and it wears off in a few days; or at any rate the eruption disappears when the flannel has been left off.

The opponents of flannel likewise said that it was injurious, by increasing the perspiration and weakening the body. This is not true. Flannel does not increase the perspiration; but it prevents the perspired fluid from rapidly evaporating and carrying off the caloric to the injury of the body. Flannel is the best covering wherever the body is exposed to such a temperature, or to such exercise, as will increase the perspiration. From its keeping a large quantity of non-conducting air in its fibres, there is always a warm and moist atmosphere surrounding the body; but when cotton or linen is worn, there is less non-conducting air between them and the skin, and these substances having besides a greater conducting power, and a greater attraction for water, the perspired fluid is taken into them, the heat passes off, and the covering having now become a still better conductor by being wetted, is left cold and clammy on the skin. It is not so dangerous to sleep in damp blankets as in damp sheets. It is by constantly wearing flannel shirts, that the workmen in potteries, foundries, &c. preserve their health, though the temperature, out of doors, is more than 60° Fahrenheit below what it is within; whilst Miss, perspiring in her linen chemise, catches her death by quitting a heated ball-room. The great value

of flannel is, that it keeps the body, under all circumstances, the most equable in its heat. It is the substance which best protects it from heat or cold, which would injure it; and by thus keeping the surface of the body always in the same state, it prevents those numerous visceral diseases which arise, either from the sympathy of these viscera with the skin, or the increased or diminished quantity of blood in them, according as it may be sent inwards by cold, or derived to the surface by heat. In the prevention of cholera, flannel was of benefit by keeping up the cutaneous discharge and temperature, and thereby preventing that derangement of the bowels which is so general a sequence of cold applied to the surface. Sailors, in a great measure, owe their health in all changes of climate, often sudden enough, to the general practice amongst them of wearing flannel shirts.

It has likewise been brought forward as an argument against flannel, that it imbibes infection very rapidly, and retains it for a long time. No one will say, however, that other clothing does not absorb contagion likewise, for it is well known that the plague has been carried from one place to another repeatedly by bags of cotton. This, then, is merely, at the most, a question of greater or less; and even if it did imbibe infection more than other textures, this would not be sufficient to debar its use, unless where contagion is present or dreaded.

These and a great many more objections were made to the use of flannel next the skin, by the anti-flannelists. It was the fashion to decry it, during the last century, even by non-medical writers.*

* Voltaire, I think it is, gave his authority indirectly against flannel. Speaking of the customs and usages in the time of Charlemagne, after mentioning that silk and linen were much used, he says,—“Saint Boniface, dans une lettre a un Evêque d’Allemagne, lui mande qu’ il envoie du drap à longs poils pour se laver a pieds.” The historian then adds his comment,—

Of late, however, it has been found, that the only advantage of cotton over flannel is, that it is cleaner, and the only advantage of linen over cotton is, that it gets whiter instead of darker, by repeated washing and bleaching ; that it is more pleasant to the eye, and has a peculiar "cauler smell," which even cotton has not. Let any one try on a cotton shirt the one day, and a linen one the next, and he will soon know which is the coolest. The texture and colour of a lady's petticoat and a gentleman's unmentionables are matters of grave experiment to Fellows of the Royal Society ; and they can now prove that the anti-flannelists are all wrong, and that flannel should be worn, as it usually is, in a warm country, to keep the caloric of the sun out,—and in a cold country, to keep the caloric of the body in. It is used by the resident in the East and West Indies, as it is by the resident in Russia and Denmark.* Flannel, therefore,

" Probablement ce manque de linge étoit le cause de tout ces maladies de la peau, connues sous le nom de *lèpres* si general alors ; car les hopitaux nommés *Leproseries* étoient déjà tres nombreux."

* Major Laing travelled from Free Town into the interior of Africa, in a flannel jacket and trowsers ; and in Denham and Clapperton's Travels, Major Denham says,—" On the 23d of April the heat was insufferable ; for several hours in the middle of the day, the thermometer was as high as 113°. *Covering myself up with all the blankets I could find* afforded me the greatest relief,---these defending me from the power of the sun, as well as from the flies. Occasionally making my negro pour cold water on my head was another indescribable comfort."---P. 156. What was this but defending the body as a man defends an ice house by a roof of thatch, which is a bad conductor of heat. The water cooled by carrying off the caloric in evaporation. " In some of the upper provinces of Bengal, where the summer is intensely hot, and the winter sharp, the dress of the native shepherds, who are exposed to all weathers, consists in a blanket gathered in at one end, which goes over the head, the rest hanging down on all sides like a cloak. This answers the triple purpose of a *chattah* in summer, to keep out the heat--- of a tent in the rainy season, to throw off the wet---and of a coat in the winter, to defend the body from the piercing cold. Hence our ridicule of the Portuguese and Spaniards, in various parts of the world, for wearing their long black cloaks in summer, ' to keep them cool,' is founded on pre-

should in every case be preferred as the covering next the skin ; for, in summer, it defends the body from the external heat ; and, in winter, it defends it from the external cold ; and if at any time the body is covered with perspiration, it prevents the too quick evaporation of this fluid, and the consequent sudden decrease of the caloric of the system, which is so frequently the cause of disease.

CLOTHING AS AN AGENT IN THERAPEUTICS.—The influence of particular kinds of clothing in the removal of disease is by no means trifling ; but the influence of clothing in the preservation of health is of the greatest magnitude. Yet there is no part of Hygiene in which there has been more error, from the raw and undigested opinions of theoretical men or careless observers. One of these errors it will be necessary to consider at some length, because of its most mischievous effects on the community.

There has a maxim long prevailed, that the body should be reared in the most *hardy* manner, so as to be able to endure every vicissitude of weather ; and the method followed to ensure this hardness of the system is, to expose the body as much as possible to the action of the air, whatever may be its moisture, or heat. We see the plants of the northern or cold climates strong and hardy ; and why should not the human body get hardy in the same manner, by exposure to the atmosphere ? Inure the body to it from infancy, they cry ; and then they boldly appeal to the children of the poor, as the hardy human plants of the climate.

Now, the matter comes to this : Is it better to have a very scanty population which is able to endure all the vicissitudes of weather, or to have a numerous and abundant population,

judice rather than considerate observation."---Johnson on Tropical Climates, 2d edit. p. 336.---Unquestionably the *black* is objectionable.

which, by proper clothing, &c. can defend itself against the injurious effects of cold and moisture? I do not deny but that, by gradual seasoning, the body will be brought to endure every change of season without injury; but how few are they who pass through the trial, and who, to provide for that which can be, by other means, obtained, would hazard the experiment? The example of the children of the poor is not a fair one. No doubt we see many hardy persons reared from amongst them, but then we forget how many deaths have taken place, which would not have been the case had they been kept warm. Mr Wilmot Horton stated in Parliament, session 1829, that one half the children of the poor of London die before twelve years of age; and Charles Dupin stated in the French Chamber, session 1829, that out of 73,000 foundlings, 30,000 died before twelve years of age.

A late writer on the diseases of children says,—“It is a subject of very common observation, that children who have been inured to cold, and brought up hardily (as it is called), are the strongest in adult age, and this has induced many parents to expose their children thinly clad to all the severities of weather. It is in part true, since children who survive the seasoning are generally strongest. The original strength of their constitution probably enabled them to bear it in the first instance; and if they are able to encounter it in early life, they will in some measure lose the susceptibility of being readily affected by changes of temperature afterwards. But *all medical men*, who have had opportunities of attending much to the diseases of children, must have observed that those families in which children are least exposed to cold in winter are generally most healthy; whilst those who act on the erroneous principle of hardening them, by the exposure of their tender bodies to severe weather, are scarcely ever free from disease of some kind. Disorders which might otherwise have remained dormant are thus

brought into activity by this mode of treating children, and many fall sacrifices to pulmonary consumption and scrofulous complaints, in more advanced life, from this error alone, of being exposed in childhood to cold, with the intention of being made strong and hardy." He then adds,—“ The present fashion of clothing young children, founded upon the same erroneous notion of hardening them, is also very injurious to their health. Their arms and chests are entirely uncovered. They generally wear no stockings at all ; and from the stomach downwards they are almost in a state of nudity.”—Clarke, p. 10 and 11.

A chubby child in this dress, in a drawing-room, is no doubt a pretty sight ; and the guests tickle the mamma by patting the cheeks and bare necks of the sweet little masters and misses ; but there cannot be a more infamous practice than that of sending young children out with their arms, their necks and breasts, and their legs, exposed almost wholly to the influence of a cold and dry, or cold and moist day. Mamma will not budge without her shawl, and furs, and flannels ; but as to a piece of flannel about any of the children, unless when they are really sick, she would as soon think of wrapping them in a Cachemire shawl, or a Siberian fur. When the children thus rearing on the hardy system are looked at on the street, their bodies are observed to be blue, from the congestion of the blood by the cold ; and when they get within doors again, they rush pell mell to the fire, and heat themselves as rapidly as they can.

That the younger the child is, the more liable it is to be affected by cold, is evident from this,—that the temperature of their bodies is less than that of the adult. Twenty adults gave, according to the experiment of Dr. Edwards, the mean temperature of $36^{\circ} 12'$ Cent. Ten infants, some hours after birth, gave the mean temperature of $34^{\circ} 75'$ Cent. We cannot therefore decide, from our feelings, how the atmospheric

temperature may affect the young. Whenever it is *disagreeable* to us, we may be certain that it will be *injurious* to them. And it is to this great susceptibility to cold we may ascribe the great mortality that prevails amongst children. If we look to the creatures of instinct, we find them exhibiting the law, that the younger the animal is, the warmer does it require to be kept. The feathered tribe line their nests with the warmest substances; they pluck the down from their own breasts to form the warmest bed; they bring forth their young only in the spring and the summer; the mother, by sitting upon them, furnishes them with a portion of caloric, which, by huddling together, they retain in the fine down that covers their bodies, whilst in her short absences she is seeking for their food; and she does not forsake them until they are clothed with a garment of feathers, until they have taken to themselves wings and fled away in the breath of the summer morning. And we have reason over the brutes, and what hath it availed us? “*L’instincte porte les mères à tenir leurs enfans chaudement. Des philosophes par des raisonnemens plus ou moins specieux, les ont engagées à différent epoques et dans divers pays, à s’écarter de ce principe, en leur persuadent que le froid extérieur fortifierait la constitution des enfans, comme il fait celle des adults.*”—Edwards. Let us except one modern Philosopher. Hunter said, “let an infant have plenty of sleep, plenty of milk, and plenty of *flannel*.” He would have made the aphorism perfect had he added that which is not less important than any of these, plenty of pure air.* Warm clothing is principally a pro-

* See also Fœdere, tom. v. p. 38. “I believe that more than one-half of the deaths, and two-thirds of the diseases, that occur amongst the children of the poor are more or less caused by cold.”—Copland’s Dictionary of Practical Medicine, p. 357. Dr. Milne Edwards states, on the unquestionable authority of returns, that of the deaths of the children of France, the greatest proportion is in winter, in consequence of their being exposed to cold whilst being carried, as the law directs, to the *Maire* in order to be registered. The deaths are more numerous in the North than the South of France, and in the country than in towns.

phylactic. There are some diseases, as for instance rheumatism, acute and chronic, rheumatic gout, and some others, principally of a chronic character, in which the patient will precede medical advice by taking to flannel next the skin, but in most of those cases where the physician has to prescribe warm clothing—and I mean more especially flannel nearest the skin—he prescribes it as the means of removing the remote cause of disease, and preventing it in future. No patient in a state of debility, from whatever disease, should be allowed to leave his room without flannel next his skin ; and in all pulmonary complaints, the man who values the life of the patient put in confidence under his charge, will never allow that patient again to go into the open air without a complete covering of flannel next his skin. I am certain phthisis is not so common in the middle ranks of life as it was ; and I am likewise certain that this is entirely owing to the wearing of flannel having become more common with the young of the present day.* Patients will often say they cannot wear flannel. It is intolerable to their skins. They should be told this will wear off in a few days, and then let them weigh a few days uneasiness against death. In young ladies, especially, there is in general a perfect abhorrence of flannel. They see their mammas and other married ladies wearing it, and they are of opinion that it belongs peculiarly to the married state. They would as soon that their lovers knew that they had clumsy legs, or distorted spine, as that they wore a flannel jacket or shift. Yet to them we must, equally as to young men, insist upon the use of flannel ; and

* “ The fatality of consumption has begun to diminish in regard to the general population of London. At the close of the last century the deaths from this disease had gradually increased from about 15 per cent. to 26 per cent. of the total mortality. From 1799 to 1808 they still increased, being then above 27 per cent. From 1808 to 1818 they, however, declined to 23 per cent. ; and from 1818 to 1825 they have become still less numerous, being at length only 22 per cent. nearly the same proportion as at Paris : at Vienna it is about 17 per cent.”—Hawkins’ Medical Statistics.

if arguments should fail, the physician should demand the aid of parental authority to enforce his unalterable decree.

Lastly, as in this climate, we may have on any day of July the thermometer at one time at 79° Fahrenheit, and at another time of the same day at 49° Fahrenheit, as no one can promise that he will not be frost-bitten or burned alive, the best, the safest, and the surest way is to wear flannel constantly next the skin, for it will keep the temperature, under all circumstances, the most equable.*

NIGHT CLOTHING.—Nor ought the attention be less to our clothing during night, or whilst asleep, than during day or whilst awake. More clothing is required during sleep than whilst we are awake. In consequence of the recumbent position which we assume, for the purpose of giving support to the greatest extent of the surface of the body, there is, according to the experiments of Legallois, a less quantity of oxygen consumed ; and whilst this will promote the drowsiness or sleep, there will, from the same circumstance, be a less extrication of caloric, and the body will therefore be more liable to be affected by cold. “ During sleep all the internal functions become more marked and are in full action, and whilst the sensibility of the mucous membrane is highly excited in consequence, the skin seems to be struck with a sort of atony ; it cools much sooner and allows less fluid to escape from it.” (Bichat, tom. ii. p. 513.) As to the secretion from the skin Bichat is not correct, for it is believed to be more abundant whilst we are asleep, but whether it be

* According to Mr. Kirwan, “ the *most usual* variations of temperature within the space of twenty-four hours in every month are,

January, 6°.	May, 14°.
December, 6°.	October, 14°.
February, 8°.	August, 15°.
November, 9°.	April, 18°.
July, 10°.	September, 18°.
June, 12°.	March, 20°.

thence the origin of vernal and autumnal colds.”

more or less in quantity, it is always much *more concentrated*; it becomes more sensible to the smell, and is more acrid when its application is continued at the surface of the body. The fact of the skin being more easily affected by cold during sleep is explained by Legallois, and proves that whatever may be the activity in the other functions, that of the lungs is diminished.*

Many delicate people are compelled to sleep in blankets, but, unless in cases of disease or of general feebleness imperiously demanding this, the sleeping in sheets is to be preferred, because they can be easily aired, and for appearances' sake, if nothing more, they are frequently washed, whereas the cleaning of blankets is a more troublesome affair, and therefore seldomer attended to. I likewise would strenuously advise all those who wear flannels next the skin to lay them off during the night, because as any addition may be easily made to the bedclothes, there is not much chance of suffering from cold during the night; and by laying off the flannels, there is not only the advantage of having them well aired instead of soaked with the nocturnal perspiration,

* Dr. Milligan, the Translator of Majendie's Elements of Physiology, furnishes us with the following note on this subject. "In Dr. Corden Thomson's experiments upon human heat, it was found that there is no difference whatever between the heat of a walking and a sleeping man (P. ult.); but that, *in those hours wherein sleep usually takes place*, viz. from 12 P.M. till morning, particularly in *summer*, (for in winter it is little changed,) the heat falls about one degree; and this the Doctor thinks may account for the mistake of J. Hunter, who says, (*An. Econ.* 101) "when a man is asleep he is colder than when awake, the difference in general, I find, is $1\frac{1}{2}$ degrees, more or less." It must be confessed, however, that in sleep the power of *resisting cold is less*, and therefore a sensation of cold usually perceived when awaking from sleep, may easily have given rise to the notion of our *absolute cold* also being increased, *i. e.* of our heat being diminished." p. 581. Whether or not Hunter and Legallois are correct, (and the probability is that they are so) or Thomson, is not, in a practical view, of much moment, as all allow that external cold makes a greater impression on us when asleep than when awake.

but the feeling of warmth is increased, and they afford much more comfort to the body during the vicissitudes of the day. At the same time caution will often be necessary in this matter, and wherever there is a chance of damp or wet from dews or otherwise, or where the body is much chilled, flannels must be retained, but *changed in the morning*.

Flannel ought not to be applied next the skin in any diseases attended with fever : in these we ought to use linen, because it more readily abstracts the morbid heat, and at the same time absorbs the exhalations from the vessels. The exanthematous diseases, especially small pox, require linen sheets as an article not less of cleanliness than coolness. In some of the chronic eruptions the friction of the rough surface of the flannel is detrimental, and therefore linen, or better still, cotton, must be used. But in all cases of disease of the throat, chest, or abdomen, flannel will be found of decided advantage ; and in pulmonary affections, and wherever there is a diminution, from any organic or functional disease, in the animal temperature, as from tubercles of the lungs and asthma, flannel is more than half the cure. After a mercurial course it ought on no pretence whatever to be omitted.

I would not have considered it necessary to have dwelt at such length on the importance of flannel, had it not been that many works have loudly denounced it, and that much popular prejudice is still strongly opposed to it. The arguments against its use are thus stated by Buchan in his *Treatise on Sea Bathing*, and he is supported by the authority of Wainewright, Baynard, Trotter, and many others.

“ Whether the present prevailing fashion of keeping the body perpetually bathed in perspiration, by wearing flannel next to the skin, in all seasons of the year, can be supposed to improve the general health of the inhabitants of this country, is a question perhaps not yet fully determined. In ad-

dition to the debility that flannel worn next the skin occasions, by increasing the secretion of sweat, it probably tends also to weaken by other means. The incessant irritation of the numerous points of which its rough surface is composed, and which always occasion uneasiness on the first adoption of flannel, only ceases to be perceived in consequence of the skin losing a share of its sensibility ; and this, like every other incessant irritation, must tend to accelerate the approach of old age. Of this effect the pale and sickly appearance of a person accustomed to be too warmly clothed, which differs as far from the hue of health, as the sickly delicacy of the hothouse plant is distant from the vigour of the forest oak, affords proof almost sufficient. Lord Bacon says, "*vestes nimicæ, sive in lectis, sive portatæ, corpus solvunt.*"*

"The sensation of increased warmth, and comfort, experienced on first wearing flannel in immediate contact with the skin, constitutes one source of deception with regard to its ultimate effects. To the living body every new stimulus is for a time agreeable. A person not habituated to the use of fermented liquor, finds himself momentarily warmed and invigorated by swallowing a glass of distilled spirits ; but how frequently do such fallacious sensations allure unhappy victims to the repetition of these circean cups, till irremediable debility ensues, and men are indeed transformed into very beasts ! People in the habit of taking purgative medicines, soon find that the bowels will not perform their functions without them ; but that would not be a good reason for saying that such people were more healthy than others, or for recommending the daily use of an aloetic pill to preserve health. The habitual use of flannel garments, by accustoming the exhaling vessels to perform their functions in a certain high temperature, in like manner diminishes their na-

* *Historia Vitæ et Mortis.*

tural energy, and renders them liable to become torpid by the slightest abstraction of the warmth to which they are accustomed, and thus gives rise to colds, rheumatism, and other complaints arising from checked perspiration, which much clothing is commonly, but erroneously, supposed to prevent. Dr. Cheyne, who was certainly well acquainted with the maladies of the feeble and the delicate, asserts "that much clothing debilitates the habit, and weakens the strength; and that the custom of wearing flannel is almost as bad as a diabetes."

"Persons who are in the habit of keeping their skin in a state of perpetual moisture, during summer, by wearing flannel, are liable, on every slight change of temperature, to partial attacks of rheumatism; and though flannel is frequently recommended as the best means to prevent rheumatism, my observation leads me to form an opposite conclusion; and I can with truth affirm that by advising persons to lay aside their flannel clothing, particularly during the heat of summer, their susceptibility to rheumatic affections has been diminished, and their general health improved. It should be kept in mind, that through the medium of the skin a very large proportion of matter is continually secreted from the surface of the body, in the form of perspiration. Of so destructive a nature is the effluvia so secreted, that in persons exposed to its influence, it gives rise to the most formidable species of disease. If much concentrated, its effects are rapidly fatal, as was dreadfully exemplified in the memorable catastrophe in the black hole of Calcutta, where, out of one hundred and forty-five unhappy human beings, only twenty-two were alive after ten hour's confinement; and of the survivors, not one escaped an attack of the worst kind of putrid fever. The porous nature of flannel admitting an accumulation of this matter, a certain portion of it must, at all times, be retained in the immediate vicinity of the surface of the

body, except that part of dress be much more frequently changed, than is commonly the case."

"The following remark, from the writings of a respectable traveller, corroborates the opinion now stated, and is entitled to the more weight, as coming from a man unbiassed by professional prejudice. 'Contagious fevers which destroy vast numbers, are very common in the Northern provinces of China, notwithstanding the moderate temperature of the climate. In the Southern provinces they are neither so general nor so fatal as might be expected; owing, I believe, in a very great degree, to the universal custom among the mass of people, of wearing vegetable substances next the skin, which, being more cleanly, are consequently more wholesome than clothing made of animal matter. Thus, linen and cotton are preferable to silk and woollen next the skin, which should be worn only by persons of the most cleanly habits.'*

"Every species of contagion is more likely to be communicated by garments composed of animal than of vegetable matters. Since the introduction of linen, the more formidable species of cutaneous diseases have certainly been less frequent. Leprosy was formerly very common, hospitals for the reception of lepers being established in the neighbourhood of all great cities. To the introduction of linen, which was considered a material improvement, the decline of these endemic diseases was, in a great measure, attributed. But, by some strange infatuation, the public appear, of late years, to be reverting to the same relaxing and frowzy habits. If flannel be necessary to guard the valetudinarian against the vicissitudes of temperature, it certainly tends to convert the healthy man into a valetudinarian."†

* Barrow's Travels in China.

† Buchan on Sea Bathing, 2d ed. p. 43. See also most of the Writers on HEALTH, during last century.

I here deliberately enter my protest against all this, except the necessity of keeping flannel clean. The illustrations of ardent spirits—the aloetic pill and so forth, are not apposite, or if so, they could equally well be used against our wearing clothing at all. The German youths acquired their ponderous limbs, without any clothing, but they were brought up in filth, they kept within doors, lived amongst their cattle, slept much, and used the *warm* bath, defending themselves in all these ways from the rigor of their climate; and when they were called upon to perform the duties of adults, both sexes wore skins often made into the close dress, the warmest of any, whilst the women sometimes wore linen.* These were “frowzy habits,” but they were habits which made strong bodies, *corpora quæ miramur*. I do not advocate a great quantity of clothing; I quite agree with Bacon in regard to the *nimiæ vestes*, but I am as much opposed to the converse. Cheyne’s statement, with regard to the effect of flannel, is certainly *frappant*; there lies its sole merit, for truth it has none.

I have already pointed out the influence of light, (p. 34,) in giving colour, firmness, and strength to the skin, in order that it may defend itself from atmospheric influences of heat and cold. Clothing prevents the discoloration of the skin by the rays of light, and this is the case in every climate.

* *In omni domo nudi ac sordidi, in hos artus, in hæc corpora, quæ miramur, excrescunt. * * * * * Inter eadem pecora, in eadem humo degunt, donec ætas separet ingenuos, virtus agnoscat. * * * * Tegumen omnibus sagum, fibula, aut, si desit, spina consertum. Cetera intacti, totos dies juxta focum atque ignem agunt. Locupletissimi veste distinguuntur, non fluitante, sicut Sarmatæ ac Parthi sed stricta et singulos artus exprimente. Nec alius feminis quam viris habitus, nisi quod femina sæpius lineis amictibus velantur, eosque purpura variant, partemque vestitus superioris in manicas non extendunt, nudæ brachia ac lacertos; sed et proxima pars pectoris patet. * * * * Statim e somno, quem plerumque in diem extrahunt, lavantur, sæpius calida, ut apud quos plurimum hiems occupat. Tac. de Mor. German.*

“ The effect is confined to the parts of the body actually exposed to the sun and air. Those which remain covered retain all their natural whiteness.” Mr. Abel found this strikingly exemplified in his Chinese journey. “ The dark copper-colour of those who were naked, contrasted so strongly with the paleness of those who were clothed, that it was difficult to conceive such different hues could be the consequence of greater or less exposure to the same degree of solar and atmospheric influence : but all conjecture on this subject was set at rest by repeated illustrations of their effects. Several individuals, who were naked only from their waists upwards, stripped themselves entirely for the purpose of going into the water to obtain a nearer view of the embassy. When thus exposed, they appeared at a distance to have on a *pair of light-coloured pantaloons*.”* The same is the case in much colder climates, although not to the same extent : the skin is darkened and hardened by exposure to light, and rendered more able to endure the cold, as in warm climates it is made to endure the heat. When we contrast the pale sallow children of a great city, with the ruddy or bronzed faces of a group of children in the country, we are witnessing the effects of an impure atmosphere, narrow streets, dark houses, and above all, window taxes, in deteriorating the public health.

CLEANLINESS.

When the excretions from animals, as for instance the fecal part of the food, and the urine, are allowed to accumulate, they contaminate the air and directly or indirectly occasion disease. The lower animals are more or less affected in the same way, and nature has either made them migratory, so that they do not come within the influence of their own or-

* Laurence's Lectures on the Natural History of Man, p. 521.

dure, or she has taught them instinctively to seek protection to themselves by burying it. There are some persons of opinion that the exhalation from the fecal excrement of the cow is sanatory ; but there are no proofs of this. These excrementitial parts are kept at a distance from us, because they are disagreeable to our senses. The other excretions are not so cognizable to us, and therefore we are not so anxious to get them removed. The exhalation of the lungs is well known to be injurious to life ; but how little do we dread it, and how ill do we often provide for its removal. The poor man ensconces his head under his single blanket, in order that the caloric of his body may be wholly preserved. He thus acquires the advantage of a warm and moist atmosphere, but he is inhaling carbonic acid instead of oxygen. When the nose of the rich man enters the hovel of his poor neighbour, it can at once detect the baneful and unhealthy close odour of the apartment ; and the rich man censures his miserable brother because he has closed every chink, and stuffed every broken pane, by which the cool air entering could carry off that heat which the apartment derives from the particle of cheerless fire, and from the warm exhalations of human bodies. Yet how seldom does that same rich man think that, in a crowded and ill-aired theatre or church, the same deleterious atmosphere exists, and often to the same concentrated degree. To the poor, filth of the body is as a garment. The skin is less affected by cold in consequence of the dirt upon it. The Indian rubs his skin over with pigment, on the same principle, to protect him from heat. The poor yield more to the present sensations of cold than to the distant dread of disease.

Many striking instances of mortality, and in some measure likewise their own sensations, have taught men the necessity of a pure or clean atmosphere. The excrementitial secretion from the surface of the body, though very great

in amount, and in many perceptible by its odour, has not met with the same attention because the injurious effects from allowing it to remain in contact with the body are not so easy to be observed. Yet it is oftener the cause of disease than any other; and as the carrier of contagious matter from the sick to the healthy, it is believed to be more active than any of the former. *

The insensible perspiration acquires a particularly acrid character, when retained in the clothes, and frequently occasions cutaneous disease in those whose skin is very soft and delicate. During the night the cutaneous exhalation is always more rank and acrid than during the day. The sensible perspiration or sweat has the same character, and acquires the same injurious effects on the body as the insensible perspiration. It is highly necessary for the health of the individual that this secretion should be removed. Where the body is covered with clothes they absorb the secretion, and consequently they ought to be frequently changed. We no doubt see some individuals who, when once they possess the luxury of a shirt, part not with it whilst a rag of it can hang upon them, and yet they are not affected with disease; but this is only the case with a few whose skins and constitutions have become, from the constant exposure to miasma, in a

* La sueur depose sans cesse sur l'epiderme une foule de substances dont l'air enleve les principales, mais dont plusieurs peu dissolubles par lui, comme les sels, par exemple, restent a sa surface, et y adherent lorsque le frottement ne les emporte pas. Melees a l'humeur onctueuse qui suinte a cette surface, aux differentes molecules etrangeres que l'air y depose comme partout ailleurs, ces substances forment sur la peau un enduit qui ne peut, comme la transpiration, disparaitre par dissolution. . . . Nous avons vu que les sucs muqueux, sejourrant trop long temps sur leurs surfaces, les irritent, les stimulent, et y causent diverses affections. Est il etonnant que le residu de l'exhalation cutanee que l'air n'enleve pas, occasionne diverses alterations sur la peau? . . . C'est sous ce rapport que les frictions seches sont aussi avantageuses: elles nettoient l'exterieur du corps." Bichat, Anatomie Generale, p. 663.

great measure callous to it, as we observe nurses in fever wards, and persons confined in jail, unaffected themselves, though they carry about the poisoned shafts which penetrate deeply into other persons who may cross their flight.

The secretions are much affected by the ingesta, by external heat and cold, and by the state of the mind. Where an individual is fed with unwholesome food, or where he does not receive a sufficiency of food, or where the body is not kept at a proper temperature, or where he is affected with any of the depressing passions, as fear, or grief, the secretions from that individual become of a much more acrid and envenomed character. There is little doubt but typhus, or the severe continued fever, originates from one or other of these causes in the hovels of the poor, and extends itself, when fully concentrated, on all indiscriminately. Cleanliness of the person is therefore not less of importance to the individual himself than to those around him; and it is the duty of the rich to set the example before the poor, and to furnish them with the means of attaining it.

We see the careful foresight, and the great knowledge of those lawgivers who made ablution a part of the practical creed of religion. How much worse would have been the state of Mahommedans, had not the ablution of the body been made imperative upon them! When Moses too declared that the mark of the covenant was the circumcision of the prepuce, he removed one of the most common causes of disease in warm climates—disease of the genitals caused by want of cleanliness between the prepuce and glans. But though the ablution of the body, by Mahommedans, is deserving of praise, we cannot add that meed when we perceive that they cover the clean and fresh body with the most dirty garments. The value of the bath is thus in a considerable degree dissipated. It is not enough that the body

“Exhales Ambrosia from within,”

if the garments distil over filth and infection. A cleanly person must be so from top to toe, and from the skin outwards. The Dutch, notwithstanding the badness of their climate, are a healthy people ; and this is, in a great measure, attributable to the most strict habits of cleanliness so universal amongst them. In all Protestant countries the people are much more careful with respect to cleanliness than in Catholic ; and it is stated that the difference of the habits in this respect is very manifest in some of the towns (Swiss) where the two sects are of about equal numbers. The Spaniards, even of the highest rank, are very dirty, and a splendid cloak often covers a multitude of lives. Philip II. died overrun with vermin.

But if it be necessary for the preservation of health that the excretions from the body of a person in *perfect health* should be removed, how much more necessary is it in the case of sickness ? All the secretions are then bearing away from the system the impure and corrupted parts. They are the common sewers which are carrying off all that is noxious and filthy. Let them, then, be thoroughly cleaned out. Let every particle of the polluted matter be put away, so that it may not, by its accumulation, render the sick person worse, or become more intense in its action on the healthy. Every one knows that the fever ward of an Hospital, with its clean walls and floor, its careful ventilation, its iron bedsteads, its well-rinsed chamber utensils, and its patients frequently spunged, cleansed, and laid in white clean sheets, which are frequently changed, is much less dangerous than the ill-aired, dark, dirty hovel of the Dispensary patient.* The secretions

* Il paraît également, d'après toutes les relations sur la peste, et d'après cette terrible couverture qui a porté la petite-varole aux Indes occidentales, que les virus contenus dans les matières excrémentitielles, et attachés aux corps poreux que le malade a touchés ou qui l'ont entouré, surtout s'ils ont été par le repos dans un état d'incubation, sont plus actifs que le corps même, vivant ou mort, duquel ils ont émanés.—Foedere, tom. v. p. 265.

and excretions much more readily convey infection than mere contact with the patient's skin. How seldom does the physician suffer who is daily feeling the patient's skin, and making post-mortem examinations, compared to the nurse, who is spunging the patient, inhaling his pulmonary exhalation, and removing the excretion of his bowels and bladder.

Every tax upon a *necessary* of life is impolitic, in so far as it acts against the community in two ways—not only deprives them of their money, but deprives them of their health. It is, as it were, compelling a certain number of men to lie idle. We deprive them of that which is necessary to their health, and consequently we cannot get the full amount of labour from them. We get as much as a sick man can do, instead of as much as a healthy one. And yet the law compel us to support the sick man. The state therefore that taxes a necessary of life, taxes the public twice over; we first pay the tax, and then we pay for the support of those who are deprived of their health in consequence of the tax—the last being the heaviest of the two.

Next to a tax upon food, the most injurious to the public health, and impolitic in a financial view, is the tax upon soap. If the evil effects of filth upon health be acknowledged, the pernicious effects of this tax must be evident. The poor are most exposed to filth in the different trades and occupations to which they must submit for a livelihood, and, whilst they require a much larger proportion of this chief agent of cleanliness, they are least able to afford it. The tax therefore presses, unfairly, upon the poor, compared with the rich. Besides, if dirtiness itself do not directly create disease, we know there is nothing so powerful in aggravating and extending it. If typhus fever break out amongst the poor, and if we deprive them of the means of cleaning the infected clothes and apartment, need there be any surprise at the disease ex-

tending ?* When Government, therefore, reduced the duties upon drugs, and made physic cheap to the poor, instead of taking the whole duty off the soap, and giving them the means of cleanliness, it was, what is called in homely phrase, “ putting the cart before the horse.” Some advance to be sure is made even in this way, but it is a matter of regret that the financial state of the country is such, that we must throw away so much power in order to make even the smallest progress forwards.

But this tax, whilst it brings a sum to the public treasury, is still impolitic in so far as that, if it were removed, the public income from other taxable articles, not at present used but by the rich few, would be much increased. There is a luxury of the external person as well as of the internal stomach. Give a man the luxury (since it seems to be so) of a clean shirt, and he will likewise desire a new coat, and perhaps a gold pin and a watch, in order to give him a finish. Let a man have a free command of necessities, and he will soon find out and covet luxuries. When he is clean, the object which he will next strive for, will be to be gaudy. Or, at any rate, if he has the strong sense not to mind fashion, if he does not consume exciseable luxuries, the cleanliness of person gives a corresponding purity to his moral faculties. He is not only a healthy, but a good man. What prisoner was ever reformed by the *squalor carceris*? In the dirt and filth of a jail he loses first all respect for himself, and then for his fellowmen. He becomes callous and hardened. Two of the

* “ This high duty is a powerful check on the consumption of soap ; for the poorer classes who compose the great mass of consumers, are compelled, by the high price, to dispense with the use of it in any thing like the quantity they would employ if it were cheaper. *In proportion as this tax deprives the poor man of the means of cleanliness, it leads to disease, but particularly to fevers.*”—Parnell, on Financial Reform.

most useful additions, in modern jails, are the scissors and the pump. They are far superior, in reforming the prisoner, to fetters, filth, and vermin. Let the prisoner have also good, but plain, and rather spare food, and let him have plenty of hard labour. Let his punishment not be at the expense of his own health, and probably at that of others. Lay the punishment not on his body, but on his mind. Keep him clean, spare, and exercised, but inflict upon him that pain which can affect him only—that punishment which is more unbearable than the deprivation of any bodily necessary, though not so injurious to the health—deprive his mind of the *necessary* of social intercourse. Keep him in solitary confinement, or without the power of interchanging sentiment or idea with his fellows.

LECTURE SIXTH.

CLIMATE.

IF, notwithstanding a trial of the methods already pointed out, the atmosphere should still affect our health, there is no help but to go in search of a more congenial clime. Other places will be found warmer or colder, drier or moister. The relative position of a country to the equator, properly constitutes that great and first division into a warm and cold, or a southern and northern climate. But though, as a general rule, this is correct; yet it is not the case that every place, under the same parallel, enjoys the same climate, or that assemblage of physical circumstances which constitutes climate. The mean annual temperature decreases as we recede from the equator, but there are numerous local irregularities which it behoves the physician to be well aware of; for it will often be in his power to find, within an easy reach of the patient, a climate equal in temperature to that which would be obtained by approaching some degrees nearer the equator. When a patient is sent to the country, it should not be, as is too often the case, a matter of indifference where this patient goes. It is too often but little known to, or at any rate little turned to account by, physicians, that even within one county climates will be found frequently varying

as much as within extensive countries, and from the same causes. These causes of irregularity are, height of the ground above the level of the sea ; position of the country with regard to seas or lakes ; direction in which the ground slopes ; position of the ground with regard to mountains and prevalent winds ; cultivation and nature of the soil.

I. HEIGHT OF THE COUNTRY ABOVE THE LEVEL OF THE SEA.—The temperature becomes diminished the more elevated the ground is. Air, in rising from the sea's level, becomes about one degree colder for every 200 feet of perpendicular ascent, and altogether 50° colder in rising 15,760 feet. Water, therefore, if of the temperature of 84° at the sea, will, at the equator, be frozen if carried 15,760 above the level of the sea. This is called the snow line. The feeling of cold, on elevated grounds, is greater on the body, likewise, on account of the currents of air from the poles to the equator being more regular upon them. As the falling of the thermometer is owing to the rarity of the air by which its capacity for caloric is increased, so vallies are warmer than the level grounds on account of the less circulation, and the greater density, of the air.

An elevated country is likewise a dry one, and this is the case the higher we ascend. Mountains attract the watery vapours of the atmosphere, which descend in violent rains. But the soil is generally sandy or calcareous, and the water, soon making its way through it, descends upon the low grounds. The attraction between rain clouds and mountains is ascribed to electricity—the cloud and the mountain being in opposite electrical states. In a country which is quite flat, as is the case with Egypt, it seldom rains. When the wind is steady, it very seldom rains. Rain is most frequent when the winds are variable. A cloud or mist is owing to the mixture of airs containing vapour, these portions of air being of different temperatures. From the generally calcareous nature of

the soil, there is a great difference as to the heat, during the day and night, on high lands. Provided the height is not great, the heat is often excessive during the day, whilst the sun's rays are striking upon the ground, and reflected by the soil, but as this soil, on the other hand, does not absorb caloric, there is none to be given out during the night.

There are some countries so situated that they have, within a few miles, all the varieties of climate. Such is the case with the Andes and Cordilleras in South America. The inhabitants, according as they ascend or descend, feel all the varieties of temperature: those on the higher parts are in a cold climate, those lower down in a temperate climate, and those still lower in a warm climate. It has been affirmed likewise, (but I do not credit it,) that in some of the high mountains of Africa, the inhabitants are as fair in the complexion as those of northern Europe. The pain in the chest, and the unquenchable thirst, which are felt on ascending a mountain, are often erroneously ascribed to the fatigue. They arise, as has been stated, from the dryness and rarity of the air increasing the evaporation from the respiratory organs and body. The pain is owing to the want of moisture in the lungs, the thirst to the desire to make up or supply the increased evaporation from the body.

II. POSITION WITH REGARD TO SEAS OR LAKES.—The position of a country, with regard to seas or other large expanse of water, will materially affect its temperature and moisture. “The effect of the sea is to equalize temperature, so that a maritime country is not so liable to such extremes, either of heat or cold, as an inland one. The temperature of the sea is very equable, and the wind passing over it partakes of its character. A cold wind takes the caloric from the surface of the water, which being thus rendered heavier descends, and is succeeded by another set of warmer particles of water, which are acted on, in the same manner, until the

wind becomes of the same temperature as the water." During this intestine motion, the water which rises to the surface, by giving out one degree of caloric, warms nearly 500 times its bulk of air one degree. A warm wind again is cooled by the evaporation of the water, and consequent absorption of the heat. A warm wind travelling over land, is increased in temperature by receiving the caloric by radiation or reflection from the earth. Such is the case with the winds coming across the deserts of Africa. A cold wind again is warmed as long as the earth contains any caloric, but when this is exhausted, then the cold wind comes with its undiminished rigour. It is from this circumstance, the equalizing effect of the water, that we find a maritime place, and an inland, although having the same mean annual temperature, yet differing greatly in the range of the thermometer at particular seasons. The summers of inland places will be warmer, and the winters cooler than those of places situated near the sea. Penzance is 2° colder than London in summer, and $5\frac{1}{2}$ warmer in winter. The difference in temperature, during the day and night, at the surface of the sea, at a distance from land, is very trifling. In equatorial seas it is only 3° or 4° , whilst on the land it is 9° or 10° . In temperate regions there are only 4° or 6° of difference betwixt night and day, whilst on the land it will be from 20° to 30° . Hence the much more temperate and equable climates of small islands than continents. A country exposed to the sea, or to a lake, will always be moist, on account of the absorption of the water by the atmosphere. Yet rains may not prevail much if the heat be great, for the moisture will be carried inland by the winds. Chili, although close to the sea, has not much rain, and the East coast of New South Wales is very deficient in moisture. The reason of this in both cases is, that a chain of mountains exists near the coast which attracting the vapours, cause them to descend there in showers. In moun-

tainous countries much more rain falls on the sides, and near the base of mountains, than on their tops; but the fact still is that rains are most prevalent in mountainous districts. In the tropics the rains fall generally in greatest abundance at particular seasons, but in temperate climates, though the actual fall of rain is less, the number of dry days are fewer, and the atmosphere is moister. Countries around inland lakes will always be moister than even those near the sea, because the wind is not so strong as to carry the watery particles to a distance.

A maritime place will be warmer again during night than an inland, because being moister in consequence of the absorption of water during the day, there will be a greater deposition of dew during the sun's absence, and consequently an evolution of caloric by this change of state.* Within the tropics, sea and land breezes prevail on the coasts, the one occurring during the day to supply the air, rarified by the reflection of the earth, and the other during the night to cool the air on the sea and restore the equilibrium. The minimum temperature, both on sea and land, is at sunrise; but the maximum on sea is at noon, and on the land about two or three hours after noon.

III. DIRECTION IN WHICH THE COUNTRY SLOPES.—The direction in which the country slopes, or its aspect to the sun, will be of considerable importance as to its temperature. “When the sun is elevated on the meridian, 45 degrees above

* Dew is merely the deposition of the watery vapour taken up during the day. It appears on the green grass and leaves, because they radiate more caloric than stones or other substances, and consequently become colder. It is much more abundant in a clear than in a cloudy night, because, in the last, the clouds radiate back the caloric, and prevent the cooling of the vegetable, whilst in the first, there are no nearer radiators than the moon or stars. As the earth and the portion of the air nearest the earth's surface, are thus deprived of caloric by the radiation, we see the danger from cold and damp incurred by those who sleep during the night on the ground, or close to it.

the horizon, his rays fall *perpendicularly* on the side of a hill facing the south at an equal angle, while the plain below receives them at an *angle of 45 degrees*. Supposing the north side of a hill to have a similar slope, the rays would run *parallel* to its surface, and their effect be very trifling; but if the declivity were still greater, the whole surface would be in the shade.* This, though an extreme case, serves to show why temperature varies with the earth's surface. Since the warmest part of the day is not when the sun is on the meridian, but, owing to the accumulation of the heat, two or three hours afterwards, it follows that, in our hemisphere, a south south-west or south-western aspect is the warmest, and a north north-east, or north-eastern, the coldest, if no local circumstances exist to make it otherwise. The effect of aspect is, of course, most strikingly seen in regions covered with high mountains. In the Vallais in Switzerland, the Alps on one side are covered with ice, while vineyards and orchards flourish on the other." (Library of Useful Knowledge.)

IV. POSITION OF THE COUNTRY WITH REGARD TO MOUNTAINS AND PREVALENT WINDS.—Mountains will make a considerable difference in the climate of a country. The low lands will be subject to inundations from the rains attracted by the mountains, and conveyed down their sides. In the

* The greatest force of the sun's rays is when they are perpendicular to the earth's surface. Bouguer calculated that, out of 10,000 falling upon the earth's atmosphere, 8,123 arrive at a given point when they come perpendicularly; 7,024, if the angle of direction is 50 degrees; 2,831, if it is 7 degrees; and only 5, if the direction is horizontal. When the rays fall obliquely, they are broken down, dispersed, and absorbed by the lower and dense stratum of air; when perpendicular, they pass through it, for they pass, unchanged, through a diaphanous medium. According to a late statement by Mr. Daniel, however, it is held, that the absorption and radiation of heat increase from the equator towards the poles, or according as the angle of incidence increases; thus in so far correcting the disadvantages in not receiving the sun's rays perpendicularly.

gorges and narrow valleys, the heat will often be excessive during the day. Mountains will likewise either defend the country from winds, or expose it to their more continued action. "One reason why the central and southern parts of European Russia are exposed to greater cold than their latitude and inclination southward would lead us to expect, is the absence of any chain of mountains to protect them from the full influence of the winds blowing from the white sea and the Ural mountains. The inhospitable climate of Siberia arises from its descent towards the north, exposing it to the winds of the frozen ocean, while, at the same time, the vast mountainous chains that cross central Asia, intercept the southern winds, whose access would tend to mitigate the rigour of the atmosphere." * The prevalent winds are likewise to be taken into account. We must take into view the direction in which the wind *most usually* comes in any particular part of a country, and the surface which it passes over during its progress. "Great Britain would, in a great measure, lose its insular climate, if its prevailing winds came across the continent, instead of from the Atlantic." The great advantage of Madeira is, that no wind can blow on it which has not been tempered in its passage by the ocean. The great danger in the Simoom and Sirocco is in their dryness, and this they owe to their having passed over arid deserts, which have deprived them of all their moisture,

V. CULTIVATION AND NATURE OF THE SOIL.—The influence of cultivation has already been stated. It is one of the human means of warming, drying, and purifying the air of a country. Soils, however, differ, and according to these the climate also. A calcareous soil reflects the sun's rays, but does not absorb nor radiate them, whilst a black soil does both most powerfully. During the presence of the sun's

* Library of Useful Knowledge,—Physical Geography, p. 35.

rays, and in a clear day, the heat from reflection is very great. In travelling over the snow or ice in Greenland or Davis' Straits, during the time the sun's rays are striking upon the snow, the heat is oppressive. Travelling in the sandy deserts of Africa is rendered almost impossible during the day, from the reflection of the sun's rays. The nights, however, are comparatively colder, because as no caloric was absorbed during the day, there is none to be given out during the night. A calcareous or porous soil, as has been stated, is likewise sure to make the atmosphere dry, because the rain sinks speedily through it. A heavy or clayey soil again retains the water on its surface, constantly exposed to evaporation. Where the soil is very impervious to water, the country must likewise be cold from the constant evaporation going on. In general the soil, in low valleys, is clayey or alluvial, and consequently they are moist, and from the density and confined position of the air their temperature would be very high, were it not that the moisture steams up from the earth and keeps the air cool. But low lying lands are subject to inundations from mountain torrents, or they are moist, if near the sea or embouchures of rivers, from infiltration. Vegetation is rank on this rich soil, but corruption is equally rapid; and whether there be great heat or great cold these places are unhealthy from the miasma contained in the atmosphere. Every one knows the fatality in the low lying coasts of the East and West Indies, and Africa, or on the banks of their rivers. Fœdere entertains an opinion that not only is a calcareous soil of advantage by allowing the water to percolate readily through it; but that it actually absorbs all gases and miasma, and thus keeps the air pure. (Tom. v. p. 123.) The influence of trees, in keeping up moisture, has been already noticed, (p. 55.) They are there alluded to as opposing winds or miasma, or impeding the evaporation from the soil; but trees themselves give out by transpiration

a large quantity of water ; in some cases sufficient to render a climate moist, independent of rains or marshes. Putting out of view the nature of the soil, a country is not to be considered moist or dry merely from the quantity of rain that falls during a twelvemonth. Where the rain falls in large quantities at one time, that country is, compared with one where less rain falls but at different times, a dry one.*

These are the circumstances which, in a great measure, produce local irregularities in temperature, and it behoves the physician to attend to them. It would save him much trouble if tables could be procured of the thermometric and hygrometric state of the air, founded upon careful observation. A collection of tables, for the different districts of a country, would be of the utmost service to the medical profession, and great credit is due to Dr. Clarke for giving, in his *Work on Climate*, tables of this kind, as applicable to some of the parts of England most frequented by invalids.

But, whilst these local peculiarities modify, in a consider-

* It is well understood that the deleterious season in the neighbourhood of marshes is not during the time of the largest quantity of water in the marsh, but when the greater part of the water has been absorbed, and when the vegetable and animal substances now killed, and in the state of decay, are exposed to the sun's action, which still farther facilitates the decomposition. This is well known in the rice-grounds of Lombardy, in the ponds or marshes of Basse Bresse, in the Tuscan and Pontine marshes, &c. The American lakes, although no perceptible impression is made on them by evaporation, throw up on their surface, at a certain season, a slimy substance, and it is during the time that this is exposed to the sun that agues prevail. There is, however, a circumstance which I have some recollection of reading in one of Dr. Ferguson's papers, in some of the Periodicals, on the diseases during the campaigns of the late war, and that is, that when the troops were encamped or bivouacked in the *dried beds* of rivers, or wherever water had been, (which they were induced to do, from the greater dryness of the ground,) they were invariably attacked with disease, whilst they were safe on the adjacent cultivated ground. We can easily understand how ploughing, or turning up, soils saturated for years with decaying vegetable substances, should be dangerous, (page 56,) but no suspicion would be entertained that the poison would inhabit spots so dry and firm as those selected were.

able degree, the influence of the sun, yet the effect of this luminary, and his action on the body, is the greater the nearer we come to the vertical direction of his rays, or the nearer we approach the equator. There is, however, on the other hand, a wise provision of nature for countries situated far from the equator, and on which his rays fall obliquely—that in such countries he continues for a certain period of the year much longer in their presence during the twenty-four hours, and consequently the heat derived from him accumulates in the earth. The day is long, and the night being short, little of the caloric gathered during the presence of the sun is given out. Within the arctic circle, the heat of the summer is often such as to melt the tar on the ship's sides, and frequently becomes oppressive. On his disappearance again, the speedy falling of the snow becomes a clothing for the earth, and prevents the radiation of that caloric which it had received. In warm countries, the days and the nights are nearly equal, and the cold night would be destructive to animal and vegetable life, were it not that the heat absorbed during the day is emitted during the night, and the water which was taken up in vapour, and kept the air so far cool during day, is again deposited, giving out that caloric which it took up during the sun's presence. Within the arctic circle, the heat of the summer would be almost insufferable, were it not that the ice and the snow melting absorb the caloric; and in winter again the cold would be much greater than it is, were it not that the water changing again its state, and becoming solid, must part with its caloric. In the torrid zone, the too great accumulation of heat is prevented by the regular flowing in of the trade-winds from cooler regions.

But, besides the local irregularities already pointed out, there are some peculiarities with regard to the northern and southern hemisphere, and the old and new continents, that cannot be so well accounted for. It is well known that the southern

hemisphere is, beyond the torrid zone, much colder than the northern, and that America is much colder than Europe. Thus, though Canada is on the same parallel as Spain, the climate is as cold as that of Sweden; and though Brazil is on the same parallel to the south of the equator as Nubia is to the north, it is as temperate as the south of Italy. The western part of both the old world and the new has a higher mean annual temperature than the eastern. For these facts physical geography furnishes different explanations which may be interesting to the student of that delightful science, but which here would occupy more space than can be allowed from its connection with the subject.

INFLUENCE OF CLIMATE.—Some naturalist has well observed, that if the whole animated world was congregated together in one place, and all had locomotive powers to a sufficient perfection, they would soon betake themselves to that latitude best adapted for them. Each zone, each climate, has its own animals and its own vegetables, and if they be transferred from one to another, they soon exhibit a most marked change. Many of them cannot exist for any time in their new situations, and, if they do continue to live, they frequently become so altered that it is with the greatest difficulty they can be recognised as the same species. Man himself is not an exception to this law, and if he does not undergo such changes as to make him lose the characteristics of his original being; it is because he is most able to avoid what is pernicious, and to select that which is most opposed to the influence of climate, to modify it by clothing, habitations, fires, circulation of air, use of certain foods, &c. He is a cosmopolite, but he is only so because he is master of many things which neutralize the influence of climate. Amongst mankind, however, something is due to constitution, for Dr. Edwards is led from his experiments to believe that the power of generating caloric varies in the inhabitants of different

countries,* as it does in the inhabitants of one country at different seasons, but this power varies in different constitutions, and hence some are able to remain in an opposite climate to that in which they were brought up, whilst others are not.

Still, in every one, a change greater or less ensues ; and in the immense swarms that are constantly falling victims to warm climates, what have we but a demonstration that an alteration must take place, and that their constitutions are unable to undergo it. And when one does get through this period of probation, he acquires a new temperament from the physical causes to which he has been exposed, he has become naturalized to the climate, acclimatized ; and should he again return to his native country, he would have to undergo another period of trial, in order to acquire a temperament different from that which he now possesses—to acquire in fact the temperament with which he set out in early life. And what is it but the uneasiness the body feels in again undergoing this great but necessary and unavoidable change, which compels many of those who have returned to the land of their birth, with all the bright visions of happiness capable of now being realized, if depending on riches, again to set sail, and spend the last of their days in that country which by them was expected to be but the source of wealth ? Many have dwelt on the moral causes which have induced a return to warm climates—on the friends of youth, dead—on the face of things, of country, and of once familiar objects, changed—and on the discovery that what had given years of mental happiness under the burning sun of the East had been but the fondly cherished infant of the imagination,

* The Physiologists, previous to the experiments of Edwards, entertained strongly an opinion adverse to this. Dumas, quoting Zimmerman, says, with an antithetical effect, “ *L’homme en effet vit, et la même quantité de feu brûle dans son corps au milieu des contrées ardentes du Sénégal, comme sous les climats glacés de la Sibirie.*”—*Principes de Physiologie*, Tom. iii. p. 133.

a thing wished for, but now, alas, found not to exist. The moral causes may be great, but the physical causes, the bodily instead of the mental pains, in the great majority, lead to a return to the warm climate which has lately been quitted.

One would think that the value of climate, as a therapeutic agent, is one that admits neither of cavil nor dispute ; yet we find a great deal of misunderstanding and ignorance on the matter. One man has sent a patient to a warm climate, and that patient has grown rapidly worse and died ; he has sent another, in the same disease, to a cold climate, and he has recovered. Another man again has sent two patients, in the same disease as the preceding, to a warm climate, and they have both recovered. The one physician, therefore, abuses a warm climate in this disease, another, on better experience of its effects, lauds it as the best of medicines. Now it will be found, that the first physician hurried his patient's death by his ignorance of the pathology of the disease, and of the effects of a warm climate. This may be illustrated by that disease which has long been considered the test of the value of climate, viz. Phthisis Pulmonalis.

This disease is the suppuration of tubercles in the lungs, accompanied with that hectic fever which is the concomitant of every large or long continued suppuration. We know that they may be born with the patient ; or that he may be only predisposed more or less to them, and that they will likely be formed sometime during his life. We know that, though hereditary, they may not appear, or that, if they are present, they may remain quiescent or inactive during a long lifetime. We know that these tubercles are excited into inflammatory action, by the usual remote causes of inflammation, and that this inflammation may terminate, if recourse is early had to proper means, in resolution, but if neglected, or severe in its course, in suppuration. We know likewise, (for it has been proved by dissection,) that the pus may be discharged,

and the sac of the tubercle closed up into a hard kernel-like knot; and, therefore, that by the cessation of the irritation and the suppurative process, or the ceasing of the discharge, the hectic will disappear, and the patient recover. This, then, I believe, is the pathology of the disease. Now for the influence of climate.

When we send a young person who is greatly predisposed to tubercles in the lungs, or who already has them, to the South of France, Italy, or Madeira, we remove him from the most usual remote causes of inflammation, from cold and sudden changes of atmosphere, from ardent spirits or wines, from beef, &c. Let him avoid all these, if he can, in the land of home, and he will avoid phthisis; or, let him gratify his national disposition to wines where they can be had cheap, and to high living, and he will have phthisis in the finest country of the globe. When we send him, however, to a different climate, we expect that he will no longer be an Englishman, but that he will conform himself, as far as possible, to the people of the country to which he is sent. Tubercles, therefore, will not form in his lungs, or, if formed, will not advance to inflammation.

Let us again send one who has already had symptoms of incipient phthisis, but in whom the inflammatory action has, by means of bleeding, blistering, and nauseating medicines, been removed. This person is now in the same state as the preceding one, but more liable to a relapse from slight causes. Let him go to a warm climate, and he is much less likely to meet with these causes.

Again, let a patient, with tubercles in a state of inflammatory action, be sent to a warm climate, and we are adding fuel to the fire already existing—the heat of the climate being a stimulus to the disease. It may be, that, if the inflammation be not severe, the patient, if sent to a *warm* and a *moist* country, (for moisture counteracts in great part the stimulus

of heat,) and by mild and low living, and the proper use of the other non-naturals, will recover ; but to such a person a settled cold climate as Russia or Lapland would be better, for the cold would diminish the activity of his system.

Again, let a patient, in the suppurative stage of phthisis, be sent to a warm climate, and we send him to increase the inflammation and suppuration in the other tubercles, we send him to suffer under aggravated hectic,—we send him more speedily to his grave. There may be a chance that a warm and moist air will cause the tubercles to suppurate kindly, and discharge the pus, and he may recover. It is just the same treatment more extended and permanent, and hence more effective, as that which we follow when we direct the vapour of warm water to be inhaled in inflammation of the mucous membrane of the throat or windpipe. There is one chance in a million in his favour. Send this patient to a settled cold climate, and you check the inflammation in the other tubercles, you check the profuse suppuration, you keep down the hectic, the cold gives even a considerable degree of bodily vigour, and you give the patient—what chance? One perhaps in five thousand. What an example of shameful ignorance is it, therefore, to see a medical man order a patient, in confirmed phthisis, to be removed to Madeira ; and what barefaced impudence is it in such a man, when he hears of his patient's death, to affirm that there is no value in change of climate. It will be seen from what has been said, that a cold climate has much more chance of curing phthisis than a warm, but that the latter is best as a defence against, or as a remedy in, its very early stage only. As to whether a residence in either will remove tubercles already formed, a negative, I believe, may be given ; and as to whether they will remove the predisposition to the disease, an answer cannot be returned until we know what the state of the system is which constitutes predisposition, whether it be

general weakness, or a specific morbid state of structure. If the first, a cold climate, as being a tonic, will have the most chance to cure the predisposition. If the latter, we must be satisfied with the result of experience as to climate ; for, until we know properly what that state is, we have no clue to the action of climate upon it. It is generally allowed that a person may return sooner from a cold than from a warm climate, with less chance of being affected with phthisis. Perhaps the reason of this principally is, that by a residence in a cold but settled climate, the body is made stronger and more likely to endure those sudden changes of temperature which are the cause of the prevalence of that disease in this country.

DIVISION OF CLIMATE, AND EFFECTS OF EACH ON THE BODY.—Climates, considered in the widest sense of the term, are divided into *Warm*, *Temperate*, and *Cold*. The warm climates are contained within 30 degrees to the north and south of the equator. These comprehend the greater part of Africa, of Arabia, of New Holland, of South America, all the southern part of Asia, many of the islands of the Indian Archipelago, New Guinea, and an immense extent of sea. From the 31st degree, to the 55th or 60th degree of each hemisphere, are the temperate zones; and they include almost the whole of Europe, Great Tartary, Thibet, Japan, a part of China, and America from New Orleans to Labrador, in the northern hemisphere ; and in the southern, the Cape of Good Hope, Van Diemen's Land, part of New Holland, and New Zealand. Northward and southward of the 60 degrees from the equator, on each hemisphere, are the cold climates, Spitzbergen, Lapland, part of Siberia, Iceland, Greenland, and part of North America, in the north, and Sea in the south.

I. A SOUTHERN OR WARM CLIMATE.—The action of a warm climate, upon the body, will be similar to that of a warm and dry atmosphere, but more distinct. The circulating system is excited, the pulse is quick, and the inspirations

and expirations more frequent. The digestive organs are weak ; the secretions, especially those of the skin, the liver, and the kidneys, are increased. The perspiration is oily, and of a strong odour, especially in natives. The absorbents are active, and any thing applied to the skin, or taken into the stomach, is speedily absorbed. The temperature of the body is higher than in the inhabitant of a cold climate. The contractility of the muscular fibre is greatly increased, and robustness and vigour are compensated for by agility and quickness. The senses are very acute, the imagination is rich, the passions are strong. It is from this increased mobility of the nervous system that we find the inhabitants of the torrid zones so fond of dancing, so fond of shews and spectacles, and of the tricks of jugglers. It is from the same excess of nervous excitement, that we find so many religious fanatics, monks, hermits, solitaires, marabouts, dervishes, fire-worshippers, &c. always multiplying the farther we proceed south. There is a tendency in the inhabitants to exaggerate all ideas and sensations ; they have a love for the prodigious and wonderful, and a strong dash of the hyperbolical in every thing. This increase of nervous excitement is accompanied with such a feebleness of body, and a want of courage, (except on any sudden mental excitement,) as to make bondage and slavery almost endemic in warm countries. Along with this feebleness there is a tendency to all the worse shades of character, to cruelty, to finessing, to fraud, to perfidy, and to all those ignoble means of defence which pusillanimity draws to its support against courage and animal prowess.

The diseases which prevail, in this climate, are principally fevers attended with great debility, cholera morbus, vermes, dysentery, and many nervous affections. Tetanus is common as an idiopathic disease, and as following local injuries. The fevers are of the most fatal character. They commonly

prevail at certain seasons of the year, and apparently depend, for their appearance, upon certain states of the air. The diseases in which it is beneficial, are principally those of a chronic nature, and peculiar to cold climates ; rheumatism, gout, venereal pains, catarrh, scrofulous affections, &c.

A considerable deal will depend upon the state of the moisture of the warm climate. A moist warm climate is more injurious to the human body than a dry and warm one, but, on the other hand, is often more medicinal for chronic diseases. A moist and warm climate is better for incipient phthisis, or any inflammatory disease, than a dry one. A tropical climate, near the coast, is always noxious. The air heated and rarified by the sun, and the reflection of his heat by the earth, falls during the night, and passing to the sea carries along with it all the terrestrial emanations which it has received during the day, and precipitates these along with its humidity. It is this which makes the night or land breezes so deleterious on almost all the coasts of warm countries, and especially within the tropics.

II. A NORTHERN OR COLD CLIMATE.—The constitution of the body, induced by a temperate or rather cold climate, is the same as that from a cold and dry atmosphere, provided the climate is dry as well as cold. The contractions of the heart are strong, but slow. The respiration is likewise slow. The digestive organs are powerful, and digestion consequently very active. “ *Les Espagnols qui vivent ordinairement de peu, deviennent voraces lorsqu’ ils passent en France,*” says one who liked to have an illustration at the expense of his neighbours. The amount of the whole secretions is much diminished. The muscles are slow and difficult to move, but their tone is immense. The effect of climate is finely illustrated in the “ *Tales of the Crusaders.*” At the meeting of the two Commanders, Richard Cœur de Lion shews the vigour of his northern nation by cutting a bar

of iron through with a stroke of his battle-axe, whilst the Souldan, Saladdin, exemplifies the suppleness of his eastern clime, by cutting into two a human hair with his scymitar. Besides this difference in tone, there is likewise some difference in size. There is more muscle in the inhabitant of the cold climate, and this, added to the greater amount of fat in the cellular membrane, and fulness of humours, gives to the different parts of the body that fine mould which is never seen in the inhabitant of a warm climate. From the great heat, and consequent perspiration, the fat is never allowed to accumulate in the latter, and this, with the diminished quantity of fluids, and less muscular fibre, allows the angularities of the bony frame to be always visible. There is too, a greater developement in the upper part of the body of the inhabitant of a cold climate, his head is larger, his chest broader : whilst in the inhabitant of a warm climate the developement is in the belly and pelvis. As to the mental faculties, the fine imagination, the splendid metaphor, sparkling comparison, and high-toned exaggeration of the south, are exchanged for clearness of conception, closeness of reasoning, accuracy of detail, and conciseness of expression. It is, however, within the latitudes of 45 to 65 degrees, that we find the ablest and strongest bodies, and the most gifted, generous, and courageous minds ; and it is to those contained within these parallels that the above remarks principally apply. They apply to the inhabitant of the temperate climate, but rather more to those in the colder part of it.

When we proceed farther north, to a very cold climate, the body again becomes weaker, and the mind more timid. Indeed we find almost the same barbarity in the extremes of warm and cold habitable regions, the same superstition and credulity, and the same paucity of population. The mind in the one passes truth as too tame, and exaggerates every idea ; in the other it cannot comprehend it, and is apathetic. In the one country the heat stimulates the nervous sensibi-

lity, and the part of the body, in which this sensibility, in a greater proportion, resides—the sexual organs, or perhaps it merely produces an increased secretion of semen as it increases all the other secretions; at any rate the body arrives early at puberty, enjoys to excess, and then soon becomes old. In the other, this sensibility is blunted, or the secretion is less, puberty arrives after a long youth, and old age does not come on until late. “*Il faut les écorcher pour les chatouiller,*” says the acute Montesquieu. It is this same want of sensibility which makes the inhabitant of cold climates so little affected with ardent spirits. A quantity which would make a savage within the tropics stark mad, would only give to the inhabitant of the north a feeling of comfort and energy. What would be a vice in the south is a necessary in the north.

The diseases which are found in a cold climate, are inflammations, catarrhs, pulmonary affections, rheumatism, and sometimes dropsy. The diseases for which such a climate is advantageous are those principally of a nervous character, and attended with debility. Intermittent fever, dysentery, hypochondriasis, melancholy, &c. The diseases of a very cold climate are not many, chiefly from the habits of the individuals. They are attended with debility generally, and do not bear depletion.

It is needless to say any thing as to a high and low country, for the influence of elevation of a country on climate has been already stated. A high land has a cold and dry climate, a low has a warmer and generally a moist climate, and the diseases most prevalent in these places, and those for which they are best adapted as therapeutic agents, have been already mentioned.*

* Athenæus says, “*Sublimia loca facilius perspirantur quia undique sunt aperta, nec quicquam sit quod ventos repellat; ex quo fit ut qui in iis degunt plerumque sani vivant, hyeme autem in morbos quos frigus excitat, magis incidunt.*”

Such are the great and manifest divisions ; but, as has been mentioned, it will often be in the power of the medical practitioner to find in the same parallel, and within a short distance of the patient, a climate drier and warmer, or the reverse. In the absence of thermometrical and hygrometrical observations extended over a sufficient period of time, he must decide, from a knowledge or description of the localities of any place to which the patient desires to go, as to the climate. There are some localities in this country, as well as in others, which have acquired a celebrity in the removal of certain diseases, and the climate of which is produced by some or other of the above causes. Thus, as has been stated, the *south-south-west*, or the *south-west* aspect in our hemisphere is the warmest ; and on the coast of England, we have, in some places, the temperature still farther affected by the exposure to the sea, and the winds of the Atlantic. Accordingly this part is much frequented by invalids of a certain description. The places on the Devonshire coast best adapted for them, as being the most sheltered, are Torquay, Dawlish, Salcomb, Sidmouth, and Exmouth, the best being the first, which being placed on a chalky hill is dry and sheltered from all winds but the south-west. The temperature of this coast, during the months of November, December, and January, is on the average 5° above that of London ; but in April it is not above 1° . The south-west winds, however, sometimes blow with great violence, and, therefore, a residence at some distance from the coast is more suitable in some diseases. The climate of the Devonshire coast is warm, but, at the same time, it is moist, and, therefore, whilst it is serviceable in many cases of cough without expectoration, in sub-acute bronchitis, in rheumatism, in incipient phthisis, and in dysmenorrhœa, and some hypochondriacal affections depending upon irritability of the system, it is not adapted for diseases accompanied with relaxation, or for those persons subject to passive discharges.

The *Land's End* contains some places much resorted to by the invalid, especially Penzance, which, from its almost peninsular situation at nearly the extreme western point, possesses a more equable climate, in respect of temperature, than any other in England ; but it is very moist, nearly twice as much rain falling there as in London. Its mean annual temperature is only about $1\frac{1}{2}^{\circ}$ above London, but it is $5\frac{1}{2}^{\circ}$ warmer in winter, and 2° colder in summer. The greatest difference of temperature occurs during the night, being in winter above six degrees, and, during the day, only three degrees above London. Although so much warmer in winter, yet it is scarcely one degree warmer in spring than London, and is below that of the south-west coast. Dr. Clarke says, " I find, on comparing the months for a series of years, that the daily range at Penzance is almost half that of the south of Europe ; but in this quality, also, it falls short of Madeira. And here it is a proper opportunity of remarking, that although in mean temperature for all the twenty-four hours, Penzance is considerably lower than that of the south of Europe, yet that during the night through the winter, its extreme minimum temperature falls seldom so low as that of the former climate. It is during the day only that the south of Europe, as far as regards temperature simply, possesses a superiority. Thus in winter, at seven o'clock in the morning, there is little difference between Rome and Penzance, but at two o'clock in the afternoon there is nearly the difference of 7° . Indeed the whole advantage of Penzance, as compared with the south of Europe, appears to occur in the winter during the night. In the duration of the same temperature, as shewn by the mean variation of successive days, the climate of Penzance excels all the northern climates, and nearly equals Rome and Nice in this respect ; but as compared with Madeira, its temperature from day to day varies twice as much."*

* " The Influence of Climate," p. 40 & 41.

of Penzance, and its exposure to the westerly and south-westerly mild winds are sufficient to account for its warmth during the day, whilst the clouds which, from the great humidity, must hang more or less over it during the night, may, by radiating the caloric back again, account for its warmth during the night. It is not protected by any hills from the east and north-east winds which prevail during the spring, and hence the greater coldness of it, compared with other places not very distant from it, at that season. It is possessed of similar effects as the south-west: it will be suited for cases of sub-acute inflammation of the abdominal viscera, and likewise for those of the chest, accompanied with a dry cough. In copious passive discharges, this climate, from the relaxation it induces, ought to be avoided, and some place with a dry atmosphere selected. Penzance has one disadvantage, which is, that it is exposed to not unfrequent and severe gusts of wind and storms.

The *South Coast* does not, from the causes mentioned, give so high a temperature as the south-west; not exceeding that of London by two or three degrees in winter, and being nearly as much below it again in summer. It is the temperature of London which varies at these seasons, that of the South Coast being the steadier of the two. The places most frequented are, Undercliff in the Isle of Wight, Hastings, and Brighton. The first is the best, and is a good winter and summer residence, the second is best as a winter residence, being sheltered from all the cold winds; whilst Brighton again, being more exposed to the North wind, is best adapted for an autumn quarters. The two first have a humid and warm atmosphere, whilst that of Brighton is rather colder and much more bracing, and therefore whilst it is not suited for inflammatory pulmonary complaints, it is well adapted for fluor albus, menorrhagia, all diseases of mucous membranes attended with discharges, and for many nervous complaints.

The *West Coast* is not so warm as the south-west, and south, but it has the advantage of being drier ; and in many parts is well defended from the cold winds of the north and east. Clifton has received the preference. The interior contains many situations eminently adapted for valetudinarians as regards air ; and some with the additional therapeutic agents of thermal and saline waters.

Although these places have received a character which they no doubt deserve, yet many others may be found on the West coast of Ireland, and even on that of Scotland, which possess a climate equal, and it may be superior, to any of these. The East coast is colder, but from that circumstance it is more tonic and bracing. It is not, however, suited for diseases of the chest generally, which are so common and so fatal, and hence the celebrity which the places already described have received.

The better to derive the advantages of a warm and equable climate, the invalid is frequently sent to the Continent, and the places preferred are the west and south-west, and the south-eastern coasts of France ; and Italy.

The *West and South West Coast of France* is about 6° higher in temperature than England generally, and 4° higher than the south-west of England ; but 3° below the south-east of France, and 4° below Italy. It is well tempered by the winds from the Atlantic, and is moist from the same cause. It is adapted for the same cases as the south-west of England, being warmer, but equally humid. Laennec found the proportion of cases of consumption very small in this part of France. *Pau* is the best place in this district, according to Dr. Clarke, and he recommends the invalid to arrive there in the end of September or beginning of October ; but seeing that it is 3° colder than the warmest parts of England during the winter, it would be preferable to make Pau the spring residence, at which time it is $5\frac{1}{2}^{\circ}$ warmer than any part of England.

The *South East of France*, or Mediterranean coast, has long enjoyed a high reputation in pulmonary complaints, a character, it seems, which it neither deserves from its effects on those sent to it, nor by the absence of consumption amongst the inhabitants. It is a remarkably dry climate—according to Clarke, the driest district of Europe. Its mean annual temperature is 7° warmer than the south-west of England, 3° warmer than the south-west of France, and about 1° below Italy; but “The temperature is distributed very unequally through the year; the difference of the mean of the warmest and the coldest months being 35° ; this, in the south-west of England is only 22° , in the south-west of France 30° , in Italy 32° , and in Madeira only 14° . Dryness is one of the most remarkable characters of the climate of Provence. At Marseilles and Toulon, about 19 inches of rain fall annually. This is less by six inches than what falls at London, and is not half so much as falls in the south-western extremity of Cornwall. The annual number of days on which rain falls in Provence, is only 67, while at London it is 178. Again in Provence, (at Toulon) the quantity of water evaporated annually, is 40 inches, while at Paris it is 32 inches, at Gosport, 25, and at London only 24. The general character of the climate of the south-east of France, therefore, is dry, hot, harsh, and irritating. Absolutely warmer than our own island, and the south-western parts of France, its temperature is divided through the year and through the day with great irregularity. It has a much wider range of temperature than our own climate; this being, when compared to that of England, as three to one for the year, and as two to one for the day. The temperature, no doubt, remains more steady from day to day than our own; but its changes, though less frequent, are more sudden and extensive. Sometimes the winter is very rigorous. This tract of country is subject also to keen cold northerly winds,

especially the *mistral*, which prevails during the winter and spring, and is most injurious to pulmonary diseases."* The only diseases of the chest for which this climate will be of benefit are humoral asthma, and chronic bronchitis accompanied with much discharge. Advantage may likewise be derived from it in some scrofulous swellings and sores, and in rheumatism. It will also agree well with persons of a lax, torpid, and phlegmatic temperament; but in consumption, in dyspepsia, and gastric irritation, it has been found decidedly injurious. The places most frequented, and in the order in which they ought to be preferred, are *Hyères, Toulon, Marseilles, Montpellier, Aix. Nice*, although situated in the same line of coast, has some local peculiarities which, in part, correct the extreme dryness, and, by warding off the cold winds, thereby make it superior as a residence to the invalid.

Italy.—Italy affords a very considerable variety of climate. Taking it generally, it is warmer than the south-east of France, and, at the same time, moister; but not so humid as the south-west of France, or of England. The places most frequented by invalids are Genoa, Florence, Pisa, Naples, and Rome. *Genoa* is subject to rapid and extensive changes of temperature, and to dry cold winds, alternating with warm humid winds. It is not in high esteem as a residence for the phthisical. *Florence* is very hot in summer, but only of about the same temperature as Penzance in winter, and only 4° above London at that period of the year. The winter is wet, and fogs are more common than in any other part of Italy. Acute diseases of the lungs are very common amongst the inhabitants. Clarke informs us that Florence agrees least, with children, of any part of Italy. *Pisa* is inferior in its winter temperature to Rome, but higher in its summer. "In *winter* it is 7° warmer than London, and 2° warmer than Penzance. In *spring* it is 8° warmer than London, and

* Clarke on the Influence of Climate, p. 74-75.

about 7° warmer than Penzance. The range of temperature, between day and night, is very considerable. The climate of Pisa is genial, but rather heavy and moist. The most common acute diseases are peripneumony, dysentery, and gastric affections. Phthisis pulmonalis is not a common disease, but chronic bronchial affections are frequent." (Clarke, p. 103.) *Naples* has a higher mean annual temperature than Rome, Pisa, or Nice, but is changeable, often very moist, and exposed to the Sirocco. Affections of the chest are common, and it is consequently not at all adapted for consumptive patients.

"*Rome* is mild and soft, but rather relaxing and oppressive." Its mean annual temperature is 10° higher than London, and 8° above Penzance; its mean *winter* temperature is 10° above the first, and 5° above the second; its mean *spring* temperature is 9° above London, 8° above Penzance, 1° below Naples, and 4° below Madeira. Its range of temperature is not so great as in any other part of the south of Europe, except Nice. It is drier than Penzance, there being about one-third less fall of rain, and that on about one-third fewer days; it is drier than the south-west of France, but not so dry and irritating as the south-east of France. It is well adapted as a winter climate, for pulmonary and bronchial complaints of all kinds, and for rheumatism. It must always be recollected, however, that Rome is healthy only during the winter and spring. The malaria fever makes its appearance in June, and continues till nearly the end of October. These intermittents, of a very malignant character, prevail during the summer and autumn at many of those places, both in France and Italy, which are recommended for the residence of the invalid, and, therefore, it behoves him to quit them previous to the appearance of the disease; or, if any circumstances compel him to a residence during the unhealthy season, he ought to follow the system pursued

by the natives, which they have found most successful in warding off the action of the miasm. The consumptive patient, and the individual who is of a relaxed and weak habit of body, should, by all means, avoid the depressing and exhausting heat of the Italian summer ; but when he finds it inconvenient to return northwards, he ought to prefer Naples as being the most moderate in temperature during this season, and where he may have the advantage of sea-bathing, of artificial baths, and of mineral waters.

Madeira.—The climate of Madeira has been long esteemed the best for those predisposed to consumption, and for the disease in its incipient stage. It is superior to any part of the continent of Europe, in so far as “ It is warmer during the winter and cooler during the summer ; it has less difference between the temperature of day and night, between one season and another, and between successive days ; it is almost exempt from keen cold winds, and enjoys a general steadiness of weather to which the best of these are strangers : the rains are circumscribed, and generally fall at regular and stated periods. During the summer, that is, from June to September, the almost constant prevalence of north-easterly winds maintains the atmosphere in a temperate state. The Sirocco, which occurs two or three times, at most, during the season, and then continues for a few days only, (seldom more than three,) sometimes raises the thermometer in the shade to 90°. With this exception, the summer temperature is remarkably uniform, the thermometer rarely rising above 80°. In consequence of the regular sea-breezes, the heat is not so oppressive as the summer-weather in England often is. Close sultry days are little known in Madeira, and there is neither smoke nor dust to impair the purity of the atmosphere. Such, indeed, is the mildness of the summer at Madeira, that a physician, himself an invalid, who has resided for some time on the island, on account of his health, doubts whether it is not

more favourable to the pulmonary invalid than the winter." (Clarke, p. 151 & 152.)

The winter of Madeira is 20° above London, but the summer is only 7° . The winter is 12° above any part of France or Italy, and the summer is about 5° cooler. From this circumstance, Madeira is eminently suited both as a winter and a summer residence. The mean annual range of temperature is only 14° , being half that of Italy and France, and the mean range, for the twenty-four hours, is only 10° . In steadiness of temperature from day to day, it surpasses every other climate, the degree of variableness being at Madeira 1.11; at Rome 2.80; at Nice 2.33; and at London 4.01. The annual number of rainy days is only 73, whilst at London it is 178; but though the air is clear, it is not exciting and irritating, for the atmosphere of the sea keeps it cool, and at the time prevents extreme aridity. Few or no diseases are peculiar to the island, but it has been affirmed by one physician that phthisis is very common amongst the natives. This has been denied by others; but whether true or not, there can be little question that Madeira furnishes the best climate in pulmonary diseases, provided always the patient is sent there before his disease has advanced beyond the possibility of cure. There is this advantage, too, in preferring Madeira to almost any part of the Continent, that there is no fatigue in travelling, that there is a voyage of a moderate length, and pure sea air; and that the patient may remain in the island at all seasons of the year. He should endeavour to arrive there in the month of October, and he ought to regulate the temperature of his apartment during a part of spring, as that is the only time, especially March, when cold winds prevail.

To those whose health will not permit them to remain in Britain, and whose income will not allow them to live in idleness on the Continent of Europe, or in Madeira, or who may

desire to live under the British government, and enjoy the society of those who are connected by ties with Britain, our Colonies afford a great variety of climates, where the invalid may make his selection of his future home and country. To those subject to pulmonary complaints, the *Cape of Good Hope*, or *New South Wales*, or even *Van Diemen's Land*, will be found superior to any part of Europe. Consumption is most remarkably rare in New South Wales ; and many cases have recovered, by being sent there early. The long voyage will no doubt be of some effect towards the cure. The *Canadas* are not so injurious as we might suppose, from the great range of temperature, in pulmonary diseases. Some medical men have recommended the West Indian Islands, others the Indian Peninsula, as a good climate for the invalid in certain cases, and very likely they have been successful. In all these climates the changes in the electric and hygrometric state of the atmosphere are sudden and unexpected ; and the invalid will often find, that being caught in a storm and drenched, has outbalanced all the previous benefits, and laid him down speedily to pass away from the world.

Baglivi has not omitted to notice that often a very slight change of situation may be sufficient to afford us a salutary change of air ;* and this it behoves the physician to remember, and when an extensive change cannot conveniently be attained by the patient, to take the advantage which is offered by a less one. Often benefit will be derived from a mere change of air, where we can find no difference either in the moisture or dryness of the atmosphere. Thus, in the West Indies, an occasional removal from one island to another, has been found to assist very much in preserving the health of the troops. When one is affected with disease,

Quibus etiam in locis (quod sane mirum) brevissimi intervalli discrimine, hic aliquantum salubris existimatur aer ; illic contra noxius et damnabilis. Prax. Med. lib. i. cap. xv.

at a distance from the place of his birth, or rather that place in which his early life was spent, a return to his *native air*, as it is termed, will often prove serviceable, even though, from our knowledge of the climate and the disease, we might be induced to think that it would prove the reverse. The moral effects of this change may perhaps be more effective in the treatment than the physical, and sufficient to outweigh any injurious effects likely to arise from them, and to cure the disease. It will often be highly proper to recommend the trial.

SEASONS.—A chapter is devoted by Barbier in his “*Traité d'Hygiène appliquée à la Thérapeutique*,” to the influence of the seasons. This I consider unnecessary, as the remarks made with respect to the atmosphere, and still more with respect to climate, include almost all that could be desired with respect to the seasons.

There is one point of importance, however, resting upon the experiments of Edwards, and that is, the influence of the change of temperature, as from hot to cold or the reverse, during the summer or the winter. It has been already stated that, by exposure to heat, the faculty of the body to generate heat is stimulated, and the body is thereby enabled to withstand the application of cold; and that, by the application of cold the faculty of evolving caloric is depressed, and the heat therefore more rapidly abstracted from the body. But this is the case when the application of the heat or the cold is of short duration, as for instance in the case to which it was applied, viz. the bath; (page 78) but when the exposure to the heat or the cold has been for a long period, as in the case of the summer and winter, Dr. Edwards found the reverse to be the fact, and that animals have less power of evolving heat during summer, and an increase in that function during winter. He exposed hot-blooded animals to a freezing mixture during a specified time in the middle of

summer and the middle of winter, and he found that they were cooled nearly eight times as much in the first as in the second.

The practical inference we draw from this, is the impropriety of making sudden transitions from one climate to another where the difference of temperature is very great from that which has been left. We see the impropriety of sending those who have just enjoyed a summer temperature of a warm country to endure a severe winter of a northern climate. We see the impropriety of bringing troops from the East or West Indies during our winter, or of sending troops from this country to the North American Colonies close on the commencement of their winter. In moderate climates we have the gradation of spring and autumn, by which the body is gradually brought the better to endure the heat of summer or the cold of winter, but in others, as for instance the colder parts of North America ; nature steps at once from the snows of winter to the broiling heat of summer, and from that again to the winter of piercing cold. And, wherever this rapid change occurs, it is at this time that diseases are most prevalent. We see likewise how this interference with the calorific function, either in summer or winter, in consequence of a great alteration of temperature, must be followed by all those diseases which depend upon irregularity in the animal temperature.

SEA AIR.—The influence of a large expanse of water, and still more the sea, on the temperature and moisture of the coast, has been noticed. The effects on the human system will, of course, be more marked in cases of voyaging, when it is exposed, for a length of time, to the atmosphere or climate of the sea. The advantages of a sea-voyage, in as far as the air is concerned, may be ascribed to several concurrent circumstances. *First*.—At the request of Sir John Pringle an examination was made, by Ingenhousz, of the

composition of the atmosphere on the sea ; and, from the result of his trials with the eudiometer, it appears that air is purer on the sea than it is on the coast, and on the coast than it is inland. Terrestrial vapours or gases containing miasma, or matters noxious to health, are absorbed, dissolved, and dissipated, through the waters of the ocean ; and this is more the case when the water is much agitated. It has been observed that the West Indies are rendered healthier after storms and hurricanes, the effect of which is to carry off more of the emanations from the soil, and to mix them more thoroughly with the water. The sea will likewise be made colder in these climes by the storm raising the cooler water from the lower parts of the ocean, whereas, in a cold climate or in winter, a storm produces the reverse, the deeper particles being then the warmest.

Second.—Another circumstance connected with the sea climate, and which has also been noticed is, that the temperature of the air upon it is always more equable than upon the land. The temperature of its air, under the equator, seldom exceeds 84° Fahrenheit. Very little variation, likewise, takes place between day and night, the temperature during night being, in equatorial regions, only 3 or 4 degrees colder, and in the temperate zones only 6 or 8 degrees during day ; whilst on the land the difference is always much greater, the thermometer sometimes sinking 30 degrees.—

Third.—A matter deserving consideration also is, that from the constant evaporation, the air must be much more humid than it is on the land. *Fourth.*—An additional advantage has likewise been stated by some—that the atmosphere of the sea contains always a quantity of salts which may act, as the sea water in bathing does, as a stimulant to the skin, or the mucous membrane. The truth of this statement is not granted to the extent demanded by its supporters. That the air may contain under some circumstances, as in a storm, or when

the wind is blowing, a quantity of the salt spray, is correct enough, but very little, if any, salts will be taken up by evaporation.

Keeping these things in view, we may see how a sea air, as experienced on a voyage at a distance from land, will be of service in many diseases. It is an equable, generally temperate, moist atmosphere, containing frequently some stimulating salts. When we add to that the collateral circumstances of the gentlest possible passive and active exercise, and the removal from all exciting objects of the senses, and the consequent perfect quietude and composure of mind, we easily perceive how a sea voyage may be attended with so felicitous consequences in diseases accompanied with a sub-acute inflammatory action, or with a general irritability of the body arising from excitement of the mind not directed strongly to any particular subject or requiring a rapid change of objects to divert it. In general the dyspeptic and hypochondriac will be benefited to the greatest extent by *travelling*, the pulmonary invalid by *voyaging*; for the first require mental stimulus, the last quietude.

PRECAUTIONS WITH RESPECT TO CHANGE OF CLIMATE.—These are two-fold—as regards the advising a change, and as regards the conduct of the patient himself. The physician has a heavy responsibility upon him who prescribes a distant climate. He may be adding a bitter pang to the dying moments of the patient, and hurting the worldly interests of the friends that survive him. The death-bed pillow is best smoothed by the hands of relatives and friends; and, if death is unavoidable from the disease with which the unhappy patient is afflicted, why not let him give up his breath in the midst of his family, and in his own home? The affection of friends will induce them to sacrifice much to follow up the direction of a physician who prescribes a change of climate; but it is a villainy of the first magnitude in him to deceive

them by the promise of recovery, or to lead them into this fruitless expense. Often, too often, does he do so either from ignorance on his part of the nature of the disease and the influence of different climates, or from a desire to get rid of a *hopeless* case, which he does by making it a *helpless* one, by sending the sufferer to die in a foreign land. Ashamed at the deficiency of the resources of his art, or blushing at his own incapacity of administering them, he cannot bear to meet his patient ; but a pitiful coward is he who forsakes the vessel that has been placed, in sincere confidence, under his command while a plank of her sticks together. There may be no hope of carrying her into port, but he need not run her on a rock that she may be the more speedily broken up, and he get a better pretence for deserting her. Climate will do much, very much, but it will not do so towards the fatal end of disease. It will do but mischief when called in at the tail of the day. The man who has clung to the pharmacopœia till near his patient's last days, should cling to it to the very last, for *now* it will assuage suffering, *now* it will be a blessing.

The invalid hopes much from change of climate, frequently too much, and the disappointment is the bitterer to him. He is told it will cure him, and he relies upon it alone and unsupported. He changes the atmosphere, but he adheres to every thing else, except physic. In both these respects he is wrong. By adhering to his former habits, he is preventing the desired effects of the new climate ; and, by throwing away all medicine, he is depriving himself of a powerful ally in support of climate. He ought always to bear in mind that he *is* an invalid, follow a regimen such as the inhabitants of the new country he has arrived in would follow in the same disease, and aid that regimen by means of the more powerful articles of the pharmacopœia, if necessary.

LECTURE SEVENTH.

EXERCISE.

THE motions of the human body are either voluntary or involuntary. We can move or not, as we please, our limbs ; but we have not the same power over the heart, its ramifications, and the abdominal canal. Voluntary motion is not necessary for mere existence, and nature has therefore left it to our own will ; but the other is, at every instant, necessary for life, and therefore she has wisely removed it beyond the power of our interference with. The blood moving in the arterial system, the peristaltic motion of the intestines, the passage of the secretions, the contraction and relaxation of the diaphragm and other respiratory muscles, are motions going on steadily and regularly, and when they cease, the small thread of life breaks asunder. But, besides the necessity of these motions for the performance of the particular functions which belong to them, they communicate a shock or motion to the whole machine. Although laid in perfect rest, as far as our volition can give rest, there is a constant motion going on in the system, and the remotest part of the extremities is receiving more or less of that shock and motion, in the contraction and dilatation of the vessels.

On the other hand, the motion of the voluntary muscles

increases that of the involuntary. The number of beats of the heart, the number of respirations, and the quantity of the secretions, are increased according to the measure of the exercise used. There is, likewise, a difference in the effects of muscular motion, according as whether or not it is made against a resisting, or an unresisting, body. The first is much greater than the latter. A person stretching out a limb in the air gives no shock almost to the system, but one striking that limb against a body, having more resistance than atmospheric air, gives a shock which is felt in every part of the body. In the state of health this is not so much perceived as in dishealth—especially in inflammation of any of the viscera, when walking, or even mere change of posture, is accompanied with the most intense pain.

Pliny the younger, speaking from his own experience, says, "*mirum est ut animus agitatione motuque excitetur.*" This is true: the mental as well as the corporeal powers are improved by exercise of the body. The mind is clear and active, and the body strong—but it is true only to a certain extent. When the exercise of the body is great, the deliberating and thinking faculty of the mind is injured.* Even walking does not permit, or rather is not favourable to, reflection and meditation, or whatever demands the entire powers of the mind. Great walkers in the open air are either observers of the operations of nature in the works around them, or they are worshippers of the beautiful, or they are gifted

* "La predominance du système sensitif sur le système moteur quand elle passe certaines bornes empêche que les fonctions de la pensée s'exercent pleinement et avec un degré d'énergie soutenu. Mais il n'est pas moins vrai que la vivacité des sensations, la facilité de leur combinaisons, la concentration des mouvemens dans l'organe cérébral, toutes circonstances nécessaires aux travaux de l'esprit ne sont plus les memes, quand les organes extérieurs se trouvent dans un état continuel de force sentie et d'action. Ainsi donc le régime athlétique ne convient point aux hommes qui cultivent les sciences, les lettres, ou les beaux arts." *Rapports du Physique et du Moral de l'Homme.*

with great imagination, and are first-rate architects in aerial castle building. A chain of abstract reasoning can only be followed in perfect quietness and rest.

It is a law of our nature that the more we accustom any part to exercise, the stronger does that part become ; and this is the case both with the mind and body. The practised logician, or barrister, will much sooner detect a sophism, than the raw youth from the University ; and the blacksmith who has just finished his apprenticeship, will swing round his head a forehammer which would defy the heaviest fellow of a college to lift. One person is born with a stronger constitution than another, as one is born with a better intellect than another ; but both will be improved by exercise ; whilst, by neglect, both may be beat by two others originally much weaker, but who have carefully cultivated and improved that which they at first received. To cultivate either exclusively is, however, injurious to the individual. He who is brought up in the close class-room, and engaged in severe study, is as much acting against nature as he who has been educated in the ring, and acquired nothing but strength of body. The former becomes the victim of irritability of mind, disease, and premature death ; the other lives on through a turbulent life, the prey of stormy passion, and in a state of mind not much above that of the brutes.

The motions may be divided into such as we make with our own muscles, and such as are made by another body carrying us ; or into *spontaneous* or *active movements*, and *gestations*, or *passive movements*. But previous to noticing these, it will be necessary to point out the effects of the different *positions* or *attitudes* the body may assume, when in the state of rest, or rather when not in a state of progression ; for in all but one of these we will find some of the voluntary muscles called more or less into action, and exercised with advantage, or the reverse.

ATTITUDES.—*Standing.* This, although not a progressive motion, is nevertheless far from being a state of relaxation or ease to the muscles ; in fact, it is one of the most fatiguing and painful of the exercises, one which is the least beneficial to the body, and which can be endured for only a very short time. During standing, the extensor muscles are in a state of continued tension, to prevent the body falling forward, which it would otherwise do, from the head and the viscera of the abdomen and chest being placed so far anterior to the vertebral column. It is much less fatiguing to walk than to stand, because in walking, the extensors and the flexors act alternately, and each set therefore obtains a rest for a time, but in standing steady the extensors are kept incessantly on the stretch. We are almost constantly, therefore, shifting or moving the weight of the body from one side to the other, to relax the extensors of one side even for a moment. Tottering, which is owing to the muscular weakness of the individual, is only a better example of this inability of keeping one set of muscles in action. The muscles of the lower part of the back, principally, are in powerful action during standing, and it is in this part that fatigue is most felt.

Standing on one Foot.—Here the base of support is only the breadth of the foot, whilst, in standing on both feet, it is the space contained under both feet and the space between them ; and consequently the body requires to be balanced on the foot, which is done chiefly by the muscles of the hip of the side on which the person stands. It is a painful position, and from the great exertion of the muscles, can be retained only a short time. The difficulty in keeping this position becomes still greater, if the person chooses to rest on the heel or on the toes.

Kneeling.—Here the base of support is in the two patellas, but as they are covered only with skin which is much thinner than that of the feet, and which has no cushions of fat be-

tween it and the bone, this position is very painful, and cannot be retained, unless some soft cushion is placed below the knee. When we bend back the thighs, and rest them on the heels and the calves of the legs, the base of support is much larger, and the pressure being taken considerably off the skin of the patella, the posture can be longer retained.

Sitting.—In sitting, the weight of the body rests upon the tuberosities of the ischia, which are well protected and covered by the muscles of the hip. When the back is not supported, the extensors of the spine and the head are kept in full action, and sitting in the erect position becomes nearly as painful as standing. By leaning back against any support, or by leaning forward and resting upon the arms, the fatigue is greatly diminished, and the posture can then be retained for a very long time.

The recumbent Posture.—This may be either on the back, on the sides, or on the belly. The greatest support is given by lying on the back: the greatest number of points being thus brought in contact with the supporting body. It is the posture which is taken by a person who is very much exhausted by exercise; it is the posture which is taken by the infant, and by the aged, and by those who are in a state of debility; and it is one of those signs by which we prognosticate the result of diseases, such as putrid fevers, hæmorrhages, &c. In those places where the pressure of the weight of the body is not defended by a quantity of flesh or fat betwixt the skin and the bone, the first becomes inflamed, excoriated, and lastly sphacelation extends to the deep parts: this frequently occurs in diseases, attended with such debility as compels the patient to lie constantly on the back. Persons in sound health lie more frequently on the *right side* than on the *left*, because, when laid on the left side, the liver, being very heavy, draws down the diaphragm and presses upon the stomach, thereby impeding respiration, preventing

the due action of the stomach, and the discharge of its contents into the duodenum, and causing disturbed sleep and frightful dreams. When lying too on the left side, the escape of the chyme is retarded or prevented by the right or pyloric extremity of the stomach, being less raised than its left or cardiac one. When lying on the side, the ribs are not permitted to extend themselves to the requisite extent, so that respiration is less free on that side than on the other ; and it is affirmed by Richerand, that it is this circumstance, and not the pressure caused by the weight of any fluid contained in one sac of the pleura upon the other, which compels a person having an effusion to sleep or rest on the same side as the effusion is. He sleeps on the diseased side because it is in part useless to breathing, and sleeps on it also that he may allow the greatest extent of motion to the other. In lying on the back, there is no pressure opposed to any expansible part of the chest, whilst in lying on the belly, pressure is opposed to the part having the most extensive motion, and hence the last is painful whilst the first is adopted, as has been mentioned, in all cases of muscular debility. When a person is laid horizontally on the back, it appears from the experiments of Legallois,* that less oxygen is consumed in consequence of the diminished muscular motion, and consequently that he is much more inclined to sleep. As the animal heat depends upon the quantity of oxygen taken into the lungs, we sometimes see patients, in the ardor of fever, lie upon the belly in order to prevent the expansion of the chest and diminish the volume of inhaled air. Children lie on a perfectly horizontal plane, but all others require the plane to be inclined ; and this position is still more necessary to those who have taken a full meal, who are dropsical, or have any enlargement of the abdominal viscera, in order that the breathing may not be interfered with.

* Œuvres de Car. Legallois. Paris, 1824, p. 14.

With the exception of the recumbent posture, and in it only lying on the back, all these are accompanied with some muscular exercise, but they are exercises which affect only one set of muscles, the extensors. They are not so beneficial to the body as where extensors and flexors are alternately called into play, and they are fatiguing or exhausting instead of strengthening. "Don't loll in that manner, Miss," bawls the kind mistress from her easy chair, to the young girl who has bent her body forward or to a side, in order to give some ease, and bolt upright again sits poor Miss to her task ; but a weary and a profitless task it is, for it is a weary and exhausted mind, in consequence of a weary and exhausted body, which is applied to it, and she girds her stays the tighter next day to support her. Lolling is a heinous offence in schools, and to keep the mind *intently occupied*, and to prevent somnolency, the pupil is seated on a form without a back or a front, on either of which a support might be sought ! The pupil of the Peripatetic Philosopher was more fortunate than the inmate of the modern school. He got knowledge with exercise, and without exhaustion and fatigue ; much better was he walking than sitting upright on a "school form."

ACTIVE EXERCISES.—In the effects of the exercises a considerable difference will exist, according as whether or not they are taken in the open air or in the house. The exercises which are followed in the open air, and in a constant change of air, are most beneficial to the health ; but the exercises which may be pursued in the house should not be neglected, when, under any circumstances, they cannot otherwise be taken. M. Clias arranges the exercises into twenty-one classes, and then divides these so as to make 227 different exercises. This subdivision, useful perhaps in the gymnasium, is too minute for us, and therefore we will notice only some of the more general and common.

WALKING.—This is the most common kind of exercise, and, if managed properly, the best. In this exercise the muscles of the inferior extremities are brought into play, and the whole body receives a shock each time that the foot is brought in contact with the ground. By walking upon the toes the shock is less, because the articulations of the tarsus and metatarsus break it; but the muscles, in this case, are much more exercised, and injuriously fatigued. By this exercise the pulse becomes quicker, the respirations are more frequent, the animal heat is increased, and, if the exercise be continued, the perspiration is poured forth. There is no exercise so natural and so beneficial as walking. A good walker is always a healthy person. This is an age of passive motions—steam carriages and stage coaches are rendering our legs unnecessary; but however convenient these may be at times, there is nothing so healthy as footing it along with a stick or a fishing rod in one's hand, and a wallet on one's back. The man who travels in this way sees much more of the country, and gets much more mental and bodily strength and freshness, than he who bowls away on the top of a coach on a dusty road.

LEAPING.—Here the shock is much greater than in walking, in proportion to the height which the body has been raised from the ground. The exercise of the muscles of the lower extremities and spine, especially the extensors, by means of which the leap is produced, is much greater, and in some cases so violent is their contraction as to be followed by a rupture of some of them, or by a fracture of the patella.

RUNNING.—Running is the same motion as walking, but the motions more frequent. The shocks follow each other rapidly, the whole organs of the body are constantly agitated, and, by continuance of this exercise, it puts on all the symptoms of a fever. Running is seldom prescribed to the invalid. It is too severe an exercise. Nor is it fit for the

person who wishes to preserve health. It is very apt to induce hæmorrhage from the lungs, or nose, or rupture of a vessel in the brain. Smart walking is quite sufficient ; unless a person hereafter expect to have to run for life or liberty ; and, in that case, a well practised pair of legs is of service. To distance an enemy or a dun is no bad thing, when one cannot conveniently knock him down.

CHACE.—The chace has received a separate consideration from some writers on exercise. It is a mixture of walking, running, and leaping ; but it is these combined with great mental excitement. It is this accompanying mental excitation which makes the chace so beneficial. Not only is there exercise, but the mind is withdrawn from thoughts which are, in many cases, the cause of dishealth. Taste for exercise varies. One man will walk for miles lost in the workings of his own imagination ; another will hunt a butterfly for hours, and walk many miles to secure a good specimen of a plant ; and a third has no desire to leave his bed or the fireside, unless he can find occupation for his dog and his gun. It behoves the physician to ascertain the particular predilection of the person, and suit his exercise in as far as possible to it. It is not a matter of indifference to the recovery of the broken down constitution of a debauchee peer, whether he be sent to the tread mill, or to his shooting box ; nor is it a thing of light moment whether the short thick legs of an obese, dumpy cit, covered with the usual breeches and stockings, carry him to his garden to prune his own trees, and watch his lillies and roses, or that the same legs, harnessed in close leathers, be sent on a tramp of some miles after the dogs, to be landed in a swamp whence the owner of these legs will not be able to extricate them.

DANCING.—Dancing will vary in its effects, according to the nature of the dance. It may be as moderate as walking, or as severe as running or leaping. In almost every species

of dancing there is a considerable concussion, by the elevation of the body from the ground and consequent fall to it. The fatigue from dancing is, however, by no means equal to that from running. Dr. Willich says of dancing "this violent exercise is particularly dangerous to females; and the use of fans in order to cool themselves, and thus check perspiration, (which is wisely ordained by nature to produce the same effect, in a more salutary degree, if not wantonly repelled,) is extremely imprudent. It would be advisable," continues the Doctor, "for the whole company after dancing is over, and before they venture into the open air, to change their *linen*, and afterwards to wait a quarter or half an hour, before they return home. During that time they may be refreshed with tea." The latter part needs no comment. It would really be amusing to hear the cry of "the Marchioness' clean linen," instead of the Marchioness' carriage, and my "Lord Charles' fresh shirt," instead of his cab.

I venture to say, in opposition to the Doctor, that this species of exercise is not dangerous to females, unless during the period of gestation, or in those subject to menorrhagia. It is the best exercise for young girls, especially at the time the menses should be appearing; and where this function is late in coming on. Dancing, as well as the preceding exercise, have this superior recommendation, that they are considered more in the light of amusement than exercise. Many a one who will not forsake his office or counting house for a half an hour's walk by the advice of his physician, will take a dance in the evening, or a walk of some miles in a bracing frosty morning after a pointer for amusement--and the fashion.

FENCING.—This is one of the very best of exercises. The chest is finely braced back, the body is beautifully poised, and the muscles of the eye, the neck, the arms, and the inferior extremities are in constant and sudden changes of motion; a vigour is felt by the whole frame, and every muscle

in it is either in action or ready for it. There is an elegance of carriage, and an alertness and rapidity of vigorous motion in the fencer which can never be acquired from the dancing master. The pupil of the dancing school moves always as the creature of art. The more finished he is, the nearer only is he to that character that can never be mistaken amongst men—his master. The expert and accomplished fencer shews nothing of this ; his grace seems natural to him, not forced upon him. He is equally without the lout of the raw bumpkin, and the grimace of the man that spends half his days neither in the heavens nor on the earth but between the two. Addison recommends fighting with one's own shadow as a good exercise for a sedentary or literary person.*

Wrestling, Climbing, and such like, are useful exercises ; and bring into play the muscles of almost the whole body, but they are not suited for the invalid. The *dumb bells* is a good exercise for the muscles of the superior extremities and the chest in particular ; whilst shuttlecock, the cricket, the foot ball, the hand ball, &c. exercise both extremities, and likewise the muscles connected with the voice, for there is considerable shouting and noise during these games.

These are exercises accompanied with more or less of concussion to the body : the three following are almost entirely muscular exercises.

DECLAIMING.—Declamation, or the reading aloud, was one of the favourite exercises of the ancients. They held that it strengthens the lungs and enlarges the chest. A larger volume of air is certainly taken into the chest during loud speaking, reading, or singing, and the muscles of the thorax are

* Many great characters, in all ages, have had their favourite exercises. This is one amongst others : “ Un courtisan surprit un jour le Cardinal de Richelieu sautant dans son cabinet, a pieds joints ; ‘ pari, Monseigneur, dit le rusé, que je saute aussi bien que vous ;’ et de se deshabiller de sauter ensemble.” Jumping, and especially jumping *round*, is a favourite exercise with ministers and courtiers.

more exercised, as well as those of the larynx and mouth. The voice is always weaker after meals, on account of the full stomach preventing the descent of the diaphragm ; and all the writers upon Health have recommended reading or speaking after meals in order to facilitate and promote digestion by the action of the diaphragm upon the stomach and bowels.*

An authority remarkable, if not great, is the following : “ Speaking,” says Dr. Willich, “ is one of the most healthful and necessary species of exercise ; and without any ludicrous allusion, I may assert that this practice is particularly salutary to the female sex who are more confined at home than men.” The scolding of servants is therefore merely an exercise, which the Lady of the house finds necessary for her health ; and that much-calumniated piece of domestic duty—the reading a curtain lecture—is only an innocent species of motion which the careful wife prefers to gadding about in her husband’s arm during the day. “ Loud reading and speaking,” continues the Doctor, “ are of singular advantage to literary men, and afford them good substitutes for other kinds of exercise for which they seldom have sufficient leisure or opportunity. It is to this cause we may justly ascribe the longevity of many schoolmasters, and teachers in Universities, who, notwithstanding their sedentary employments and the vitiated air which they daily breathe in schoolrooms, attain to a long and healthy life.” It is some comfort to the master, in his noisy mansion of youngsters, that, in quelling the wild uproar, he is benefiting his health ; and to the lecturer, that his

“ Words of learned length, and thund’ring sound,”

* Hippocrates says, *και απο διπνου δε ο της φωνης πονος μαλα επιτηδειος*. Celsus says, “ *Prodest adversus tardam concoctionem clare legere.*” Pliny, “ *orationem Græcam Latinamve clare et intente, non tam vocis causa quam stomachi lego.*” Cheyne likewise tells us, “ *clara voce eloqui, pulmonem confirmat, et ventriculi concoctionem promovet.*”

are doing at least as much good to himself as to his hearers. The absence of consumption amongst sailors is, in part, owing to the large volume of their lungs acquired by the loud speaking, in order to get above the noise of the waves, and to address their comrades from above and below. We see, therefore, the propriety of enjoining the most strict silence on the pulmonary invalid, and the patient labouring under acute disease. The patient who is laid, by the direction of his physician, on his back, in order that the number and depth of his respirations may be diminished, may, by speaking to his visitors, do as much harm to himself as if he walked up a steep hill with them.

SINGING.—The Greek philosophers could not dispense with singing, as a part of education. Their declamation was so carefully modulated in sound as to be a species or kind of singing. Their language, containing a great number of vowels, was much more harmonious than those containing many consonants, and required a fuller volume of air from the lungs; whilst the lips, the tongue, and the mouth were called less into action than amongst those nations which use many consonants. Some naturalists have affirmed that the language depends upon the climate, and that the inhabitants of warm countries use a language which opens the mouth widely, (the *os rotundum*,) whilst those of cold countries have such a language as will not require the lungs, mouth, and throat to receive frequently renewed portions of cold air. In Europe, the Greek, and next to it the Latin, have been placed as the most musical and mellifluous, and easiest pronounced, whilst the languages of Teutonic origin are sharp, harsh, and difficult to be pronounced but by those whose mouths have been trained to them from earliest infancy. Singing is much more fatiguing than speaking, because a much greater number of muscles are called into play, and exercised with greater rapidity and variations.

SWIMMING.—This is almost entirely a muscular exercise, for the water does not offer much resistance, and there is little concussion given to the body. The body is specifically heavier than water, but when loaded with much fat it is of the same weight as an equal bulk of water, and fat people swim with most ease. In order, however, to bring the body as nearly as possible to the sp. gr. of the fluid, the swimmer inhales an additional quantity of air into his chest, and, by a contraction of the muscles of the glottis, retains it there so as to keep the chest expanded. This he always does when floating on the surface. It is one of the best exercises for strengthening and invigorating the system. The muscles of the extremities, of the chest, of the spine, indeed almost the whole muscles of the body are brought into play ; whilst the medium in which it is taken—the cold bath—is itself one of the most important of tonics. The outpouring of the perspiration which takes place when any of the other exercises are pursued to any extent, does not occur here, for the temperature of the water prevents it. Swimming, therefore, as an exercise, could be continued with less bad effect than any other, but the fatigue is greater in consequence of the swimmer being under the necessity of striking the water frequently in order that, by this repetition, he may compensate for the less fixed point of action of the fluid. As the head must be kept out of the water, and for that purpose must be bent back, this causes considerable additional fatigue. One cannot labour much in the open air without being overpowered with sweat, but in the water he labours more, and he is not relaxed by sweating. To the man therefore who wishes muscular strength and agility, there is not a better exercise to be found. From the greater number of the muscles having their fixed point of action in the chest, and from the enlargement which takes place by the additional quantity of air inspired, swimming and floating must tend more to improve

the lungs than any other exercise whatever, at the same time, that it may not be without danger in those liable to hæmorrhage from that organ. The rise of the body in the advance forward, and the stroke of the swimmer with legs and arms, expand the chest, exercise the back, and give the freest motion to the extremities. Nor is there a more beautiful exercise than this. It is one of the finest things possible to see a parcel of gallant boys breasting it boldly over the waves far out of their depth, and shouting to each other as they stretch out in noble rivalry—to behold a curly-pated little fellow, with his body as red as the back of a boiled lobster, shaking the salt water drops off his head as he emerges through the breaker. Mamma's darling, and Papa's hope of the house, should not venture beyond their depth; but the rough squad that rank between the young pet and the heir—the youths who are to man England's navy, or fill her ranks, or carry her name and merchandize to foreign climes, these are the fellows that drive away fear, and brace their young and growing bodies in her seas and deepest rivers.

PASSIVE EXERCISES.—In these the locomotive power of the body is scarcely called into use, the muscles having nothing farther to do than to preserve the equilibrium. But, though there is little exercise of the muscles, compared with the active or spontaneous motions, there is more or less of the same shock or concussion, according as the ground which is gone over, is rough or smooth, or, as mechanical means are taken or not, to break up and divide the shock, as in the springs of carriages. The effect of the passive exercises on the body is the same as the active, but in a less degree; and therefore they are more suited for invalids and particular cases of disease. There is, however, one circumstance with regard to the gestations that does not apply to the spontaneous exercises, and that is, that the body is more exposed to the coldness of the atmosphere. A person by smart walking will

keep himself warm in the coldest weather of this climate ; but this he will never be able to do by driving in any vehicle. In the passive exercises there is likewise, in general, a much greater change in our atmosphere ; and a strong friction often against such parts as are exposed to the action of the wind.

RIDING.—Riding on horseback has long been celebrated as one of the most elegant and most healthy of the passive exercises. To many not accustomed to it, however, it proves fully as much an active as a passive exercise ; and they labour and perspire as much in the saddle as if they had been running on foot at the same rate. To such persons instructions in the riding school should precede exercise on the road. Riding on an ass has been recommended as preferable for the invalid, the motion being softer and easier, and the danger of accidents less. The she-ass is preferred, as besides carrying the invalid, it will furnish him with her mild and easily digested milk. Riding has enjoyed a high character in England, as a remedy in phthisis, from the time of Sydenham, who gave it out as a certain cure in that disease, down to the latest writer on the subject of Health.* It is no gentle exercise, however, that some consider will answer for that purpose. Fuller, I think, puts the plan to be followed most strongly : “ He that in this distemper, above all others, rides for his health must be like a *Tartar*, in a manner always on horseback, and then from a weak condition he may come to the strength of a *Tartar*. He that would have his *Life for a Prey* must hunt after it, and when once he finds his enemy give way must not leave off, but follow his blow till he subdue him beyond the possibility of a return. He that carries this resolution along with him, will, I doubt not, experience the happy effects of the good old direction, *Recipe Caballum* ; he will find that the *English* pad is the most noble me-

* Now Dr. Combe.

dium to be made use of for a recovery from a distemper, which we, in this nation, have but too much reason, by way of eminence, to stile *English*.* The practice may be good in chronic bronchitis, but, in suppurating tubercles of the lungs, such exercise must be questionable: the diseases were formerly confounded together.

The effects of riding in any vehicle will depend upon its construction. In the common cart and such like, there is a concussion or jolt given to the body much greater than what it experiences in walking.† In this case the motion is not broken by the joints of the inferior extremities, but is carried from the pelvis upwards, as the person is generally sitting. In a carriage again, the jolt is divided by the springs, and in the best contrived of these vehicles the shock given to the body is almost none.

SAILING.—Sailing is supposed not to act in the manner of the other exercises, but yet to have an influence on the body equal to any of them. The effects of it arise more from change of situation, change of air, and change of food, than from motion of the body. This, however, is not the opinion of Dr. Gregory. The advantage obtained from sailing he ascribed almost entirely to exercise.‡ The muscles are cal-

* *Medicina Gymnastica*, 5th ed. p. 106.

† It is unnecessary to point out to the student of anatomy the use of the many bones of the tarsus, and of the different joints, in preventing that severe shock which the body would otherwise receive each time the foot is brought to the ground in walking. The brain, and its appendage the spinal marrow, cannot sustain these shocks with impunity, and the finest and most skilful mechanic could not have contrived any thing superior to the extremities and the spine for preventing that shock being conveyed to the delicate brain.

‡ “*Mea autem sententia quicquid boni ex navigatione percipitur, ipsi exercitatione præcipue imputandum. * * * Ad hunc motum perficiendum omnium fere corporis musculorum exercitatio modica, crebra et vix sensibilis requiritur, et hæc exercitatio sine ulla intermissione perficitur; ita ut quandocunque aliquis navigationem facit, etiamsi in lecto decumbat vel dormit, exercitatione vel gestatione saltem utitur.* Quic-

led into exercise in order to preserve the balance of the body as the vessel is rising, falling, or rolling,* and besides there is a shock—certainly a very slight one—during the motion of the vessel. Sailing on the sea is much preferable to sailing on a river or smooth lake. A great deal of the advantage of sailing unquestionably lies in the sickness and vomiting often induced.

FRICTION.—Friction is more a passive than an active motion. When performed by the invalid himself, it is accompanied with more or less motion in other parts of the body, but when performed by another person, there is no farther motion than what the muscles of the part rubbed make to regain the position from which the mechanical force has displaced them. If the friction is very light, it affects the skin only, and chiefly, it would appear, the nerves of the cutaneous organ. When this friction is performed slowly and gently by the soft hand of another person, the effect is much more manifest, the mind becomes languid and enervated, the muscular fibre is relaxed, the whole surface becomes agreeably warm, all pains and uneasiness are calmed down, the person is easy in body, happy in mind, and falls into a profound sleep. It is in this way that Broussais very properly accounts for the wonderful effects which the “*Magnetizers*” often produce on persons possessed of great delicacy of skin and sensibility of constitution. When the friction is severer the muscular fibre is excited, and a larger quantity of blood is

quid igitur boni ab exercitatione aequali moderata et continua, in morbo aliquo percipitur a navigatione præ omnibus aliis exercitationibus jure expectandum est.—De Morb. Cœli Mutatione Medendis.

* During the motion of the vessel, the landsman is constantly stumbling or falling, until he has gotten what the sailors call “his sea legs aboard,” that is, until he has learned to keep his feet wide asunder so as to increase his base of support, and to balance himself. A sailor rolls in his walk like a woman with a wide pelvis; but the one does so from acquired habit, the other from her construction.

sent to the surface, as in cases of the active exercises. Accompanying this increase of blood to the skin, there is likewise an increase of heat, and an increase of the cuticular discharge. The body is rendered easy, supple, and active, without any feeling of fatigue. When to this friction are added, likewise, slight strokes on the muscles, and a stretching or "cracking" of all the joints, the body, if not strengthened by this, is brought to a state which is the most agreeable that the mind of the individual could desire. The system of champooing is known only in its perfection in warm climates, and is there not only of service by acting as a derivative from the liver and bowels to the skin, but as a substitute for those active exercises of the muscles which the climate will not allow to be taken. The treatment of disease by Friction is usually ascribed as the invention of Celsus. Of its great value in many cases of disease no doubt can be entertained. It may be either applied as a local remedy or as a general. As a local remedy it is used in cases of diminished muscular action, or to remove swellings by increasing the action of the absorbents. It is had recourse to in paralysis from local causes, from overstretching of muscles by sprains, or from diminished motion arising from disease in the moveable part. It is used to discuss tumours, and to dispel the water in dropsies. In rheumatism and gout it is likewise applied for its local effects. As a general remedy it is used as a tonic in diseases of debility, and as a diaphoretic in diseases depending upon obstructed perspiration. Considering the intimate relation which subsists between the internal mucous membrane and its termination or continuation the skin, it would be but reasonable to conclude that whatever promoted its regular and healthy state would likewise, in some degree, promote the health of these internal membranes. Experience has confirmed this, and in many diseases of the mucous membrane of the thorax and abdomen, and in many of the dis-

eases arising in other parts from the derangement of function or organization, we cannot have a better remedy than a diligent and assiduous use of the FLESH BRUSH. To young children, especially during the period of dentition, friction along with the tepid bath are the safe-guards of life. The deposit of solid matter which is constantly being left on the skin after the evaporation of the perspiration, is, as has been already mentioned, injurious both to the function and organization of the skin itself, and Bichat has well pointed out the value of even dry rubbing in removing this excretion.

What makes the jockey so careful to curry his horse, but that he knows it is necessary for his beauty, his fleetness, his strength, and his health ; for the horse exudes a large quantity of solid matter in his perspiration, and this retained in his hair would soon destroy him were the currying comb not frequently used. The professed "*Rubber*" often meets with the *nasus aduncus* of the school-learned physician ; but it would be well if this last learned gentleman would turn his scholarship to reading the many histories of cures by means of friction ; and that he would recollect what Fuller says, that " Exercise is to physic as a bandage is to surgery, an assistance or medium, without which many other administrations, though ever so noble, will not succeed." Your regular pill, powder, and draught gentleman has a great contempt for rubbing—the effect of his ignorance.

MOTION AS A THERAPEUTIC AGENT.—The importance of motion to health is shewn in the very construction of the body. When the brain is not receiving the motion of the blood, the lungs, that of the heart and diaphragm, then there is an end of thinking and living. Lorry has therefore properly said, that exercise is not advised by nature, but commanded ; she has given almost the whole mass which covers the bones for motion, and made it capable of much more powerful motion than that which she herself keeps a-going.

Her's are the finer and steadier movements, but she demands in us an accompaniment of the coarser and stronger ones. Broussais, after alluding to instinct, as leading imperiously to motion amongst all animals, places exercise as a passion affecting the young of the human race.* Cheyne, speaking of the exercise of the young, gives us a good remark when he says : " 'Tis beautiful to observe that earnest *desire* planted by *nature* in the *young* persons to *romp*, *jump*, *wrestle*, and *run*, and constantly to be pursuing *exercises* and bodily *diversions* that require labour, even till they are ready to drop down, especially the healthier sort of them, so that sitting or being *confined* seems to be the greatest *punishment* they can suffer ; and imprisoning them for sometime will much more readily correct them than *whipping*. This is a wise contrivance of nature, for thereby their joints are rendered *pliable* and *strong*, their blood continues sweet and proper for a full circulation ; their perspiration is free, and their organs stretched out by due degrees to their proper extension." Meditate on this, ye mothers, whose poor girls can scarcely walk, much less run and romp ; and who procure for them crooked backs and pale cheeks. Meditate on it, ye parents who send your daughters to fashionable boarding schools, in order that, in acquiring art, they may lose nature ; and ye who are looking out for wives, say, will you take this deceptive creature with her pale cheeks, and fetid breath, and distorted body—the victim of her mother and fashion—or her who comes bounding down the hill-side to your arms, with her ringlets streaming in the wind, her face with the

* " Le besoin de l' exercice musculaire n'est moins prononcé chez les enfans ; il est fondé sur le plaisir qu'ils trouvent à exercer leurs forces naissantes ; il se convertit en véritable passion, puisque la perspective d'enjouir occasione chez eux de violens transports, avec sensations agreables dans les visceres ; et s'ils en sont prives, la tristesse les saisit, et leur santé est compromisé." Physiologie appliquée a la Pathologie.—Tom. i. p. 185.

freshness and glow of health, her body in the luxuriance and freedom of unchecked and uncontroulled nature, and her kiss sweeter than

“Sabean odours from the spicy shore
Of Araby the blest.” *

It is in the chronic diseases, and more especially in those connected with the digestive organs, that exercise is of the most marked benefit. Functional disorder of the stomach or intestinal canal, or disordered secretion of some of the viscera of the abdomen, is almost invariably occasioned by sedentary habits. The affection is often not so severe as in itself to create attention ; before it has arrived to such an extent as to raise the alarm of the patient, it has brought on structural disease in that or some other part. The secondary affection, being the one generally first felt, is believed to be the only one existing, by the patient or careless observer, but he who possesses penetration knows that it has arisen from irregularity of function in some part of the abdominal canal ; and he knows too, that the cause of the latter derangement is the neglect of that degree of exercise of the muscles of the body which is requisite for the due performance of the duties of these viscera.

Exercise may properly enough be said to be the medicine of chronic diseases ; but it must be carefully observed that there are chronic diseases in which motion or active exercise would be injurious. Wherever exercise or motion causes pain it is decidedly improper. There is no exception that I know of to this rule, save in rheumatism, where exercise is sometimes recommended, not on account of the exercise itself, but the sweating brought on by it. Wherever we find the pulse much increased, and this increase permanent for

* “Soave fior, qual non produce seme,
‘Indo o Sabeo nell’ odorata sabbia.”

Arios. C. vii. v. xxix.

some time, and wherever we find the breathing much hurried, we may decide that the exercise is too severe or improper.

Distortions of any part of the body will frequently be removed by a judicious exercise suited to the muscles that are affected, continued for a sufficient length of time ; and even where the distortion is in the bone, exercise, and more particularly assiduous friction, will sometimes have the effect of restoring the part to its natural state. When the spine is threatening to become crooked, the treatment ought not to be tighter stays, or any such mechanical contrivance, or the recumbent posture, but well directed exercise. Clias gives some instances where deformity of the spine was removed in this manner.

It often happens that exercise is carried too far, and is succeeded by restlessness and fever. An invalid should never take exercise to such an extent as to *fatigue* him. In some cases the patient expects too much from it, and in other cases it is difficult to convince him of its importance.*

* Fuller's remark is good :—"How ridiculous would a man seem, who, when his physician had recommended some medicine to be taken, to the quantity of a drachm or half a drachm, should go and take half an ounce of it, and then exclaim against the medicine that it disturbed him, and did him a great deal of mischief, and that he would never take it more : or if, instead of taking a moderate quantity twice a day for a considerable time, he should take that moderate quantity but once in two or three days, and then exclaim that the medicine was ineffectual ? He that would act thus, would be thought to be a very unreasonable person ; and yet, after this manner, most sick people set upon the use of exercise. You shall have a man ride fifteen or twenty miles, when he should ride seven or eight, come home very much tired, and resolve never to be so served again ; and so perfectly lay aside all hopes of any good from the more moderate use of that exercise. Another shall ride out five or six miles once in two or three days, finds no great matter of relief, despairs of any success from that course, thinks it a trivial thing, a mere phancy, when the physician does not know what to do, and so he wholly leaves it off too. Now, allowing moderate exercise to be a medium for the recovering of our health, this is a very unfair way of making use of it."--*Medicina Gymnastica*, 5th ed. p. 46.

REST.—The value of rest, as a therapeutic agent, was well appreciated by Aretæus, when he gave minute directions even as to the construction of the patient's bed.* There is certainly no disease in which motion is more injurious than the one—Hæmorrhage—the treatment of which Aretæus is here discussing. Wherever there is excitement of the vascular system, and more especially where this excitement is attended with rupture, or a disposition to rupture of any vessels, rest, perfect and complete, must be rigidly enforced. And, although in other diseases of an acute nature, motion might not be so directly and immediately fatal, yet it will retard, more than any thing else, the patient's recovery. In every fever, in every inflammatory complaint of the viscera, motion of the body must be prevented as much as possible ; and in every local inflammation, or disease attended with pain on motion, absolute rest must be enjoined, for motion always is accompanied by an increased consumption of oxygen, and consequently by an increase of the animal heat. The temperature of animals is diminished when they are laid on their backs and deprived of all motion.

Not only is rest proper in excitement of the vascular system, but it is so, likewise, in that state of the nervous system which goes by the name of irritability. There are cases of nervous disease where the weakness and relaxation, the bodily laziness and inactivity, and the mental lassitude and torpor induced by rest, especially if long continued, will be of the utmost service. If there be any truth in the acrid humours, and the thin blood, and the lean and meagre flesh, being the cause of these nervous affections, instead of being, as is commonly now-a-days believed, the effect of the disease, we have the authority of Hoffman for saying "*nil plus*

* Κλινὴν ἰδρυκὴν ὅπως μὴδὲν σιιηται, τρεθιστικὸν γὰρ αἱ σιισεις. De Morb. Acutis.—Lib. ii. cap. i.

ad generationem superflui sanguinis, facit quam quies seu motuum consuetorum intermissio."

TRAINING.—As an example of the great effect of exercise on the body, we may here notice the practice of training. The horse is trained for the race course, as is also the jockey that is to mount him. The pace and the wind of the horse are astonishingly improved, and the rider can be brought to any weight. The champions of the ring are regularly trained previous to the fight, so that they may be in good or prime condition, that the bone may be strong, the muscle firm and hard, and the wind long. The most flabby and shaking sot of a taproom will be, in a three or four weeks' training, made as pretty and powerful a man as can be seen of his inches. All this is achieved by *pure air*, by *nourishing food*, and by *exercise*. The trainer takes his man to an open, and, if possible, a hilly country—he cleans out his stomach and his bowels once or twice with an emetic and a warm and resinous purgative—he takes him from bed every morning at six, and exercises him in walking, running, leaping, riding, or a part of all, for three or four hours at least—he then breakfasts him on a beef steak, stale bread or biscuit, and a little tea or milk. Exercise is again had recourse to, either as before, or with the gloves, the ball, the dumbbells, or quoits. The dinner is beef steaks, or joint of mutton, or lean chop, stale bread, and a little beer. Exercise is again followed for three or four hours in the open air, and then supper of steaks and stale bread. The bed is hard, and the length of sleep not above seven hours. He has no idleness of mind or body; he must be always occupied, and it is best to engage his mind with the exercises of his body. He eats but three meals a day, and the solids must be nothing but the lean of fat beef, mutton, or venison. The legs of fowls are sometimes allowed for variety, but no veal nor pork. The meat must always be broiled and under-done. Stale bread is almost the only

vegetable substance allowed ; sometimes a little potatoe, but no *herbs*. Eggs are occasionally taken, but no cheese, nor butter, or fat of any kind. The quantity of solids allowed during the day will depend upon the stomach and constitution of the individual, but must always be rather *below his usual quantity*—seldom, in any case, above twenty-four ounces. No condiments are allowed, with the exception of salt, and that only in a very small quantity. Fluids are considered as injurious. No food is given in this form ; and, for the purposes of alleviating thirst and supplying the necessary waste of the fluids of the body, soft spring water is the best. No spirits are allowed, but occasionally a little porter after dinner or supper. The quantity of fluid, of any kind, taken during the twenty-four hours, must not exceed, in all, three English pints. Exercise of that kind in which the trained person is to exhibit, must form a large part of his daily occupation.

LECTURE EIGHTH.

DIGESTION.

Στομαχος ἡδονης και αηδινς ἡγεμων, the stomach is the leader of pleasure and of pain, says that elegant and scientific practitioner Aretæus, in the commencement of his chapter on its disorders, thus pointing out that it is the source both of health and disease ; for he did not mean to say that the receiving into it of all those various luxuries, those highly-seasoned dishes, and those strong wines which garnish the table of the gourmand afforded the maximum of delight. His was not the opinion that the stomach requires the soothing, the pampering, and the flattering, which we furnish to some capricious maiden ere we can hope to bask in her smiles ; but his was the belief, along with a congenial spirit, Epicurus, that a crust of bread and a draught from the fountain are the best adapted for the wants of nature. Out upon all those who have, in their extreme ignorance, libelled the great founder of the Epicurean philosophy. “ *Te sequor o Graiæ gentis decus,*” cries in all the rapture of his soul his enthusiastic and poetic pupil, and were his master

“ *Qui genus humanum ingenio superavit ; et omneis
Præstinxit, stellas exortus uti ætherius sol,*”

and this pupil the purveyors to the stomach, or the slaves of

the sensual desires? No, pleasure was with them the *summum bonum*, but what was pleasure in their eyes? Not what the world understands now-a-days by that term, not sensuality, not the carnal appetite belonging to all animals indiscriminately, not even the enjoyment arising from variety of food and drink peculiar to man alone, but the cultivation of mind, the extension of science, and the exercise of virtue.

Yet, as Aretæus affirms, the stomach is the seat of pleasure and of pain. Hunger is a sensation or feeling attended with great pain, and whether or not the state of the stomach be the cause of the pain, we know that the removal of this pain, by the taking of food into the stomach, affords pleasure. Look at the same man before and after swallowing a good dinner. In the first case, (if hungry) he is cross, peevish, irritable, snarls at every body and every thing, puts questions and gives answers in the most captious tones, and is ready to knock any one down that says him nay on any one point. But as his stomach becomes filled with the good things of life, his eye beams mildly, the storm clears from his brow, and the black clouds give gradual place to calm sunshine in his countenance. His face is the index of his mind; his wit sharpens, he is the idol of conversation and mirth, his soul expands in generosity to all mankind, his purse and his sympathies are open to them, and as he finishes his meal he is pleased with himself and the whole human race. Lord Bacon very beautifully calls the stomach the "father of the family." Scæmmering titles the first section of his *contemplatio stomachi vivi*, "*DIGNITAS ventriculi in œconomia animali*," and affirms (incorrectly however) that no animals are found without this organ. He places it as the most important by far in the animal economy, and in this is followed by Dr. Wilson Philip, who regards the digestive organs as "the central and most sensible part of our whole organs."

DIGESTION.—Before proceeding to the consideration of

the separate articles used as food, it will be necessary to point out those changes that take place on all food ere it can become part of the human body. It is universally allowed that a good dinner gets very easily into the stomach, but many are the disputes amongst physiologists as to the changes it undergoes there, and as to how it gets out of it. All the theories come to this, that the stomach must either be a saucepan, a fermenting vat, a grinding mill, or a digester with a corrosive fluid in it. The first supposed that the food, by the heat of the stomach, was cooked up into a pultaceous mass. This was the famous concoction of the ancients. The second supposed digestion to be a certain action of the particles of the food on each other, a process of putrefaction, or of fermentation, which, in the end, converted food into chyme, like wort into beer. This was the theory of the early chemists. The third supposed our food to be ground into chyme by the attrition of the sides of the stomach. This was the theory of the mechanical physicians. The fourth supposed that the gastric juice converted the food into chyme by a sort of chemical solution ; or, as those who did not admire this phrase borrowed from science said, by an "assimilating process,"* an explanation which just leaves us as wise as we were before, but, burdened with an unintelligible term which may possibly pass muster with some as knowledge, on the principle that whatever is dark is deep, like Swift's puddle. All these theories have been overturned singly, and physiologists of the present day not being able to get one better, have compounded with them, and converted the food into chyme by a medley of the four. The stomach is excited by the food which is its proper stimulus, there is an increased flow of blood to it, an increased heat, an increased motion, an increased secretion of gastric juice ; and a slight action of

* See Hunter on the Animal Economy, p. 216.

the parts of the food on each other. The food is reduced into a mass of a pultaceous consistence, a greyish colour, and a sweetish and slightly acid taste, which is called chyme. And, provided the stomach be healthy, and the substances taken into it be not of so powerful an affinity as, under all circumstances, to undergo a chemical change or a re-action of the constituent elements of the food on each other in spite of the appropriate action of the stomach, it will prepare the chyme in a longer or shorter space of time, according to the nature of the food. The average time may be stated at three hours. It forms in layers, in contact with the coats of the stomach; and after the layer has formed, it passes the pyloric orifice, to be succeeded by another layer, and so on. There are as many sorts of chyme as there are foods, if we may judge by consistence, colour, &c. On arriving at the duodenum, the chyme meets with the secretion from the liver and the pancreas; and here the second change takes place, the conversion of chyme into chyle. The bile is believed to play the principal part here. It separates the feculent from the nutritious part of the food, and, by its bitterness, acts as a stimulant to the peristaltic motion of the intestines. The chyle which is left is a bland fluid, of a whitish, or rather a cream colour, containing a solid matter of a nature between albumen and fibrin, and a watery part resembling serum. From the small intestines, and especially from the jejunum, the chyle is taken up by a number of minute vessels, named lacteals, from the appearance of the fluid which they carry. They pass through a number of glands, and convey the chyle to the thoracic duct, by which it is carried into the circulation at the junction of the left jugular with the left subclavian vein.

When we approach the conversion of inanimate into animate matter, nature throws a veil over her mysterious operations, and the enquirer can now only sit down and contem-

plate those results of her handiwork which she may give to his view. We have seen, with tolerable distinctness, the conversion of food into chyme, and of chyme into chyle; but, as the nutrient matter approaches the nature of blood, it becomes less distinct, and as it verges to living matter, as it is becoming part and parcel of that which we are, the operation is entirely hid from us.* Still, if nature is the operative, we are the keepers of the store; if she manufactures, we furnish her with the raw material; and it is thus in our power to exercise an authority over her. The *effects* of her operation upon food we can ascertain by experience and observation, the *quomodo* we need not care much for seeking after.

At one time it was believed that there was a *quod nutrit*, one distinct substance,† contained in all aliments, or that the stomach formed one peculiar compound out of all the varieties of food, a substance *sui generis*, and possessing none of the peculiar characteristics of each food.‡ Were this the case,

* The beautiful description, by Plato, of the use of the blood stands yet as the ultimatum of our knowledge of nutrition. Aretæus' account of the use of the blood is emphatic and correct; 'Αἷμα δὲ πάντων τροφή, πάντων δὲ βερμὴ, πάντων δὲ χροίη. De Morb. Acut. Lib. ii. cap. ii.

† This opinion has been held by many of the most eminent men in the profession, but they have nearly all differed as to what that *quod nutrit* is. Haller says it is *jelly*. Stahl held that it was *gum*. Cullen makes it *oil* or *sugar*, or a *compound of the two*. Fordyce makes it *mucilage*; and Prout adds *albumen* to the *oil* and *sugar* of Cullen. Richerand supports *mucilage* and *sugar*, and Dumas patronises *mucus*. Majendie omits the question altogether in his text, but in a note he appears to uphold the opinion that the principle is different in different aliments. Hunter seems to consider the nutrient principle a peculiar compound formed by the stomach out of all foods.

‡ The passage with which Hippocrates commences his book, *De Alimento*, Τροφή και τροφῆς εἶδος, μία και πολλαί, has been the cause of the contention; but from the context here, and likewise from what he states in other places, and especially in his book *De victus ratione in morbis acutis*, it is evident that he allows that the different foods possess different and distinct effects on the body both in health and disease: This is all that is practically of any importance. Even supposing we got a *quod nutrit*, a distinct

there would be no occasion to make any classification of foods, except as to the comparative ease with which they undergo this process in the stomach ; and it would follow that the man who lives on vegetables would in no respect differ in constitution from him who lives on flesh. But it is not the case. Chemistry has not satisfactorily demonstrated to us that the chyme or the chyle is always the same in composition. It is allowed that they vary according to the food that has been taken. Observation likewise teaches us, that if we supply one species of food, nature lays it out on the muscles ; if another, that she lays it out on the fluids ; if another, that she expends it on the cellular membrane. The habitual use of a certain food, whether animal or vegetable, whether *flesh, fish, milk, grains, roots, herbs, or fruits*, always distinguishes itself by certain characters which it gives the body. No one will deny that there is a decided difference in the constitution—not merely as to strength and weakness—but in the constitution taken in the widest sense of the term, between the Indian Brahmin and an English butcher, between the acidulated Spaniard and the oleaginous Esquimaux.*

and one substance, the possession of this would be trifling, compared to our possessing a knowledge of the influence of the different foods, or of the different substances with which this *quod nutrit* is associated, on the body.

* It is stated that charts have been made of the places or districts best adapted for obtaining recruits of a certain physical character, and these charts would likewise show that, in each of these districts, there is some material difference in the food of the inhabitants from that of the others. Perhaps, however, in this case, others of the non-naturals, especially climate, may assist in causing the difference. “ Les populations vivant de chataignes fraiches ont toutes leurs humeurs acescentes. De meme l’usage abondant de la biere, ou du cidre apporte dans les temperamens des dispositions toutes autres que celles qu’ on remarque chez les nations vinicoles. Les analyses qu’ on a fait des urines, du lait, du sang, de la bile dans l’ espee humaine, ne seront parfaitement identiques en Suede et en France, d’ apres la difference des alimens solides et liquides usites en ces deux pays. . . . Les peintres n’ ont point tous le meme coloris pour les memes objets, en comparant l’ ecole fla-

Beautiful and regular as physiologists make the different processes in digestion, we have reason to believe the simplicity is more in systems of physiology than in the human system. It is not easy to believe that the thoracic duct is the sole feeding pipe of the body, and carries the substitutes for the refuse or excretions removed by canals many thousand times its calibre. Absorption takes place by the veins of the stomach; and in this way we account for the rapid effects of many medicinal substances on the system, and the cessation of hunger sooner after taking liquid than solid food. These effects have been usually ascribed to some action of the substances on the nerves of the stomach, and through them on the brain and system at large, but this is merely a supposition, whilst the other opinion is supported by the fact, that the medicinal substances are found in the circulation soon after they have been taken into the stomach, and that solid food does not appease hunger so soon as liquid, which, if depending merely upon the nerves of the stomach, it should do.*

mande a l'ecole romaine, ou Rubens a Poussin; les premiers boivent de la biere et mangent du fromage, tandis que les autres ont des nourritures moins humectantes et des humeurs moins delayees."—*Virey Jour. de Pharm.*

* Charles Piso accounts for hunger and its appeasement by food in this way:—"Fames non aliter sedatur, quam quia molesta et dolorifica ventrarum ad ventriculum pertinentium suctio os ventriculi corrugans et affatim exasperans quiescit, * * * quod sane evenit, quia pars ciborum fusa jam, et liquida ex se, atque prona sequi attrahitur, et defertus a vasis in viscera trahentia, sive hepar sive aliud quodcumque, atque ita satisfacit tractioni eorum," p. 28. Hufeland affirms that more nourishment is taken into the system by the medium of the skin and lungs, than by that of the stomach—so strenuous an advocate is he of absorbent feeding. If this be true, we can easily see that the man who dined by smelling the cooking of the rich man's dinner may have had the best share of it. He had only to keep within the nourishing vapour! This is better than "dining with Duke Humphrey," and equally cheap. Ben Jonson in this view was quite correct, as to a physiological fact, when he makes one of his characters, in taunting another as to his former neediness and want, say

"Do but recollect, Sir, where I met you first.

" * * * * * At Pie Corner,

Taking your meal of steam in, from cook's stalls;"

Physiologists will have it that liquids are digested ; that the water is removed by the absorbents, and that the solid matter goes through the different stages of digestion. They ground this opinion, principally, on the circumstance, that milk is coagulated in the stomach ; but this is a peculiar effect of the gastric juice on milk, and to give their opinion weight they should shew that milk is not coagulated, but made solid by the absorption of its watery particles. A person may be nourished by nutritive enemata, or by being immersed in a bath of milk. The food is not here digested in the rectum or colon, or in the absorbent vessels of the skin. Are not mercury, and many other solid substances, absorbed by the *cutis vera* ? Are not gonorrhœal matter, and many other poisonous substances absorbed from the mucous surfaces ? I do not mean to deny the acknowledged use of the lacteals and the thoracic duct ; but I cannot help expressing a doubt whether we have not been misled by the idea that we have in these the *sole* means of carrying nutrient matter into the system. The ancients gave some share to that large viscus, the liver, in the process of converting inanimate into animate

But he differs from Hufeland very much as to the value of such a mode of diet ; for he adds,

“ Where, like the *father of hunger*, you did walk
Piteously costive, with your *pinch'd* horn nose,
 And your complexion of the Roman wash,
 Stuck full of black and melancholic worms,
 Like powder-corn shot at the Artillery yard.”—*Alchemist*.

The piteously costive, and the pinched horn nose, and the resemblance to the father of Hunger, we can easily believe to be the effect of feeding by smell ! M^rKenzie is of opinion that absorption takes place by the veins. He says, “ The most fluid and subtile part of our aliment, before and after it is elaborated into chyle, passes into the blood by certain absorbent veins dispersed all over the mouth, gullet, stomach, and intestines. This is evident from the sudden refreshment and strength communicated to weary, faint, and hungry people, immediately upon drinking a glass of good wine ; or eating any cordial spoon meat ; and from the flavour which different sorts of food give to the urine much sooner than it is possible for the chyle to reach the heart in its common windings.”—*History of Health*, 3d ed. p. 341. Gmelin and Tiedemann confirm the absorption of liquid food from the stomach.

matter, but the moderns only acknowledge its use in supplying a resin as a natural purgative to the intestines, and as furnishing a precipitant for separating the valuable from the useless part of the food. The vascular system in the liver, the *vena portæ* has, in a great measure, got the go-by ; and, though formed by the veins of the organs concerned in digestion and the absorption of the food, we appear to have given no additional weight to that circumstance, or to allow that the liver serves any purpose in producing a change upon the nutrient matters which these peculiar vessels may contain. If the use of the liver is merely to separate bile from the common mass of the blood, the arteries, as in all the other glands, would have been most likely to furnish that secretion, and if it was to be an exception from the general rule, if the bile was to be separated from the venous blood, it appears singular that the *vena cava ascendens*, as containing a large volume of that blood, and blood too very impure, should not have passed through the liver instead of under it, to be defecated.

The stomach, however, is not alone concerned in that process by which the food is furnished to the living body. Van Helmont, who called the stomach the seat of the soul, was not so far amiss. This organ shares a very extensive sympathy. Affections of mind and body are felt by the stomach, affections or states of the stomach act upon the mind and body. Disease of the brain, or over-exertion of its function of thinking, brings on disorder of the stomach, and interruption of its function of digestion ; and *vice versa*.

There are paleness and coldness of the skin when a person is hungry. When food has been received into the stomach, this paleness and chilliness are succeeded by a healthy flush, and a general glow of heat, the pulse gets fuller and quicker, and the respirations more frequent and deeper. As the process of chymification commences, the skin again becomes

chilly, the blood is drawn towards the bowels, in order, as the ancients believed, that the internal heat might be raised, the secretions are, in a great measure, stopt excepting those of the liver and pancreas, there is an inaptitude for motion, and a lassitude of the mind as severe as that of the body. When the stomach has nearly emptied itself, when the chyle has been separated from the feculent matter, the system again begins to rouse itself, the perspiration becomes free, the urine flows abundantly ; and as the chyle pours into the blood, and the process of sanguification is going on, the body is mentally and physically at its best. The skin is red, the face flushed, the heat agreeable, the pulse quick and strong, and some delicate persons are so much affected as to be subject to faintings. The whole of the secretions are open, and busy throwing off that portion of the old man, the place of which the blood is now supplying with new matter.

PRECAUTIONS IN EATING.—Keeping in view the different stages in digestion, and the influence of them on the body and mind, we may be able to correct some errors depending upon wrong theory, or on ignorance. And *First*, with regard to bodily exercise after the taking of food. It was believed that exercise was necessary to digestion, and those who were resolved to be correct began exercise as soon as the stomach had received the food. An experiment knocked this on the head. Two hounds were fed, one left to its sleep, and the other led to the chase. On the return of the latter, both were killed. The food in the stomach of the dog that had slept was nearly digested, the food in the stomach of the one that had been hunted was unaltered. Exercise (in this case the exercise was perhaps too great) therefore retards digestion. But there was no occasion for this experiment, except to those who will uphold a theory against the experience of their own feelings, and the observation of the practice of those animals who are guided by their instinct. We have

mentioned the disinclination for motion, and the lassitude of body and mind during the conversion of the food into chyme ; there is an important process going on in the animal economy, and the stomach, now truly the father of the family, and working for its support, demands the attention and assistance of the whole subordinate parts.

Second.—Neither will the stomach perform its function if the mind be severely exercised after food. In this case, as in the former, the food lies in the stomach the more liable to undergo the changes which it would undergo out of it—to run into the acid fermentation, or into putrefaction—from being exposed to the high temperature of the living body. To what are we to ascribe the prevalence of disease of the digestive organs amongst persons devoted intently to study or to business, but to this very circumstance of their minds being too intently engaged to allow the stomach to convert the food into chyme ? It does not follow that because the stomach warns them of the necessity of taking food, it will chymify this food. The sensation of hunger is appeased, but by neglecting to allow the process of digestion to be completed, the studious man is laying up to himself a large store of future suffering. But does not the labourer return to his work after his meal without any bad effects ? It is true. Habit, which has justly been called “a second nature,” has brought him that he can return to his labour without detriment. The spare meal of the labourer is easily digested, but even he feels a lassitude after taking it. He loves his few minutes of relaxation and conversation after his meal, and the work does lag a little until the food has been chymified. Hippocrates remarks that exercise is necessary to the joints and the muscles, food and sleep to the viscera.*

* Πονος τοις αρθροις και σαρκι σιτος ὑπνος σπλαγχνοισι. De Morb. Vulg. Lib. vi. Sec. v.

Third.—A difference exists amongst medical men as to the propriety of sleep immediately after eating. We perceive that such is the practice with a great number of the lower animals, with mankind in the savage state, and with not a few of those who believe themselves the most highly civilized. None of the vital organs perform their functions so powerfully during sleep as during watching; and the conversion of the food into chyme is slower during sleep. A person whose digestion is good may sleep after taking his food, but he whose stomach is weak requires the stimulus which all the functions feel during waking. If he sleep, chyme is not quickly enough prepared, the food runs into putrefaction or acidity, and he awakens with bad taste in his mouth, and fetid or acid eructations. The effect is the best test of the practice, and provided no bad effects are felt, neither the old citizen who takes his habitual snooze on the sofa after dinner, nor the young citizen who goes to bed after a full supper, commits a fault.

Fourth.—Old women have a notion that a little food, and often, is much better than a full diet, more especially for the sick. Dr. Temple gave forth as an aphorism that “the stomach of an invalid is like a schoolboy, always at mischief unless it be employed.” The Doctor’s comparison of the stomach of an invalid, to a schoolboy, is certainly quaint, but that is the sole merit in it. It is of much more service to the health of the schoolboy to be at some mischief or other, than to be moping all day over his tasks; neither is it for the advantage of the stomach to be constantly engaged at its task of eating. The schoolboy *has* his hours of relaxation, and he sits down to his task after his play with pleasure. The comparison which the Doctor should have drawn between the schoolboy and the stomach is, that both require relaxation and rest after their labours. Every organ of the body requires rest to alternate with labour. Why should the sto-

mach be accounted an exception, and kept drudging on constantly like a servant of all-work in a lodging house? Is it a wonder that it should be worn weak with this never-ceasing toil, or that, from its intimate sympathy with the brain, it should furnish part of its irritation and annoyance to that organ, and make it a sharer of its griefs and troubles, as it does of its joys and comforts? * The stomach ought at once to receive the proper quantity of material to work upon, and hours should intervene before it is again called to active labour.

Were the stomach constantly employed, not only would disease be engendered, but life itself would be without enjoyment. It is when the stomach has completed its duty, it is when the chyle has been formed, and the blood is receiving the new supply of nutrient matter, that mind and body are at their best. It is then that the greatest exertion in body or in spirit will be fearlessly made. It is then that the philosopher spins the clearest and subtilest theory. It is then that the body revels in all that is beautiful and lovely, in all that is grand to see and grand to think of, in the real or imaginary world. Is it not Goldsmith that says, "if a man with an empty stomach write like a hero, with a full one he will rise to the sublimity of a God?" Goldsmith was wrong so far, for the loaded stomach would spoil his genius; but if Goldsmith drew his illustration from his observation of his contemporaries or himself, he merely made a mistake as to

* Soemmering, with his usual correctness and elegance, says, "*ab eo animalis ipsiusque hominis pendet vel ferocitas, vel mansuetudo, moresque quoque animalium ventriculus quasi moderatur;*" and then "*Morositas illa ac ægritudo, qua homo sibi aliisque oneri est, crebro ex mala ventriculi conditione oritur.*" De Corp. Hum. Fab. Tom. vi. p. 235. See also § 179. "*Consensus ventriculi cum aliis partibus in genere,*" et seq. Indeed the *contemplatio stomachi vivi* deserves the careful perusal of the student, for it contains most sound information, which will be found of great importance in practice.

the *period* when the sublime ideas marched thick before the mind. Goldsmith, and his literary friends, were of that class of whom Byron finely says, they “write that they may eat;” and if they wrote so well on the “spare fast that oft with gods doth diet,” they could not fail to surpass their former doings when they were *making blood* of a good meal.

Fifth.—But what is a necessary quantity of food? How much can we safely eat, and how do we know when we have enough? Many physicians prescribe a certain weight of food to patients; and this is all right, when they know the composition of the food, the capabilities of the patient’s stomach, and the necessities of his system; but nothing can be more absurd than confining a strong and healthy man to twelve ounces of food daily, because Cornaro found that quantity sufficient for *his* body. Too much weight is given to that Italian’s hash of simplicity, religion, and whim; and one may well ask, with Feyjoo, did God create Lewis Cornaro to be a rule to all mankind as to their meat and drink? Cheyne is more liberal than Cornaro, when he allows eight ounces of animal food, and twelve ounces of vegetable a day to a studious man. Not any one author agrees even in the average quantity of food necessary for the healthy adult. One will allow a labourer twenty ounces of solid food, and forty of liquid. Dr. Gregory seems to think two pounds of good bread with three of milk, sufficient for a working man. (*Conspect. Medicinæ*, cap. xxv. 1011.) In the military hospitals, full diet is composed of thirty-six ounces of solid food, and sixty-four of liquid composed of gruel and beer. Are we to continue until we feel ourselves filled, as it were, to the mouth, or are we to rise from the table with an appetite? That man is a fool who rises from table with an appetite, according to the advice of some writers on dietetics, because he sat down to get rid of the sensation of hunger. On the other hand, he who eats until he is stuffed nearly to vomiting, and

until he loathes the food before him, is as much sinning against nature's laws, for he is, by the unnatural distension of his stomach, creating disease in that organ. It is impossible to tell the quantity of food to be taken by each individual, for it will, in a great measure, depend upon habit, constitution, and manner of life. One person requires several pounds a day, another may be satisfied with as many ounces of the same food. To steer a kind of middle course is the best; but to keep a point or two to abstinence shews a good knowledge of our vessel's qualities, for she is apt to make leeway towards indulgence. Dr. Wilson Philip gives a rule for the weak stomach, which will likewise answer very well for the healthy one, both with respect to eating fast, and quantity of food. "To eat moderately and slowly is often of greater consequence than any other rule of diet. The dyspeptic should carefully attend to the first feeling of satiety. There is a moment when the relish given by the appetite ceases: a single mouthful taken after this oppresses the stomach. If he eats slowly, and carefully attends to this feeling, he will never overload the stomach." By eating fast, especially when the food is solid, much more is taken into the stomach than it can digest.

There are differences too depending upon age, sex, and climate. The young require more in proportion than adults, because they have not only to supply the wear and tear of their bodies, but to furnish more than is returned. The growth of the body is here additional to the mere waste of life. In old age, on the other hand, the quantity of food required is less than in the middle period of life, and the body seems in so far to feed on itself, for the quantity of the matter given off is greater than the quantity of nutrition taken in. There are some who think that the full-grown woman should be classed with children. But this is a mistake, for the woman does not require as much food in proportion as

the child, seeing her body has come to full growth. Her stomach is, from her general habits, weak ; and, from want of exercise, the same waste does not take place from her system as from the male's.

Sixth.—With respect to the effects of the quality and consistency of the food on the stomach, and the process of digestion, it has been ascertained that a strong or concentrated food, though nourishing and filling for a short time, ultimately loses these properties, or at any rate disagrees with, and proves injurious, to the body. This is owing to the want of sufficient exercise to the stomach ; for concentrated foods are in small bulk, and very easily or very speedily digested. There is a medium in the exercise of the stomach. It must be neither kept too idle, nor too much fatigued. If not properly exercised, it affects the whole system nearly as much as when too much worked. The effects of the consistency of the food depend upon the same circumstance. There are some foods that require great labour from the stomach ; there are others which are too easily digested. Hard foods, as for instance hard boiled eggs, hams, &c. have their particles in such a close state of aggregation that the stomach has great difficulty in reducing them ; liquid foods again being, for the most part, absorbed from the stomach, that organ is weakened from the mere want of the performance of the process of digestion. Some foods which are neither solid nor altogether fluid, are difficult of digestion. This is the case where the fluid is tenaciously held by the solid. Gelatine is not by any means so easy of digestion as fibrin. The gelatine is too thick to be absorbed, and it has so great an attraction for water that the latter cannot be removed so as to allow the coats of the stomach to act on the solid food. The same is the case with mucilage, when taken alone. Oil likewise, from its lubricity, is difficult of digestion, the coats of the stomach not being able to lay hold of it. Some northern tribes add saw-

dust to the oil, to break down or keep asunder the particles, and the oil is thus easier of digestion. The bulk or volume of the portions of solid food swallowed affects its digestibility : the largest pieces remain longest in the stomach, and those which are small and indigestible, such as grape stones, some skins of fruits, &c. pass speedily into the intestines.

Seventh.—It may be the case that the stomach will receive the food, only in part digest it, and then send it into the intestines. When this is the case, the function of digestion is diseased, and either the stomach or some part connected with it by sympathy will exhibit derangement. Soemmering, Richerand, Philip, and above all, Abernethy, have pointed out to us how frequently diseases, named and believed to be *local*, have arisen from, or are connected with, functional derangement of the stomach and its assistant viscera. How frequently do we see diseases, essentially local, rendered much worse by an overloaded stomach, or by some indigestible article in that viscus or in the intestines ?

MEALS.—The word meal, or diet, is applied to certain periods of the day when the food is taken. The common sayings go, that the beggar eats when he can, and the rich man when he will ; or that the best time for dinner is for a rich man when he can get an appetite, and for a poor man when he can get food. There are writers on dietetics who are of opinion that no regularity should be followed, and that a person should always eat when he feels hungry. To eat when the system demands food is that which would be followed were man a solitary being, but, as he lives within the social pale, he is under the necessity of eating with others, and as they could not know the time when his body would be demanding food, his stomach might have to labour when it should be at rest. The practice of eating, at certain conventional periods of the day, is never attended with any bad consequences, and is actually necessary in the present state of

society. Habit exercises the greatest influence in this matter, and the man who has been in the practice of taking food at a certain hour of the day will always, whilst in good health, feel hungry at that hour. Indeed, it sometimes happens that the stomach will only work at those hours to which it has been long accustomed ; and dyspepsia has been traced to a change in the hour of taking a meal. What would be the value of a dinner if all did not sit down to it with a keen desire to do justice to the landlord's cheer ? And all who are well do sit down to it with an appetite, because all have been in the practice of taking their dinner at this hour. Observe the anxiety with which watches are looked at in the drawing-room, and the complaints, not loud but deep, which are heaped thickly on some luckless wight who happens to be late, and say what, but the habit of eating at this hour, could make so many differing in age, sex, and constitution, so anxious for dinner ? What is it that stops the half-finished joke without eliciting a curse from the wit ; what is it that checks the flow of the scholar's eloquence without hurting his pride, and what is it that makes the lover, without regret, drop for a time the vows he is paying to his adored ; what but the appearance of " John," and the stomach-stirring enunciation, " dinner waits" ?

One meal a day is strongly recommended by some philosophers. Plato censures the practice of taking two. Monophagi, however, are never healthy. Hippocrates tells us that they have meagre dry bodies, and that their bowels are more dry and constipated than those who eat oftener. (*De vict. rat. lib. ii.*) They are commonly large in the belly, from the great distension that is given to the stomach by the large quantity of food they take into it. Amongst European nations, there are two principal meals, breakfast and dinner. To these are added, in some countries, tea ; and in almost all, supper. Liquids have always formed part of the break-

fast or first meal, being required by the system to make up for the loss of the fluids by the perspiration during the night. The breakfast, in the lower and middle classes, is commonly, in this country, taken at the same hour. The former, however, have the advantage, that they have previously got through part of their daily labour, and their stomachs have got entirely free of the previous night's supper. Persons with strong stomachs, or those with weak stomachs who have not taken supper, are fit for breakfast when they rise. In other circumstances, moderate exercise so as to get the stomach cleared out, by assisting the descent of the chyme, should precede breakfast. From six to eight hours should intervene between breakfast and dinner. It is very injurious to put dinner farther off, and dyspepsia is often induced by persons in business allowing too long time to elapse between breakfast and dinner. Tea or coffee should soon follow dinner as they do not constitute a meal, but merely a slight stimulant to assist and quicken the action of the stomach.

Much has been said against supper. The Salernian school has given the doggrel couplet.

*Ex magna cæna, stomachi fit maxima pæna,
Ut sis nocte levis, sit tibi cæna brevis.*

Hippocrates and Galen hold that the supper should be the fullest meal. The singularity of this opinion disappears, however, when it is known that the same name has been bestowed on two different things, and that we are disputing about the name without thinking of what it is meant to represent. The two Greek writers did not mean that the stomach should be loaded with food before going to sleep. Their supper was the meal after the fatigues of the day; the dinner in *high life* takes place at a later hour than the supper of the ancients. The lunch which is taken, by people of fashion, in the middle of the day, or somewhat later, is in fact the dinner; and there is no difference but a name in the mid-day

meal of the plain citizen and the nobleman. The latter, however, has an advantage over the former, that the supper which he takes, under the name of dinner, is much less injurious than the supper which the citizen takes before shrouding himself in the blankets. Yet to good stomachs, a supper before going to bed does no harm. It is only the slow digester, or the dyspeptic, that will receive a visit from the night-mare, and rise in the morning with a still loaded stomach. A full or heavy supper is seldom taken without the addition of a tumbler of punch, a practice which, although in conjunction with taking such suppers, of the most baneful effects in the long run, is, in the meantime, very proper.

But, though regularity of meals is of the utmost importance for the health of the individual, yet we must take into consideration age, sex, manner of life, seasons, and habits, as leading to some modifications. Children cannot be confined so regularly to meals, as their digestion is more active, in order that material be supplied for the growth of the body. They should, therefore, be allowed food when hungry. Old men require food often, as their stomachs are able to digest only a little at a time. Women, likewise, being more feeble in their digestive organs than men, can only take the lighter kinds of food, and only a little at a time, and they consequently require food more frequently than the other sex. Persons leading a sedentary life can want food much longer than those engaged in an active one. In winter the appetite is keener than in summer, and the meals may be more frequent, for the digestion is better. Habit, it must always be recollected, is every thing in diet, and must never be rashly interfered with.

FOOD AS A THERAPEUTIC AGENT.—Before proceeding to the consideration of the separate articles of food, it will be proper to say what alterations are demanded in the above rules, when food is taken, not for the preservation of health,

but for the removal of disease. When once it is granted that there is no such thing as a *quod nutrit*, a one and always the same substance formed out of the different species of food, it must follow as a consequence that each food will possess an action on the body more or less apparent to our observation. We cannot say why one food should be principally laid out in one tissue of the body, and another in another, more than we can say why one medicine acts on the bowels and another on the kidneys.

But medicines may be taken or they may not be taken. Food, however, it is believed, must be taken, or the patient will die. It may happen, however, that the patient has no desire for it—that he loathes it—that he abhors the very sight or smell of it. Is such a one to be forced to take that to which he has such a decided antipathy? He may have perhaps an equal antipathy to a dose of any medicine, yet we force him to take it; then why not force him to take that which we believe to be as necessary to him as any medicine? For this reason, the stomach has not to digest physic, it passes into the system without going through the stages of digestion, and it does not convey nutrition to it. In the other case, we not only add material to the body, when not requiring it, but we call into operation a set of organs possessing an intimate sympathy with all the other organs, and which will not act to the advantage of the patient unless the whole be in harmony. There cannot be a worse practice than thrusting food upon a patient. When the time arrives that food will be of service to him, he will demand it, and he will relish it. Given before this, it lies as a foreign load on the stomach, making an additional disease, or aggravating the one under which he is labouring. If he cannot take solid food, if his stomach loathes gruel, if it loathe a still lighter food, barley water, if it loathe a lighter yet, toast and water, then let it have water alone, and depend upon it that if the patient dies

it is not from want of food, but from the force of disease. How often do we see the patient die of typhus, at the very time that the system is receiving the most exciting and supporting food that can be given in these cases—wine.

The sick are very apt to indulge in whims and fancies with regard to food. Are we to gratify them or not in these? There are some practitioners who never refuse to the patients what they ask for, looking upon these cravings as the indications of nature. This practice cannot be too much reprobated. The rule should be to let the patient have what he desires, when the substance craved can do him no harm; for disease has enough of painful accompaniments without the chagrin occasioned by the refusal of a request, the compliance with which would do no material injury. Nay, it is often of positive advantage to allow him to have his own way, for his spirits are thus raised and buoyed up, and we know very well how much the body sympathises with the mind. But, wherever the yielding to his desires would be injurious, the physician must kindly but firmly resist his importunities; and if the patient be capable of understanding him, explain to him the impropriety of his demands. Before, however, he can act in this case, he must know the nature of the substance desired, and the effect it would have upon the disease. It is too often the case, that those who yield to all their patient's whims, do so because they know no more than he does what will be the consequence of gratifying them. They are not a whit superior to that practitioner, who, having once gratified a patient in the desire to eat rancid lard, and believing the recovery of the patient to be owing to this substance, prescribed rancid lard to another patient in the same disease, who, in consequence of taking it, died.

Another thing to be observed is, that regularity cannot always be attended to in prescribing food for the sick. Hippocrates justly ridicules one Prodicus, who kept his patients

four days without food, and then after the fourth day allowed them to indulge their appetite. According to Celsus too, Asclepiades was a physician of this kind, not allowing his patients scarcely a drop of water to moisten their parched throats until after the fourth day, when they were left to their uncontrouled desires. In prescribing food for the sick, we must likewise recollect the circumstances of age, sex, season, climate, and habit.* Children require little or no food in disease, when that disease is of an acute character.

But it is not enough that the physician know the composition of the different foods, and the effects of each upon the system. He must know equally well the state of his patient's constitution, and the disease. Van Swieten, speaking of foods, very properly remarks, "to assert a thing to be wholesome without a knowledge of the condition of the person for whom it is intended, is like a sailor pronouncing the wind to be fair without knowing to what port the vessel is bound." Unless he has this knowledge of the condition of his patient, he is, in prescribing a certain kind of food, acting as a mere quack.

CLASSIFICATION OF FOODS.

The first and grand division of foods has always been into

* Northern nations are always more voracious than those in a warm climate; and attention must be paid to this in treating their diseases. During the last war most of the wounded Russian prisoners died under the treatment of the French surgeons, but, when left to the charge of the Russian surgeons, a great number recovered. At this time the French army medical department was allowed to be inferior to none in the world for science and knowledge; but the reason of the greater success of the Russian surgeons was, that knowing the Russian constitution and habits, they allowed the sick many things (for instance spirits,) strictly forbidden by the French surgeons, and no doubt very improper for Frenchmen. With regard to habit, the oracle of Cos very properly observes, "*a longo tempore consueti etiamsi fuerint deteriora, insuetis minus turbare solent.*"

animal and vegetable.* The animal again has been subdivided, according as its products swim, walk, or fly; or into fish, flesh, and fowl. The vegetable has likewise been subdivided according to the edible part of the vegetable, or into seeds, roots, herbs, fruits, &c. This was the division of Hippocrates and of Galen. Each class was likewise divided, according as the aliments were warm, cold, moist, or dry. Another division of foods has depended upon their *digestibility*, or the facility with which they are acted upon by the stomach. This is ascertained by experiments on animals—the time required for the disappearance of each kind of food being the test of its digestibility. The following Table exhibits a classification of the foods in this way, from the work of Dr. Gosse.

* A pretty considerable quantity of ink has been expended in the dispute, as to whether man is properly a *herbivorous* or *carnivorous* animal. The dispute has been settled by shewing that he is neither one nor other exclusively, but that his proper food is a mixture of both. One author thinks he has discovered the proportion, which, according to him, is twenty parts of the one to twelve of the other. The dispute has been settled by anatomists showing that the teeth and the motions of the lower jaw of the human species resemble in part those of the herbivorous and those of the carnivorous animals; and that his intestinal canal is in length between that of those two classes.

Not a little has been likewise said on the comparative value of animal and vegetable food. It has been affirmed, that the former being nearest in composition to our own bodies, ought to be the best adapted to us. Disputants in this matter, as well as on the former, would have saved much trouble to themselves if they had merely stated the fact as they saw it. They would have seen that the Hindoo cannot, and does not, eat flesh, because it is to him stimulating and heating, and of stimulus and heat he gets enough from his warm sun. They would have seen again, that the watery cooling vegetables are not adapted for northern nations, because they are already leucophlegmatic, and cool enough. They would have lastly seen, that nations in the temperate zones take both in a proportion according to the climate and season of the year.

Table of Substances, and their comparative Solubility in the Stomach, without reference to their Composition.

<i>Comparative Solubility of Foods.</i>	<i>Animal Substances.</i>	<i>Vegetable Substances.</i>	
I.—Substances Insoluble or very difficult of Solution.	I.—Tendinous parts.—II. Bones.—III. Oily or Fatty parts.—IV. Hard Boiled White of Egg.—V. Skin of Fishes.	I.—Oily Seeds.—II. Expressed oils of different nuts and kernels.—III. Dried Grapes, (Raisins).—IV. Rinds of farinaceous substances.—V. Pods of Beans and Peas.—VI. Skins of Stone Fruits.—VII. Husks of Fruit, with grains.—VIII. Stones of Fruit.	
II.—Substances partly Soluble, partly Insoluble.	I.—Pork dressed in several ways.—II. Black Puddings.—III. Fritters of Eggs, Fried Eggs and Bacon.	I.—Dressed Salads of various kinds.—II. White Cabbage less Soluble than Red. III.—Beet Root, Onions and Leeks.—IV.—Roots of Red & Yellow Carrots. V.—The Pulp of Fruit, with Seeds.—VI.—Warm new Bread, and Sweet Pastry.—VII. Fresh and Dried Figs.	Of all these substances there were parts which were not digested in the Stomach, which were digested, however, while passing along the intestines, although at the expense of irritation there.
III.—Substances Soluble or easy of digestion, requiring an hour or an hour and a half for their reduction into a pulp in the Stomach.	I.—Veal, Lamb, Mutton, and the Flesh of young animals in general are more easy of digestion than that of the old.—II. Fresh Eggs.—III. Cow's Milk.—IV. Perch boiled.	I.—Celery, Tops of Asparagus.—II. Botoms of Artichokes.—III. Boiled pulp of Fruits.—IV. Pulp, or meal of farinaceous foods.—V. Different sorts of Wheaten bread, without butter, the second day after baking, the crust more so than the crumb.—VI. Turnips, Potatoes, (mealy,) Parsnips, not too old.	Brown bread, in proportion as it contains more bran, is less digestible.
IV.—Substances which appeared to facilitate the power of the Gastrick juice.	Salt, Spice, Mustard, Horse-radish, Capers, Wine and Spirits in small quantities, old Cheese, Sugar in small quantity, Bitters, Gentle Exercise.		
V.—Substances which retard the power of the Gastrick juice in the Stomach, and occasioned some of the Food to pass undigested into the Intestines.*	Water, particularly when taken hot, and in large quantity, Acids, Astringents, Oily substances, Strong and violent Exercise.		

* Sir Astley Cooper made some experiments on the digestibility of several substances, which furnished results, confirming, in the chief points, the above. He gave to dogs a certain quantity of pork, mutton, veal, and beef, preserving a register of the figure of the pieces, and the order of their introduction into the stomach. The animals were opened at a certain time, and he found that the pork was first digested, then the mutton, then the veal, and lastly the beef; the pork and mutton, in some cases, having disappeared when the beef remained untouched. He found that muscular flesh is sooner digested than skin, skin sooner than cartilage, cartilage sooner than tendon, and tendon sooner than bone. He states, as the result of other experiments, with the same substance prepared in different ways, that boiled veal is two-thirds more digestible than when roasted, which we can readily believe to be the case with all gelatinous flesh, (see Gelatinous Foods,) but nearly the reverse would be the case with beef. He found also that fish and cheese are very digestible substances.

Foods have likewise been arranged according to the *quantity* of nutrient matter they are believed to contain, no regard being had to what that nutrient matter is. Some have arranged them according to their *effects on the system*, without reference to the quantity of nutrient matter they contain. Thus some are invigorating, some relaxing, others cooling, and others stimulating or heating. When chemistry had advanced in its march of investigation into the vegetable and animal kingdoms, it soon demonstrated that numerous as the substances are which are used for the support of the animal world, they all contain but a few principles ; and that foods differ merely as they contain one or more of these principles, or in the proportion in which they contain them along with substances not alimentary. It found that all vegetables affording nourishment contain *farina, gluten, mucilage, sugar, acid, or oil* ; and that all animal foods contain *fibrin, gelatine, albumen, oil, or mucus*. Each of these principles, we are satisfied, affords nourishment to the body. They may be used alone, but are far better adapted to nutrition in the state in which they exist in nature, two or more of them being mixed together, often with substances not alimentary. One, however, generally predominates ; and foods have been arranged according to the principle most abundant ; or into *Farinaceous, Mucilaginous, Saccharine, Acidulous, Oleaginous*, and into *Caseous, Albuminous, Gelatinous, and Fibrous*. On account of their containing a bitter or very stimulating principle which modifies the particular action of the food on the stomach and body, a separate place has been given to the *Bitter and Stimulating Foods*.

Experiments with these separate principles has shown a fact to physiologists which they have as yet found a difficulty in explaining, viz. that not any *one* of these principles used for a *continued period* will support life. Some explain it by saying that azot must be furnished to the body, and

this being furnished, according to them, by the food, those principles which do not contain azot will not support life. Majendie, from the results of his first experiments on nutrition was inclined to the opinion that no substances which do not contain azot will continue for any time to support life. On extending his experiments farther, however, he found that some animals will not live if confined to one food, whether containing nitrogen or not ; he therefore deduces "that diversity and multiplicity of aliments is an important rule of the hygiene." Dr. Stark made many experiments on himself with the different foods, with the view of ascertaining which was the most nutritious, and he is said to have sacrificed his life to his zeal, and fallen a victim to the trials to which he put his stomach. If the value of a food depends upon the weight which it gives to the body, compared with all other foods, then the experiments of Stark might be of some value, but vigour and strength are seldom in proportion to mere weight, and the most *fattening* foods may therefore not be the best for the body. Those containing the most azot are the most strengthening. Flesh is first, and next to it the articles which contain gluten—this last having much nitrogen, but gluten taken by itself will not support life. Nature always offers us a mixed food, and we should take the hint.

Chemistry has likewise shown that the proportion in which these principles exist varies with the age of the vegetable or animal, and that the one may give place to the other. Thus the farinaceous plants contain principally mucilage when young, which is succeeded by farina ; acid gives place to sugar, or sugar and mucilage ; and gelatine, abundant in the young animal, makes way for fibrin. In the arrangement of the foods, according to their principles, some must be placed in one class when young and in another when full grown. Such for instance is the case with the pea.

There are no substances from the inorganic kingdom which

afford nutritive material to the human body. Wherever such articles are taken by animals, along with their foods, it is for the purpose of assisting mechanically the comminution of the food, or stimulating the natural action of the stomach, or preventing the chemical action of the constituents of the food on each other. They do not themselves afford nourishment, but they promote the nutrition of other substances, or perform some operation as necessary to the animal economy as nutrition. Water stands in the same position. It is not nutritive, but it is necessary for life. Attempts have been made by those who support the existence of a distinct nutritive principle to define what a medicine is, and what a food ; and they tell us that food is changed by the body whilst a medicine acts upon the body without undergoing any change. (See Dumas, *Principes de Physiologie*, Tom. i. p. 183.) We see no good reasons for admitting this definition.

The annexed Table will exhibit shortly the effects, the digestibility, the nutritive powers, and the articles composing each class of foods.

TABLE OF FOODS AND THEIR PROPERTIES.

<i>Foods.</i>	<i>Digestion.</i>	<i>Nutrition.</i>	<i>Influence on the Body.</i>	<i>Separate Foods of each Class.</i>
Farinaceous.....	Difficult ..	Great.....	Invigorating without exciting.....	<i>Grains.</i> Wheat, Barley, Rice, Maize, Oats, Rye, Millet. <i>Roots.</i> Potatoe, Yam.— <i>Legumens,</i> Bean, Pea.— <i>Fruit.</i> Chesnut, Bread Fruit. <i>Vegetable Extracts.</i> Arrow Root, Salep, Sago, Tapioca, &c.
<i>α Farina with Gluten</i>	Very difficult.....	Very great ..	Invigorating.....	Wheat-Flour and all its preparations except Bread.
<i>β Bread</i>	Very easy ..	Great.....	Invigorating.....	Fermented wheaten flour bread, and next, every bread that will ferment
<i>γ Pure Fecula</i>	Very easy ..	Moderate ..	Invigorating.....	Arrow Root, Sago, Tapioca, Potatoe flour, &c.
Mucilaginous ..	Difficult ..	Very little.....	Relaxing.....	<i>Herbs.</i> Cabbage, Colewort, Cauliflower, Broccoli, Savoy, Spinnage, Lettuce, Succory, Endive, Purslane, Asparagus, Artichoke.— <i>Roots.</i> Carrot, Turnip, Beet root, Skirret, Salsafi.— <i>Legumens.</i> Young Bean and Pea.— <i>Fruits.</i> Cucumber, Melon, Banana, Plantain, &c.
Saccharine ..	Easy.....	Very great ..	Moderately Invigorating.	Sugar, Honey, dried Figs, Raisins, Plums, Dates, &c.
Acidulous ..	Easy.....	Very little ..	Refrigerant.....	<i>Fruits.</i> Apples, Pears, Cherries, Prunes, Apricots, Peaches, Strawberries, Raspberries, Gooseberries, Oranges, Lemons, Limes, Grapes, &c.
Oleaginous ..	Very difficult ..	Very great ..	Very relaxing.....	Vegetable and animal fats, and oils.
<i>α With Farina</i>	Difficult ..	Great ..	Moderately relaxing.....	Almonds, Nuts, Filberts, Cacao, Cocoa nut, Cashew nut, &c.
Bitter or Stimulating.....	Very quick.....	According to the principle with which combined.....	Exciting.....	Tea, Coffee, Onions, Leeks, Raddish, Garlic, Mustard, Peppers, &c.
Milk or Caseous.....	Easy.....	Moderate ..	Slightly relaxing.....	Milk and its preparations of Curd, Whey, Butter-milk, Sweet cheese, &c.
Albuminous ..	Easy.....	Moderate ..	Invigorating ..	Eggs, Oysters, Mussels, &c.
Gelatinous.....	Difficult ..	Very great ..	Relaxing.....	<i>Young Animals</i> —Veal, Lamb, Chickens, young Birds, and some Fish.
Fibrous ..	Very easy.....	Very great.....	Very exciting.....	Beef, Mutton, Pork, Goat's flesh, Venison, full-grown Fowls, many Birds, and most red-blooded Animals.
Fish.....	Very easy.....	Moderate.....	Relaxing.....	All Fish not placed in any former Class.

THE HISTORY OF THE
CITY OF BOSTON

Year	Event
1630	Founding of the city by Puritan settlers.
1634	First church organized.
1638	First school established.
1642	First fire in the city.
1646	First public house.
1650	First printing press.
1656	First hospital.
1660	First library.
1664	First newspaper.
1670	First bridge.
1675	First shipyard.
1680	First bank.
1685	First college.
1690	First university.
1695	First hospital.
1700	First fire.
1705	First ship.
1710	First bridge.
1715	First shipyard.
1720	First bank.
1725	First college.
1730	First university.
1735	First hospital.
1740	First fire.
1745	First ship.
1750	First bridge.
1755	First shipyard.
1760	First bank.
1765	First college.
1770	First university.
1775	First hospital.
1780	First fire.
1785	First ship.
1790	First bridge.
1795	First shipyard.
1800	First bank.
1805	First college.
1810	First university.
1815	First hospital.
1820	First fire.
1825	First ship.
1830	First bridge.
1835	First shipyard.
1840	First bank.
1845	First college.
1850	First university.
1855	First hospital.
1860	First fire.
1865	First ship.
1870	First bridge.
1875	First shipyard.
1880	First bank.
1885	First college.
1890	First university.
1895	First hospital.
1900	First fire.
1905	First ship.
1910	First bridge.
1915	First shipyard.
1920	First bank.
1925	First college.
1930	First university.
1935	First hospital.
1940	First fire.
1945	First ship.
1950	First bridge.
1955	First shipyard.
1960	First bank.
1965	First college.
1970	First university.
1975	First hospital.
1980	First fire.
1985	First ship.
1990	First bridge.
1995	First shipyard.
2000	First bank.
2005	First college.
2010	First university.
2015	First hospital.
2020	First fire.
2025	First ship.
2030	First bridge.
2035	First shipyard.
2040	First bank.
2045	First college.
2050	First university.
2055	First hospital.
2060	First fire.
2065	First ship.
2070	First bridge.
2075	First shipyard.
2080	First bank.
2085	First college.
2090	First university.
2095	First hospital.
2100	First fire.

LECTURE NINTH.

FARINACEOUS FOODS.

FECULA is one of the most extensively diffused principles of vegetables. It is found in a great number of plants, and in some it is met with in their seeds, in others in their roots, in others in their pith, in others in their leaves, &c. From whatever plant, or part of a plant, it is obtained, it is known to chemists as a distinct principle possessed of peculiar properties, and it is known to the physician as one of the best articles for the support of the human system, and one which the stomach will tire with less than any other. It appears to be, both by the extent of its diffusion over the earth, and by its effect upon the human body, destined by nature to be more the food for mankind than any other. Wherever it abounds, men increase and multiply, and if the increase of food be produced by the exertions of the people in the cultivation of the soil, civilization and happiness keep pace with food and population. Countries favourably situated for the growth of corn, and at the same time governed by just and equal laws, have always been more populous than those countries where animal food is chiefly used. The pure fecula, however, is not so much used as when combined with other substances: these are gluten and mucilage. A combination

of fecula and gluten is much more nourishing, and much better adapted for a food than pure fecula, and it is this combination, which we term *farina*, which exists in the cerealia. The greater the quantity of gluten present, the more valuable is the substance as a food. Gluten is a distinct vegetable principle well known to the chemist, and can be easily separated from the other.

The combination of the fecula with mucilage is next in value, and in frequency, to that of gluten. Occasionally, too, the farina is combined with some sugar or oil; but in most of these the quantity of farina is so great as to give them the properties which belong to the farinaceous foods. In some of the grains, the envelope or pericarp forms a large part, and when that is the case, the quantity of the perisperm or endosperm, or, in common language, of farina, is diminished. When the envelope is thick the grain is light, when thin it is heavy. In this way can we ascertain the comparative quantity of farinaceous matter, and consequently in some measure the value of the grain. Thus

100 seeds of Wheat weigh	69.4980	grains
100 „ of Barley „	59.4594	„
100 „ of Rye „	43.2432	„
100 „ of Oats „	38.6100	„

“ In the mill, 14 lbs. of good wheat yield on an average 13 lbs. of flour, the same quantity of barley 12 lbs. and of oats only 8 lbs.” (Davy.) The Sicilian wheat is very hard, heavy, and thin skinned. It consequently gives more flour, which again by its absorbing more water than common flour, gives more weight of bread.

Celsus makes a remark with regard to the articles used as food, which is very applicable here. He says, “ *quo valentior quæque materia est, eo minus facile concoquitur, sed si concocta est, plus alat.*” Farina when pure is very easy of digestion; when combined with gluten or mucilage it is more

difficult, but on the other hand it is much more nourishing. The most nourishing is the combination of farina and gluten, and this compound is likewise the least easy of digestion. According to their nutritive powers the farinaceous foods may be arranged in this order. 1st. *Seeds or Grains*—wheat, barley, rice, maize, oats, rye, millet. 2d. *Roots*—potatoe, yam. 3d. *Legumens*—bean, pea. 4th. *Fruits*—chesnut, bread fruit. 5th.—*Vegetable extracts*—arrow root, tapioca, sago, &c.

The farinaceous grains contain much more farina, bulk for bulk, than any of the roots or legumens, and the legumens contain more farina than the roots. The subjoined Tables exhibit the analysis of the farinaceous grains hitherto made. Raspail, in his Organic Chemistry, qualifies the faith to be placed in them, on account of the difficulty of the analysis. "In fine," says he, "an analysis of farina on the large scale is truly a chaos—a simple approximation, useless to physiology, whose results can at most serve as a guide in manufacturing operations." Sir Humphry Davy, from whose work on Agricultural Chemistry the second Table is taken, says, in addition; "It is probable that the excellence of different articles as food will be found to be in a great measure proportional to the quantities of soluble or nutritive matters they afford; but still these quantities cannot be regarded as *absolutely* denoting their value. Albuminous or glutinous matters have the characters of animal substances, sugar is more nourishing, and extractive matter less nourishing than any other principles composed of carbon, hydrogen, and oxygen. Certain combinations, likewise, of these substances, may be more nutritive than others."—P. 132.

It will be observed that in his Table Sir Humphry places mucilage and starch together, and that he associates albumen with gluten as being similar in their properties, if not the same substance under two different names, as Raspail believes them to be.

TABLE I.

Analysis of various Farinaceous Grains.

	Bran.	Farin.	Water.	
Avena Sativa.....	34.	66.	. . .	Vogel.
Hordeum Vulgare.....	18.75	70.5	11.20	Einhof.
Secale Cereale.....	24.2	65.6	10.2	do.
Triticum Monococcon..	7.481	92.519	. . .	Zenneck.*
Zea Mays.....	3.25	96.75		†
Oryza Sativa.....	0.‡	100.		

* M. Fee states in his "Cours d'Histoire Naturelle Pharmaceutique," that the bran of the *Froment Cultivé*, amounts to 25, 30, or 33 per cent. "*suivant les varieties.*" † Stated by Fee without giving any authority.

‡ The envelope or pericarp is caducous.

TABLE II.

Quantities of Soluble or Nutritive Matters afforded by 100 parts of different Vegetable Substances.

Vegetable or Vegetable Substance.	Whole quantity of Soluble Nutritive matter.	Mucilage or Starch.	Saccharine Matter or Sugar.	Gluten or Albumen.	Extract or matter rendered insoluble during evaporation.
Middlesex Wheat - - -	95.5	76.5	-	19.	- -
Thick-skinned Sicilian Wheat	95.5	72.5	-	23.	- -
Thin-skinned Sicilian Wheat	96.1	72.2	-	23.9	- -
Spring Wheat - - - -	94.	70.	-	24.	- -
Barley (Norfolk) - - -	92.	79.	7.	6.	- -
Rye (Yorkshire) - - -	79.2	64.5	3.8	10.9	- -
Oats (Scotch) - - - -	74.3	64.1	1.5	8.7	- -
Bean, Common - - - -	57.	42.6	-	10.3	4.1
Peas, Dry - - - - -	57.4	50.1	2.2	3.5	1.6
Potatoes - - - - - {	26. {	20. {	2	4.	- -
	20. {	15.5 {	1.5	3.	- -
Red Beet - - - - -	14.8	1.4	12.1	1.3	- -
Parsnips - - - - -	9.9	.9	9.	-	- -
Carrots - - - - -	9.8	.3	9.5	-	- -
Swedish Turnips - - -	6.4	.9	5.1	.2	.2
Common do. - - - -	4.2	.7	3.4	.1	- -
Cabbage - - - - -	7.3	4.1	2.4	.8	- -

TABLE III.

Comparative Analysis of the Farina of various Grains.

From RASPAIL'S Organic Chemistry, Translated by HENDERSON.

	Fecula.	Gluten and Albumen.	Woody Fibre and Hordein.	Gum.	Sugar.	Extract and Resin.	Oil.	Salts.	Water.	Loss.	
Avena Sativa,.....	59.00	4.30	...	2.50	8.25 (a)	...	2.00	...	23.95 (b)	...	Vogel.
Hordeum Vulgare,.....	67.18 (c)	4.67	7.29 (c)	4.62	5.21	...	...	.24*	9.37	1.42	Einhof.
Do.	32.00	...	57.00 (d)	...	11.00 (g)	...	...	...	...	...	Proust.
Do. (unripe, but } fully grown),..... }	14.58	2.22	15.97 (e)	...	5.55 (f)	...	...	...	52.09	...	Einhof.
Do. (malted),.....	57.00	...	13.00 (d)	...	30.00 (g)	...	...	...	...	...	Proust.
Oryza Sativa (Carolina),..	85.07	3.60	4.80	.71	.29	...	.13	.40†	5.00	...	Braconnot.
Do. (Piedmont),.....	83.80	3.60	4.80	.10	.05	...	.25	.40‡	7.00	...	Do.
Secale Cereale,.....	61.07	12.76	6.38	11.09	3.28	...	...	...	...	5.62	Einhof.
Triticum Hybernum } (French),..... }	71.49	10.96	...	3.32	4.72	...	...	...	10.00	...	Vauquelin.
Do. (hard Odessa),.....	56.50	14.55	2.30	4.90 (h)	8.48	...	...	...	12.00	...	Do.
Do. (soft Odessa),.....	62.00	12.00	1.20	5.80	7.56	...	...	...	10.00	...	Do.
Do. do.	70.84	12.10	...	4.60	4.90	...	...	...	8.00	...	Do.
Do. do.	72.00	7.30	...	3.30	5.52	...	...	...	12.00	...	Do.
Do. (Paris bakers),.....	72.80	10.20	...	2.80	4.20	...	...	...	10.00	...	Do.
Do. (—Hospital—best),.....	71.20	10.30	...	3.60	4.80	...	...	...	8.00	...	Do.
Do. (—do.—second),.....	67.78	9.02	...	4.60	4.80	...	...	...	12.00	...	Do.
Triticum Monococcon } (unsifted),..... }	64.84	16.33	7.48	11.35 (i)	...	...	...	...	...	...	Zenneck.
Do. (sifted),.....	76.46	15.54	.81	7.20 (i)	...	...	...	...	...	...	Do.
Triticum Spelta,.....	74.00	22.00	...	...	5.50	...	...	...	...	...	Vogel.
Zea Mäis,.....	77.00	5.50	3.00	1.75	1.45	.80	...	1.50§	9.00	...	Gorham.
Do.	80.92	5.75	8.71	2.28	.89	1.09	...	.08	...	...	Bizio.

(a) This number expresses a mixed precipitate of sugar and bitter extract which Vogel did not further examine.

(b) The loss sustained in the analysis is comprehended in this. It was not more particularly ascertained.

(c) Both the fecula and the woody matter obtained by Einhof contained portions of gluten which he did not separate.

(d) These experiments having been made on the entire grain, the numbers expressing the quantity of hordein necessarily include the bran, which, according to Einhof, amounts to 18.75. They probably also contain the gluten.

(e) This consisted of the green woody envelopes of the grain along with a portion of green fecula.

(f) Along with the uncrystallizable sugar there was a little brown extractive matter soluble in alcohol, and a portion of a brown nearly insoluble extract.

(g) These numbers are expressive of the quantity of matter soluble in water, consisting principally of sugar and gum.

(h) The gum obtained from the various kinds of wheat contains portions of the phosphate of lime and of magnesia.

(i) In this number are comprehended also portions of sugar and extractive matter which were not separated from the gum.

* Phosphate of lime.

† Salts of potash and lime whose acids were the phosphoric, the hydro-chloric, and a vegetable acid.

‡ Phosphate of lime, with a trace of other salts.

§ Phosphate and sulphate of lime.

|| Phosphate of lime and other salts, with some acetic acid; including the loss.

No.		Date		Description	
1	1890	Jan 1	1890	Jan 1	1890
2	1890	Jan 2	1890	Jan 2	1890
3	1890	Jan 3	1890	Jan 3	1890
4	1890	Jan 4	1890	Jan 4	1890
5	1890	Jan 5	1890	Jan 5	1890
6	1890	Jan 6	1890	Jan 6	1890
7	1890	Jan 7	1890	Jan 7	1890
8	1890	Jan 8	1890	Jan 8	1890
9	1890	Jan 9	1890	Jan 9	1890
10	1890	Jan 10	1890	Jan 10	1890
11	1890	Jan 11	1890	Jan 11	1890
12	1890	Jan 12	1890	Jan 12	1890
13	1890	Jan 13	1890	Jan 13	1890
14	1890	Jan 14	1890	Jan 14	1890
15	1890	Jan 15	1890	Jan 15	1890
16	1890	Jan 16	1890	Jan 16	1890
17	1890	Jan 17	1890	Jan 17	1890
18	1890	Jan 18	1890	Jan 18	1890
19	1890	Jan 19	1890	Jan 19	1890
20	1890	Jan 20	1890	Jan 20	1890
21	1890	Jan 21	1890	Jan 21	1890
22	1890	Jan 22	1890	Jan 22	1890
23	1890	Jan 23	1890	Jan 23	1890
24	1890	Jan 24	1890	Jan 24	1890
25	1890	Jan 25	1890	Jan 25	1890
26	1890	Jan 26	1890	Jan 26	1890
27	1890	Jan 27	1890	Jan 27	1890
28	1890	Jan 28	1890	Jan 28	1890
29	1890	Jan 29	1890	Jan 29	1890
30	1890	Jan 30	1890	Jan 30	1890
31	1890	Jan 31	1890	Jan 31	1890

The following is a list of the names of the persons who have been admitted to the membership of the Society since the last meeting of the Council, and the date of their admission.

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Attempts have been made to ascertain the comparative *nutritive* value of the different farinas, but on looking at the result of the experiments, we must acknowledge at once that the great discrepancy is such as to give us no confidence in their correctness: thus the nutritive power of the potatoe, compared with wheat, is, according to Mayer, as 15 to 48; Block, as 15 to 120; Petri, as 15 to 74; and the Faculty of Medicine as 15 to 45. M. Raspail very correctly observes that “it is sufficient to cast the eye over the Tables that have been published by different Authors, to see that this kind of enquiry rests on no certain foundation, and that the results obtained are different according to the mode of experiment adopted, the kind of animal experimented on, and perhaps also according to the temperature of the air and the season of the year.”—Organic Chemistry, p. 394.

In the order of their digestibility, the vegetable extracts must be placed first; then the grains, in this order, rice, barley, maize, millet, oats, rye, wheat; next to these is the potatoe, then the bean and pea, and lastly the chesnut. But, though wheat is placed here as the most difficult of digestion of the grains, yet this does not apply to *fermented bread*, for, as will be stated, the gluten has disappeared from it, and bread is a new substance of as easy digestion as pure fecula.

In their effects upon the body, the Farinaceous Foods are neither stimulating nor relaxing, but directly strengthening. The pulse under their use becomes full and strong, and rather slow than quick. The secretions are small in quantity, and that from the bowels dry. From this dryness of the fœces, the ancients placed the farinaceous substances amongst the exsiccants, but we ascribe it to this, that the greater part of them being nutritious, there is very little which is not taken up into the system. The perspiration is small in quantity, clammy, and odorous, as may be known by coming in contact with those who are decided meal-eaters. The blood

is increased in quantity, and is thicker. There is little or no fat. The muscular fibre is large and strong—the muscle being hard as iron. The muscles, however, are less agile and active. They are capable of enduring great fatigue, and of performing great labour, but not with much quickness or alertness. The sensations are blunted, and the sympathies and affections roughly kind. There is enough of plain good sense, but little of the fire of genius. “The people,” says Venel, “who make their principal food of farina, have a healthy appearance, a fresh and blooming colour; they are stout, heavy, lazy, little inclined to exercise or troublesome duties, without vivacity, without *esprit*, without uneasiness.” In this country, however, the farinaceous foods have not in a very marked degree these effects, because they are frequently used with flesh; or their action is altered by spirituous or malt liquors taken along with them. Still, however, the characteristics mentioned by Venel, are found to some extent in the bold and bluff peasantry of Britain. The French ascribe to this food a soothing (*adouçissant*) property. They say that it diminishes the force of the passions, and build their belief of this upon the practice of the Quakers of the United States who feed their jail prisoners with maize and melasses, which the Quakers believe change the violent dispositions of these personages. This was a maxim known, however, in England before the introduction of Quakerism; and though we have never in our jails trusted to the making a Howard out of a Burke, by dieting him on fecula, yet we do give him the chance of going out of the world a milder man, by feeding him with rogue’s allowance and fare, which is always bread and water.

An objection has been made to the farinaceous foods, that they disengage a large quantity of air in the stomach and bowels, or, in other words, are flatulent. It is likewise affirmed that many of them are acescent. Neither of these are

serious objections, and these effects only take place where farina is combined with mucilage and sugar, and where the stomach is so weak as to allow the food to run into fermentation. The farinas swell, but this is not from the formation of any gas, but from the absorption of water, and when they have acquired all their bulk by previous cooking they do not swell any more or produce any disorder in the *healthy* stomach. If they have not been well freed of the envelope or bran, they are more apt to become ascendent, in consequence of some principle contained in it which favours acidity. This, in a most marked degree, is the case with the rye. When containing the bran, some of them prove laxative. This may either be the consequence of the acid formed, or it may be owing to a mechanical action of the envelope, generally indigestible, on the coats of the canal.

WHEAT.—The most important of the Farinaceous Foods is wheat. The wheat flour contains, besides the farina, a very large quantity of gluten, in fact the largest of any vegetable substance. It is to this it owes its superiority as a food, and it is to the same circumstance that it, of all the cerealia, can only be made into bread. The wheat, and more particularly that called the *hard* wheat, of the South has more of this gluten in it than that of the North, and hence it is better adapted for the making of maccaroni. The flour of the other farinaceous seeds, containing little or no gluten, never undergoes the panary fermentation, and cannot be made into loaves like the flour of the wheat.

BREAD prepared from wheat flour is a new substance, for we can neither obtain the farina nor the gluten from it; and this change is entirely attributable to what has been called the *Panary Fermentation*. When the flour has been mixed with the water, yeast, and salt, and exposed for some time to the atmosphere, a species of fermentation takes place, and a gas is formed. When the paste is then exposed to a heat

of 448° Fahrenheit, the gas expanding, and, from the tenacity of the paste, not being able to escape, carries the paste outwards with it, and gives the bread the light spongy appearance which it possesses. The crust is frequently blistered, as it is called, by the rising of the gas, and the blisters are frequently broken by the force of the gas from its expansion by the heat.

But yeast is not necessary to the formation of bread, though the process is accelerated by this addition. A natural fermentation takes place by the action of the gluten and farina on each other, and the gluten disappears in the same manner as it does from yeast-fermented bread. But the bread naturally leavened is so sour and unpleasant that it cannot be eaten. The practice, therefore, was to take a little of this paste or leaven, and add it to more flour and water. The addition of the leaven brought on the panary fermentation sooner, and the bread rose better and was more spongy. The bread, however, prepared in this way, is always either too sour or too compact, from our not knowing the exact quantity of leaven required ; and hence we use yeast, which produces the same effect with more certainty, and can be better calculated as to quantity. We are said to owe the practice of using yeast to the ancient Gauls. As it is known that alcohol, carbonic acid, and, towards the end, acetic acid are evolved during the panary fermentation, yeast was supposed to contain these principles ; but this supposition was overturned when it was found that yeast which has been dried by heat, and from which consequently these principles, if present, must have been driven off, answers equally well, when rubbed down and moistened with water, for the preparing of bread. Yeast has since been found to contain, besides carbonic acid, a quantity of gluten, and it is to the presence of this latter that it owes its value in the fermenting of bread.

The wheat flour contains even more gluten than is sufficient

for itself, for other substances which cannot be made into bread alone, as barley, beans, pease, potatoes, &c. when added to flour, undergo the panary fermentation. The gluten of the wheat absorbs a quantity of water during the kneading, which remains in it and adds to the weight of the bread ; but in the other feculas the water is not absorbed, but merely adheres to them, and though they require more water at first to knead, this water soon evaporates, and the bread becomes dry, hard, and of the same weight as the meal : thus 5 lbs. of flour give 8 lbs. of bread, but 3 lbs. of flour, with 3 lbs. of potatoe flour, or starch, give only 6 lbs. of bread. It is affirmed by some that fermentation takes place to a partial extent where farina is united with mucilage, but this is denied as stoutly by others.

Bread is easier of digestion than flour in any other preparation, but less nutrient. Ægineta tells us that “boiled wheat flour used as food is difficult of digestion and is flatulent ; but that if digested it gives a powerfully nutrient food. If, however, it be made into bread, it is deprived of its flatulency, and of its indigestibility, by the fermentation and the addition of the salt.” The circumstance of its being less nutritious he does not appear to have known. Celsus says “*aqua madens panis imbecillissimis annumerari potest.*” I cannot understand how such bread can be less nutritive than bread otherwise eaten, but it may be more difficult of digestion. Athenæus tells us that “warm and recent bread nourishes more than old and cold bread, and this is evident, for the warmth assists the concoction.” Athenæus, however, is here sacrificing at the shrine of the theory of concoction. Old bread is always more easy of digestion than new, and agrees better with the stomach. In fact the fermentation, or some part of the process, does not appear to be completed until the bread is perfectly cold ; for new bread has always a different smell and taste from old, which shews

that something is lost or some change takes place by keeping. It is according to invariable experience that new bread is unwholesome.

The unfermented bread is merely the flour and water mixed together, and the paste rolled well out, and then dried by a high and continued heat. It keeps much better than the other, but it is neither so easy of digestion nor so agreeable to the stomach. With invalids, however, where the common bread runs into acid in the stomach, biscuits, when prepared without butter, will often agree admirably. Since bread is much more easy of digestion than any of the other preparations of flour, it is not a matter of indifference to the stomach of a patient, or to his system, whether he eat bread pudding ; or batter pudding, dumpling, or any similar preparation. Dumplings, pancakes, paste, &c. are highly indigestible, whilst bread may be allowed to the stomach of the weakest patient, and is frequently the first food that is craved. Bread does not produce to so marked a degree the constitution induced by the use of the farinaceous foods as the other preparations of wheat flour ; and it may be taken with all the other varieties of food without interfering with their specific action on the system. It may be given to afford bulk to a concentrated food, as for instance sugar ; or to assist their digestion, as for instance the oleaginous foods. It neither stimulates the system nor relaxes it ; it is the best food, the staff of life.

BARLEY.—This grain will endure a greater variety of climate than wheat. It will grow also in a lighter and drier soil, and it germinates and ripens the soonest of any of the cerealia. Barley has long been considered as possessed of the next nutritive qualities to wheat. It is believed to contain the fecula in great purity ; it contains much saccharine matter, but little gluten, and hence the impossibility of making it into bread. Galen very correctly tells us that “ barley bread is friable.” It is friable, cracked, hard, and not in the

least improved by the addition of yeast. "Barley bread," says Ætius, "is less nourishing than that from wheat, but is more laxative on the bowels." This property is still found to belong to it. Barley exhibits the common property of *fecula* when boiled—the seeds swelling, enlarging, and acquiring a semi-transparency. The decorticated seeds, Scotch barley, are used for the making of broths, for which they answer well, and the meal is sometimes used for making porridge, which is a very good light dish for invalids. *Pearl* barley is the seed entirely deprived of the husk or pericarp, and is used for making barley water.

Barley, from the time of Hippocrates downwards, has been esteemed more cooling and cleansing than wheat, and has been used to prepare the well-known sick chamber panacea barley water, or decoction, or ptizan. The *πτισανη* of Hippocrates was prepared solely from this grain, but the moderns apply the term ptizan to all preparations of similar consistence, from whatever grain. The Greeks prepared barley in different ways. With a large proportion of water, and the addition occasionally of honey, it was used as a drink; or with a less quantity of water, or by longer boiling, so as to bring it to a thick consistence, it was used either alone or with the addition of some vinegar and salt, or some oil, as a light food to the invalid. This was the practice of Hippocrates—barley water during the acute stage, in cases where any food was proper, and the barley itself when the patient was in a fit state to take solid food.

The large quantity of saccharine matter contained in barley renders it well adapted for distillation. The seed is sometimes infused without having been malted, but in general malting, or the conversion by the process of germination of the *fecula* in a great part into sugar, for the nourishment of the young plant, is had recourse to as a previous step. Bar-

ley germinates more easily than any other seed, hence also a reason for preferring it.

RICE.—“Rice,” says Arbuthnott, “is the food of perhaps two-thirds of mankind : it is most kindly and benign to human constitutions, proper for the consumptive and such as are subject to hæmorrhagies. Next to rice is wheat,” he continues, “the bran of which is highly ascendent and stimulating ; therefore bread that is not too much purged of it is more wholesome for some constitutions.” The assertion here made that rice is preferable in any way to wheat is not founded in truth. It is commonly considered as binding or astringent on the bowels ; and by some as difficult of digestion. It has no stimulating matter in it to quicken digestion, and therefore it is perhaps longer of leaving the stomach. It is to assist the stomach in acting upon it, that rice is so commonly eaten with the peppers or condiments in those countries where it forms the common food of the inhabitants. The soldiers in India complain that they are not sufficiently nourished by rice ; and, on the other hand, Professor Moscati, who made experiments on the comparative nutritive powers of wheat, rice, barley, and potatoe, was led to believe that the rice was the most nourishing, and next, or perhaps equal with it, the potatoe. As, however, rice contains no gluten, it cannot be so nourishing as wheat, but, from the same reason, it may be more easy of digestion as being nearer in its composition to pure fecula. Though it may be made into cakes, it will not ferment, but mixed with wheat flour it makes very good bread. Though it has been deduced from the inhabitants of warm climates eating peppers to it, that rice is difficult of digestion, yet it is only difficult to *their* weak stomachs, in which wheat would be still more indigestible. There is little question but that the rice is very dense or compact. This is proven by the quantity of water required

for its germination ; and it may, from this hardness, give more labour to the stomach. From the same circumstance little spirit is obtained from it, but it is from it, fermented alone, or with other substances, that *arrack* or *rack* is principally obtained.

MAIZE.—Maize, or Indian corn as it is called, is unfortunately the inhabitant of a rich soil and a warm country only, otherwise it would be one of the most extensively cultivated of plants, for whilst its flour is useful to man as a food, its leaves and stalks are excellent and fattening food for cattle. The maize is not very well relished by the convicts who are sent from England to New South Wales ; but to those accustomed to it from early life, it is pleasant enough. It contains bran 3.25 in 100 ; no gluten, no saccharine matter, and cannot be made into good bread. The fecula contained in it (96.75 in 100) is very pure. It forms a great part of the food in North and South America, and in Africa it is now used to nearly as great an extent as rice. A good deal of discussion has taken place with respect to its nutritive powers, but in those cases where it grows abundantly we find the inhabitants fond of it, cooking it as a food in many different ways, fattening their cattle with it, and preparing more than one wholesome fermented drink from it. The cattle fed on it soon get fat, and their flesh is very firm. Maize has no place as yet in the European sick chamber.

OATS.—Oats ought, from the extent of their use, in this country, to have followed wheat, if we were to take the circumstance of a food being common as the test of its being the best. But the people of a country must use that grain which is best adapted to the soil, and therefore most extensively cultivated ; and custom not only reconciles them to it, but they come actually to believe it the best. “ This seed,” says Galen, speaking of the oat, “ is the food of horses, not of men, unless perhaps, in some times of great scarcity, when

recourse may be had to bread prepared of this grain." In northern cold countries, however, where the land will not grow wheat, this grain must furnish an article of food to the inhabitants. In these places, and especially in the northern parts of Britain, it has been, by careful cultivation, improved; but in others it has a bitterness united to it which renders it excessively disagreeable as a food. The Greeks held it as much inferior to barley in the quantity of nutritive matter it contained: But Dr. Cullen entertains an opposite opinion, and perhaps, from the method of cultivation and the climate, the barley of the South may be superior to that of the North; but the oats of the former inferior to that of the latter, in the same way as we know there is a difference between the wheat of the South and North. We find a small quantity of gluten in it according to climate and cultivation. It certainly is inferior to wheat in nutritive qualities—according to some, in the proportion of 75 to 95½ per cent. It was considered by the Greeks as very easy of digestion, and they recommend, as the best way of taking it, a *sorbitio* prepared by boiling ten parts of water with one of oats—this being taken "*vino dulci aut defruto, aut vino mulso.*" Galen says that oats neither loosen nor astringe the bowels; but Ætius and Ægineta state distinctly that the oat is astringent, "*adstrictionis non nihil habet, ut etiam ventris profluviis commodet.*" This opinion corresponds with that derived from its use with us. They placed it likewise amongst the calefacients, and we are also of opinion that it is much more heating to the system than either wheat or barley. Sir Humphry Davy says "I have been informed by Sir Joseph Banks, that the Derbyshire miners in winter prefer oat-cakes to wheaten bread, finding that this kind of nourishment enables them to support their strength and perform their labour better. In summer, they say oat-cake heats them, and they then consume the finest wheaten bread they

can procure. Even the skin of the kernel of oats probably has a nourishing power, and is rendered partly soluble in the stomach with the starch and gluten. In most countries of Europe, except Britain, and in Arabia, horses are fed with barley mixed with chopped straw; and the chopped straw seems to act the same part as the husk of the oat."—*Agricultural Chemistry*, p. 132. Unquestionably the skin of the oat contains some substance not found in the husks of the other grains, for by infusing the husks in hot water, the liquid becomes loaded with a quantity of the finer parts of the fecula, and with a quantity of mucilage, and perhaps some other substance, possibly gluten or albumen, for Raspail demonstrates to us that the gluten is principally contained in the envelope. This infusion in a few days becomes acid; and when strained and boiled is thick and glutinous like a paste of flour. This is the dish well known in Scotland by the name of sowens, and from the cooling qualities it possesses by the presence of this acid, and from its lightness to the stomach, and the ease with which it is digested, a better food cannot be prescribed for the invalid recovering from an acute disease, or even for chronic cases, provided the stomach has not a tendency to turn the food to acid.

Oatmeal contains no gluten, according to Vogel, and therefore cannot be made into bread. The cakes made of it do not agree with many stomachs on account of their creating acidity. Oats contain a considerable quantity of sugar, and from this circumstance food prepared of oatmeal runs into fermentation in the digestive organs. It is not the case, however, that oats contain so much sugar as barley, otherwise they would be more used for the making of beer and spirits. At one time a kind of beer, named *mum*, was prepared principally from oatmeal. A French writer, Nodier, intimates that in Scotland, "*On fait un eau-de-vie d'avoine, dont on use dans le pays, où elle, s'appelle WISKEY; on la mêle à*

l'eau pour en faire un GROG, qui rend potables les eaux les plus malsaines." So much for the "*Promenades aux montagnes d'Ecosse*" ! The decorticated oat, or *groats*, or *grits*, as they are called, are used in decoction to make a gruel, and for this they answer much better than the ground meal.

RYE.—Rye is likewise a grain belonging to northern nations. It is well suited to a cold, bleak, and sandy soil. Rye flour kneads well, and forms a firm paste which ferments and rises. The bread made from it is of a brown colour, the vacuities spread through it are equal through the whole, the crust is perfect, not chinked nor cracked, and the taste is agreeable enough. The Swedes bake only twice a-year, and consequently the bread is as hard as a stone. Rye contains a quantity of gluten superior to any of the other cerealia, excepting wheat, and besides this, a large proportion of mucilage, which likewise assists the gluten, for the quantity of this present is not nearly sufficient alone, being very far below that in wheat. Brown bread is generally composed of wheat and rye flour ; and it makes a much better and more nourishing bread than the rye alone.

To the stomach rye is sufficiently agreeable, and by no means difficult of digestion, but it is by far the most ascenscent of the cerealia, and is very apt to act as a laxative on the bowels, from which last circumstance rye bread is well adapted to certain cases of disease. It is much less nourishing than wheat, but should be, and no doubt is, more nourishing than oats or barley, when it does not create acidity. It is much less cultivated in Britain than it once was, and very undeservedly is it neglected. Two parts of rye meal with one of malted barley furnish by distillation the spirit used in Holland, Sweden, Prussia, &c. The infusion of rye passes very quickly from the vinous to the acetous fermentation, and does not furnish much alcohol.

MILLET.—Dr. Arbuthnot says "Millet is diuretic, deter-

gent, and useful in diseases of the kidneys." It had at one time a considerable reputation as a medicine, but it possesses nothing medicinal more than barley, or wheat, or any other of the cerealia. It contains fecula combined with very few other substances, but differs in so far from the other seeds, that the fecula has a yellow colouring matter united very closely with it. The millet is the common food of the inhabitants of the West of Africa, who use it generally boiled. The proper millet is the *Panicum Italicum* of Linnæus, but there are several other seeds known, and used, under the name of millet. It is the rye of the light and hot sandy soil of Arabia, Syria, and Nubia. It is called *dhourra* in Nubia, and *Guinea corn* in the West India Islands, where it is used by the negroes.

THE POTATOE.—Next in importance to the grains, as an article of food, is the root of the *Solanum Tuberosum* or Potatoe. It contains a very large quantity of fecula, a fibrous farinaceous matter, albumen, and a large proportion of a viscid mucilage. No gluten has been found in it. There is likewise a considerable difference in the quantity of farina, according to the age of the root, or the period from the time it was dug up. The quantity gradually increases from the time the root is dug up to the month of November, at which time the potatoe is most mealy: it gradually decreases after this month, and the potatoe gets more and more waxy. When well beat up it may be made into a very indifferent bread, even if it deserves to be called bread at all, but, if mixed with wheat flour, the compound undergoes the panary fermentation, rises, and forms a tolerably good and fair bread. Potatoes are extensively used to adulterate wheaten bread, and it would be well indeed that an article so wholesome were only used. An attempt has been several times made to introduce the pure fecula of the potatoe, as an article of general use. It can be easily prepared, and it is a very light food

for the sick, being the same as arrow root, for which it is in nine cases out of ten fraudulently sold, but it is not so nutritive as the potatoe itself, and consequently it is not common as a food.

The potatoe is by no means difficult of digestion, but does not afford so much nourishment, in the same bulk, as any of the cerealia. Quantity is required to make up for quality, and five pounds of potatoes are required by the system for one pound of wheat.* That it is not an unhealthy food, however, is made apparent by that immense example we have in the Irish peasantry, a strong hardy race, whose chief sustenance is the potatoe. Much ground is at present used for the growth of this root, which might, with greater advantage to the physical and moral improvement of the cultivators, be employed in the growing of some of the farinaceous seeds. Wherever food sufficient to serve the population can be reared easily, the inhabitants of that country will acquire habits of sloth, idleness, and filthiness, and a temperament towards turbulence, or merriment and joviality, according to temporary exciting causes. Being sure of what is necessary to support life, they are deprived of a most powerful stimulus to constant exertion, which, when once formed, by use increases in the individual, and does not rest with the supply of mere

* Mr. Jacob, in his *Corn Tracts*, is of opinion that 2 lb. of wheat afford as much *subsistence* as 7 lb. of potatoes, but that it is doubtful if it furnish so much *nourishment*. He calculates that "one acre of wheat will produce sustenance for three persons, or one acre of potatoes will afford it to six and five-sixths." Sir Henry Parnell, in pointing out the evils of the present Corn Laws, well observes that the farmer may be even ruined by high prices. "The stimulus which the high price of corn gives to the growth and consumption of the potatoe, will clearly bring about a reduction in the price of corn." But before this can take place, the people will have been thrown on a worse quality of food, and be liable to the physical deterioration following thereon. Moreover, the population will have increased and adjusted itself to the quantity of this food, and the return to a higher must be attended with great trouble and suffering, even if it can be achieved at all.

food, but extends and expends itself on the improvement and advancement of those things which contribute to comfort and even luxury. By the mind and body being thus actively engaged, the one in planning and speculating, the other in executing and labouring, the susceptibility of the former to sudden impressions is diminished; or rather the individual cannot allow himself to think of any thing but that which is necessary to his existence or his comfort, and acquired or acquiring habits. The free inhabitant, and the slave of the central nations of Africa are lazy, thoughtless, merry mortals, because nature gives them their food with almost no trouble: the peasantry of Ireland are a lazy, idle, slothful race, merry or angry with the slightest excitement, but always in the one state or the other, because the favourite potatoe is the most certain crop, and cultivated with the least labour of any. This is the potatoe theory for the evils of Ireland, and, with a little labour, it might be made as pretty and plausible a little theory as any of the thousand and one propounded, to account for the misfortunes of that singular country.*

YAM.—This root, used in some parts of Africa, Asia, and America, is similar in composition to the potatoe, but denser. It is used either boiled or roasted, and is not difficult of digestion.

LEGUMENS.—The legumens, when fully grown, contain a large quantity of farina, and more or less of mucilage; but

* Les negres qu' on nourrit de cassave ou de patates, de meme que les pauvres en Irlande, en Allemagne, et ailleurs, qui vivent presque uniquement de pommes de terre, et les sauvages des Isles de l'Ocean Pacifique, qui font cuire les racines de taro ou celles de quelques fougères pour leur subsistance, sont moins robustes, moins actifs, moins vivaces, que les peuples substantive des grains des cereales; ils leur obeissent. Generalement les caremes alanguissent la circulation et les fonctions de l'organisme. Le sang reste pale et peu fibreux."—J. T. Virey. *Journ. de Pharm.* We give his remark, but deny its correctness as to Ireland.

they are without gluten, and though the combination of the farina with mucilage does make a kind of bread, it is merely a paste, for it does not ferment. The legumens are nourishing, but very difficult of digestion, and always flatulent. When young they are easier of digestion, owing to their being at this time composed principally of mucilage and sugar, but they are not so nutritious. Some of them grow in situations where none of the other cerealia will thrive. Where water cannot be obtained to cultivate rice, and where manure and perfect tillage cannot be procured to promote the growth of the cerealia, the poor native throws into his dry and sterile soil a little pulse, and it springs up, relieving by its green freshness, the barrenness around, and repaying the little trouble bestowed, by some succulent stalk for the cattle, and a small store of hard and dry pease for the winter use of the cultivator.

Bean.—The bean is the most nutritious of the legumens, but being very difficult of digestion it is not so much used as the pea. Dr. Cullen says the kidney bean is such a favourite that “in certain parts of Scotland the farm servants would not engage unless their masters stipulated that they were to receive so much meal of this bean by the day or the week.” The mixture of wheat flour and bean meal makes a very good bread, which rises well. The bean contains about 58 per cent. of nutritious matter.

Pea.—When young, the pea contains a large quantity of sugar, and is then easy of digestion. “Those who are fond of pease soup,” says Willich, “would better consult their health by boiling the pease whole than split and deprived of their husks; for these promote the grinding of the pease, and prevent them from turning acid in the stomach, which split pease readily do; they are also apt to occasion oppression in the bowels and heartburn.” The opinion of Galen is more correct than that of this modern doctor, for he tells us that

by the removal of the husks, the pease become less astringent, less flatulent, and more nutritious. The oppression in the bowels and the heartburn depend more perhaps upon the fat used in cooking the soup than upon the pease. The pea contains nearly the same quantity of nutritious matter as the bean, but as it retains a little sugar even when full grown, it is on this account easier of digestion.

There are other seeds of the legumens used besides these in some countries, as for instance haricots and lentils by the lower orders on the Continent; and the chick pea in some parts of Spain, and supposed to be the cicer which when fried formed the food in part of the slaves of Rome. There are others peculiar to warm and dry countries. In this country the legumens are cultivated for cattle, or for only a small share of human food, but in places suffering under the extremes of heat or cold, and not attended by moisture, they furnish the only farinaceous food of the inhabitant. The Arab scours the desert for weeks subsisting on his *Lebleby*, which is some fried chick pease.

CHESNUT.—The chesnut is composed almost entirely of fecula and of sugar—one species cultivated in Tuscany giving about 14 per cent. of sugar. The chesnuts are much used in the south of France. They are not very easy of digestion, but are improved by keeping or roasting. They do not contain much oil, and though less nourishing they are more easy of digestion. In those countries where they abound they are not only used raw or roasted, in which last case they resemble a mealy potatoe, but also in puddings, and even are made into bread.

BREAD FRUIT.—This food is bestowed by nature on the inhabitant of many of the islands of the Pacific and part of the Continent of Asia, ready to his hand as it were. It is not inferior to the cerealia themselves in the quantity of nutrient matter, but its fecula is united with much mucilage,

and is not easy of digestion. The species which is preferred is the one which contains neither seed nor stone. When charred or roasted it resembles a mealy potatoe, and is, to the taste, between that of newly made bread and a roasted chestnut. The fruit exists for eight months of the year, and is pulled and roasted for immediate use. A paste or flour called *mahe* is prepared from it, which the islander uses as a food during the four months that the tree is not bearing. Two or three of these trees are sufficient for a man's subsistence, and even for all his wants, for the bark furnishes his clothes, the wood his domestic utensils and dwelling, and the leaves its thatch.

VEGETABLE EXTRACTS.—The Vegetable Extracts, as arrow root, sago, tapioca, salep, &c. may be termed pure fecula, or if combined with any thing, it is only a little colouring matter, or an aromatic principle. They are therefore all the same, notwithstanding that they are met with in commerce under the different forms of powder, grains, small lumps, &c. The physician, therefore, who knows this, knows at the same time that it is a matter of indifference which of them is given to a patient, (and they are generally prescribed as food to the sick by the medical attendant,) for they have the same effect upon him. They are very light, easy of digestion, and if a given quantity of them is not equally nutritious with the same quantity of wheat flour or the meal of some of the other cerealia, the greater facility of digestion compensates for this, and makes them, in many cases, better adapted for the stomach of the invalid. They are either taken simply boiled with water or milk, or with the addition of some wine.

Arrow Root.—Arrow root is in the form of powder, and is obtained from the root of the *Maranta Arundinacea*, by scraping the root, washing away the fecula in water, pouring off the water as the fecula subsides, and then exposing

this fecula to a heat sufficient to dry it. It is brought to this country from the East and West Indies, especially from Jamaica, but a great deal of what is sold for arrow root in the shops is the fecula of the potatoe or of wheat.

Sago.—Sago, signifying in the Amboyna dialect, meal, may be obtained from the greater number of the palms, but the *Sagus Farinifera* of the Molucca islands, whence the name Sago comes, and the *Cycas Circinalis* of the East Indies, afford the most. A white powder appearing upon the leaves indicates the proper time to cut the tree down. The pith is then extracted, soaked in water, and strongly pressed through a sieve in order to separate the fecula from the fibrous parts, and then dried on a hot plate or pot. The fecula is imported by us in the form of very hard small grains. It is frequently adulterated. It keeps a great length of time, from the circumstance that in granulating it, it is half baked. The powder when ungranulated soon becomes sour. One tree will give from two to four cwt. of flour; and Mr. Crawford "has calculated that a single acre of land will support thirty five sago palms, which will annually produce 120,500 lbs. of sago" or 251 qrs. of flour; so that it would require only 199,601 acres to supply the 50,000,000 quarters of flour required for the whole population of Britain. Even allowing for the difference in nutritive powers, this is so great a quantity of food on so small a space, that Mr. Malthus must allow that the positive check against the increase of the whole human race ought to be far off. Potatoe flour is easily formed into the same granular appearance as sago.

Salep.—Salep is obtained from different species of the *orchis*. The best salep is brought from Persia, Syria, and Turkey, where it forms a large part of the food of the people. It is met with in the shops either in the dried bulb or in powder. The latter is frequently adulterated with potatoe flour. It is very compact, and it is difficult to reduce the

dried bulb to a powder. One pound of salep is said to require sixty of water to dissolve it. It is considered by some to contain a much larger proportion of nutriment than any other vegetable substance. An ounce of it, with an ounce of portable soup, boiled in 2 quarts of water, is said to be sufficient for the daily sustenance of an adult. Berzelius says the salep contains much vegetable mucilage, but very little fecula or gum.

Tapioca or *Manioc*.—The tapioca or manioc is imported from South America. There are two plants, the *Jatropha Manihot*, or bitter root, and *Jatropha Janipha*, or sweet root. The first is preferred. The root is a very useful one, for it not only furnishes the fecula known by the name of tapioca, but is itself eaten as a food by the natives. The bitter root contains a very poisonous juice, which, after being expressed, deposits a sediment which is fecula, and when washed and dried is the tapioca of commerce. The root, which is scraped down before being subjected to pressure, is baked by the natives into cakes, which, after having been exposed to heat until they become somewhat yellow, are used as food under the name of *cassava*. The poisonous matter is almost entirely removed in the juice, and what remains is driven off by the heat, being volatile. The juice is used by the Brazilians, *boiled* with meat in a soup named *casserepo*, and is considered wholesome. It is likewise converted, by the addition of sugar, into an intoxicating liquid.

LICHEN.—The different species of lichen, especially the *Lichen Islandicus*, contain a large quantity of a substance that boils to a jelly, and very much resembles that prepared from fecula, but it is not the same. It is obtained by boiling the lichen previously infused in warm water in order to remove its bitterness. The jelly thus prepared is sometimes used as a sick-chamber food.

FARINACEOUS FOOD AS A THERAPEUTIC AGENT.—Where-

ever it is our object to give permanent strength without any accompanying stimulus, wherever we wish to add to the mass of the blood without increasing the force of the circulation, there we use the farinaceous foods. Their great nutrient qualities, and at the same time that property they possess of allaying all inordinate actions, render them eminently useful at the termination of acute diseases, and in all discharges not attended with inflammatory action. In mucous inflammations this food makes up to the body for the increased and weakening discharge, at the same time that it does not give any excitement so as to increase the inflammation. Yet the use of this food would be injurious in cases of acute inflammation, as those of the viscera. Much as Hippocrates has celebrated the barley decoction, and much as he recommends it, he withholds even its use in severe peripneumony, and says, "if you give ptizan to such a patient, death will follow the use of this medicine." Farina contains too much nutritious matter for the acute stage of fever of any character. In the exanthemata, when the violence of the fever is over, it will be the best food, and as such was very freely prescribed by Sydenham in the termination of small pox. In almost all chronic diseases, the farinaceous foods may be freely allowed, provided the one used do not run into acid in the stomach, nor astringe the bowels. If either of these take place we must change the food for some other of the farinas, or, what will often answer, change the preparation—as for instance biscuits, or hard toasted bread for soft bread, bread pudding for batter pudding, &c. The peculiar effects of rye, and of the coarse wheaten bread, on the bowels, should not be forgotten, for their laxative effects will often recommend them to use. At the termination of acute diseases, we must recollect that the stomach is in a correspondingly weak state, and we must suit the food to it. Barley water or gruel may be enough for it at first, and this then succeeded by

boiled sago or arrow root, or sowens, then bread pudding, and lastly rice pudding, potatoes, &c. Bread alone will frequently be relished by the stomach when it nauseates every other substance.

MUCILAGINOUS FOODS.

The cerealia require the most fostering care on the part of the inhabitant of the temperate climes to bring them to perfection ; but the mucilaginous foods, under which we place the olera or herbs, and most of the roots, grow almost wherever the seed can find ground. One of them, indeed, appears as if it were a domestic plant, for it follows man in his peregrinations, and springs up beside his habitation, offering itself to his hand as it were. And were it that the rearing of the mucilaginous foods required much trouble, the cultivation of them would be very much circumscribed ; for, though they may be necessary in a certain quantity for the preservation of health, they by no means afford nourishment equal to the farinaceous, the saccharine, or the oleaginous foods. Mucilage which, like farina, is a distinct principle* abounding in different parts of different vegetables, is by no means easy of digestion ; and even when it is digested, it affords but little nutrient matter. In general, therefore, we find the mucilaginous substances used as food, either containing some sugar, or holding some acrid principle or essential oil, as if nature provided something which will assist the

* It may be necessary to observe that all chemists do not hold mucilage to be merely *gum* dissolved in water. Berzelius makes a distinction betwixt *gum* and *vegetable mucilage*, the prototype of the first being the gum of the *acacia vera* ; and that of the second, the produce of the *Astragalus Tragacantha*. Vegetable mucilage, as he describes it, has been named Tragacanthine, Cerasine, &c., and he seems to think that it is an azotized principle. It therefore comes near to gluten, and substances containing it may be more nutritious than those containing merely gum, *e. g.* Salep.

stomach in digesting them. At the same time, too, there is in the greater number of these foods, a large quantity of matter which is entirely indigestible—as for instance woody fibre and colouring matter. The Table in page 240 contains a list of several of the foods belonging to this class; and it will appear from it that they ought, with more propriety, to be placed in the saccharine than in the mucilaginous foods, for the quantity of sugar much exceeds that of mucilage. But, although the quantity of sugar is greater than in any of the farinas, not excepting barley, yet it is less than in the saccharine class, and is combined with a larger quantity of indigestible matter. Another circumstance, and one deserving of particular consideration, is, that the sugar contained in this class of foods is much more liable to form an acid in the stomach than in any other, not excepting that of the *acidodulces* fruits themselves. Fermentation and the extrication of gases in the majority of stomachs accompany this food.

The father of physic has very correctly given his opinion of the mucilaginous substances, "*sanguinem debilem faciunt*;" and the rest of the Greeks coincide with him. The contractile power of the heart is diminished; the pulse is slow and weak; the function of respiration corresponds with the heart; and the skin in consequence exhibits a paleness and coldness; its secretion is diminished, according to Gorter, "*non ex defectu humoris sed ex defectu propulsione*;" and the body does not appear so much reduced as from the innutritious nature of the food we would anticipate: It is bulky, but not firm. The urine is limpid, colourless, and speedily undergoes decomposition. The stools are copious from the quantity of indigestible matter in the food, and soft from its watery nature: "*per alvum magis secedunt*," says Hippocrates of these foods. That the secretion of the testicles is diminished by the use of the mucilaginous foods is according to common observation; and hence nearly all the articles admitted once

into medicine under the name of *anti-aphrodisiacs* which did not owe their reputation to sheer fancy or whim, are found amongst the olera. The action of the testicles in a great degree depends upon the animal heat, and whatever diminishes this, diminishes the secretion of semen. A ducking in the horse pond is the old cure for lechery, and a dish of salads is only a milder prescription of the same nature applied through the stomach. From the want of energy in the vascular system, from the abundance of watery humours, and from the bulky but lax state of the solids—"une sorte de gonflement atonique," as the French describe it—there is the appearance of strength to the inexperienced eye that believes bulk to be the criterion of physical power, but the physician and the fancy man at once know that these are the flabby and weak muscles that cannot endure fatigue nor return blow for blow—putting out of view a return with interest. Animals which are fed entirely on pasture, become feeble, lazy, and unable to sustain labour. Their organic tissue becomes soft, humid, and relaxed.

The sensations and intellectual faculties correspond with the state of the body. The senses are sluggish and inactive, and the impressions are faint and indistinct. The intellectual powers are oppressed. The system is in that state which predisposes to typhus, to nervous fevers, to the cachectic diseases, and especially scrofula in its most distressing varieties. "*Debilitatem quandam corpori inducunt*," and dropsy is a frequent attendant of this food. "In the famine which occurred in some parts of France in 1817, the inhabitants were reduced to subsist entirely upon potatoes, oat bread, and bran bread; and when these got done, during the months of April, May, and June, they lived on goat's beard, wild sorrel, nettle, succory, stalks of beans and pease, and buds of young trees. The result of this was, the disappearance of all usual diseases; but many of the inhabitants died of mere inanition, and all were more or less affected with dropsy. This dropsical

infiltration continued during the whole time of the use of this food, and did not disappear for many after months and even years. In the history of France, there is mention made of a famine similar to the above, and followed by the same effects. M. Agron states, that at Guadaloupe he has seen 4,000 negroes perish of dropsical disease from having no food but such herbs as they could pick up. According to Diogenes Laertius, the philosopher Heraclitus having withdrawn in misanthropy from the world to the mountains, and fed himself with herbs, died of dropsy."—*Journal de Physique*. Tom. i.

But though taken by themselves, as a food, the *oleræ* are thus rather injurious to strength and health, yet they are eminently useful as an accompaniment to, and corrective of, more stimulating nourishment. Scurvy and putrefactive diseases so prevalent once in England have entirely disappeared since the improvement and extension of gardening have furnished, in the numerous and agreeable vegetables, an antidote to the over excitement of animal food so much used in this country. These vegetables correct the putrescency of the animal foods, and this is almost their sole value as a food for human beings. The burden of the satirical ballad goes, that

“ The Monks of Melrose made gude kail,
On Fridays when they fasted ;”

but, notwithstanding an insinuation conveyed here against the abstinence of the servants of St. Mary's, it would have been much to the public health had the pot herbs of the monastery garden been, in these days, as carefully cultivated for culinary purposes through the country as they now are. The labourer's garden may not give his family much nourishment, but it gives them health ; and wherever the garden is to be seen carefully cultivated and neatly cared for, contentment will be found to dwell in the cottage.

The mucilaginous foods may be divided into those of which we use the leaves or young shoots, those of which we use the roots, and those of which we use the seed or fruit.

I. HERBS.—The first class is known by, and sometimes described under, the name of salads or herbs. It includes all the varieties of the brassica, spinnage, lettuce, endive, succory, purslane, asparagus, artichoke, &c.

Brassica.—Under this may be enumerated *cabbage*, *colewort*, *cauliflower*, *brocoli*, *savoy*. The red and white cabbage contain a considerable quantity of mucilage, with a small quantity of sugar and essential oil. Brocoli and cauliflower possess the same principles, but are more tender and digestible, and less flatulent. The savoy and the common greens, colewort or kail, afford very little nutriment, and pass through the bowels rapidly, acting on many persons like a purgative. They are not so apt to excite heartburn as the cabbages. Of all these the cauliflower is the best for the stomach of a patient.

These are lowly and humble plants, but there is a cabbage obtained from one of the tallest and most beautiful trees of the tropics. The *cabbage palm* tree rises to the height of 130 to 200 feet, and within the leafy crown of this most graceful tree “there is concealed a substance of about two or three feet long, as thick as a man’s arm, and perfectly cylindrical. This substance is composed of longitudinal flakes like ribbands, but so compact as to form a crisp solid body. When eaten raw it resembles the almond in flavour, but is more tender and delicious.” It is the young or unexpanded leaves which lie close together, and being concealed from the light they become thus very succulent and tender.

Spinnage.—The spinnage contains the same principles as the above, and added to these a quantity of green extractive matter evidently of a purgative nature, for spinnage acts as a laxative, and passes through the bowels, quickly giving its green colour to the stools. It is the most tender of the herbs,

but it is not nutritive, and keeps its place at table more from its fine green colour than from any thing else.

Lettuce.—The lettuce is a particular favourite at table. When young it abounds with a watery mucilage, but as it increases in age this gives place to a milky resinous juice which has all the properties of a powerful narcotic.* All the old writers celebrate the lettuce as the most agreeable and cooling of the *olera*, and as the best antaphrodisiac. The decoction of the seeds was a highly valued remedy for nocturnal emissions—no doubt because the patient got no other and perhaps more heating supper.†

Lettuces are generally eaten in the raw state, along with some such articles as sugar, oil, or vinegar. The first and last assist the digestion, but even with the addition of any of these substances salads should not be eaten by the weak stomach.

Asparagus.—The asparagus contains a mucilage and a peculiar substance, the nature of which has not been fully ascertained. It is to this substance that we have to ascribe the peculiar odour which the asparagus gives to the urine, and the character this vegetable has received of being diuretic.‡

Artichokes contain a small quantity of sugar. *Succory*, *endive*, and *purslane* are similar to the lettuce. The *nettle*, *mallow*, &c. are likewise of the same composition when young.

* Ægineta says, "*Lactuca manifeste perfrigerat et humectat, quampropter etiam somnifica est;*" this was according to their theory: he then adds "*quantum vero ejus in oleribus existet probe nutrit et boni succi sanguinem gignit.*"

† Spenser has not forgotten the properties of this and some other herbs. He says:

"Fat coleworts and comforting purslane,
Cold lettuce and refreshing rosemarine."

‡ The ancients used, under the name of *Asparagus*, the young leaves of a great many plants. Oribasius says of them "*omnes vero stomacho idonei sunt, urinamque provocant et parum nutriunt.*"

Many plants which when full grown, or when the flower or the fruit has been perfected, are poisonous, may be eaten as a food when young, being at that time possessed of a large quantity of mucilage, which, at a more advanced growth, is converted into an acrid and poisonous principle. Such is the case with the *aconite* used when young as a salad in Siberia.

II. Roots.—The mucilaginous roots are the carrot, the turnip, the beet, the parsnip, the skirret, the salsafi, &c. All these are composed of indigestible fibre, mucilage, sugar, and essential oil. Like in the herbs the woody indigestible part is the most abundant, but, on the other hand, the mucilage is more copious than in the herbs, and this added to the sugar which they also contain, makes them more nutritious than the herbs. The oil is contained in most abundance in the covering or bark of the root, and is, in general, very acrid. The roots are more easy of digestion than the herbs, but are more flatulent.

Carrot.—The carrot contains, besides mucilage and sugar, a very small quantity of an aromatic yellow resinous matter. It consists of two parts, an external or cortical part, which is the most nutritious, and an internal or woody part; and unless very well boiled it passes through the bowels unaltered. The carrot has by cultivation been almost entirely changed, for the wild or natural carrot is hot and acrid, having more of the resinous matter and less of the sugar and mucilage. The seeds of the wild carrot were extensively used by the ancients as emmenagogue and diuretic; and *Ætius* says of this seed “*Veneris est provocativum.*”

Parsnip.—A substance somewhat resembling fecula, has been obtained from the parsnip, especially when the root has been grown on a poor soil and then roasted. This root likewise contains a considerable quantity of essential oil, which, in a great measure, is dissipated in the boiling. It is said by some to be the most nourishing of the mucilaginous roots.

It is not so much used as it once was, because the soil suited for it will also grow the potatoe, which is the better food.

Turnip.—The constituents of the turnip are fibrous matter, a watery mucilage, a small quantity of essential oil, and a portion of sugar. The essential oil resides chiefly in the covering, and what exists in the inner pulpy part is in a great measure dissipated by boiling. The turnip swells a little in the stomach, and in the intestines it extricates a large quantity of fetid gas—a property peculiar to all the cruciform plants. On two occasions of dearth during the 17th century, boiled turnips, along with an equal quantity of wheat flour, was in Essex made into bread, which when cold could not be easily distinguished from wheaten bread.

Beet Root.—There are two species of this, the *Beta Vulgaris* and *Beta Cyclas*. The first which is the red beet root is the one in most common use. It contains a large quantity of sugar; fourteen pounds of it giving one of sugar. The mucilage is very much diluted, and the root is so flatulent that notwithstanding its being more nutritious than any of the other roots, excepting the potatoe, it cannot be much used as a food. The Greeks, according to Actuarius, used the leaves as well as the root.

All the others, such as the *skirret*, the *salsafi*, the *viper's grass*, &c. have the property of being flatulent. There is one root which, as cultivated in this country, must belong to the class of stimulating foods, but in warm climates it is mild and succulent, viz. the *onion*. The Israelites regretted the departure from Egypt on account of the loss of the onion; and the modern Egyptian fondly trusts that this root will be met with in the garden of Paradise, and be the food of houris and true believers.

III. SEEDS AND FRUITS.—The mucilaginous seeds may be said to be the young pea and bean, and the fruits, the cu-

cumber and melon. The *young pea* and *bean* contain a large quantity of mucilage and some sugar, and at this time properly belong to the mucilaginous foods. As they grow, these principles disappear and give place to farina. The *cucumber* and *melon* contain a large quantity of watery mucilage, and likewise a considerable proportion of sugar, the melon, having, however, so much more of the latter as to deserve a place in the saccharine foods. The melon contains likewise an aromatic principle which renders it much more agreeable to the stomach. The cucumber and melon are gently opening on the bowels, and in many occasion even diarrhœa. Cucumbers were looked upon by the Greeks "as giving crude humours to the body, as being cold and moist, and difficult to be digested."

GUM stands in the same relation to the mucilaginous foods as what we termed the "Vegetable Extracts" to the farinaceous foods. It is the principle which gives a character to this class of substances, in a state of purity—free from sugar, farina, colouring matter, woody fibre, and water. It is in small pieces from the size of a walnut to a pea, hard, white, and semitransparent. It is obtained either by natural exudation, or from incisions made in the tree. The tree furnishing it is a native of the tropics, and the inhabitant of an arid and dry soil. The *acacias* are sometimes seen in those parts of the desert where not a drop of water is present to nourish the more valuable date tree, stretching out their strong and vigorous arms so closely intermingled as to form under them not alone the shelter to the casual traveller, but a fixed place of abode to a family of natives. In many places some of the species grow in forests, but the *acacia vera* is generally a solitary tree.

The produce or the dried gum is the principal food of the Moors in the interior of Africa, of the natives along the banks of the Niger, and of some tribes of the Bedouins. It is not

easy of digestion, and it does not by any means furnish so much nourishment as when combined with some of the other principles.

MUCILAGINOUS FOOD AS A THERAPEUTIC AGENT.—There are two things to be observed with regard to the mucilaginous foods ; and these are, *first*, that they are relaxing to the system, and *second*, that they afford very little nourishment. It is evident, therefore, that they may be allowed in all inflammatory complaints, for foods which are relaxing and not nutritious are, at the same time, cooling. In the inflammation of mucous surfaces, where the cure depends upon a relaxation of the secreting vessels and increase of the discharge, the mucilaginous foods should be used freely. In catarrh, hæmoptysis, phthisis, dysentery, gonorrhœa, cystitis, &c. this food is actually medicinal. Gum Arabic and gum tragacanth are prescribed in these cases, and must be absorbed and carried to the inflamed mucous membranes. Berzelius says it becomes a substitute for the natural mucus, and must pass through the blood to arrive at the mucous membranes. (*Traité de Chimie*, tom. v. p. 226. *) In the inflammation of serous membranes, in phrenitis, pleuritis, &c. and in rheumatism and gout it may be allowed if the patient is desirous of it, or his stomach likely to digest it ; and in priapism, nymphomania, strangury, dysury, and such like, it has been long used with great benefit. It is, however, of fully more service as a prophylactic than as a remedy ; for by a steady use of it, the state of the constitution is changed, and the phlogistic diathesis which gives such a tendency

* This would show either that mucilage is the *quod nutrit*, or that a food may pass into the blood without undergoing any change or *denaturing* process in the stomach. Majendie found gum in the urine of a person using that substance, and it is impossible to see how it can be of service in cases of catarrh, cystitis, gonorrhœa, &c. otherwise than by its being absorbed. The use of *demulcents* for sweetening or improving the *acrid humours* may therefore be founded in truth.

to inflammatory diseases, and especially to mania, hæmoptysis, and that bane of Britain, phthisis, is removed. In fact this food and proper clothing are our sheet anchor in preventing phthisis, and in removing it when only in its first stage.

Where, however, the constitution is not dangerously phlogistic or sanguineous, but rather phlegmatic or even melancholic, this food is not proper ; and there cannot be a more mistaken notion than that which prevails with the common people, and even with many who believe themselves learned and scientific physicians, that the *olera* are suited for those who are of delicate health, or for the invalid whose stomach is weak. Even if the mucilaginous foods contained much nourishment, it might be a matter of question whether the nourishment they gave was sufficient to compensate for the labour to the weak stomach in separating it. But when we know that these foods are not only innutritious in comparison with others, but that they undergo very little alteration in the stomach, and are therefore more liable from having acquired the heat of the body to undergo those chemical changes in that organ which they would do out of it ; we must conclude that they are ill adapted for the chronic invalid or dyspeptic. There are many persons in sound health who cannot take greens, or cabbages, or turnips, without an attack of heartburn ; and yet these, or a soup prepared of them, will be recommended to these same persons in dishealth when the stomach is now ten times less fit to digest them. It is commonly said, “ oh, these vegetables are a very light food : they are a fine, soft, healing thing for the bowels.” If, by being a light food, it is meant that they give little nourishment, the expression is correct enough ; but they are not of light digestion, and they either pass through the bowels unaltered in cases where the stomach is affected either idiosyncratically or sympathetically, or they ferment and run into acid,

creating still greater disorder and disease of the chylopoietic viscera. The essential oil or the acrid and resinous matter, or extractive, which is contained in them, whilst it may be of service in quickening their digestion in the stomachs of the animals adapted for feeding on these vegetables, disagrees frequently with even the healthy human stomach, and therefore they cannot be too long boiled in order to be freed of these when to be used as a food. The "vegetables" require some care in their use in chronic disease. Even when they are given on account of the laxative effect which most of them have on the bowels, we must consider well the cause of the constipation. If it be from a dry state of the body, "*strictior corporis habitus*," as Stahl calls it, then we may use them freely if they agree with the stomach: but if it is the dyspeptic we are treating, if the constipation arise from disease or derangement of the chylopoietic viscera, then we must weigh the circumstance, whether this food whilst it acts as an aperient, may not be deceiving us and increasing the weakness and disease in the organs. It is almost needless to mention that in all diseases requiring tone and strength, and in the convalescence from all acute disease, we do not seek nor expect aid from this class of foods.

SACCHARINE FOODS.

Sugar is a principle which is found extensively through nature. It can be obtained both from the vegetable and the animal kingdoms. In some vegetables it is found in small quantity, and combined with other nutrient principles which altogether overpower its characteristic effects on the system; in others it is found almost pure, and in that case it exhibits most distinct effects on the human body when used as a food. It is very nutrient, and is the easiest of digestion of any food we possess. It is speedily converted into chyle,

and the excrements after its use are much less than after any other food, thus shewing that the greater part of it is nutrient. It makes the pulse fuller and rather stronger, but does not quicken it. The muscles are enlarged, the cellular membrane is filled out, and the body assumes that state which the French call *embonpoint*, a constitution something more soft and elastic than that which results from the use of the farinaceous foods. During the sugar season, the slaves and the domestic animals of the West Indies become fat and lusty ; and persons training for the course are sometimes fed with much sugared foods in order to acquire weight. The tonic power of the muscles is increased as well as their bulk, but their contractility is diminished, so that the motions are less agile and quick. Richerand, I think, mentions a case of a lady who consulted him for obesity, and it was ascertained by him that her unnatural fatness arose from her consuming a very large quantity of sugar daily.

Much, however, will depend upon the food with which the sugar is given. Combined with any other food it facilitates digestion, and we know that sugared water is one of the best articles that we can exhibit for quickening the digestion of substances contained in the stomach, but combined with farina it is much more strengthening than combined with mucilage. Yet as the last requires more the assistance of the sugar, we find the combination of mucilage and sugar much more common than that of farina and sugar, and in that case the mucilaginous food, though still more difficult than farina of digestion, is more easy of digestion, and more nutritious, than when alone. But, though sugar is a nutritious food, and though it is easy of digestion, yet when continued for a length of time, and taken to a great extent, without mixture with other foods, it appears to injure the stomach, and begets disease in it, and ultimately emaciation. The saccharine foods are ; 1st. Those in which the sugar exists

almost without any other principle : and 2d, Those in which it is combined with a quantity of mucilage, or, as they may be termed, the saccharo-mucilaginous foods.

SUGAR.—Sugar is met with in commerce either in its pure and refined state, or in its raw or unrefined state. In the latter case it contains a quantity of mucilage, and, from this circumstance, the coarse sugar is more filling to the body than the refined. Sugar that has been acted upon by fire is more tonic than refined or common sugar, but at the same time more heating. Sugar is almost never used alone as a food.

HONEY.—Honey was a great favourite with the ancient physicians, and was the only substance approaching the nature of a pure sweet until the introduction of sugar. They used it extensively, both as an article of food and as a medicine. As a food they considered it well adapted to old men ; but to the middle aged, and those of a hot or sanguine temperament, it was believed to be injurious, because in them it occasioned flatulence, and was converted into bile. Into bile it could not be changed, but they believed this on account of the disturbance it excited in many cases in the bowels, and its bringing off bilious stools. In many persons honey appears to undergo a fermentation in the stomach ; and to the sick and delicate it ought never to be allowed, because it remains a long time in the stomach, and is seldom properly digested, but ferments and extricates gas. The famous drink, called mulse, was composed of one part of honey boiled with eight of water. It must have been much inferior as a sick chamber drink to the sugar and water, or the sweet julep of modern times.

Saccharo-Mucilaginous Substances.—The saccharo-mucilaginous articles used as food are the dried fruits—the acid contained in them in their ripe state, giving place to more sugar as they are kept.

FIGS.—Figs contain, when dried, a large quantity of sugar

and mucilage. They were considered by the Greeks as the best of the fruits. They produce a better blood, and nourish the body more than any of the other fruits; but some, says Actuarius, are of opinion that they are flatulent, and that the flesh which is formed during their use is more flaccid than from any other food. Ætius says they furnish an aliment to the body which does not make it solid, but, on the other hand, lax. There was an opinion, with regard to this food, common amongst all the old writers, and that was, that it produced "*pediculorum copia*." The decoction of figs thickened with meal was a common dish. Figs in the dried state in which they are generally used with us are not easy of digestion, and should be eaten sparingly. They do not appear to have stood high in the estimation of the inhabitants of this country, if we may judge from an expression used in the way of contemptuous defiance. "I do'n't care a *fig* for you." "A *figo* for your friendship," says Ancient Pistol. Yet, in the warmer climes, the fig tree, with its three crops annually, was the emblem of peace and plenty. "Every man under his own fig tree," was the type of the possession of security and abundance.

RAISINS AND PRUNES.—Raisins and prunes are similar in their composition to the foregoing. They are, like them, difficult of digestion when eaten raw, but when stewed, the fleshy part of the prune being rather more acid than that of the raisin, and more easily deprived of its stone, is preferred, and is a very useful food to the sick. The skins of the raisin are very indigestible, and generally pass through the bowels unaltered.

DATES.—The fruit of the *Phœnix Dactylifera* contains a quantity of sugar, with a still larger quantity of thick mucilage. Dates afford a very agreeable and nourishing food, and in one arid and thirsty land the date palm is looked upon as the peculiar gift of the Almighty, and forms so exclu-

sively the only tree of the country, and to such an extent the food of the inhabitants, that it is called the "Land of Dates." It follows the windings of the great desert which stretches for many thousand miles from the Atlantic to Persia, and wherever a spot containing a little moisture can be found in the sterile wilderness, the date palm rears its beautiful form. To the native of Barbary, of Syria, and to part of those of Egypt and Arabia, it is almost the only food. There is, perhaps, no plant of such extensive utility. The fruit (a drupe) is cylindrical, often conical, covered with a thin membrane, which encloses a pulpy matter, having a very hard seed in its centre. The taste is of a honey-like sweetness. The dates are used in the ripe state; but they do not keep, speedily undergoing fermentation. They are often pulled before they are completely ripe, and dried in the sun. Date bread is the dried date strongly compressed. By long exposure to the sun a farina or mealy paste, called *adjoue*, is obtained from the date, and, by strong pressure, the ripe date furnishes a most delicious syrup. The dates, along with water, ferment into a most agreeable alcoholic liquor; and the nut or kernel, as also the stalks, are boiled, bruised, and then given to the cattle. The juice or sap of the tree becomes also vinous, and is used as an inebriating drink, under the name of *lakaby*. It speedily undergoes the acetous fermentation, forming a very strong vinegar. The terminating leafy bud is considered a very great luxury, especially by the natives of Tripoli, but, like the cabbage of the cabbage palm, it is obtained only at the expense of the tree. The fibrous parts of the date tree are used for making ropes, baskets, and other domestic utensils. In countries to which the date tree belongs, it is carefully cultivated. It is dioecious, and therefore the male and female must be planted near to each other. The cultivator, however, does not trust to nature. He ensures a crop by taking the branches of the male, and,

climbing to the top of the female tree, he shakes the pollen upon the female flowers. One tree will furnish from 100 lbs. to 200 lbs. of dates, and one branch will often give from 20 to 30 lbs.

BANANA AND PLANTAIN.—These plants differ but slightly. They grow equally well within the torrid zone or near to it, in Asia, Africa, America, and the islands of the Pacific, and they furnish food to a large portion of mankind. The fruit is soft, yellowish, full of a sweet juice, and contains a little of an agreeable acid. It is either used ripe, or after being dried in the sun. By cutting it in slices, drying it well, and then beating it, a meal is obtained which keeps well and may be made into bread. A spirit is likewise obtained by fermentation. It has been called the king of the herbaceous vegetables, and furnishes more food on a given space of ground than any other vegetable. A spot of a thousand square feet, containing 40 plants, will give more than 4,000 lbs. of this nutritive substance. "M. Humboldt calculates that as 33 lbs. of wheat, and 99 lbs. of potatoes, require the same space as that in which 4,000 lbs. of bananas are grown, the produce of bananas to that of wheat is consequently as 133 to 1, and to that of potatoes as 44 to 1." It contains not nearly so much nutritive matter, weight for weight, as wheat, but a greater number will be maintained on the space of ground planted with bananas than with wheat. It is light, easy of digestion, and much relished by the negroes.

SACCHARINE FOOD AS A THERAPEUTIC AGENT.—The extreme facility with which sugar is assimilated by the digestive organs, and the great nutrition which it possesses, render it as an article of food of the very first importance. It is of the greatest moment, in many cases of disease, to have a food which will support the system without either stimulating or relaxing it, and this is the case with sugar. It is not, however, so much during the time that disease is actually

present, that we find the value of sugared food, as during the subsequent debility. The ease with which the weak stomach acts upon sugar, and the large addition of nutriment it gives to the system, make it particularly well suited for every case of debility. The young and the aged are fond of sugar, and in both of these nature seems to direct them to that food which is most easily digested by the stomach, and most filling to their bodies. As sugar is often disagreeable when taken alone, it should be liberally mixed with other articles. Plenty of sugar should be given along with the vegetable extracts, with bread, with rice, with milk, and such like, when these are used as food in the sick chamber. Indeed much more sugar would be consumed, and most advantageously too for the health of the public, were the price of it lower; and the wisest measure the government could follow, both for the increase of the revenue and the comforts of the people, would be to reduce the duty on this article. A family would use two pounds of sugar in that case where it now uses only one. I cannot but think that Sir Henry Parnell has greatly erred in placing sugar as a *luxury* from which a large revenue may be raised. There is a great facility, I grant, in collecting the revenue on this foreign importation; and I am of opinion that this circumstance has been the means of deceiving his usual sagacity, with respect to the effect of a reduction of duty on consumption, as well as the importance of sugar as a necessary of life. It is not now, even amongst the humblest, held in the light of a *luxury*. It is the next necessary, as a food, to corn and beef, and, as a condiment, to salt.

ACIDULOUS FOODS.

Under the acidulous foods are placed the different autumnal fruits. These contain, besides acid, mucilage and

sugar ; but the acid, especially in their ripe state, prevents, in a great degree, the peculiar influence of the mucilage, or saccharo-mucilage ; and the acid fruits have been from the very earliest times, and still are, placed as a distinct class of foods. Taken in small quantities they are easily digested—the acid acting as a stimulant to the healthy stomach, and quickening the digestion. In this way they are not less a luxury to the palate, than a necessary stimulus to the stomach, too often previously loaded with more solid viands, when taken as a dessert. They convey very little nourishment to the body, being in fact the least nutritious food of any. The pulse becomes slower and weaker, the respirations less frequent, and the skin colder. This influence of the acid fruits, in diminishing the animal temperature, has been a matter of observation since the infancy of medicine, and numerous theories have been coined in order to account for the refrigerating properties possessed by the vegetable acids. *Ætius* explains the matter in this way ; he says that thirst arises from two causes, one the diminished quantity of moisture in the system, and the other the increase of heat in it. Now the vegetable acids do not remove the thirst which arises from the absence of moisture, for water only can do this ; but they remove the thirst which arises from too great heat. If this opinion is according to fact, the modern chemist would easily give the rationale of this action, by saying that the acid has a great capacity for caloric. The physiologist who is not a chemist, will seek for a theory for refrigerants in some particular action of the acid on the fluids or the solids. Perhaps the acid fruits are cooling merely on account of their affording little or no nourishment to the system ; for on the food in some measure depends the animal temperature. The secretion from the kidneys is increased if the patient be kept cool, and that by the skin is increased if he be kept warm. With regard to the effect of the acid

fruits upon the bowels, a considerable difference of opinion exists, one party holding out that they are laxative, and another that they are astringent. Oribasius, quoting from some of the physicians, says, "acids break down the thick humour which they find in the intestines and carry it downwards, moistening the dejections; but when they find the stomach clean they rather astringe it." Actuarius has likewise thus stated these properties of the acids; "They act upon the bowels of those who are naturally bilious, but in those who are not so, they possess the property of restraining the alvine evacuations." (Lib. iii. cap. xviii.) The fact appears to be, that if the canal is loaded, the acid acts as a stimulus to the torpid intestines, and increases their peristaltic motion, but acids are decidedly not purgative, and indeed they are used in cases of diarrhœa depending upon laxity of the intestinal fibre, to give tone to it, and stop the discharge. If too strong, or taken in too large a quantity, they often create severe spasm of the intestines. When a quantity of mucilage and sugar is present, and when these substances form more acid by fermentation in the stomach, then in a majority of persons the very ripe and sweet fruits purge, like must, or new cyder, or any other fermenting liquor. If fruits so abundant and tempting at one season were injurious, "it would seem," to use the words of Van Swieten, "as if God, the bountiful giver of all things, had laid snares for mankind, if fruits so pleasant were the cause of disease." It may be that the inhabitant of the colder regions of the north in part dines on a few berries plucked from the sides of his cold mountains, but there is no nation that exclusively makes use of the acidulated fruits as food. The fruits grown under the warmer sun of the temperate regions contain in them more sugar than acid, whilst those again which come to maturity under the burning heat of the tropics contain not only sugar and mucilage in abundance, but frequently also fa-

rina. These tropical fruits, therefore, we have placed in one or other of the former classes. But though perhaps niggard nature was not unwise nor improvident in this distribution of her treasures, the eater of flesh and animal oil in the cold north corrects, by means of his native berries, the putrescency of his high and stimulating natural food ; and he, at the same time, obtains a most delicious and fragrant variety to his palate in the few fruits that belong to his country, whilst the more lazy and idle inhabitant of lands rich by a warm sun and a fertile soil, is both nourished and cooled by the farinaceous or saccharine and watery offerings of nature. So little are the acidulated foods the general subsistence of any one people or nation, that we cannot ascertain the temperament induced by them.

Arranged according to their nutritive powers, they are *apples, pears, prunes, apricots, grapes, cherries, peaches, oranges, lemons, and gooseberries*. They are cooling and refreshing again in the reverse order. There are numerous other fruits which may be included in this list, especially in this country the strawberry and raspberry. The stone fruits have been generally considered as the least easy of digestion, but this is owing to their being frequently eaten when not fully ripe. They are likewise said to be more liable to undergo fermentation in the stomach than any of the others.

PEARS and APPLES contain malic acid, mucilage, and sugar. Of them there are numberless varieties, some being firm and others soft, some sweet and others sour, some with a fine perfume and flavour, and others almost without any. Pears do not keep so long as apples ; the latter gradually lose water and weight, and become shrivelled and dry, but more sweet. Boiling increases their sweetness, as well as age, but, whether boiled or unboiled, apples still give an agreeable coolness. Pears are much more juicy, but not being so acid are not considered so cooling. PRUNES and

APRICOTS.—Some of the plums, in their fresh state, contain a large quantity of acid, and others are very sweet. The apricot contains more mucilage than the prune, its pulp is soft and its juice very sweet. **GRAPES** contain citric acid, tartaric acid, malic acid, a large quantity of sugar, a small quantity of mucilage, vegetable albumen and gluten, combined with a large quantity of water. They are said by many to be the most nutritious of the acidulated fruits.—**CHERRIES** contain the same principles nearly as the apple, but more water and sugar, and less acid. Some of them contain a colouring matter dissolved in their juice. From the firmness of their skin they are considered as not very easy of digestion. **PEACHES** contain, besides acid, mucilage and sugar, a small quantity of essential oil. They are said to be as agreeable a fruit as any, and the easiest digested of the stone fruits. **ORANGES** and **LEMONS** contain a large quantity of much diluted citric acid, sugar, and a very little mucilage. The orange has a considerable quantity of sugar, the lemon and the lime almost none. **GOOSEBERRIES**, **STRAWBERRIES**, &c. contain nearly an equal quantity of malic and citric acids, with sugar and mucilage. The small and wild berries, as the cranberry, whortleberry, &c. contain similar principles, varying merely in the quantity of the acid and sugar, with an essential oil on which the flavour depends. The *sorrel* which, though not a fruit, is placed among the acidulous foods, contains oxalic and tartaric acid, united with potass, mucilage, and woody fibre.

ACIDULOUS FOOD AS A THERAPEUTIC AGENT.—"With respect to the quality of the food," says Dr. Gregory in his *Conspectus Medicinæ*, "to be given in acute diseases, nature herself advises us that we must seek it in fruits and herbs, and not in flesh. Rarely, indeed, do we see fever patients looking without disgust, much less with desire, upon flesh, or food prepared from it however delicately; whilst again

we find them eagerly devouring fruits, or herbs, or common bread." A free and almost indiscriminate use of the fruits has always been allowed in acute diseases ; and in nothing, we are told, do we so far minister to nature as in this. Were there nothing else belonging to this class of foods than that they afford little or no nourishment, and give very little labour to the stomach, they would be important as a therapeutic agent in many diseases ; but when we add to this that, by their use, the heat of the body is reduced, and that they are almost always agreeable to the palate of the patient, they become deserving of attention from their suitability for a class of diseases not the least numerous, and by far the most dangerous—the *Pyrexiae*. In all fevers, whether putrid or not, and in all inflammations, with the exception of those of the abdominal canal, they are not only safe but medicinal. They alleviate the thirst, they moderate the heat, and they lower the inordinate action of the heart. In hæmorrhagies, especially hæmoptysis, the cooling or temperating property of the fruits, and their little nourishment, render them eminently adapted for lessening the activity of the circulation. Sydenham allowed no food to his patients in the febrile stage of small pox, in erysipelas, and in quinsy, but boiled apples.

The more juicy or watery fruits, however, should only be used during the acute stage of disease. The preserved soft fruits are not relished so well as the ripe fruit by the patient ; but they are of service at those seasons of the year when the fresh fruits cannot be obtained. The sugar in which they are preserved may, in some cases, forbid their use, but this may be in part corrected by diluting them well with water. The more solid fruits should only be taken by the convalescent, or one whose stomach is able to digest them ; and even then it is better to have the denser parts, as the rind, removed, and the fleshy part softened by roasting, stewing, or boiling. With the fruit plenty of sugar should be allowed, as more

filling to the convalescent, and bread as strengthening to him ; but pastry would be too indigestible. We must attend to the action of the fruit upon the bowels, and if it ferment and prove loosening it must be given up. In some chronic cases, however, this action upon the bowels is of service, and the use of an acidulous food has been made the means of keeping the bowels open without much trouble, and with great relief to the ailments. In chronic diseases, attended with great emaciation, and feebleness in the functions of the different organs, this food is injurious. In putrescency arising from the continued use of animal food, or in scurvy, it is a certain cure.

OLEAGINOUS FOODS.

Oil or fat is at once the best and the worst food. It is very filling or fattening, but at the same time it is not strengthening, and it is the most indigestible of all. Some are of opinion that it is less nourishing than sugar, but this is not the case. The preference, however, is certainly due to sugar, on account of its greater digestibility. While only one man out of a dozen will get fat on oily meats, ten will get lusty on sugar—the stomachs of almost all digesting the latter, whilst very few stomachs can digest fat. The fatness or corpulency induced by the use of the oily foods is a fallacious test of its value, for the oil is deposited in the cellular membrane only, and to every other part it is injurious—weakening them in texture and in function. To the stomach oleaginous food is, for the most part, injurious. It weakens or dilutes the gastric juice, and relaxes the coats of the viscus itself, so that in all cases the digestion of this food is much more tedious than any other. Fat, when taken in large quantities, is either rejected with vomiting, or it lies in the stomach, inducing headache, nausea, and sickness. Oil

again either passes through the pylorus almost unchanged, and then in part runs off by the bowels, and in part is absorbed ; or it remains upon the stomach, and becoming rancid, causes fetid eructations and sickness. The solid oils, or fats, are more easily digested than oil, but they oftener derange the stomach by remaining a long time in it : Oils are less easily digested, but they induce fewer bad consequences, for they speedily pass through the intestinal canal. Oil is much more easy of digestion when triturated with any solid, and well mixed with the saliva previously to being swallowed. It is thus broken down, and the coats of the stomach can more effectually act upon it.

During the use of the oleaginous foods, the pulse becomes slower, softer, and weaker ; the respirations are slower, the skin is pale and cold, and the whole of the secretions are diminished. The secretion by the skin contains a quantity of oil, as indicated by an oily rancid odour, and by the linen being tinged. The bulk of the body is increased. The muscular fibres receive no enlargement, but the cellular tissue which binds them together swells out from the fat deposited in it, and hence there is an appearance of increase in the muscle itself. There is no addition to the muscular fibre ; on the contrary, it is weakened and relaxed, and its sensibility and contractility diminished. Even when combined with other foods, unless a great preponderance be given to them, this is the effect. Barbier tells us, that in the religious houses where much butter and oil are used, hernias complete or incomplete are common. Such a cause for hernia will not, however, be received in Britain without some doubts.* Nor will we, in this country, receive with more

* Sensible French writers very properly reject this opinion. “ Les hernies ou descentes sont-elles plus communes en Provence qu’ ailleurs, parce qu’ on consomme plus d’ huile, et l’ usage de cette substance peut elle y donner lieu. *Erreur sans fondement.* Si les moins en offroient autrefois beau-

satisfaction the opinion of Zimmerman, that many of those who used this species of food were subject *a pisser au lit* during their sleep, from the great relaxation which it produces. If monks are subject to this juvenile fault, the enemies of Mother Church would say that it is more owing to too much of the rosy juice of the grape than to butter and oil, much as monks are famed for eating the fat of the land in idleness.

Yet, notwithstanding these bad effects of the oily foods on the system, an opinion was, and still by some is, held, that fat meats are the best. Mr. Hewson, in his "Experimental Enquiry," page 151, says, "nature makes use of the form of oil in preference to any other for the nutritious substance of the body, from its being the least liable to putrefaction, and from its containing the greatest quantity of nourishment in the least bulk. This circumstance (he continues) was clearly proved by my valuable friend the late Dr. Stark, who, in a course of experiments, made by weighing himself after living for some time on different kinds of food, discovered that a less quantity of suet was sufficient to make up for the waste of his body, than of any other sort of ordinary food; and that, when compared with the lean part of meat, its nutritive power was at least as three to one." The fact as to the increase of weight was no doubt correct: the deduction from it wrong. The Dr. was heavier, not solely because the suet nourished his body more than any other substance, but because the use of this food diminished the secretions from his body more than any other. Had he made the same trial with a saccharo-mucilaginous diet, he would have found himself heavier perhaps than with one of

coup d' examples, cela tenoit a leurs habitudes." *Des Erreurs Populaires relatives a la Medicine*, par A. Richerand, p. 155. He attributes the prevalence of hernia amongst Churchmen to their being *much on their knees* during the year, and the bowels, during genuflexion, pressing entirely on the lower and fore part of the abdominal parietes.

lean meat. But weight is not strength, and the Dr. would have been a better, if not a bonnier man, by feeding on the lean flesh. The oily foods have the same relaxing effects on the brain and its functions, as on the other parts of the body. *Fat* is a French noun for a fool, and it may be questioned whether we borrowed the word from them, or they took it from us, where they find amongst our gloriously obese citizens so many prominent examples of the meaning of the term.

In the oleaginous foods we have the different vegetable oils; and as the animal oils or fats, and butter, are exactly the same in their action they may be placed together. Next to these we have several substances in which so large a quantity of oil is present, as to induce us to place them in this class. They are the almond, the filbert, the walnut, the cacao, the cocoa nut, the cashew nut, the poppy seed, and the olive. In these the oil is mixed with other nutritious substances—in the nuts for the most part with farina, which makes them much better adapted for food.

VEGETABLE OILS.—The only vegetable oils which are used internally as food, are the oil of olives, the oil of almonds, and the oil of the poppy seed. The oil of the olive is the most extensively used. That which is obtained without the aid of heat, which is of a slightly green colour, and which freezes with the least cold, is the best. It is easier digested, weighs less on the stomach, and mixes better with other aliments than any of the other oils. The oil obtained by means of heat is much less pure, is much more disposed to rancidity, and should never be used as food. The oil obtained from the almond is the sweetest and the most agreeable to the palate of any of the oils. The oil from the bitter almond is equally good with that from the sweet. The almond is only used medicinally in its pure state. The oil of the poppy seed is very inferior to both the former.

ANIMAL OILS.—Of all the solid animal oils the one which we use to the greatest extent, and which, with the exception of oil of olives, digests much better than any oil or fat from the vegetable or animal kingdom, is butter. It gets sooner rancid than the olive oil, and the sooner the more whey it contains. By melting the butter the whey is driven off, and it keeps for a much longer time; but in consequence of this operation it has become acrid from another cause, viz. by the formation of sebatic acid.

Of the next class of oleaginous foods, several were known to the old writers under the name of *nuces* or *juglandæ*. They did not hold them in much estimation, placing them at the bottom of the list, and say of them *exiguum alimentum dant*.

ALMONDS, FILBERTS, WALNUTS, &c.—These contain a large quantity of oil and fecula. They are not of easy digestion, but they are a better food than the oil alone. The meal of the almond was used in the form of a *sorbitiuncula*, but though the best of the nuts, and this form the best in which to use it, still it is not “*stomacho accomodata*.”

CACAO, CHOCOLATE and COCOA, &c.—Cacao is the seed of the *Theobroma Cacao*. It contains a large quantity of buttery oil in its fecula. It has likewise a brown colouring matter, and a slightly bitter and aromatic principle. It is heavy and indigestible. By the addition of sugar it is rendered much lighter and easier of digestion. When rubbed down with sugar, and some spices, it forms chocolate. By the presence of the spices the digestion of the cacao is still farther assisted, but the food has, by this addition, become stimulating. *Cocoa* is prepared from the same seed as the chocolate. It is less oily, and, upon the whole, better adapted for general use than the chocolate. The *cocoa nut*, (*cocos nucifera*,) and the *cashew nut* (*anacardum occidentale*,) are

both the inhabitants of a warm climate, and contain oil mixed with fecula.

The *seeds* of the *poppy*, and of the *cucurbitaceæ*, contain oil mixed with fecula; the first have no narcotic principle, nor the second any thing acrid in them. Both have been, and are, used as a food by the natives in those places where they grow abundantly.

OLIVE.—The fruit of the *Olea Europæa*, whether in their unripe or ripe state, have a detestable acidity, and it is only by repeated soakings in water that they are so far deprived of it, as to become (by the aid of a bitter likewise in them, and which still remains) any ways agreeable. They are not easy of digestion when taken in large quantities.

OLEAGINOUS FOOD AS A THERAPEUTIC AGENT.—As oil contains a large quantity of nutrition, this would seem to indicate that it was a good food for convalescent or cachectic patients: but such is not the case. No food can be worse for them. The stomach which in its healthy state digests the oleaginous foods with great difficulty, is too much deranged, even in the slightest disease, to have any action upon them. There cannot be a worse practice than the exhibition of soups with fat swimming upon them to the sick or the convalescent. The oil is not digested, and remaining upon the stomach produces severe disorder of the system, or passing off by the bowels brings on a purging. There is no case of disease for which an equally good and a safer food may not be found. There is one state of the system, a state marked by an extreme tonicity and rigidity of the muscular fibre, by a sharpness and hardness of the pulse, a dryness of the skin, and a certain irritability both of body and mind, what in short the French correctly designate "*une complexion sèche*"—a constitution liable to nervous diseases, in which this food, provided always it does not derange the

stomach, may be used, but should it disagree with that organ we must then have recourse to mucilage or sugar. In cachectic cases, especially in the different diseases depending upon a scrofulous taint of the system, the oleaginous foods ought to be prohibited. In dropsy it is very improper. The missionaries at the islands in the South Sea, ascribe the prevalence of dropsy amongst the inhabitants to the great use of the cocoa nut oil.

STIMULATING VEGETABLE FOODS.

To this class belong a number of substances which contain a bitter, or an acrid principle, or a volatile oil. They contain, at the same time, more or less of some of the nutrient principles already treated of, but the quantity of the stimulant present is sufficient to give them a peculiar action on the body. Still they are not used as a distinct food; they are more a condiment to other foods, and to assist the digestion. It is needless to treat farther of them, for as a food they are not and should not be taken alone, and the physician must decide in his own mind whether a food which has become stimulating and exciting by the addition of condiments and spices is proper for his patient, or whether the excitement they raise in the whole system may not counterbalance their advantage in promoting the digestion of substances in the stomach. They are horse radish, parsley, mustard, the fermented cabbage or *sauer kraut* of the Germans, all pickles, spices, &c.

COOKING OF VEGETABLE FOODS.

The cooking of the food will make a great difference in its digestibility, and consequently in its effects on the body. The principal object in cooking is to lessen the cohesion of

the substances, so that the stomach may act more effectually upon them. Occasionally a part of the substance which would be noxious to the body is removed by this preliminary process. The cooking of the *farinaceous foods* is either baking into bread, or cake, or simple boiling. These foods, as has been mentioned, swell when taken unboiled into the stomach. By decoction they become soft and gelatinous, and this takes place much sooner with the flour or meal than with the seed, from the greater division in the particles. Raspail affirms that fecula is not nutritive to man until it has been boiled, the stomach not being able to burst all the grains, and that though the graminivorous quadrupeds and birds possess organs fitted for this purpose, yet that from experiment they are found to fatten better when the grains of fecula have been softened by boiling. The *mucilaginous foods* are softened by boiling or stewing in soft water. They are, by this means, rendered much more easy of digestion; and the acrid matter or the volatile oil is dissipated in a great measure by boiling, which to some stomachs is an advantage, to others not. *Sugar* requires no cooking: the *saccharo-mucilaginous foods* should be boiled or stewed when to be eaten in any quantity. *Acidulous foods*, when solid, should be boiled, stewed, or roasted: the watery acidulated foods may be taken uncooked. The *oleaginous foods* should be well divided and mixed with other substances. The nuts taken without being well comminuted are very indigestible.

LECTURE TENTH.

MILK OR CASEOUS FOODS.

MILK has generally been placed as of a nature between the foods of the vegetable kingdom and the animal, having the nourishing qualities of the latter, with the mild and soothing properties of the former. The analysis of animal milk, and of almond emulsion or vegetable milk, gives nearly the same results. It contains a large quantity of nutrient matter, and its digestion is easy. Both these qualities might be foretold of it, when we find nature herself making use of this food, in preference to every other, as the support of the young. The pulse, during the use of milk, becomes slow and full. The amount of the secretions and excretions is diminished, and the body becomes plethoric. The permanent effect of milk on the system is that of relaxation. The tone and contractility of the muscular fibre are diminished, and there is always a degree of languor and disinclination for exercise after the use of this food. "Fresh and pure milk," says Cabanis, a French physician, "acts upon the whole system as a sedative, it moderates the circulation of the fluids, it carries into the organs of thought a particular calm, and it disposes the moving powers to repose. By its influence the ideas become more clear, but have little activity, the desires are peaceable, but they fail of energy; and although this

food affords upon the whole a sufficient strength, indolence prevails over all things; we think little, we desire little, we do little." This is to be understood of milk used alone. The case is different when the farinaceous food and sugar are taken along with it. It is then a strengthening, as well as a very nutritious and filling food. Milk, however, does disagree with some persons; it is digested with difficulty, and often brings on purging and tormina of the bowels, and in many, especially in children, vomiting. When either of these occur, it will generally be found that the milk has too much oil in it or is too rich; or that it has been taken in too large a quantity; or that there has been acidity or too much bile in the stomach or intestines. Indeed milk never agrees well with those who are of a bilious constitution, and it was the opinion of the ancient physicians that the butter of the milk was converted into bile. Nor does it agree with those who are subject to acidity; but we will find in this case that the addition of some absorbent earth will prevent the purging and vomiting. The general effect of milk on the bowels is rather that of an astringent than a purgative, but milk contains no astringent principle. It merely induces atony and relaxation of the intestines, so that the *fœces* accumulate from the want of a sufficient peristaltic motion in the guts to send them downwards. It likewise appears to mix with, or dilute the bile, and diminish the action of that secretion on the peristaltic motion of the intestines. Frequently, however, one kind of milk will agree with the stomach and bowels, when another will not.

Milk is different in composition according to the animal from which it has been taken; and it varies, likewise, according to the food on which the animal has been fed. The more vigorous and hardy the herbage is, the richer is the milk. Animals which feed in a low marshy place, have their milk lighter and more serous than those that are fed on the

hilly grounds. Animal food injures the secretion of the milk. Nurses who live much, or entirely, on vegetables give a much better and more abundant milk than those who use an animal diet. "According to the season of the year," says *Ætius*, "the milk varies. In the spring it is the most liquid and thinnest, as the season advances it thickens, so that in the middle of summer it is thickest and driest; but autumn milk is the most easily digested, and of the most agreeable odour." The milk of the full grown animal is much better than that of the young or the old. The milk is thicker and richer a few hours after a repast than immediately after it. *Deyeux* and *Parmentier* found that the milk taken in successive quantities from the animal was not the same: for instance, milking a cow into four successive vessels, they found that the milk first taken was the most serous, that the second was more consistent, the third still more so, and that the fourth was almost entirely cream. Milk is composed of water, sugar, animal oil, and albumen or caseous matter. The proportions of the solid and watery parts in cow's milk, are,

Butter,	-	-	4 . 5
Cheesy matter,	-	-	3 . 5
Whey,	-	-	92

100

this quantity of whey containing 4.4 sugar of milk and various salts.* The whey of the milk contains the sugar, the

* The analysis of milk deprived of cream, by *Berzelius*, is

Water,	-	-	-	-	-	-	-	-	-	928.75
Cheesy matter,	-	-	-	-	-	-	-	-	-	28.
Sugar,	-	-	-	-	-	-	-	-	-	35.
Hydrochlorate of potass,	-	-	-	-	-	-	-	-	-	1.70
Phosphate of potass,	-	-	-	-	-	-	-	-	-	0.25
Lactic acid, acetate of potass with trace of lactate of iron,	-	-	-	-	-	-	-	-	-	6.
Earthy phosphate,	-	-	-	-	-	-	-	-	-	0.30
										1,000

caseous matter retains the greater part of the oil. The cream rises to the surface when the milk is kept at a temperature of about 50° in from twelve to twenty-four hours.* Cream is not so heavy to the stomach as butter, and when taken in tea or coffee it is an excellent corrective to the stimulating principle contained in these.

The caseous part of the milk is composed of albumen. Milk does not entirely coagulate by heat on account of the large quantity of water contained in it, but when boiled, a pellicle forms on the top, and this when removed, is succeeded by another, and so on, until the whole of the albumen has been removed. It is coagulated and separated from the water by different substances, as for instance, acids, astringents, alcohol, gelatine, &c. They are believed to produce this change by having a greater attraction for the water than for the solid part. The gastric juice is the best coagulating substance, acting on a much larger quantity of milk than any of the former. The curd, however, likewise separates from the watery part of the milk spontaneously by keeping, particularly in warm weather, or at a temperature above 50° . This curd is acid, and is free from the butyraceous part, which remains on the surface. It is light and trembling like a jelly, and when freed of the serum, and dried, it forms a white acid cheese, which is very refreshing, but not very nourishing. This acidulated curd is much more easily digested,

* Dr. Willich, in his *Work on Diet*, p. 338, has this note upon butter. "I am inclined to think it would be beneficial to society if the making of butter were strictly prohibited, as well as the importation of salt butter into every civilized country, where the hurtful properties of it are sufficiently understood. *Melted fat* or the *drippings* of baked or roasted meat are equally, if not more, pernicious to the stomach than even stale butter, and both ought to be used only for greasing cart wheels, and not for injuring human organs." If the hurtful properties of butter are so great, it is astonishing that it still continues to be made and purchased at a high price! Dr. Willich, however, prescribed most likely amongst dyspeptics, and no doubt knew very well with what to *butter his bread*.

provided it is not too hard, than that formed by some chemical agent. Cheese made of the curd, separated by a coagulating substance, is sweet and nutritious, in proportion to the oil contained in it. It is seldom, however, that the curd, either sweet or sour, can be allowed to an invalid. The milks used as food are the milk of the woman, of the ass, of the cow, of the goat, the rein deer, the camel, &c.

Human Milk.—The woman's milk is less rich in nutrient matter than that of any of the others, but it is more easily digested. It contains more sugar, but less cream and cheesy matter than the other milks. When therefore a child is to be reared with the spoon, the milk of the cow should not be used unless much diluted with water, or boiled and skimmed, and sweetened with sugar.

Asses' Milk.—The milk of the she ass is rather richer in cream and cheesy matter than that of women, but it is still less so than that of the cow or goat. It contains more sugar than these two, and in facility of digestion it is next to the woman's milk. It is particularly well adapted to the patient whose digestive organs are very weak. The ancients considered the milk of the ass to be laxative, as also that of the mare.

Cow's Milk.—The milk of the cow is still stronger, containing much more butyraceous and cheesy matter, but less sugar. It is only adapted in its pure and undiluted state to an active and even powerful stomach.

Goat's Milk.—The milk of the goat is the richest and strongest of all. This is entirely owing to the herbage on which it feeds. It contains much less sugar than any of the preceding, and the butter obtained from its cream is less consistent than that from the cow, but the milk seems to possess some aromatic principle, and many stomachs will, apparently from the presence of this stimulus, digest it when they cannot digest cow's milk.

The milk of the *rein deer* is said to be a very exquisite beverage, very rich, and with a fine aroma. In colour and consistence it is said to resemble the cream of cow's milk. The milk of the *camel* is said to be very nourishing.

The *whey* or the watery part is likewise used as food, and is easily digested. When separated by rennet, it contains some butter and curd. It always contains almost the whole of the sugar of the milk, and from it the crystals of sugar of milk are obtained. From the quantity of sugar in it, it is more liable to ferment than the milk in weak stomachs. Some nations prepare an intoxicating liquor from it.* The *sour milk*, which remains after the separation of butter, is not nourishing; but being acidulated, it is cooling and refreshing, and may be allowed freely in acute diseases.

COOKING OF MILK.—Milk is used in different ways. Where it agrees with the stomach it is best to take it warm from the animal, but where it does not agree with that organ in this state, it should be diluted with some warm water. Occasionally by boiling the milk, and removing the pellicle of albumen, it will sit much better on the stomach. The addition of a little absorbent earth will, (as has been mentioned,) often prevent the milk from deranging the stomach and bowels. Dr. Willich says, "milk porridge, as well as those dishes in the composition of which milk and flour are used, have a manifest tendency to obstruct the lacteals or milk vessels of the intestines, and the mesentery; a circumstance which renders them extremely unwholesome, espe-

* Haller says milk undergoes fermentation, and furnishes an inflammable spirit by distillation—the milk used being that of the mare. See Elem. Phys. tom. vi. p. 196. He states also, from Cheyne, an experiment where two hogs were fed for the same time—the one on milk and the other on whey, and that the one fed on the last was the fattest, p. 198. *Sour milk* gives *acetic acid* by distillation, and Raspail affirms that what has been termed *Lactic acid* is merely acetic acid holding some albumen dissolved in it.

cially to children." This is arrant fudge—bare assertion, unfounded in science, and disproved by experience.

CHEESE.—The curd or albuminous part of the milk, when separated from the serum and sugar, by means of any coagulating substance, and then salted, compressed into a mass, and dried, forms not a small part of human food. In this state it is difficult of digestion, and invariably almost is hurtful to the debilitated stomach, but to those who can digest it, it proves a strong and nourishing aliment; and of those individuals who have arrived at a very great age, the majority will be found to have lived chiefly upon cheese or sour curd. The earliest *Athletæ* were fed with bread and cheese. The albumen is similar to gluten in containing a large quantity of azot, and hence its great effects as an article of nutrition. Cheese has long been noted as astringing the bowels, but it contains no astringent. It merely is ill digested; the bowels are dry because the whole of the food has been absorbed.*

* Dr. Willich has given us a note upon cheese, about as brilliant as that upon butter. He shews that cheese, if not adapted for broken constitutions, answers well for patching up broken china. "To shew the strongly viscid quality of cheese, and *what powers of digestion it will require to assimilate it* to our fluids, I shall mention a composition which may be useful as the strongest cement yet contrived for mending china cups, glasses, and the like." The composition which he here recommends is melted cheese, mixed with as much quicklime as it will absorb; in fact it is the lute, as the Dr. ought to have known, of albumen, (the white of egg is used commonly as most convenient,) and quicklime daily used in the laboratory. I allude, however, to the note as an instance of a logical fallacy too often introduced into reasonings connected with the living body. It would be a questionable inference to say that because cheese is viscid therefore it will be indigestible, had we not the proof of experience; but surely we cannot say that because cheese is insoluble when united *with* lime, it will be insoluble or indigestible in the stomach where it is *without* lime. An illustration from the inorganic kingdom applied to living bodies must be taken with great caution. Archbishop Whately, in one of the notes in his *Elements of Logic*, 4th ed. p. 203, furnishes us with an instance where an illustration, though striking and happy, may mislead. In pointing out the error in mistaking a *sign* by which we might infer a certain phenomenon, as the *cause* of it, he says,

MILK AS A THERAPEUTIC AGENT.—There is no kind of food which has kept so much in favour with medical men as milk. Well might Oribasius quote, “Milk has two uses, one as a food, the other a medicine.” It is both relaxing and nourishing. There are other foods which possess these properties, but then milk is superior to them in this—that it is easier of digestion. Thus mucilage is relaxing, but it is not nourishing, and its digestion is difficult: oil is

“Exposure to want and hardship in youth, has been regarded as a cause of the hardy constitution of those men and brutes which have been brought up in barren countries of ungenial climate. Yet the most experienced cattle breeders know that animals are, *cæteris paribus*, the more hardy for having been well fed and sheltered in youth; but early hardships, by destroying all the tender, ensure the hardness of the survivors. So loading a gun-barrel to the muzzle, and firing it, does not *give* it strength, but proves, if it escape, that it *was* strong.” I object to the inference which one naturally draws from this comparison. The gun-barrel is, and always will be, the same, excepting that it may be worn thinner by use, and therefore more liable to burst; but practice and habit in hardships *may* render the human constitution more able to endure them. We cannot speak positively in the one case (the human body) as we can do in the other, (the inorganic substance,) and though I am happy to have the weight of Dr. Whately to the opinions I entertain, (see p. 126,) yet it is but fair to state that an opinion opposite to that which he takes on the authority of cattle breeders, has been supported by good authority. A story connected with cheese, and one which is something more pertinent to physic than the mending of broken china, is the following of Baynard. “I remember when I lived at Preston in Lancashire, a man died with a *cheese* in his *belly*, by drinking new *milk* upon sour *stale beer*, which so frightened people from the use of milk that all forsook it, but the wiser *Calves*. And here a word of admonition may be not amiss: I have known a great many that have destroyed themselves, and some very suddenly, by drinking milk too soon upon any sharp acid liquors, as *wine*, *cyder*, *stale beer*, &c. when those liquors have been drank safely after milk, though I should not care to drink sharp liquors too soon upon milk, for fear of curdling, not trusting too much to the *Dutch* proverb;

Wine up Millock, is good for Elock,

But Millock up Vine, it is Venine;

Though milk curdles upon all stomachs whatever, even upon the youngest animals, but it is a soft curd, and loose, when acids make it hard, stiff, and compact.”—P. 196.

both very relaxing and very nourishing, but it is very difficult of digestion. In all acute diseases the best treatment is an abstinence from food, or the exhibition of such as is barely sufficient to support life. In such cases, therefore, the use of milk may be very questionable; yet Sydenham allowed a drink made of three parts of water to one of milk freely to his patients in small pox and measles. But there is a great number of chronic diseases exhibiting a slight degree of fever or of inflammation to which this food will be eminently adapted, such are hæmoptysis, incipient phthisis, chronic hepatitis, chronic dysentery, irritable ulcers, disease of the urinary organs, as chronic nephritis, gonorrhœa, &c. In cases of pectoral disease, Trallian who, of all the Greek writers, appears to have the greatest faith in milk, says, "not any medicine or food is so suited to the patient, or so useful to him, as milk." To many spasmodic and nervous diseases milk will be of the greatest service. This state of the system is indicated by a quick and sharp pulse, and a leanness and meagreness of the whole body. But meagreness of the body frequently arises from dyspepsia, and to such a case milk is not at all suited. Ægineta says "it brings on pain of the head and inflates the bowels." See also Hip. Lib. 5. Aph. 64. Nor is milk adapted as a food for the convalescent from acute disease, for in this case the pure milk does not appear to agree with the stomach. Even in chronic diseases it will seldom answer in their latter stages if it has not been used in their first.

ALBUMINOUS FOODS.

Some writers are of opinion that albumen is not entitled to a separate place as a food, on account of its being but very sparingly diffused, and not having any decidedly distinct action on the system. As it is found in the milk, it might be

treated of under that article ; but as it is found in greater abundance in the blood, and as the eggs of the oviparous animals are almost entirely composed of it, and as it forms the greater part of the edible part of the oyster, mussel, cockle, and some other testaceous animals, it deserves to be noticed as a distinct food. It is at once known by its becoming solid with heat. Raspail affirms that ordinary albumen is composed of two parts, one a fluid, which is soluble in water, the other an insoluble organic texture, in the cells of which the liquid albumen is contained. He states likewise that the insoluble albumen is identical with fibrin, but the last gives more nitrogen, from containing the ammoniacal salts of the blood. It is by no means difficult of digestion when moderately coagulated, but it is not so easy when uncoagulated and not diffused in a large quantity of water, and it is still more indigestible when coagulated to the utmost. It has neither a decidedly stimulating nor relaxing effect on the system. It is a good strengthening food. It was at one time believed to be heating, and stimulating to venery, but this is not the case.

Egg.—The white of the egg is almost albumen entirely, and the yoke is composed of albumen, gelatine, oil, and water. It is very nutritive and not difficult of digestion when moderately boiled. “Eggs,” says Hippocrates, “give a strong nourishing filling aliment.” The eggs of the different animals differ very little in composition, and are only to be distinguished by more or less oil, and by the flavour. The eggs of the granivorous fowls are esteemed the best ; the eggs of the water fowls are the most strongly flavoured.

The shell fish, such as the oyster, cockle, &c. contain a large quantity of albumen and some soft mucus. They have a small quantity of gelatine or fibrin united with the albumen, which makes them firmer, even in the raw state, than the uncoagulated egg, and more easy of digestion. The

Oyster is very easy of digestion, and in general agrees well with the healthy stomach. When boiled, it is much more indigestible on account of the hardness, and many more oysters can be eaten in the raw state than when boiled. When the stomach is weak, they are more digestible when very slightly boiled. They are sometimes taken as a *whetter* to promote the appetite; if they do so, it is because they contain some of the common condiment salt dissolved in a very palatable juice. They are very nutritive. When of a green colour they were at one time believed to be poisonous, the colour being attributed to the oyster lying on a coppery bed, but we now know that the colour is derived from its lying in beds containing much green marine plants. The oyster casts its spawn in the month of May, and is not fit for eating again until the end of August.* The *mussel* is more solid than the oyster, but does not digest so easily, nor agree so well with the stomach. It is better boiled than raw. That cutaneous eruption which sometimes follows the eating of shell fish has more frequently appeared after eating mussels than any other. The common people remove a part of the mussel which they believe to be poisonous. It is the heart, and is perfectly innocuous. The other shell fish, as the *cockle*,

* Baynard, ridiculing the pertinacity of some men in clinging to their theoretical opinions in their practice, introduces us to some of the whims about Foods: "One cries up *Crabs* and *Lobsters*, as if Health came from Sea in Armour; t'other *Oranges* and *Lemons*. Dr. *Alkaly* says Vinegar and Pepper is bad with Roast *Beef*; and Dr. *Acid*, that a Pearl Necklace swells the Glands of the *Throat*, and will breed *Quinseys* or the *King's Evil*; one asks his Patients, can ye eat *Oysters*? And t'other can ye drink *Verjuice*? So that you see that the *Land-Crabs* and the *Sea-Crabs* can never agree. All these foolish Extreams are of ill consequence, and of pernicious Tendency to the commonwealth of *Health*; for to be wedded to an opinion is true madness, unless warranted by infallible Demonstration. *Physick Bigotry* is worse than that of *Popery*, and does more mischief to *Bodies*, than that to *Souls*; for God may have mercy on an error in his *Worship*, but a misapplied *Medicine* can have none, but must on and act according to its *Nature*, whatever be the consequence."—5th ed. p. 198.

shrimp, &c. are of easier digestion, and are generally preferred when coagulated by slight boiling.

There is no more reason why the sea snail should be eaten than why the land one should not.* Their composition is

* At least so thought two celebrated Philosophers, whose attempt to reduce their gastronomical philosophy to practice is well described in the following anecdote, given by Sir Walter Scott (I believe) in his amusing notice of John Home's Works, in the Quarterly Review :—"Professor Adam Fergusson, the Historian of the Roman Republic, used to give a dinner, weekly, to several of the most distinguished literati of Edinburgh. Two constant attendants, on this weekly symposium, were the Chemical Philosophers, Dr. Black and Dr. Hutton. They were particular friends, though there was something extremely opposite in their external appearance and manner. They were both, indeed, tall and thin ; but there all personal similarity ended. Dr. Black spoke with the English pronunciation, with punctilious accuracy of expression, both in point of manner and matter. His dress was of the same description, regulated, in some small degree, according to the rules which formerly imposed a formal and full-dress habit on the members of the medical faculty. The geologist was the very reverse of this. His dress approached to a Quaker's in simplicity ; and his conversation was conducted in broad phrases, expressed with a broad Scotch accent, which often heightened the humour of what he said. The difference of manner sometimes placed the two Philosophers in whimsical contrast with each other. We recollect an anecdote, entertaining enough, both on that account, and as showing how difficult it is for Philosophy to wage a war with prejudice. It chanced that the two Doctors had held some discourse together upon the folly of abstaining from feeding on the testaceous creatures of the land, while those of the sea were considered as delicacies. Wherefore not eat snails?—they are well known to be nutritious and wholesome—even sanative in some cases. The epicures of olden time enumerated among the richest and raciest delicacies, the snails which were fed in the marble quarries of Lucca ; the Italians still hold them in esteem. In short, it was determined that a gastronomic experiment should be made at the expense of the snails. The snails were procured, dieted for a time, then stewed for the benefit of the two Philosophers ; who had either invited no guest to their banquet, or found none who relished in prospect the *pièce de résistance*. A huge dish of snails was placed before them ; but Philosophers are but men after all : and the stomachs of both Doctors began to revolt against the proposed experiment. Nevertheless, if they looked with disgust on the snails, they retained their awe for each other, so that each, conceiving the symptoms of internal revolt peculiar to himself, began, with infinite exertion, to swallow, in very small quantities, the mess which he internally loathed.

nearly the same. During the famine that prevailed in some parts of France in 1817, the inhabitants were under the necessity of using snails as food. It is stated by the physicians of those districts, that the consequence of eating them to excess was a stupor similar to that induced from Belladonna. No cutaneous eruptions, common to indigestion occasioned by some sea testaceous animals, appeared.

ALBUMINOUS FOOD AS A THERAPEUTIC AGENT.—As this food is very nutrient, it will not be proper to those cases where our main object is to reduce the patient; but as they agree well with the stomachs of many, and are easy of digestion, they are well adapted for convalescents, and for chronic cases. Indeed it may be said, that, with the exception of the acute inflammations, wherever the patient's stomach will digest a soft boiled egg, or an oyster, it may be given to him.

GELATINOUS FOODS.

Gelatine is found in abundance in several of the different tissues—in the skin, in the cellular membrane, in the intestines, in the ligaments, in the glands, and in the bones. It constitutes the greater part of young animals, and the younger they are the more of it do they contain. It has been placed in the same relation to fibrin, in the animal kingdom, as fecula to gluten in the vegetable, but there is this difference, that in the one case the most nutritive substance, the

Dr. Black, at length, 'showed the white feather,' but in a very delicate manner, as if to sound the opinion of his messmate:—'Doctor,' he said, in his precise and quiet manner, 'Doctor, do you not think that they taste a little, a very little, green?' 'D—d green, d—d green, indeed—tak them awa, tak them awa,' vociferated Dr. Hutton, starting up from table, and giving full vent to his feelings of abhorrence. And so ended all hopes of introducing snails into the modern *cuisine*; and thus philosophy can no more cure a nausea, than honour can set a broken limb."

gluten, is more indigestible than the fecula, whilst fibrin again is more digestible than gelatine. According to Raspail, however, albumen is next in value to fibrin. Gelatine forms the frame work of all the parts of the body ; it is the investing membrane, and in some textures, and especially by an increase in age of the animal, it becomes firmer and more insoluble. It is dissolved by decoction with water at the ordinary temperature of 212° , or by a *digestor* ; and on cooling, it acquires the consistence and appearance of jelly. It is very nutritious, but difficult of digestion, and relaxing. It is more nourishing than mucilage or milk, but more relaxing than the last. The younger the animal is, the more indigestible is the gelatine. The pulse, during its use, becomes slow and full. The secretions, with the exception of that from the bowels, are diminished, and this diminution of secretion, along with the increased quantity of nutriment absorbed, gives the body a degree of "*bouffissure*." The bowels are very free, more so indeed than after any other animal food, and often purging is brought on. Hippocrates calls these foods *humid*, from this relaxing effect on the bowels. When the gelatine is much diluted with water, as in the form of soup, the laxative effects are much more certain than when the flesh itself, or the evaporated jelly, is used. He likewise places it under the term *νουφος*, as a *light* food, and unquestionably it is not heating or exciting, but it is not easy of digestion except when of that age as to deserve a place nearly in the fibrous foods. This class comprehends a considerable number of substances. The young of almost all animals are placed in it. Whilst very young, they are composed of a viscid glairy substance, which has not all the properties of gelatine. The gelatine appears next, and then the fibrin. There are some animals, however, in which the gelatine continues to prevail ; and in all it is found in different tissues, from which it may be separated.

The gelatinous foods may, therefore, be divided according to the age of the animal.

I.—Into those in which the flesh is viscid, glairy; and so soft that the extract or jelly cannot be dried. Such is the case with all newly-born or very *young quadrupeds*, and *birds*; but these last acquire proper gelatine sooner than the others. This division is not well adapted for food, and not at all suited for the invalid, being indigestible and purgative.

II.—Those in which the flesh, without having lost entirely this viscosity, has a gelatinous substance more perfect. Such is the case with the *calf*, the *lamb*, the *kid*, the *pig*, when fed for some time. *Birds*, when able to fly, have almost entirely lost the viscosity. The calf affords the largest quantity of gelatine. The lamb again contains more oil and less gelatine. The kid contains a tolerably firm gelatine. *Veal* is most extensively used, and frequently the gelatine is dissolved out of it and taken in the form of soup. It is very filling and nourishing to an exhausted patient, but care must be taken of its effects on the bowels. Galen says “the flesh of the sucking calf is, in sweetness of odour, pleasantness, and delicacy, inferior to the flesh of no animal, but it is not suited to the sick, nor to the convalescent, for it is heavy.” *Lamb* is much easier of digestion than veal or kid, and is much better solid than in the form of soup. The *frog* likewise belongs to this class of foods.

III.—A third division includes those in which the flesh is soft and tender, without being viscid or very gelatinous. Here we may place the young *rabbit*, the young *domestic fowl*, the young *pheasant*, and the young of almost all the *birds* which have *white flesh*. The calf, the kid, the lamb, the pig, may belong to it according to their age, though some of these possess the red fibres to some extent. It is near the verge where the animals pass over into the fibrous foods. The substances in this division are the easiest of digestion of the gelatinous foods.

GELATINOUS FOOD AS A THERAPEUTIC AGENT.—There is perhaps no food more common in the sick chamber. It is a great favourite with many practitioners in the convalescence from acute diseases. The large quantity of nutrient matter contained in it, renders it eminently fitting for the renewal of the flesh and fat of the body which have been wasted by illness. We must recollect, however, that the food is not very easy of digestion ; and that the weak stomach may not be able to produce the requisite changes on it. If we can, along with this food, allow some condiments, or a glass of good wine, there is no diet that will sooner restore the system to its former fulness. There was once a fashion for using this food exclusively in intermittent fever, and as the gelatine was held to be here a *medicine*, one author prescribed glue liberally in that disease—glue being nearly pure gelatine. It was a fashion which this strange practice soon threw into discredit. Gelatinous food is almost the only animal food allowed to persons much predisposed to phthisis, hæmoptysis, and nervous irritability. From its relaxing properties, some are of opinion that it might be used in febrile and inflammatory diseases. Such a practice would be highly improper, and cannot be too much reprobated. In using gelatine, especially in the form of soup, we must not forget its laxative effect on the bowels. In some cases this will be an advantage attending it ; in other cases where we may be desirous to use this food, but, at the same time, to avoid this property, it will be best given in the solid state—veal, or lamb, or chicken, broiled or boiled.

FIBROUS FOODS.

Of all the species of food the most strengthening, and the most easy of digestion, is the fibrin or flesh of animals.

But before stating its action, it is necessary to take notice of

a very old and very important division of animals, viz. into the *white blooded* and *red blooded*. When young, many of the red blooded animals have only white blood, but they have a large quantity of gelatine, and are therefore placed in the former class. There are many animals, however, that are almost entirely white blooded, even when come to maturity, as for instance fowls, and many birds, and the greater number of fishes. To fish we have assigned some separate remarks ; but we have some terrestrial animals which are white blooded, and which the closeness, and firmness, and insolubility of their fibres will not permit us to place amongst the gelatinous foods. In their action on the body, they are, in many cases, preferable to the gelatinous and fibrous foods, neither loading the stomach so much as the former, nor exciting it so much as the latter. It is to be observed then, and kept in mind, that the *full-grown white blooded* animals are much *more tender*, and give a much *lighter nourishment* than the *red blooded*, and are not *heating* nor *stimulating*. These latter properties belong exclusively to the red blooded animals, and are said to depend upon a peculiar animal principle contained in their fibrin, to which the French chemists have given the name *osmazome*, and the English that of *animal extractive*. This substance, which is soluble in water and alcohol, is of an agreeable odour and taste, deliquescent, and can, with difficulty, be preserved or kept for any length of time. It is not a food, it contains no nutrient matter, it adds nothing to the body, but by its presence it powerfully quickens and assists the assimilation of the fibrin. It is like the stimulating or acrid principle in some vegetable substances. It is taken into the system with the fibrin, and produces that excitement of the body which follows the use of animal food ; and it is to the foods containing this principle, or the red blooded foods, that the following remarks apply.

But, although I have thus noticed osmazome as a dis-

tinct principle, still most chemists allow that it has not yet been obtained in a state of purity; and many deny its existence as a principle. Raspail says it is nothing more than an impure compound of albumen with acetic acid. Whether we have obtained a *proximate principle* or not, there can be no question that coloured flesh has a different effect on the human body from the other animal foods. Blood, according to Raspail, contains ammonia, or at any rate its base, azot, in greater quantity than any other part of the body, and it may be this alkali which may render such food more easy of digestion and more heating. The effect of decomposition (putrefaction) on fibrous food would seem to support this opinion, for all tainted (ammoniated) meats are easily digested, but heating. An argument might be drawn from this, in support of the gastric juice being the principal agent in digestion. Tainted foods are rendered sweet in the stomach previous to their being digested. This is done by the gastric juice, and it is very probable, therefore, that such foods increase the secretion of this fluid, and that, from its increase, there is a more rapid and effectual chymification and chylification.

There is no food which so speedily and so distinctly shows its influence on the system as fibrin. The pulse becomes, in a very short time, quicker, and much stronger. The number of respirations is increased, and the animal temperature is greater. The secretion from the skin is increased; it is odorous, and tinges the linen. The secretion from the kidneys is lessened, and the urine is high coloured. The discharge from the bowels is less abundant after this food than after any other, with the exception perhaps of sugar. There is no undue or particular fulness of the system. An increase of vigour and strength is given to the muscular fibre, and, at the same time, the contractility of the muscles is greatly augmented. The motions are free, active, and powerful. The

brain corresponds with the body. There is the mind that can conceive, plan, and arrange, with the body that can execute. The animal strength is accompanied with great mental courage; there is no fear, no truckling, no hesitation, if the object aimed at is within the possibility of being obtained by human means.

The use of this food predisposes to many severe and dangerous diseases, to fevers, to inflammations, to apoplexy, to hæmoptysis, to mania, &c. And wherever disease does occur in persons addicted to it, it runs not in any slow, lazy, loitering stream, but rolls onward, rapidly, boisterously, and outrageously. The stages so distinctly marking the progress in other cases are here merged under the one overwhelming torrent.

In arranging the fibrous foods, then, we have two classes depending upon colour; but these two classes cannot, of course, be distinctly separated. They are shaded into each other. The birds are, in general, easier of digestion than the quadrupeds, but do not contain, bulk for bulk, so much nutrient matter as the latter. Some aquatic birds are very indigestible. Some contain much more fat than others. The common *domestic fowl*, when full grown, is the best adapted for the invalid: when young, (the chicken) it is still more easy of digestion. The *Turkey* affords a similar but stronger nourishment than the *Capon*.

In the first class of coloured foods are the quadrupeds most commonly used, the ox, the sheep, the hog, the goat, the rabbit. Of the birds there are the pheasant, the partridge, the duck, the goose, the wild duck, and the wild goose.

In the second class again, or dark coloured animals, there are, of quadrupeds, the stag, the fallow deer, the roebuck, the rein deer, the wild boar, and the hare. Of birds there are the pigeon, the quail, the muirfowl, the woodcock, the

snipe, the lark, &c. This class gives a more stimulating food than the former, but as, on the other hand, it is more flavoured, it is more easy of digestion.

The substances in these classes are placed in the order of the value put upon them as foods. The *ox* has the first place, as affording the most powerful nutriment. It agrees very well with the healthy stomach, and unless old is easy of digestion. The beef of the cow is much inferior to that of the ox. The Greeks had no good opinion of it. Oribasius says (Lib. ii. cap. xxviii.) "the flesh of cows affords by no means a weak nourishment, but it is with difficulty digested, and it renders the blood thicker than it ought to be;" and again, "if any one is by nature given to melancholy, if he eat of cow's flesh he will be seized with that disease." The beef of the bull is much inferior to that of the ox and the cow, and should never be used. "*Agnorum caro humidissima pituitosaque est,*" says an old authority, but the remark cannot apply to the *sheep*, for as an agreeable and nourishing food it is next to the ox. It is more tender than the former, rather easier of digestion, and not so stimulating; but not possessing so much *savour*, it is not so much relished by the invalid. The flesh of the *wedder* is by far the most digestible. *Tup* and *Ewe* mutton are much inferior. The flesh of the unclean animal was the favourite amongst the Greeks.* They fed their *athletæ* with this food, considering it the most strengthening and the most nourishing. Some modern writers exclude *swine's flesh* from this class, placing it amongst the white blooded animals on account of its not

* "Of all aliments," says Galen, "pork nourishes the most, both on account of being of good juice and easier than any other of digestion, *cum alias, tum ob similitudinem ad homines.*" This author has not condescended upon what these *aliases* may be, but it is to be hoped they are more to the point than the reason he does give—the resemblance between a man and a hog.

being highly coloured. Pork, if taken without much fat, and in its fresh state, is perhaps rather easier of digestion than any of the former, and less stimulating. The flesh of the *goat* has never been much esteemed. It is heavy and coarse. The *rabbit* is tender and easy of digestion. Of the *birds* the most easy of digestion is the *pigeon*, then the *partridge*, and then the *pheasant*. The *duck*, the *goose*, and the *wild duck*, and *wild goose*, are difficult of digestion.

Of the animals of the second class there are not many in common use in this country. They almost all belong to the animals held in law, and in practice, to be game. The flesh of the *stag* (venison) is nutritious, easy of digestion, and wholesome, except when the animal is very young or old. The *fallow deer* is similar in its properties, but is generally better fattened, and has not the flavour of the flesh of the stag as obtained from the hills. The *roe buck* is rather inferior to the fallow deer. The *rein deer* is, in every respect, equal to the stag.

Blood has likewise been placed in the list of fibrous foods, on account of the quantity of fibrin contained in it. It is very nutritive, and easy of digestion; but it is said to be more heating and stimulating than the red fleshy fibre, from containing more osmazome.

FIBROUS FOOD AS A THERAPEUTIC AGENT.—From what has been said, it is evident that of all the foods described this is the most important; and that more than one half of the good or bad effects of animal food depends upon this principle contained in it. Osmazome is the master spirit, the evil one, to whom alone are due almost all the denunciations against animal food that have been given since the time of Hippocrates. The other foods may lie a foreign load on the stomach, causing disorder in it, and consequently in the whole system, or if digested they merely give nutriment to the body; but this one, if digested, (and it is more likely to be

more or less digested,) not only brings nutriment, but it brings a stimulus along with it. It is the same in its effects as if so much wine or brandy were taken.

In all continued fevers, of whatever type, in all the eruptive fevers, in all inflammatory diseases, in all the febrile discharges ; wherever there is plethora of the system, wherever there is the prospect of disease from excitement of the vascular system, the fibrous foods must be carefully withheld. It is not mending the matter, but rather making it worse, to say that a patient labouring under an inflammation of some organ received only a *little broth* or *beef tea*, and that he did not taste the *meat*. Better for him that he had had a boiled *round* in his stomach than the soup made from it, for the former would most likely have remained undigested, merely giving that additional derangement which a loaded stomach produces, but the soup contains poison, which is taken up by the absorbents, and conveyed into the system to exercise its evil effects. In the last stage, however, of fever—at that period when the physician has given his fiat for the exhibition of wine—at that time when the disease and the body, when the enemy and defender, have become nearly equally exhausted, and when one rally of the constitution, produced by the prescription of a wise and able physician, will give the patient his last chance to throw out the disease, then, and then only, will be the time to support his strength and prepare him for the struggle, by the exhibition of beef tea. The attentive physician who watches minutely the stages of the fever will know when to call this remedy to his assistance. Carelessness and ignorance had better let it alone, and repose themselves on the general rule—to withhold animal food from every patient in acute disease.

Wherever there is extreme sensibility of the nervous system, fibrous food will be improper. On the other hand, in all diseases attended with relaxation or debility, this species

of animal food will be of the greatest service. In many cases of scrofula, in dropsy attended with, or depending upon, cachexy of the system, in chlorosis, in diabetes mellitus, in extensive ulceration, in rickets, in dyspepsia, and often in diseases of the skin, great advantage will be derived from the stimulus and nourishment contained in a good, juicy, beef steak. In the treatment of many local diseases, which are too often very erroneously considered as little connected with the system at large, the most decided effects will be seen by putting the patient upon, or withholding him from, this animal food. What are we to think of the man that applies leeches to a bubo or other inflammatory swelling, in the morning, and allows his patient to take a beef steak for his dinner? Yet how frequently do we see it the case? It is like a man attempting to empty a cistern with a pipe of a half inch bore, whilst a three inch one is pouring water into it. Soups prepared of beef, (the lean of the beef,) of veal, and of chicken, are common in the sick chamber; and the student should recollect that the beef tea is stimulating and heating, that the veal is merely filling or nourishing, and that the chicken soup is similar to that of the veal but lighter.

OLEAGINOUS FOODS.

It is not requisite to say any thing farther of these foods than what has been stated at page 287. The only difference is, that the animal fats are, when in small quantities, more easily digested on account of the solid fibre with which they are mixed; but in large quantity again they are more injurious to the stomach, because they cannot get exit through the bowels, unless fully digested. As most frequently eaten, animal oil is solid, and is mixed with, or enclosed in, cellular fibre, but it is digested much better when mixed with some of

the fleshy fibre. In some cases it is found principally in the skin, as is the case with the common fowl, and many of the birds and fishes, and in others attached to the muscular fibre or some of the viscera. When liquid, as in fat broths, or gravy, it is similar to the vegetable oils, but is even more indigestible, and frequently brings on purging, in part owing to the large quantity of warm liquid with which it is taken.

FISH.

In considering merely the composition of fish they might have been included partly in the albuminous, the gelatinous, and the fibrous foods. We find some of them containing more red blood, and more oil or fat, than the others; some containing albumen (generally a layer of it between the different layers of fibres, as more especially in the haddock, the ling, and the salmon); and others containing a large quantity of gelatine. They all contain fibrin, but they differ in this from the fibrous foods, that they contain no osmazome. No savoury extract or soup can be prepared from them, which will keep without decomposition, like that of terrestrial animals. They are easy of digestion when they are without oil or fat, but the fat fish are more indigestible than flesh containing an equal quantity of oil in its cellular membrane. Some are of opinion (erroneously) that fish are, in every state, more indigestible than any other animal food. Haller says they nourish much less than the flesh of terrestrial animals; but Cullen throws some doubts upon this opinion, and gives, in support of an opposite view, the uniform healthiness of the inhabitants of fishing hamlets. But we must recollect, that the good health enjoyed by fishermen is more to be attributed to exercise, the pure air, and the farinaceous foods, than to the nutritive qualities of the fish, of which, by the bye, they eat very little. A more satisfactory illustration of

the greater correctness of Haller's opinion, is found in the circumstance that jockeys who are above weight, are fed on fish in order to bring them down to the requisite standard. Fishes are less nutritive than terrestrial animals, and more nutritive than vegetables. They are not relaxing to the system, unless when combined with a large quantity of oil, but they are not strengthening nor heating. They very speedily become putrid, and in that state are not suited for food. Provided, therefore, that they are fresh, and that the oily or fat fishes are not desired, they may be allowed in any disease where mere nutrition will not be against the cure. In scrofulous and cachectic cases they are an improper food; and indeed where the object is strength or tone, we will not prescribe from this class. A very long list of diseases has been ascribed to the use of much fish; but we will find that these diseases occur where filth and impure air may justly claim a share in bringing on the morbid state.

Fishes may be divided into those without fat or oil, and those with. Of the first class a slight division may be made, according as the fish is soft or firm in the fibre. To the first belong the *whiting*, the *haddock*, the *ling*, the *flounder*, the *sole*, the *turbot*; and some river fish, as the *trout*, the *perch*, and the *carp*, when not fat. To the second belong the *cod*, the *skate*, &c. and the white or fibrous part of the *crab* and *lobster*, the *shrimp*, &c.

In the second class again are placed the *herring*, the *mackerel*, the *halibut*, the *trout* and *carp* when fat, the *salmon*, the *eel*, &c. The *turtle* likewise belongs to this class: it is composed of fibrin, of firm gelatine and fat well mixed together. It is fitted for the stomachs of city dignitaries and gourmands, but not at all adapted for the sick chamber. An old division has existed of the fishes, in a medical point of view, according as they inhabit fresh or salt water. The last are preferred. The fish of marshes, and dark and

muddy waters, Galen says, are heavy ; whilst the *saxatiles* and *littorales*, those found in clear waters, and on the sea coast, were placed by him as the lightest and most easy of digestion.

STIMULATING ANIMAL FOODS.—Are there stimulating animal foods besides fibrin ? Nature says not, but art has contrived to render even fibrin itself more stimulating than it naturally is. Almost every *prepared* or *cured* animal food is a stimulant—at least all animal foods prepared by *salt*, by *spices*, by *vinegar*, or by *smoking*. Salt renders all foods much more heating. If the food has likewise been dried or smoked, the flesh, having lost all the juice by the evaporation, becomes harder, more compact, and much less easy of digestion. All *spoiled* or *tainted* meats are likewise stimulating. They contain a large quantity of ammonia evolved during their decomposition. They are more easy of digestion ; but this applies only to the healthy stomach, for the stomach of the invalid will not be able to digest them, and they will so much the quicker continue the process of putrefaction. That their nutritive properties are injured, we have reason to believe from the fact that putrid matters never nourish any of the lower animals. The same remarks apply to old *cheese*, and especially all high tasted, biting, or salted cheeses. They contain ammonia, and are stimulating. They may answer in place of a dram, as a stomachic, after the full dinner of a healthy person, but they are to be carefully eschewed by the stomach of a patient.

COOKING OF ANIMAL FOODS.—Sometimes a sort of preparation is given to the food before the animal is killed. Thus *castration* always improves the quality of the flesh, rendering it much more tender, and likewise making the animal more easily fattened. All animals, after castration, become fatter, and the fat will be better mixed through the fibrous parts than where they are not deprived of this sexual organ. Muscular fibre is likewise improved by being *depriv-*

ed of its irritability, and animals which are hard run, as in hunting, (whipping a pig to death!) are rendered more easy of digestion. *Wild* animals are generally easier of digestion than the same species in the domestic state; but when the animal is *old* the fibre is hard and more indigestible. The parts, too, most exposed to motion, as the legs of the swift animals, and the wings of the birds, are harder and sinewier than the rest of the body. Fish again are improved by rendering their muscular fibre more firm, as by *crimping*, a process which must be performed before the muscular fibre has lost its irritability. The muscles are cut across in several parts, and the animal thrown into cold water. Contraction takes place in the muscular fibre, and it becomes denser. The *kind of food* which the animal uses in its natural state, or to which it has been forced artificially for the purpose of preparing it for the table, will affect the character of its flesh as a food. Those feeding on the grains are firmer in the flesh than those eating the herbs, and those taking the mountain herbs, are firmer and more savoury than those using the succulent and watery. Animals feeding on animal food have their flesh much coarser and more heating and alkaliescent; and few of them can be used as a food without detriment to the human body.

Whether the flesh of an animal which has died of, or been affected at its death with, some disease, will be injurious to the health after it has been properly washed, and boiled, or roasted, is not yet satisfactorily settled; but if we judge by analogy from what follows the use of diseased corn, as ergot, we should say it would. If known, it should never be used. We should not be led away by the remark, that no bad effects have followed the use of swine's flesh, though it was known that the hogs were affected with a cutaneous disease. Fish whilst spawning are always unwholesome.

There are few animal foods eaten raw. We may except

some of the albuminous foods, and some of the fish perhaps, by persons with good stomachs and singular tastes. Not that there is the same necessity for cooking animal foods as for cooking vegetable. The latter swell in the most healthy stomach when taken raw or unboiled, but animal food never shews any other bad effect than being, in some cases, less easy of digestion; and it always is contracted or made less, instead of being swelled, by cooking.

Roasting.—FLESH, when roasted, contains nearly all the juicy parts, with the exception of a little melted fat. It is covered with a burnt crust of a brown colour, and a peculiar flavour and taste, somewhat resembling the taste of burnt sugar, or what the French call *caramel*. This crust retains the juice, and gives to the gravy a brown colour and an agreeable taste. The osmazome is contained in the flesh, and a little in the crust and gravy. *Baking* is much the same as roasting, and though not so much relished by the gourmand, is economical, and attended with little trouble. If done over with a paste, before being put into the oven, the meat is then stewed, or almost boiled, in its own gravy. It is very equally done and is tender, but neither the meat nor the gravy have the rich taste of the roast. *Broiling* is, in some degree, similar to roasting, but done more quickly. There is no thick crust, and scarcely even a crisp upon the steak. It is always juicy and rich, and is by far the most nourishing and the best suited for the stomach. *Frying* is somewhat like baking, but the meat instead of being cooked in its own juice or gravy, is half roasted and half boiled in butter or fat. The osmazome is more dissolved out of it than in the former processes, and it has scarcely any crust. It has the *empyreuma* derived from the burnt butter or fat. It is the worst kind of cooking, and the meat prepared in this way is always difficult of digestion, and very apt to excite heartburn. The invalid must avoid it most religiously.

Boiling deprives the flesh of all its soluble parts, all its gelatine, its fat, and its osmazome. It is now an article very different from what it was after any of the former methods of cooking.* It is dry and hard, and has very little taste or flavour. It is neither so stimulating nor so easy of digestion as when roasted, baked, or boiled. It might, from its having been deprived of this property, be allowed, in some cases, to patients, where meat otherwise prepared would be improper; but, on the other hand, it is not suited for the stomach of the invalid on account of its indigestibility. The broth prepared from the meat will be rich or not, according to the flesh from which prepared, and the period during which it has been boiled. If the meat contain much fat the broth will be oily and relaxing, if it contain much gelatine the broth will be viscid and nourishing, and if it be prepared from the lean red flesh it will be highly flavoured and stimulating.

FISH are broiled, fried, or boiled. They are very agreeable when *broiled*, and may be allowed to the invalid, if not too salt. By *frying*, they acquire an empyreumatic flavour, and a crust of burnt butter. They are not suited in this state for the weak stomach. The best method of cooking fish, for the invalid, is simply *boiling* them. With the exception of the fat fish, little or nothing is lost in the boiling, and the fibre is made firmer and more digestible. Plain boiled fish may be permitted wherever the stomach will digest it.

* "*In universum, carnes debilitantur elixatione, et minus dant roboris.*"—Haller, Tom. vi. p. 224.

LECTURE ELEVENTH.

DRINKS.

IT is not always alone for the purpose of assuaging thirst that we drink a fluid. Pure water is the only proper fluid to remove thirst, and any other that we take must have some additional action on the body. They either nourish or they stimulate ; and they contain some or other of the principles that we have already discussed mixed or dissolved in water ; or they contain some new nourishing or stimulating substance evolved from these principles by some chemical change that has taken place. The different fluids used as drinks are, therefore, water alone ; or water holding some proximate vegetable or animal principle dissolved in, or mixed with, it ; or water holding the product of a change produced on some of these substances.

They may be arranged thus, *water, juices, infusions, decoctions ; and fermented liquors*, including of course *wines, alcohol*, and vegetable *acids*. Their effects on the constitution will depend upon the substance united with the water. "*Fieri not potest, ut idem sentiant, qui aquam, et qui vinum biberunt*, says with great propriety the old adage. John Dryden describes a species of poetry of his day (not by any means extinct yet,) as

"Decoctions of a barley-water Muse ;"

and the critic frequently makes the old element, water, a

comparison to the no great advantage of his author. But if the philosopher can thus perceive a difference in the ideas according to the potations of the writer, the physician can still more distinctly distinguish the body diluted with water from that accustomed to a stronger drink.

The necessity for liquids to the system appears to be greater than for food, if we are to believe the remark that thirst is more difficult to be endured than want of food. This we should expect from the large consumpt of the fluids of the body in the different secretions, and from the circumstance that there is no store for fluids in the system. We have the fat in the cellular membrane to supply food for a time, but we have no receptacle for water. When required it must be supplied from without. In the remarks upon digestion we spoke of the quantity of food to be taken, and the proper times for taking it. Does the quantity of fluids drank, and the times for drinking it, concern the health as much as the quantity of food and times for taking it? It has been observed that persons who drink very little water seldom enjoy uninterrupted good health. The quantity of drink taken will depend upon the quantity of the fluids of the body consumed. Whatever increases more especially the flow of the perspiration, will increase the thirst. By much or violent exercise, and by external heat, the desire for drink becomes greater. A rise in the temperature of the body, as in fever, is always accompanied with a desire for cold liquids. Certain substances in the stomach, as salted foods, occasion a very great thirst. A certain quantity of fluid is required by the stomach for the proper completion of the process of digestion. Some persons furnish enough of saliva for that purpose: others require to take drink. Too much fluid in the stomach is, however, more injurious to digestion than too little; and to persons with weak stomachs a habit of taking liquids with their food should be as much as possible

avoided. A man may be allowed, whether sound or sick, drink when he is thirsty ; but he will require less of it if he drink slowly, and allow the fluid to spread over all his fauces.

WATER.—Water is the only proper diluent, and the only liquid proper to appease thirst. It should contain as few foreign matters as possible. Distilled water is the purest, but it has a faded and vapid taste from not containing air. By exposure to the atmosphere it absorbs air, and more especially fixed air or carbonic acid gas, and loses the vapid taste. Boiled water has the same taste as distilled water. The hard waters, or those containing some of the earthy salts, are by no means injurious to the health, unless these exist in them to a very large extent, when they are supposed by some to lay the foundation for stone in the bladder. Water containing any animal or vegetable substances in a state of decomposition, is unfit for drink. *Rain water* is very pure, at any rate such of it as is collected in an open country, and after the rain has poured down for some hours—the first fall of rain containing any impurities that may have collected in the air. *Spring water* is by far the best for drink, when not containing much earthy salts ; then *well water* which is raised from a silicious stratum ; and lastly *river water* which runs over a rocky bed. Water when cold, or when warm, removes thirst better than when merely tepid, and water which is only slightly or sensibly cold refreshes much better than water which has been cooled very far down. “Water drinkers are, in general, long livers, are less subject to decay of the faculties, have better teeth, more regular appetites, and less acrid evacuations than those who indulge in a more stimulating diluent for their common drink.”*

JUICES.—The juices used for the purpose of removing thirst are those of the lemon, the lime, the orange, and of

* Saunders on Mineral Waters, 2d ed. p. 480.

different berries. They contain a large quantity of water, having united with it more or less of acid and of sugar. They are refreshing in proportion to the quantity of water and acid contained in them, and nourishing in proportion to the sugar. We do not know the reason why acidulated water should remove thirst more than water not containing any acid. For the ancient explanation of the causes of thirst and effects of acid, see p. 282. The preserved juices are frequently diluted with water, and allowed freely to the sick when thirsty.

INFUSIONS AND DECOCTIONS.—The infusions and decoctions are solutions of some of the proximate principles already noticed. The two most frequently used are *tea* and *coffee*. Much has been said and written on the comparative value of these, and their effects upon the human body. Both contain an aromatic and stimulating principle, along with a substance somewhat of the nature of tannin; and coffee likewise appears to contain an oil which acquires an empyreumatic flavour by the roasting. On the animal economy they act as stimulants, the first being most exciting, the latter most corroborant or tonic. The first taken in excess exhausts and weakens the nervous system. This effect is ascribed by many to the infusion being drank very warm; but though this must weaken the stomach, yet tea contains some principle which affects the sensorium. That there are substances which act almost exclusively on the nervous system, is proved by the effects of strychnine—the principle contained in the *nux vomica*. The stimulus of tea is followed by a diminution of the vigour of the nervous system. The stimulating principle contained in coffee is not followed with this effect, unless in some constitutions, where the persons are said to have got as much inebriated with coffee as with fermented liquors. When these liquids contain cream and sugar, of course they will be so far nourishing.

The principal advantage of tea and coffee is as a diluent, and a mild stimulant. Taken at the first meal in the morning they in some measure wash out the stomach ; and they supply the loss of the fluids of the body during the previous night. Taken after dinner they gently stimulate the stomach to the digestion of the food, and by diluting the chyme assist its passing into the duodenum. Unquestionably much more importance is ascribed both to tea and coffee, as to their influence as a part of our food, than they deserve.

FERMENTED LIQUORS.—*Ale* and *Porter* are prepared from the same grain, but differ in this, that the ale contains nothing but as much of the bitter of the hop as will serve to keep the infusion of malt from running into the acetous fermentation, whilst the porter, besides containing much more of this bitter, holds other substances in solution. Porter is, in fact, a composition known only to those initiated into the mysteries of the brewery. These liquors contain a quantity of sugar, gluten, mucilage, bitter extract, alcohol, and carbonic acid. They are stimulating in proportion to the quantity of alcohol they contain, and nourishing in proportion to the mucilage and sugar. The constitution acquired by the use of fermented liquors is, to all appearance, the same as that from the mucilaginous foods. The body is fat and plethoric, but, at the same time, not muscular, and by no means powerful or vigorous, except when under the immediate stimulus of a large quantity of the drink. The alcohol contained in it acts on the *sensorium*, and the beer drinker is indolent, dull, or choleric—a dolt, or half a savage, whilst drunk. We all know Mr. Boniface, who fed purely on his ale, drank his ale, and always slept upon his ale ; and we know that the same *honest* innkeeper must have been intended to represent, in rotundity, one of his own ale puncheons ; whilst his wife again, always wishing to qualify the ale with a dram, was a poor thin sickly woman, that went to her grave

after an Irish gentleman had presented her with a dozen bottles of usquebae. The constitution acquired by the constant use of fermented liquors, the beer swiller's, is the worst possible to endure disease, worse even than that of the wine bibber or whisky tippler. The system will not stand depletion when the disease is inflammatory, as it often is ; and when of a cachetic character, there are no medicines that have much effect on the diseased chylopoietic viscera of the beer drinker. Witness the effect of disease or injury on the London brewery draymen.

WINES.—The vinous liquors contain, besides alcohol, mucilage, sugar, tannin, extractive, acid, and colouring matter. Their effects on the body consequently will vary according to the prevalence of any one or two of these principles. They may be classed according to the quantity of alcohol they contain, as Madeira, Sherry, Port, &c. ; or according to the other principles most abundant in them. They are commonly divided into five classes.

1st. The *sparkling wines*, or those containing a large quantity of carbonic acid, as for instance, Champaigne. The sparkling wines do not contain much alcohol, owing to the process of fermentation being stopt by bottling the wine. They contain, from the same cause, a considerable quantity of sugar. They are stimulating, principally from the carbonic acid raising the alcoholic portion of the wine, and applying it more extensively than it otherwise would be to the mouths of the absorbents of the stomach, but there not being much alcohol present the stimulating effects are soon over.

2d. The *sweet wines*, or those containing a large quantity of free sugar. They are Malmsey, Constantia, the wines of Chios, Lesbos, Candia, &c. In these the process of fermentation is stopt by burning sulphur in the vat, or pouring sulphuric acid into it. They are very luscious and nourishing, but when taken in large quantities are very injurious to the

stomach. They are used only in small quantities as a dessert wine.

3d. The *astringent wines*, or those containing a large quantity of tan, as for example Port. They are prepared by fermenting part of the stalks along with the grape, and owe their astringency to the tannin dissolved out of the stalks and skins. Port wine, so extensively used in this country, contains a larger proportion of alcohol than the natural wine which is used in Portugal. It is expressly prepared for the English stomachs, by adding a large quantity of brandy during the fermentation. This is called *fretting in* the brandy, and port wine, unless made strong with alcohol in this way, would not meet with a sale in the English market. This wine is stimulating, but it agrees well with the stomach, and is a valuable tonic.

4th. The *ascendent wines*, or those in which there exists a large quantity of tartaric acid. In these wines the fermentation is completed, and has even passed somewhat into the acetous fermentation. These wines, of which the principal are the Clarets, are very light, containing but a small quantity of alcohol. They are consequently the least heating of any of the wines, but seldom agree with the dyspeptic.

5th. The *dry wines*, as Sherry and Madeira, contain the largest quantity of alcohol, and are consequently very heating. They are fully fermented, and are not sweet, nor ascendent, nor astringent. They agree well with the stomach.

The *home-made wines*, or those prepared in this country from different berries or fruits, contain generally a larger quantity of alcohol than the foreign wines. They are very heating, and generally do not agree with the stomach, creating severe headache. Their inferiority to the Continental wines is said to be owing to their containing principally malic acid, whilst the other wines hold the tartaric acid in solution with only a very little malic acid.

The fermented juice of the apple and the pear, or *cyder* and *perry*, is used as a drink, and from the acid and sugar contained in it, is considered both agreeable and refreshing. It is neither so nourishing as the malt liquors, nor so heating as the wines. When drank before the fermentation is fully completed, it acts on the bowels, and brings on diarrhœa.

ALCOHOLIC LIQUORS.—Alcohol is obtained from all the fermented liquors, or from infusions of grains containing fecula or mucilage and sugar, or from solution of sugar with gluten. It is more or less diluted with water. It likewise contains frequently a colouring matter, which may be removed by re-distillation, or by filtration through animal charcoal, and an essential oil which gives the peculiar aroma or flavour to each spirit. *Brandy* is prepared by distillation from wine. The best wines give the best brandy, and the brandy of France is preferred to every other, because it is free from a disagreeable essential oil contained in them. Brandy is cordial and stomachic in small quantity. When taken to the extent of producing intoxication it occasions very great derangement of the stomach and severe pain of the head. *Rum* is prepared from the sugar cane, sugar, or molasses. The colouring matter contained in it may be removed in the same way as from brandy. On the system rum is heating, and much more sudorific than any of the other spirits. *Gin* or *Hollands* prepared from an infusion of malt and rye, and flavoured with the oil of the juniper berry is heating, and very diuretic. *Whisky* prepared from malt, or unmalted grain, is likewise heating and diuretic, but not possessed of nearly so powerfully diuretic properties as the *Hollands*, of course from not containing any of the oil of juniper. *Arrack* prepared from rice, or the pith of the palms, is likewise heating, and somewhat diuretic.

With regard to all these kinds of ardent spirits it may be remarked, that they are more injurious to the stomach the

stronger they are, *i. e.* the more alcohol they contain. Drams are much more noxious to the stomach than grog or punch, on account of the strong spirit being applied to the delicate inner coat of the organ. Grog is not so safe as punch, because, in the first place, it is not taken with sugar—and sugar in some way modifies the action of the spirit—and in the second place, as it is taken cold, it does not pass off by the skin which the warm punch does rapidly. The acid sometimes added to punch likewise seems to prevent the inebriating effects of the alcohol, to a considerable degree. The long continued use of alcoholic liquors produces weakness and emaciation, and leads to a numerous train of nervous affections in the first place, and ultimately to the most incurable disease of the chylopoietic viscera, attended generally by dropsy. The mind is not rendered dull and stupid like that of the drinker of beer: it is at first brightened intensely, and appears ultimately to have been consumed as it were by its own fire. The clog may be removed from the mental workings of the beer sot; but the intellect of the dram drinker is not checked by want of exercise or by foreign impediments: the machinery has been shattered and knocked to pieces beyond the hope of repair. Emaciated in his frame, dropsical, diseased in his stomach and his liver, with a mind that has lost all that is dignified and majestic in his species, the tippler, in the prime of his years, crawls over the earth in the imbecility of premature old age—despised and shunned by old friends and acquaintances—without an affection for one living thing—without the least spark of shame or feeling—caring for nothing—valuing nothing, but that glass which his now palsied hand will not allow him to carry full to his mouth, and for which he has bartered independence, fortune, fame, and even honesty.

DRINK AS A THERAPEUTIC AGENT.—The mere satisfying of the thirst should be allowed to every patient, and for that

purpose water will be the best adapted in almost all cases. Practitioners are much questioned by friends as to the drink to be given ; and these friends have a great unwillingness to allow *cold* drinks, especially *cold water*, to patients. This is a great mistake. Where cold water is desired, let the patient have it, for cold water is as good a refrigerant as can be given. The juices are sometimes added to water. They make the drink more agreeable to the palate, but as to the temperature it is the same as cold water. The friends give this drink to the patient because they consider it medicated. Dr. Saunders states it as corresponding with his experience that tepid water is often of great advantage in weak and delicate stomachs that are unable to digest the food properly, and especially in those subject to heartburn. I have seen it sometimes useful in dyspepsia. The thermal mineral springs never weaken the stomach, but strengthen it and increase the appetite. It no doubt depends upon the internal heat being thus artificially increased. The use of the other drinks will depend upon the disease under which the patient is labouring. Weak tea, and not too warm, may be allowed, wherever it does not disagree with the patient's stomach. It is merely flavoured water. Coffee is not agreeable when very weak ; and there are few that will take it in that state. Much has been said as to the comparative value of ale and porter in cases of disease, where such stimulants are proper. The best way is to use the one that agrees best with the stomach, and this can be only ascertained by trial. If ale create acidity, and diarrhœa, as it often does, let porter be tried, and if, in another case, porter create headache, and torpor, and restlessness, let ale be had recourse to. Recollecting the composition of these liquids, and their nourishing effects, we will have recourse to them where our object is to fill up the body and to support it. Often the emaciated and worn out patient will find the greatest advantage from the use of

the malt liquors. They ought to be used only when fresh and ripe. When new or when faded they create disorder in the bowels.

The wines again are, properly speaking, articles of the *materia medica*. Their exhibition requires the same knowledge and discrimination in the physician, as the exhibition of opium, or the use of the lancet. As in the case of malt liquors, we will be directed in the use of the different wines according to their effects on the system and the stomach. In general it is found in accordance with the remark of the Sallernian school, that the white wines agree best with the stomach of the invalid. He himself, however, will be the best judge, and to him we should leave it. The alcoholic liquors are very seldom prescribed. They are only used in great sinking of the powers of life ; and in that case it is perhaps a matter of indifference which is used. The best is that which is readiest at hand. Brandy, however, is generally preferred as a medicine, being considered most cordial. They may be either used alone or with cold or warm water.

LECTURE TWELFTH.

SECRETIONS.

[The Secretions are not the agents of health, but the effects of it. As, however, they are likewise the signs of health or disease, and as we can act upon some of them so as to cause or remove disease, I have thought it proper to add this Lecture.]

THERE is a constant change going on in the system, a constant absorption of old particles and deposition of new. The blood is not only the *pabulum vitæ*, the purveyor of the new material, but it is the scavenger of the old. It takes up, and it lays down ; and from it are furnished all those numerous fluids which are necessary for the performance of the functions of different parts of the body. Through it the *debris* of the old constitution is constantly being thrown off. To all fluids separated from the blood, the name of *secretions* has been given. The term *excretions* has likewise been used synonymously with secretions ; but it is more correctly applied to such as remove the old material of the body, or are thrown out as not necessary to it. Thus the expired air is an excretion, being composed of carbon which is thrown off by the lungs, and that part of the atmospheric air which is not required by the body ; the alvine dejection again is composed in part of the bile and pancreatic fluids and mucus of the intestines, but principally of that portion of the food which is not nutritious. The urine again is wholly separated

from the blood, and so are all the other fluids, whether they may be excremential, as the cutaneous perspiration and pulmonary exhalation, or intended to assist in the action of some organ, as, for instance, the saliva, the bile, the pancreatic juice, the tears, the sebaceous fluid of the skin, the mucus, &c. Most of these secretions, though necessary for the performance of certain functions, are not taken back into the system, and therefore may be considered likewise as excremential: thus the mucus of the nose, the wax of the ears, the tears, &c. are not reabsorbed, and therefore are excretions.

All the secretions go on independently of our will. We may increase or diminish them by substances which are applied locally, or which act through the system. The passions affect them, but these states of the mind must be called into action by something external to the body, or something acting upon it. Fear, anger, pain, &c. will diminish or increase certain secretions; but our mere *volition* has no influence on them. We can check the perspiration by the application of cold, or increase it by the application of heat, or the internal use of the substances called sudorifics; we can increase or diminish the caloric of the body by certain substances; we can loosen and astringe the bowels by some medicines, but “Who can hold a fire in his hand

By *thinking* of the frosty Caucasus?

Or cloy the hungry edge of appetite

By bare *imagination* of a feast?

Or wallow naked in December's snow

By *thinking* of fantastic summer's heat?”

Of these secretions some are going on constantly, others only at particular times. Thus the secretion from the kidney suffers no interruption; the gastric juice, we have reason to believe, is only secreted at particular times, and the same is the case with the semen. Some too vary in quantity, being more abundant at one time than at another.

As the uninterrupted discharge of two of the secretions—the urine and the fœces—would be attended with considerable inconvenience and disgust, Nature has kindly prepared a receptacle in which they are retained until a quantity has been collected, and she then intimates to us, by a sensation which cannot be mistaken, the necessity of emptying them. They have therefore been called the *retenta* or *retentions*. The rejected air from the lungs is thrown out constantly, because it has no inconveniences attending it. The same is the case with the pulmonary exhalation and the insensible perspiration. But though intimation is given to us of the proper time to discharge these receptacles, still they are so far under our command that we may for a while pay no attention to the intimation.

Derangement or irregularity of the secretions is followed by a greater or less derangement of the health, according to the importance of the secretion. In some the health is principally and directly affected, in others in a much less degree and secondarily. The stoppage of the cuticular exhalation is immediately followed by fever; the stoppage of the secretion of the tears is followed first by inflammation of the eye, and then by disorder of the general health. The retention of the fœces brings on disease of the bowels, and this brings on general derangement of the system. Diseases of an acute character are very frequently brought on by our permitting any foreign agent to interfere with the secretions; and diseases of a not less dangerous character and not less distressing, though more tedious, are brought on by our not attending properly to our retentions, or the call made for the emptying of the bladder and bowels.

The secretions may be divided into those which are habitual and continuous; into those which are temporary; and into those which are accidental, or the effect of disease.

CONTINUOUS SECRECTIONS.—To the first class belong the secretions of the skin ; the pulmonary exhalation ; the mucous secretions ; the secretions necessary to digestion ; and the urine.

Perspiration.—The *insensible* perspiration is either carried off by the atmosphere or by the clothes. It is not always equal in quantity. Whatever increases the force of the circulation augments it. It is, consequently, less in winter than in summer, and in a moist day than in a dry one. It is less immediately after food has been taken into the stomach, and, when the chyle has been formed, increases again. The depressing passions of the mind diminish it, the exciting increase it. It is intimately connected with some of the other secretions, more especially the urine, for when the one is diminished, the other is increased, and vice versa. When morbidly lessened, nature seeks relief by an increased discharge from some of the mucous surfaces, as for instance from the nose and trachea in common cold. In some persons, and particularly in some women at every time, and in almost all at the period of menstruation, an odour arises from the body, which is ascribed to the cutaneous perspiration. It is, however, more probably owing to some change in the matter secreted from the mucous follicles, or small glands which secrete the oleaginous fluid that lubricates the skin. In these persons the quantity of this secretion is increased, as seen by the oily tinge which the linen acquires. The *sensible* perspiration, or sweat, is commonly considered as merely the cutaneous exhalation increased in quantity, but some physiologists are inclined to think it a distinct secretion ; or that it is a disease, or an exertion of nature to relieve herself. They place it therefore amongst the accidental or morbid secretions. The state of the perspiration exercises a very extensive influence, and an interruption of it is invariably followed with severe consequences on the system generally. It is best pro-

moted by warmth, by a clean state of the skin, and by moderate exercise. By checking it, which is most effectually done by cold, inflammation falls upon some mucous surface, the pharynx, larynx, trachea, internal coat of the nostrils, internal coat of the bowels; or on the serous secreting organs, the pleura, peritoneum, tunica arachnoides, synovial membrane, &c.; or it is followed by general inflammatory fever. It is a mistake, however, to say that perspiration can be entirely suppressed by cold. The amount of transuded liquid may be diminished; but if the air be dry, the loss by evaporation will be increased. Even supposing the air to be humid as well as cold, there will still be some evaporation, in so far as the air, by coming in contact with the body, has its temperature raised, and therefore will have its capacity for moisture increased. If the air be warm and humid, then evaporation will be diminished, but transudation more abundant.

Pulmonary Exhalation.—The pulmonary exhalation is similar to the cutaneous, but is not, like it, so liable to be affected by the application of cold. The organ from which it comes is liberally supplied with blood, has a regular and steady motion, and, if not the furnace in which the heat of the body is kept up, at any rate is not affected by the cold air to any thing like the same extent as the skin. There is no transudation in the lungs, or if there is, the fluid must be carried off in vapour. The quantity of vapour exhaled from the lungs will depend much more than the skin upon the hygrometric state of the atmosphere. If the air is warmer than the body, and humid, this exhalation may be suppressed, as there is no evaporation.

The rejected or excreted gases from the skin and the lungs interfere with the health, when they are kept long in contact with the body, and expired air is unfit to be breathed again. A free ventilation is of the utmost importance, in

order to remove these gases, and to mix them with the atmospheric air, so that they may undergo the decompositions or the changes necessary for their performing services in the economy of nature, for which they, as well as every other excretion from the human body, are intended.

Mucous Secretions.—These secretions are not so much intended for removing the old parts of the body,* as for assisting certain functions; or rather they are necessary for the proper performance of the functions of certain parts. They are found in all passages, and their use is either to prevent their walls from adhering, or to preserve the fine and delicate membrane covering them from the action of acrid matters taken into, or sent from, the body.

These secretions are very apt to become deranged, and when they are so the system always suffers. They may be either diminished, or the secretion may be much more than is requisite for the proper function of the part. Those in parts much exposed to the atmosphere are very apt to be affected by cold. A diminution of the secretion takes place in consequence of the constriction of the secreting vessels, and this constriction arises from inflammation in the mucous membrane. Or, from the astringent property of the cold air the constriction is first brought on, and is followed by inflammation. Whichever may precede is little matter. Both are present, and the quantity of the secretion is much diminished. In other cases, and especially in the inhabitants of cold and moist countries, the quantity of the secretion is often very much increased.

The secretions from the lining membrane of the bowels, and of the urethra, are not by any means so liable to be affected directly by the state of the atmosphere, as by acrid substances passing over the membranes. They are some-

* Raspail says that much of the debris of the body is found in the mucous secretions.

times affected, however indirectly, by the atmospheric air, viz. when it checks the perspiration. In preserving the regularity of these discharges the extremes of temperature must be carefully avoided, as also the application to the membranes of any poisonous or mechanical irritants. There is one irritant which folly introduced, and fashion has retained, fortunately now only amongst the male part of the human race, viz. snuff. It produces at first an increase of the discharge from the mucous membrane of the nostrils, but it ultimately diminishes this discharge, and very much injures the sense of smell. It may be occasionally of service in some diseases, but to the sound and healthy it cannot but be injurious.

Secretions belonging to digestion.—The secretions that more particularly concern the digestion of the food are the saliva, the bile, and the gastric and pancreatic juices. The quantity of the *saliva* is very much affected by the mind, and by the application of certain substances to the membrane of the mouth. The idea of a good dinner, excited by a savoury smell, increases the quantity of the saliva, and the same is the case by the chewing of those acrid substances usually called sialagogues. The practice of smoking tobacco cannot be more approved of than that of snuffing the same weed. Smoking, as well as chewing tobacco, increase the salivary discharge, and to persons not accustomed to them act as a narcotic. In moist and cold countries the stimulus from smoking is, in a considerable measure, a prophylactic to the complaints indigenous in such places; but in other cases, unless where *prescribed* as a remedy for some disease, it can only be considered as a very expensive, and a very dirty habit, and ought not to be allowed to the sick.

Over the other secretions, the *gastric juice*, the *bile*, and the *pancreatic juice* we cannot exercise so much controul. The quantity of bile we have reason to believe is affected by

the temperature of the atmosphere—at least to an additional secretion of this fluid we ascribe the bowel complaints so common in warm climates. It is likely that the bile, as well as the gastric and pancreatic fluids, may be affected by the different foods taken into the stomach; but the particular action of each food on these secretions, and effect of this action on the general health, we do not know.

It is necessary that the *fæces* or rejected parts of the food, and likewise those parts of the secretions belonging to the digestive organs, and not absorbed, should be passed from the bowels. The proper time for this is not the same in all individuals, and, in the greater number, it is so far ruled and governed by habit. The child's dejections are frequent. The adult again has generally, when in full health, only passage once in the twenty-four hours. It is a foolish thing with many to insist that a person cannot be healthy unless he has a dejection from the bowels daily. Much will depend upon exercise, food, drink, season of the year, and more especially constitution of body. A man may enjoy perfectly good health, although he has passage from his bowels only every second day, or every third day, provided such has been the case for a long period of time with him. It will, however, be a very different thing if this person only permits himself to have passage at these long intervals, or if he disregards the calls of nature, and taking the matter into his own hands, goes to stool only when *he* thinks fit and convenient. A very extensive part of those diseases which flesh is heir to, arises from this inattention to the call to empty the abdominal canal. Wherever there has been a departure from the *daily practice* of emptying the bowels, disease in some part of the body or other will not be long of following. Even when the bowels have not been opened at the *usual* time, the system becomes aware of it. There is

not pain, but a general feeling of uneasiness, a weight upon the spirits, and an irritability of mind. A facetious lecturer was so satisfied of the importance due to this excretion, and its effects upon the mind as well as upon the body, that he was in the practice of saying to his pupils, "if you want a favour from a great man, never call upon him until he has been at stool; and even if you desire to be heard favourably by your sweetheart, it is worth while to bribe the maid to let you know if her mistress has been lately at the water closet." This was filthy, but it was truth. "Who knows not," says Majendie, "the marked effect which the accumulation of the fecal matter exerts upon the moral disposition?" So satisfied are many medical practitioners of the very great frequency of disease arising from derangement of the bowels brought on by neglect of the calls of nature, that they seldom or ever use any other medicines than purgatives. The state of the bowels is to them the first and sole object. In them they find the prolific mother of maladies.

The same error into which some practitioners fall, with regard to the time, is likewise common with regard to the quantity, colour, and consistence of the excretion. On the average it amounts to four or five ounces, and it is commonly of a deep brown colour, (like "wetted rhubarb," observes Mr. Abernethy,) and of a firm consistence, but not hard, nor evacuated with pain or difficulty. In some persons the quantity may be greater, and in others less, from the same weight of the same food. This will depend upon the powers of digestion. The colour will often depend upon the nature of the food, as will also the consistence. Provided health is not interfered with, neither the quantity, colour, nor consistence of the secretion from the bowels need be attended to.

Urine.—The secretion from the kidneys goes on regularly, and the urine, provided there is no mechanical obstruction,

passes immediately along the ureters into the bladder. The quantity of urine will vary according to the quantity of drink, or diluents, that has been taken into the stomach, and according to the quantity of the other secretions. If the stools are copious and watery, or if the perspiration be very abundant, the quantity of urine will not be increased. The action of the atmosphere upon the secretion of the skin influences the secretion from the kidneys. If the atmosphere be cold, and if it be at the same time moist, the urine is copious and limpid. If the atmosphere again be warm and dry, the urine is in small quantity and high coloured. The reason is evident: In the one case the perspiration is diminished, in the other it is very much increased.

The colour of the urine varies from different causes. We find it very frequently coloured by the food we eat; and, in other cases, we find its colour depending upon certain affections of the body or the mind. Attempts have been made to distinguish diseases by the appearance of the urine, and to the physician, the physical as well as the chemical state of this fluid will be often of great importance in assisting him in the diagnosis; but there never was a more gross example of charlatanry, and imposture, and ignorance, than the practice of Water Doctors, who offer to decide on the disease solely by the appearance of the urine.*

* *Uroscopie* was much in fashion in the days of the famous Radcliffe, and a woman having brought him the urine of her husband, put the phial on the table, along with a small fee, telling Radcliffe, that hearing of his great fame, she had made bold to call on him for a remedy, for her husband who was sick in the country. The Doctor enquired what trade her husband was of. "A bootmaker," answered the woman. "Very well," replied the Doctor; then taking the bottle, and retiring for a little to make the necessary substitution; "take this home with you, and if your husband will undertake to fit me with a pair of boots by its inspection, I will make no question of prescribing for his distemper by a similar examination."

The call to make urine, like that to empty the rectum, depends greatly upon habit—indeed much more than that of going to stool. A person will make water when going into bed, even though he made water not five minutes before, and a person will often make water when he comes to a place where he has been in the practice of making it very often, even though he is satisfied that his bladder can contain little or none. Children empty the bladder, as they do the rectum, at the first intimation by nature. In old age the sphincters lose a considerable part of their power, and some old persons are subject to an incurable incontinence of urine, whilst in others the sphincter of the anus, if it does not permit the escape of the fœces, cannot prevent the egress of flatus. We often neglect the call to empty the bladder. When this call depends upon associations, and not upon the quantity of water, no harm can follow the inattention ; but when it arises from the bladder being actually full of urine, the neglect is accompanied with severe pain, and is followed by consequences which soon prove fatal. The effects of a resistance here are much more immediately injurious to the individual, than the resistance to the calls to empty the bowels. The intestines will dilate so far, the watery part of the fœces will be absorbed, and there is the long hollow tube in which the fœces can collect. But the bladder will not bear much dilatation ; little or no absorption takes place of the urine ; and the bladder and ureters being filled, the secretion still goes on and must have exit. The consequence is, the bladder bursts, and death immediately follows. Perhaps, before this event, he has an opportunity of making his water, and he finds he cannot pass a drop, for the bladder has become paralyzed, and will not contract. This last is an accident that often occurs to young persons ; and in females, were the passage from the bladder not so short, it would very fre-

quently occur. It arises from their being placed in situations where a false modesty, or a sense of delicacy, more rules them than the most acute bodily feelings.

TEMPORARY SECRECTIONS.—These secretions are connected with the reproduction of the species; and occur only at a certain age of life, and only then at certain times. They are the menses and the semen.

Menstruation.—That periodical discharge which takes place from the uterus during the period of life that the female is capable of bearing children, has been a fruitful source of discussion to physiologists. It was believed to be blood separated from the blood-vessels of the uterus, but it is now placed by some as a distinct secretion from vessels adapted for the purpose. Under ordinary circumstances the menstrual discharge is not pure blood, but rather serum coloured, and having a peculiar odour; but, when in very large quantities, it is found to coagulate, and to possess all the other appearances and properties of blood.

Menstruation has been held a matter of much more consequence to female health than almost any other secretion. By women it is considered as of the very first importance, and any alteration from the usual state is looked upon as the most unequivocal indication of derangement of the body, and of the necessity for the advice of a physician. The general health, however, may be unimpaired, and yet this secretion may not be the same as in the majority of women, or as in the same woman formerly. These are often troublesome cases for the medical attendant, and unless he can, by some medicine, restore the discharge, he stands every chance of losing his patient's favour. It is generally the case that the cessation, or the alteration, whatever it may, of this discharge is the symptom of some disease, and the object is not to restore the secretion, but to restore the health, and when that has been accomplished the secretion will return.

Semen is, in every respect, a natural secretion, and consequently necessary for the health. It is in a great measure affected by the mind, but yet it is not much more exclusively under its command than the secretion of the saliva. The organs exist, organs elaborately and finely formed, and they surely were not made to be useless. Let hypocrites say what they will about mortifying the flesh, and subduing the earthly man; it is all arrant imposture, and the most holy monk that ever conned breviary is not less a man than he who mixes with the world in all its seductions; and beautiful and lovely as is female virtue, she who devotes herself to celibacy is not less—nay, perhaps more, acting against nature than she who gives herself up to immoderate sexual indulgence. It will not do to tell a physician, that a man or woman whose organs of generation are perfect, will pass through life unaffected by sexual desires. Nature will have her way, and advantage will be taken by her of the moments when sleep has overpowered the deep resolves of years, or the individual will become the victim of disease.*

* Aussitôt que la grande crise de la puberté est accomplie, la liqueur prolific ramassée dans les vesicules avertit, par l'excitation qu'elle produit, par la distension qu'elle cause dans les vaisseaux spermatiques, qu'il est temps de se prêter à la conservation de l'espece. Des ce moment la secretion de cette humeur acquiert chaque jour de nouvelles forces; la vue d'un autre sexe, des desirs croissans l'accumulent dans ses reservoirs: elle y prend de l'odeur, de l'âcreté; et il devient tres souvent un besoin pressant pour la conservation de la santé d'en diminuer la quantite. Le mariage est donc l'etat qui convient à l'homme vivant en societe, pour qu'il fasse un usage moderé des nouvelles forces qu'il a acquises, et qui lui deviendrait tres souvent à charge, s'il obstinait à vivre dans le celibat. *Cette verite est si irrefragable, elle si au-dessus de tous les sophismes que les opinions humaines ont enfantés, que Tertullien et plusieurs autres premiers peres de l'eglise ont ete forcés de convenir qu'il fallait se resoudre à une operation honteuse, si on voulait faire du celibat un vertu sacerdotale.* This, if to be done well, ought to be done early—at any rate before puberty.—Foederé Tom. i.

In the female sex the sensibility of the body being greater, abstinence is so much the more insupportable : and though a well regulated, and still more, a religious mind, aided by that sense of modesty so commanding to the female, does overpower the desires, and leads her by its bright and shining light to glory through her maiden life, yet the mental satisfaction and pride are often dearly purchased by the bodily suffering, by chlorosis, hysteria, melancholy, and numerous other severe ailments. The victory is the greatest that the female can achieve, and all who know it to be so, should give her full credit. Ridicule has fired its shafts at her without remorse, but there is not one more deserving our pity for her sufferings, and our admiration at her strength of mind, than she who is vulgarly called an old maid.

Towards the male we cannot have the same feelings, for he has it in his power to take a wife. It is but a very poor excuse to say his means will not permit him. It is merely an excuse for idleness. The diseases to which he will be a martyr are not less severe than those belonging to the female, but it is seldom, indeed, that he is abstemious, and therefore seldom that we see them. It is much too frequently the case that the diseases affecting him are the effects of over indulgence. We have daily to prescribe for the worn out debauchee, almost never for the anchorite. To be old in one's youth is the characteristic of the rake that indulges in venery to excess. To cast away his manhood ; to throw out of his day of life the brightest and best hours of man's existence ; to jump at once from the spring of youth to the winter of old age, without once seeing or enjoying the intermediate seasons ; to pass from the bracy vigour and elasticity of newly arrived puberty to the tottering feebleness and little pitied helplessness of premature old age ; to give the mirth and spirits of youth, and the promising hope of a glo-

rious mental exhibition in the prime of years, for imbecility of intellect, and the low disgusting twaddle of debauchery—these, and more than these, are the debasing effects of this excess. Well does the poet furnish the conclusion.*

The diseases accompanying this broken down state of the constitution are always difficult to cure. Whilst he has the power to continue his habits, such a one will not give them up, and even on the bed of sickness, and when physical capability is gone, he is pleased and delighted with allusion to the disgusting scenes he has seen and acted in his former days. It generally happens that the rake is likewise the drunkard, and two better means could not be devised for ruining the constitution. There is just one hope which the Poet facetiously rests upon their habits, and that is,

“T’would clap the Devil for to fetch their souls.”

And so he is likely to let them alone.

To provide for the intentions of nature, with regard to the sexual secretions, we have that most blessed of all institutions—*Marriage*. It can be shown that marriage is much more advantageous to health than celibacy, or promiscuous intercourse. Dr. Haygarth has proven by his tables, that during a specified period, more unmarried adults, of a specified age, die than married, and consequently that the married live longer than the unmarried. Buffon and Deparcieux had previously made the same observation. The latter proved that from 1685 to 1745, very few *Religieux* of either sex lived

* Adde quod absumunt vireis, pereuntque labore ;
Adde quod alterius sub nutu degitur ætas.
Labitur interea res, et vadimonia fiunt,
Languent officia, atque ægrotat fama vacillans.—Lucr. Lib. iv.

And another has well said, in the vernacular :

“ ’Tis *Drink* and *Lust* that does our Health destroy,
And brings the *Man* too soon upon the *Boy*.
Repeated *Bumpers*, and Repeated *Pox*,
Two fatal Earthquakes that our Fabrick shocks.”

to eighty years of age ; that such of them as did not inhabit religious houses, but moved about through the world, lived longest ; and that nuns lived longer than monks. Sinclair likewise tells us, that married women live to a greater age, notwithstanding the accidents and dangers to which they are exposed in that state, than whose who have not been married.

The superiority in the chances of life, in the married state, is perhaps owing to the following circumstances.

1st. The succour and consolation which the married pair afford each other in any affliction or trouble. The friendship that is talked of in the world is nothing more than a name. The only friendship that exists, is that between husband and wife, a friendship which was created by love or esteem, and is now cemented by that best of all bonds, self-interest. Even if the lamp of love has never been lighted, or if so, has burnt out, *he* trusts to the one object on earth that knows best his frailties, and knows himself next best to himself ; and *she* feels most for, and relies most upon him who knows her in like manner, and has become her stay and support. Children become, likewise, the means of linking them closer together ; for the natural affection of the parents to their offspring leads them to look for the best protectors to them, and they well know that the best are those that gave the infants being. The bitter line of Juvenal,

Jucundum et charum sterilis facit uxor amicum,

is exquisitely correct. The barren wife is a warm and loving friend, but the mother of a family looks up to its father with feelings that are much more dear than friendship ever gave. In the married life care is invariably paid to illness in either party, and as this attention is paid from the very commencement of the complaint, it is often successful ; whilst he who lives by himself and for himself, has no one that feels an interest in his well-being, and therefore his sickness which, taken in the commencement, might have been easily remov-

ed, may become, before it is attended to, past the reach of art.

2d. There are certain objects which engage the minds both of men and women, and urge them to exercise and labour. The calls of hunger are imperative on the poor and needy, whilst to the rich the passion of ambition and thirst of glory impel them to abandon idleness and sloth. To mankind in general, however, the most common excitement is the necessity of providing for a family ; and, from the great majority, this demands manual labour, which is the best for promoting health. It is very seldom, indeed, that we find a hypochondriac in a married man with a family depending upon his exertions for their support. It is only amongst the single, or the childless married, or those whose families are grown up, or those who are independent, that we find such a one. It is real sickness which takes the married man from his avocations, when the proceeds of these are necessary for the support of his family. Exercise is more certain to be the lot of the married man than the single, and to this exercise he, in a great measure, owes his better health.

3d. By marriage, the chance of disease from promiscuous intercourse is avoided. The diseases contracted by impure intercourse, may not be, in any case, immediately fatal, but they often weaken and destroy the constitution ; so that the individual sooner sinks under some other disease with which he has become affected, than he otherwise would have done.

4th. Excess in connection is fully more injurious to the health than perfect abstinence, and to any such excess, marriage is the best antidote. The single man who roves through the frail part of the creation, is excited much more frequently than the staid and virtuous husband. Every new face and figure raise the passion of the other for beauties that meet not the naked eye ; and are only seen in the eye of the imagination. The influence of face and figure have ceased to act on the married pair. The only association with Mrs.

Shandy was the weekly winding up of the clock. The married man yields only to the calls of nature, the debauchee yields to the seducing pictures of his own distempered mind ; and the latter being almost constantly in a state of excitation, the body is weakened in consequence.

5th. Not only in the married state is the natural call to the discharge of the secreted fluid gratified in moderation, but the parties, and more especially the female, become more unreserved towards each other, and there is much less of the injurious forms which fashion imposes on the unmarried. A young Lady must be the creature of artifice. She can be thought nothing else than a wax doll possessed of intellect, and the finer feelings of human nature. She is not allowed to be subject to the common necessities of our nature. She must often walk when she is ill able for it, eat little when she is very hungry, say she is well when she is ill, and wear the mask of gladness when her heart is the seat of woe. She has a part to act, and she is not off the stage until she is married. The play is then ended, and she ungirds and undresses herself for a natural character. The divinity that doth hedge a virgin disappears from a wife, and she becomes in every respect a mortal. The character which she formerly held in public, she, in a great measure, retained from modesty and diffidence even in private ; but now she is freer before her husband than she was before her sister. And notwithstanding that the woman who keeps her necessities and the lot of her sex as far as possible from the knowledge of her spouse, will have a charm about her, and much longer retain his early affections, yet, in the majority, there is a wonderful free-and-easiness ; and Swift was correct, though as usual dirty, in that poem where, amongst other things not altogether decorous from a parson, he says

On box of Cedar sits the wife,
And makes it warm for "dearest life."

Much has been said about the age at which a person should

marry, and many have insisted upon late marriages ; whilst an equal number have recommended early marriages. In almost every country, the usual age for marriage varies according either to the constitution induced by the climate, or to favour some political object. In ancient Rome a male could affiance himself at twelve, and marry at fourteen years of age ; a female affiance herself at ten, and marry at twelve years of age. The Athenians, according to some, allowed marriage when the parties had arrived at puberty. Euripides, like a poet as he was, thinks the female is best *επειδ' εἰς ἡβην ηλθε* or when she has budded into womanhood. Francis Rous says, in his *Archæologia*, that the man must be thirty-five years of age, and the woman twenty-six : but Aristotle will allow the woman to marry at eighteen, though he insists that thirty-seven is early enough for the man. The Athenians, according to Rous, married “ in the first Moneth of Winter, (cleane contrary to the custome of the Persians, who thought it fitter to follow nature's example, and set upon the worke of generation in the spring.)” The Spartans allowed thirty years of age for the man and twenty for the woman.* According to Tacitus, the Germans did not permit early marriages. Every one is fit for marriage after puberty, and must be guided by inclination or circumstances of life. In some countries puberty arrives at an earlier age than in others ; and hence will arrive a difference in the age at which they marry. In warm countries, where the woman comes to maturity at ten or twelve years of age, and is past child-bearing at twenty-five or thirty, marriage of course

* Hesiod gives his opinion thus:—

Ωραιος δε γυναῖκα τῶν ποτε οἶκον ἀγισθαί,
 Μητε τρηκόντων ἐτεῶν μαλα πολλ' ἀπολείπων,
 Μητ' ἐπίθεις μαλα πολλά. Γαμος δε τοι ὤριος οὗτος.
 Ἡ δε γυνη τετορ' ἡβῶν, πεμπτῶ δε γαμοῖτο.

Hes. Oper. et Dier. Lib. ii.

must take place very early. In cold climates again, puberty is late of arriving, and the woman continues fit for child-bearing for a much longer period. In this country it is the common opinion that a woman should not marry before twenty-five, nor a man whilst under thirty. The affirmation that early marriages produce a weak population, which, according to Rous, is the opinion of Aristotle—for the Archaialogian says, “he (Aristotle) thinks it very unfitting they should marry so young; both because they travell with a great deal more labour, and labour for their travell with a great deale more intemperance, and also because he had observed that, in those places where they used to make such hast, the Puppies for the most part were blind, not so perfect, or not so bigge of stature as else they would be”—is disproved by Ireland, where the lower classes marry early, and yet where the children are strong and robust. Indeed early marriage is, where the parties can support themselves and families according to their station in society, upon the whole to be preferred. Old men, however, should not marry, their powers of life positively are too low, and it is hastening on their death.

There is an absurd opinion which has been often sounded forth, viz. that literary men ought not to marry. To say that literature destroys the desire or the ability for procreation, is a bare assertion which the experience of every day contradicts; and the reverse of this, that marriage destroys genius, is equally unfounded in fact. Both assertions have been given forth, either by the callousness of some would-be philosophers to women, or by pique from disappointment; and they have continued (as many opinions often are) more from their age than their correctness, more from their oddity than their truth. Monks who are sworn to celibacy, and the diffident and bashful who are distrustful of their favourable acceptance amongst womenkind, may see fit to attempt to

bring others to the same abstinence ; but many of the most learned men have been very prolific. There is an anecdote told of one man, a German juris-consult, I think, that wrote a book, and got a son, for I forget how many successive years. He, however, must stand as rather a prodigy. There is no class of men to whom the comforts of matrimony could be more necessary ; and there is no class of men that in their old age, and the infirmities consequent upon their sedentary habits, require more of woman's fostering care.

As a means of supporting a healthy population marriage is the best ; for though it be a common remark, that illegitimate children are generally the cleverest and the strongest, yet, whatever may be the original strength of their constitutions, they are subjected, in general, to so many privations and hardships in the rearing, that they become frequently diseased and deformed, and a much greater proportion of them die, during the period of infancy, than of legitimate children.

Occasionally it falls to the duty of the medical practitioner to recommend a patient to enter into the matrimonial state ; and sometimes to give an opposite advice. In both these cases, he is deciding as to the effect of the step on the present or prospective health of the individual. In some cases, again, his opinion will more depend upon the progeny that might possibly follow this union—the almost certainty of the malady of some of the parents being entailed upon them, to their own misery and the injury of the state. It will occasionally happen, likewise, that he may have to give an advice to a married pair as to the frequency of their intercourse.*

* M. M. Benoiston de Chateauneuf, and Villermé have furnished much information with respect to promoting fecundity. They prove that spring and summer are most fruitful, that occasions of public rejoicing and merriment tend much to procreation, and that times of scarcity, sickness, as well as cold and marshy countries, retard it. The country, they show, is better in this respect than the towns ; but in the towns the effect of the influence of the season is not so apparent.

Wherever we are of opinion that the disease of the individual arises from abstinence, wherever we think the body is scorched by its internal fires, we should recommend marriage. To many of the complaints of the unmarried and full-grown female, it will be found the most effectual and speedy remedy, to chlorosis, to hysteria, to melancholy, and more especially to religious melancholy. In the male we will not have so often occasion to prescribe this remedy; but it will be found useful in some nervous disorders to which the abstinent man is liable. A good and sensible partner will not only often remove the cause of real diseases; but, by being the best of all companions, will often chase away those imaginary ones which are as tormenting as those which are real. To the man who has given himself up to excess with women, or to a still more baneful and debilitating practice, self-pollution, marriage will be found the most certain antidote. In all such cases it should be strenuously recommended. There is a chance that the constitution will rally, and in no way is excess so likely to be put a stop to.

When marriage, or any circumstances connected with it, would be injurious to any of the parties or to both, an advice should be given against it: Thus, when the pelvis of the woman is so deformed as that there will be a risk of her life, or the life of the infant, during parturition. The same is the case when there is any imperfection or disease about the genital organs of either party. Those much predisposed to phthisis should not marry, as it is said that, besides the weakly offspring which follows, such persons are very much inclined to excess in venery, and that they soon suffer in consequence of over indulgence. Paulo Purganti's wife may be said to convey the sentiments of this class of people. Phthisis is believed by some to be infectious, and that married pairs often catch the disease from each other—another reason for their not sleeping together at any rate.

Persons subject to any singular or inveterate habit, or to any nervous diseases, ought not to marry ; for the person with whom they are married is very apt, from imitation, to acquire the same. Where we have a nervous wife, we soon likewise get a nervous patient in the husband. Persons subject to hereditary diseases of a bad kind, as mania and epilepsy, should not marry. Both diseases are rendered much worse by marriage ; and besides they are almost sure of being entailed on the progeny, by which an immense deal of misery is given to both parents and children. The same is the case with phthisis and scrofula when the parents are strongly predisposed to these. A great difference in the ages of the individuals should be a bar to marriage. The exhalations from the body of a young person have always been esteemed healthy, whilst those from an old are the reverse. There is considerable difference between the breath of youthful beauty, and that of the toothless gummy mouth of age. A votive inscription found at Rome tells us that a man lived 115 years, by sleeping always with young girls.

The rule as to frequency of intercourse will depend on the state of the patient. It must not be allowed in contagious diseases of any description ; nor should it be allowed when either party is labouring under any acute or chronic disease. Even in the case of those who are in perfect health, moderation is necessary here, if they desire the happy name of parent. Whores are almost never fruitful, not from the reason given by Lucretius, (Lib. iv.) but from the one here stated. The girls on the town, when exported, as they often are, for the nimbleness of their upper extremities, to New South Wales, generally become mothers. The Colonists ascribe this to the climate ; we to the long abstinence from venery.

There have been States that interfered in the marriages of the people with a view of improving the breed of the hu-

man race, as jockeys do that of horses. Lycurgus considered it strange that so much attention should be given to rendering more perfect the race of domestic animals, whilst none was given to that of man. This attempt to improve the physical powers of a people, has only been practised in small nations or tribes surrounded with enemies, and when every man was of necessity a soldier and warrior. Such was Sparta; and Spartan brevity was not more marked than Spartan blood, and Spartan prowess, and manliness of body. In large nations this interference in a matter that so much concerns the happiness of individuals will never be requisite. The weak and the feeble will find employment in different professions and trades, and there will be more than enough of the strong and powerful to serve as the defenders of the country.

There is, however, one remark which may be made here, and it is derived from observation both on mankind and the lower animals, and that is, that the intermarriages amongst the same stock depreciate the race both mentally and physically. Such a practice is common only amongst high and aristocratic families, and it is a matter of sufficient notoriety—whether or not true in proportion—that there are fewer wits amongst the high and rich than amongst the poor and needy. England is an exception to this, because wealth acquired by the most plebeian papa, makes his daughter a most fit, and even desirable, match for the man with the best blood of the land in his veins; and, if there was any truth in tales, the masculine vigour of the coachman or groom often flowed in the person of my Lord's heir. The crossing of the breed is not the less beneficial to the race in the bed-room than to that in the stable. Frederick of Prussia was as careful with the breed of his soldiers, as the best English jockey with that of his horses, or a Leicester farmer with his sheep. He insisted upon his

guards—tall, strong, well-formed men—marrying with women possessed of corresponding physical powers. It has often been remarked that the finest race of people is to be met with in garrison towns. According to the soldier's song :

“ His coat it is of scarlet, and turned up with blue,
And every town that he comes to, he finds *sweethearts* enew ;”

and he leaves his strong and healthy body, and his manly bearing, impressed in the offspring of the place. The Turks, notwithstanding the debasing effects of their habits and manners, are a most handsome people ; and this is attributable to their practice of taking the females of Georgia and Circassia, who are not only beautiful but strange, into their Harems. It is generally the case that a beautiful woman is married to an ugly man, or the reverse in both ; at any rate that, though we may sometimes see two beautiful and handsome persons married together, we seldom see two ugly. It is in this case a wise law of our nature by which we desire to possess that of which we have ourselves least. The ugly man knows his misfortune, and whilst he is remedying it as far as he can for his own comfort, he is improving his descendants. The other party must trust to the maxim, “ *consuetudo concinnat amorem.*”

Monogamy is not less of service in a physical than in a moral view. In countries where polygamy is allowed, the births of females exceed that of males, whilst the opposite is the case in the christian States. In the lower animals, the number of females much surpasses that of males. It has been stated as the result of extensive observation, that weak parents have female children. A titled rake often leaves a female as the scion of an ancient stock—

“ Sole offspring of his house and hope.”

ERRATA.

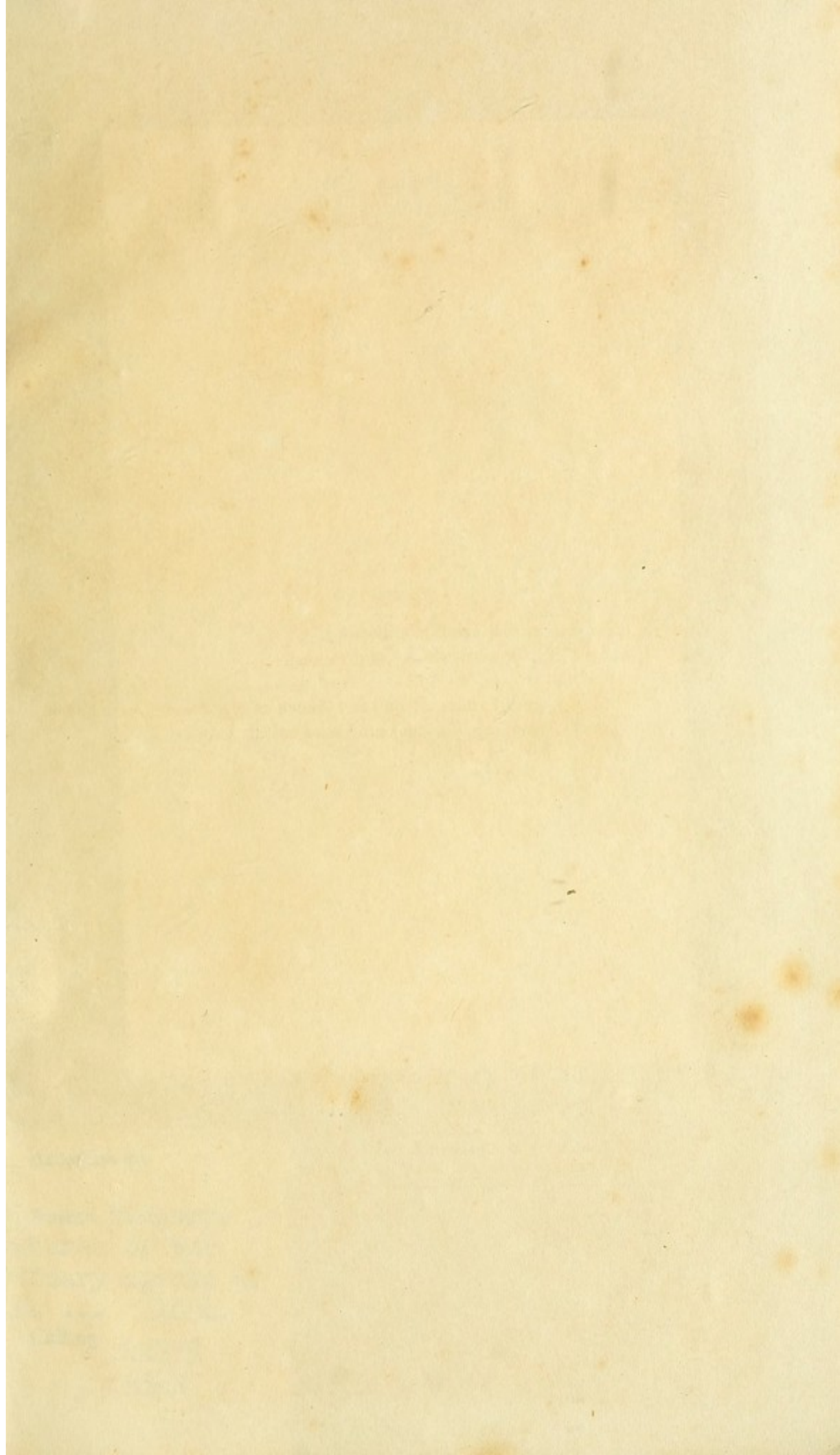
Title page, *for* ἱπιστατίιν, *read* ἱπιστατίιν.

Page 7th, line 17th, *for* preserves, *read* preservatives.

— 37th, line ult. (Note), *for* applique, *read* appliquée.

— 50th, line 4th from bottom, (Note) and elsewhere, *for* Fædere, *read* Foderé.

— 100th, line 5th from top, *for* hot bath, *read* hot air bath.



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