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LECTURES ON NURSING

SMITH

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LECTURES ON NURSING.

BY

WILLIAM ROBERT SMITH

RESIDENT SURGEON, ROYAL HANTS COUNTY HOSPITAL

LONDON

J. & A. CHURCHILL, NEW BURLINGTON STREET

1875

TO THE RIGHT HONOURABLE

SIR WILLIAM HEATHCOTE, BART.,

CHAIRMAN OF THE COMMITTEE,

AND ONE OF THE MOST LIBERAL BENEFACTORS TO THE

ROYAL HANTS COUNTY HOSPITAL,

THE FOLLOWING LECTURES

ARE RESPECTFULLY DEDICATED,

WITH A GRATEFUL SENSE OF MANY ACTS OF KINDNESS

RECEIVED BY HIS OBEDIENT SERVANT,

THE AUTHOR.

PREFACE

THE following Lectures were originally prepared for delivery at the Huddersfield Infirmary. In their present more complete form they have been given to the Nursing staff of this Hospital; and they are now, for the first time, committed to the public, with an earnest hope that they may be found somewhat useful in connection with one of the most important medical questions of the present time, viz. the proper establishment, and efficient training of Nurses for Hospital, as well as private work.

COUNTY HOSPITAL, WINCHESTER;
August, 1875.

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Page 126, line 5, for *Cuneiform*, read *Ensiform*.

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LECTURES ON NURSING

LECTURE I

INTRODUCTORY

THE task of delivering to you a course of lectures upon nursing I undertake most willingly, but yet not without some anxiety, because I fear I shall fail to do my subject the justice its great importance deserves; and, to my mind, it adds not a little to my responsibility when I think that perhaps some trivial word or ill-considered sentence may influence you for good or evil in the performance of your duties to the sick and others entrusted to your care.

I would in this lecture, however, first address a few words of warning and advice, that you may be induced to tread the path you have chosen in such a way that you will not only have reason to look back with pride and satisfaction to your probationership here, but also that you may have the consciousness of doing your duty in that state of life in which it has pleased God to place you.

The calling which you have undertaken is truly a noble and highly honorable one;—one by which you may not only earn a respectable livelihood, but

also in its pursuit do good daily and hourly. Nor is this all, for by the constant practice of those little duties and virtues, which you will see the necessity of every day in your wards, you will feel that you are humbly following in the path pointed out by Him who went about doing good. I hope you will resolve this night, that the opportunities now offered to you, which, if lost, can never be regained, shall be used in the way most beneficial to your patients and to yourselves.

Indeed, if any of you have entered upon your office with any other feelings than those of an earnest desire to do good to your fellow-creatures,—a feeling which makes you long to be with them, to help them, to take care of them, you have made a great mistake in becoming a nurse, and the sooner you seek for some other honest means of obtaining a livelihood the better. Now do not take this unkindly. You may be very good, respectable, and well meaning, yet make very bad nurses. You may be of an excitable or fretful disposition, and find it one of your greatest trials to subdue it. You may be physically unfit, and thus, unable to bear the confinement and fatigue of a sick room; or you may be low spirited, unkind, or sulky. Now if any of these things is really the case with any of you, I should advise such a one not to be a nurse, and especially not to be a nurse to the Royal Hants County Hospital.

There is a great difference between a person when

ill, and the same person when well. When well, he may be agreeable, friendly, and obliging; but when ill, indifferent, ill-tempered, and fretful. You may do some little kind act which you think will promote the comfort of the sufferer, only to find you have irritated rather than pleased him.

And this will be a daily occurrence with you; for no sooner has the sick one become once more well, than fresh cases of sick arrive, with the same fretful, irritable dispositions, to tax your strength and try your temper. Then sometimes the friends of the patients are not civil, nice people; they express no gratitude for all your kindness, but seem rather to treat you as their servant, and indicate by their manner they have been doing you and the doctor a great favor by entrusting their son, or their daughter, or friend, to your care. All this is very hard to bear, I know; but still it is your duty to bear it, and you must bear it and be happy withal, if you would be a thoroughly efficient nurse.

Remember, that though your office seems to be very lowly, though your name may never be known out of this hospital, yet in God's sight your calling is a high and lofty one, to the right performance of which He promises a rich reward; but you may likewise be sure that He will mark whatever you do ill, such as fits of impatience, neglecting, or careless watching of those whose life or health is entrusted to your care.

There are, however, great rewards attached to

nursing. There is the honest pleasure of having done your duty; and this will be in proportion to the difficulties encountered. Then, what greater joy and satisfaction can you have, than the assurance which you will frequently receive from the doctor, that you really have been the means of saving a person's life; that to good nursing, and not to medicine, he is indebted for his restoration to health and strength.

Again, amongst all the changes which have taken place in our midst during the past thirty years, none is more remarkable than the great desire which exists now for systematic and trained nursing. The world, especially the medical world, seems to have awakened to a sense of its great importance. A few years since, nursing in our hospitals meant nothing more than the attendance which a few old women could give in a rough and ready manner between floor scrubbing and laundry work. How different it is to-day! Since Miss Nightingale first startled this country with the idea that a woman of education and gentle birth could leave a home of luxury and ease to staunch the bleeding, and moisten the fevered lips of those wounded in war, we have had no lack of ladies—ladies both by birth and station—willing to give up all for such a noble cause. Did not "Agnes Jones," think you, my friends, independently of the position she occupied as Lady Superintendent of such an important institution as the Liverpool workhouse, find a rich reward for all her self-denial in the love which

was freely given to her by all with whom she came in contact. And although, unfortunately, her noble life of self-sacrificing love ended in a premature death,—yet, to deserve the words, "She hath done what she could," is a reward which neither you nor I can adequately estimate.

Here, then, is a great work for women, but, at the same time, how requisite is training and organization. The qualifications essentially necessary in a nurse are sobriety, honesty, truthfulness, trustworthiness, punctuality, quietness, cleanliness, and neatness: these are all indispensable requisites in a good nurse.

Sobriety is unquestionably required. We dare not trust you with the care of the sick and dying, if you are given to acts of intemperance. The allowance which is made you here is certainly ample if you are in good bodily health. You notice how little stimulant is used in the wards: it is only ordered where the patient's previous intemperate history, or the nature of the case, renders its administration necessary.

As to *honesty*, I will not hurt your feelings by enlarging upon it; but I have seen such a person as a dishonest nurse, who drank a portion of the patient's wine, and substituted water instead to supply the deficiency; who appropriated the tea given out for the patients, these poor things getting, as a consequence, something even worse than "husband's tea;" who, being too idle to give the patients their medi-

cines, either allowed them to take it themselves, or quietly poured it down the sink, and thus deceived the doctor as he saw the bottle gradually becoming empty. This is a character I hope we shall never have within these walls.

Above all, be *truthful, trustworthy*, and *punctual* in your work. Let the doctor feel that he can place full reliance and thorough dependence upon your word. Never shrink from telling the truth, even though, by so doing, you expose yourself to the reproaches and anger of your superiors, either for some neglect of duty, or carelessness in your management of a case. Then, again, consider how important this is for the patient's well-being; for suppose, in justification of your conduct, you give an incorrect report of the patient's condition to the doctor, he, acting upon this, alters his treatment where no alteration was needed, with the result, perhaps, of the patient getting worse, and ultimately dying. In addition, be punctual in your work; observe zealously the time-table constructed for you, for by so doing you will not only find everything work smoothly, and the various parts of your duty dovetail into each other; but also your own health will be less likely to suffer. Remember, you are occupied in a sick room, and, therefore, do your duty in a quiet, careful, orderly, and methodical manner.

I tell you candidly, I think there is great room for improvement in some of you in this respect. Always

look to it that you have a fair supply of pins in your pin-cushion, so that you are never reduced to the extremity of borrowing one from your fellow-nurse, or from a patient. I have known—I do not say here—patients receive double doses of their medicine to make up for the previous neglect of the nurse; or crumbs left in the bed for days together, making the poor sufferer feel as if he was lying upon a gravel walk, rather than a hair mattress; or, if the fire wanted coals, a whole box-full thrown on, with the result of a great part of it coming thundering down upon the fender, terrifying the patients to such an extent that they could not sleep for hours after. If you have occasion to light a candle, do not thrust it between the bars, but light it with a match or piece of taper; or, if it be gas, do not turn it full on before lighting it, because, in the first case, you will save the unpleasant odour of burning tallow in the wards, and, in the second, prevent the sudden blaze which so often irritates the patient.

Method and order, in your wards, are very essential necessities. Just one word about those cupboards. I often wish those doors had been made of glass; I wonder if we should then see a confused mass of bandages, pads, dressings, ointments, etc.; or what it ought to be—splints, air-cushions, and the like, arranged carefully on one shelf, and oil-silk, gutta-percha, lint, thread, pins, on another; with the bandages all arranged in order, and all greasy preparations

for dressings, sweet oil, and all stock-bottles kept alone, with the most perfect order and cleanliness, with labels upon them, always clean and tidy.

These little instances you will perhaps think trivial and unnecessary, but, it is in these, that the real comfort of a sick room is centred. You may be an exceedingly clever nurse in dressing, or at operations, or at bed-making; but you will not be an orderly one unless you observe these minor details, which, carefully combined, really form the basis of good nursing.

Then, you must be *cleanly* and *neat* in your appearance; and I think if you take our own hospital uniform you will have a very good standard, consisting as it does of a white cap and apron, a clean print dress, and a pair of scissors, with a pin-cushion suspended from the waist; bows of various colours often give a little relief to the print or alpacca dress. As your washing is done for you by the Institution, you have no excuse for not always appearing in clean cuffs, caps, aprons, and collars. Let the distinctive badge of your office be cleanliness and tidiness. Never wear ornaments but those absolutely necessary, and then, only of the simplest kinds.

Always have clean hands. Take especial care to wash them thoroughly, after dressing any wound, before proceeding to another; for, to the non-observance of this rule, we often have reason to trace epidemics of pyæmia, and other infectious complaints which occur in our hospitals.

And not only be clean in yourselves, but clean in your wards. Always keep them sweet. Never let anything offensive or disagreeable remain in the wards. Let every vessel be emptied and well scalded out directly it is done with. Do not leave food in a ward if the patient cannot eat it; and change the drink of the patient frequently. Remember they absorb or take up the deleterious gases in the atmosphere—gases which have been exhaled from the lungs; and, consequently, the patient would be actually putting back into his stomach the poison which had been previously thrown off from his lungs and skin.

And, lastly, let me say a few words in reference to your duties to one another, to your patients, and to your superiors. Amongst yourselves, let charity have her perfect work; be kind and forbearing one towards another. In olden times, hospitals were called "Houses of God." To this day the largest hospital in Paris is called the "*Hotel Dieu;*" and surely if ever a place may be thus named it is an hospital, where love and good feeling should abound. Let it be said of you, then, that "They walked together as friends."

The character of both nurses and probationers is enquired into most carefully before they are taken on here: I need say nothing, therefore, on this point; but, be careful, that no immodest jesting takes place in your wards, especially the men's wards; for men

are keen observers, and quick to mark even the semblance of levity in a woman; and if once this is noticed, there is an end to that moral influence which every nurse ought to have in her wards, and, without which, the nurse cannot efficiently discharge her duties.

One good rule I think it well to observe, is, to inquire into any serious domestic trouble which may happen to your patients during their residence in the hospital. You will frequently have the opportunity of helping and comforting those under your care; and, to such cases, draw the attention of your superintendent, that she may act in a manner most calculated to lessen the misery she has become acquainted with.

And, to your superiors, let your conduct be above reproach. Never exhibit any ill-temper, sulkiness, or incivility, upon being justly reproached. As regards your superintendent, I know I am speaking her mind when I ask you to regard her, not only as your mistress, but as your friend, in the highest and best sense of the term—one to whom you can go in any trouble or doubt; and believe me, you will always be sure of finding sympathy, advice, and help. But, I do ask you in return, to carry out her wishes in your wards, not with a reluctant and grumbling spirit, but with a glad and cheerful willingness, which will then, in itself, be a lesson for all with whom you come in contact of respect for authority.

Never try to interfere with the duties of the doctor,

or set yourselves up above his directions. The duties of a nurse to the doctor are twofold: first, to strictly carry out his directions as to diet and medicine in reference to the treatment of the patient; and secondly, to report to him at each visit the changes in the patient's condition, and the result of the treatment which has been pursued: this she must do in a short, concise manner.

The doctor will always value the remarks of a judicious nurse, and carefully consider her suggestions; but when she has nothing else to say but that, "I thought he would have died in the night," or that "he nearly went into fits," or that "he is better or worse," without assigning any good reason for these opinions, she will be thought ignorant and stupid. That this may not be the case with you, I ask you to give diligent and attentive heed to the cases which will come into your wards. Zealously watch their course, and carefully note any change in their progress. Have constantly before your mind a sense of the responsibility, of the grave charge you have undertaken; of the priceless value of life; and the strict account you must some day give of this talent committed to your charge.

There are many points in which an intelligent nurse can materially assist the doctor, because she must, for obvious reasons, have far better opportunities of obtaining from her patients correct answers to her inquiries, than he can have; but always be

careful that these inquiries are made in a kind, quiet, delicate, interested, but firm manner. They should never be made to gratify curiosity, or furnish topics for conversation in the ward; and, on the other hand, the patients should be encouraged, by every means in your power, to repose confidence in you, in such a manner that they may tell you everything connected with their complaints, and thus render their cases more likely to be successfully treated.

When a patient is admitted, first of all inquire into what is called the history of the case. You note the occupation, residence, whether married or single, habits, previous illnesses, health of father and mother, or, if dead, the cause of such death. Find out whether the patient has enjoyed good health, been strong and robust, accustomed to hard work; or if he has been feeble, delicate, incapable of hard work; whether there has been any progressive wasting or emaciation of the body, or the reverse; whether he has gone through much hardship, privation, and exposure; whether he has suffered falls, or hurts to the chest, head, or abdomen; ask, and record, whether he has been an intemperate man, addicted to the use of beer or spirits; inquire whether consumption, gout, rheumatism, or cancer has been observed in any member of the family, and then look, as you often see us look, for scars or other evidences of scrofula, syphilis, etc., in such places as the neck, axilla, or groins.

Inquire how, and when, the first symptoms com-

menced, specifying any alleged cause, whether the attack set in with rigors (which is the technical term for shiverings), nausea, pain, or great nervous and muscular prostration; inquire, next, what local signs were first manifested, and in which part of the body; if pain, the character of the pain—whether sharp, cutting, lancinating, or aching, periodic, or permanent. If there is swelling, whether it is hard or soft, doughy or elastic; if first seen about the head or face, or extremities. And so on with regard to every other sign and symptom—always inquire into its locality and progression.

In the case of females, whether married or single, find out if she has borne children, etc. If the patient be a child, ask of the mother, whether it has been vaccinated, had measles, whooping cough, or suffered from spinal disease, scrofulous swellings, sores or fistula.

Then inquire whether the bowels are regular, confined, or relaxed; whether the motions are painful, watery, coloured, or bloody. If any of these morbid characters be present, always save a motion for the doctor's inspection.

Then the urine, the quantity, colour—whether high, or straw coloured; if any blood, gravel, or pus be present; and if pain is caused on passing it, the time of the pain—whether before, during, or after micturition.

Then inquiries should be made if the appetite be

good. If vomiting be present, the character of the vomited matter—whether it has the appearance of coffee grounds or not—if pain is present, whether before, or after taking food.

I do not mean to say you will in every case have to find out all these particulars. The circumstances of each individual case will guide you in your inquiries. If, *e.g.*, a man is admitted with a fractured leg, you would never think of asking whether he vomited, or had pain after his meals; or, if a woman fell out of a window, and pitched upon her head, the inquiry as to whether or not her parents had done the same thing would not help us at all in our treatment; and so in your inquiries you must be led entirely by the conditions of the case.

But now, let us suppose an accident has happened, and it is in this department some of you will be principally engaged; what is the first thing you should have? Presence of mind, and complete self-control. Of all the miserable and hindering nuisances, there is nothing worse than persons, who, just at the time their services are most wanted, begin to scream, run wildly about, get into other people's way, faint, or pretend to do so, or go off into hysterics. Every one knows that all have not the same powers in this respect—strength of nerve, as it is very improperly called. It is quite natural to have a dread, and feeling of horror, at the sight of blood, for this is always suggestive of pain or death; still much can be done by making up one's

mind to bear and face the difficulty. But do not become hard-hearted, indifferent, without sympathy for your fellow-creatures, by the habitual opportunities you will have of witnessing this. I do not believe it is the tendency, as some people would have you think, for doctors and nurses to become hard-hearted, callous, or indifferent to the sufferings around them. Ask anybody who lives with and knows them, how they hear them speak of the pain some poor creature must be suffering, or the agony of some painful operation, which, through force of circumstances, has been performed without the use of chloroform. How often do we hear them say to each other, "Poor fellow, I am afraid he will not get better;" or, "It is very unfortunate such a symptom has set in;" and then, notice the anxiety and watchful care which the countenances and actions of these men and women bespeak. Do they not suffer, when others are in pain? Yes, truly; but they know that the lives perhaps of their patients —certainly their welfare—depends upon their restraining their feelings, and becoming calm, so that the knowledge they possess may be useful to others in their distress. It is wonderful what a power of self-control some persons have under the most trying circumstances, provided they will it, and make up their minds to it. We sometimes hear of persons, who, during some dreadful accident, materially assisted the doctors, but, directly the sufferer was attended to, and put comfortably to bed, fainted away.

Well, this is quite true, improbable as it appears, and the explanation is very simple: they made up their minds to do a certain work; directly this work was done, the power of self-control was gone, and they yielded to their natural feelings.

Some persons will bear pain much better than others. You no doubt have noticed this frequently in your wards. One person will cry out with the pain that another would have borne without a word. A man who has been used to roughing it in life will bear pain a great deal better than one who has lived in ease and luxury. Never forget that many of the cases you will have to attend to are accidents occurring to men of otherwise good health, who have been taken suddenly from an active life; and, therefore, it is not to be expected that they will bear confinement and restraint. However, this will soon pass off, and they will become quiet and obedient.

I have often wondered how some people that come here really do bear up under their accidents, without exhibiting some degree of restlessness or irritability. The explanation, however, I suppose, is that they make up their minds to bear it. I well remember reading about a case which bears upon this. It was before the days of chloroform, that a sailor was told he would have to lose his leg; to this he consented, and bore the operation without a groan or word of complaint; but, as the house-surgeon was putting on the bandage, he accidentally pricked him with the

pin, when he immediately cried out, "Hallo, Mr Surgeon, the point of that marling-spike's rather sharp—that's too bad!" On being asked why he cried out upon the prick of a pin, when he bore having his leg off without a word, he said, "Don't you see, I made up my mind to have my leg cut off: I told you I'd bear it; but I made no bargain about the pin-sticking business."

Always bear in mind that the most terrible accidents are not the most painful; the larger the surface burned or scalded, the less the pain; and the diseases which are most painful are by no means the most fatal.

In conclusion, let me advise you once again to cultivate a business-like habit of constant punctuality, attention to your duties, and to the smallest details. The hindrances to these are, if I may judge of you from myself, indolence, and unreasonable love of pleasure. But surely no amount of present pleasure can be thought enough to counterbalance your future regret if you wilfully or negligently fail in your duty. Have constantly before your minds that the lives and health and happiness of men are entrusted to you. There is nothing better to make you strive to overcome those habits which tend to make you careless in your work.

And now, having finished my advice, let me wish you all happiness in the path of life you have chosen. It is not likely to be found in great wealth, or high

social position; but in competence of living, blessings from the poor, and daily opportunities for the exercise of the best Christian virtues. The pleasures of virtue are within the reach of you all.

Your duties are arduous; but be encouraged, for if you set about them with honesty of purpose, and a determination to succeed, the words of Charles Mackay will certainly be true in your case:—

> "If thou canst plan a noble deed,
> And never flag till it succeed,
> Though in the strife thy heart should bleed,
> Whatever obstacles control;
> Thine hour will come—go on true soul,
> Thou'lt win the prize—thou'lt reach the goal."

LECTURE II

The Sick-room — Aspect — Furniture — Light — Temperature of the Ward for ordinary and operation Cases—Ventilation—Mechanism of Respiration—Its Uses—Composition of Air—Changes produced by Respiration in the Air and Blood—Ammonia in Air—Nitrogen —Experiments for Testing purity of Air—Importance of Ventilation—Methods for procuring it.—Lavatories—The Bed—Draw Sheets—Changing Bed-clothes—Cleanliness of Patients—Administration of Medicines—Feeding of Patients.

THE sick room, or ward, when a choice can be made, should always have a south, south-west, or west aspect. It should always be light and cheerful, spacious and lofty; the windows should be made to open both at the top and the bottom; and not much furniture should be permitted to remain in the room, particularly if the disease be infectious.

Bear in mind that woollen articles, from the roughness of their texture, hold smells much longer than cotton or linen ones; therefore, never allow woollen curtains in a sick room. It is far better to be without curtains at all; but if the room looks cheerless and bare, curtains made of muslin or linen are the best, as they are easily washed. For the same reason, woollen-covered sofas and chairs should always be expelled,—cane-bottomed, or plain wooden ones, being far preferable. In some cases, the carpet

may be retained; but it is always safer to remove it, a strip only being placed down the centre of the room, and another by the side of the bed.

Light should be moderated, according to the feelings of the patient. It must, however, be constantly excluded in cases of inflammation of the brain or eye. As a rule, it is never tolerated in acute diseases; whilst in chronic ones, it is both pleasing and refreshing. Direct sunlight is, in some cases, as necessary to speedy recovery as fresh air. Patients, as a rule, get better much quicker in a ward well-lighted, with a southern aspect, than in one badly lighted, looking to the north. We see this well exemplified in most of our military towns: a dark barrack-room, with a northern aspect, will furnish a much larger amount of sickness than a light, sunny, southern room.

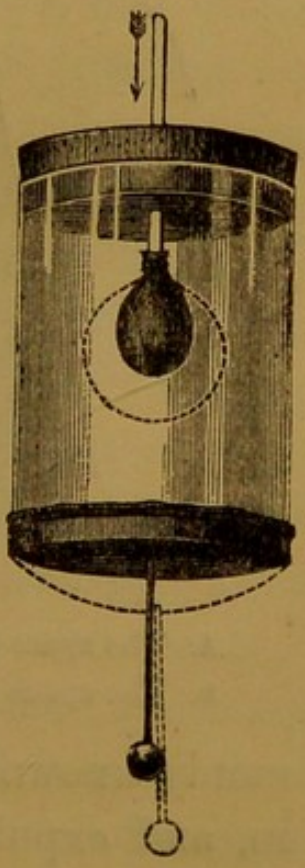
The temperature of the room should be kept as constant as possible, according to the feelings of the patient. At an average, say of 62°, or at a range from 60° to 65°. The temperature of a ward where an operation case is, will have to be kept 4° or 5° higher than this; but for all such cases you will generally receive full instructions from the surgeon.

Then the room should be well ventilated; and I would impress this particularly upon your minds, inasmuch as you are very apt to neglect it in your wards. It is of paramount importance there should be a continual current of fresh air passing through

them. No amount of care, or luxury, can compensate for its absence: the air within a sick room should be as pure and fresh as it is without.

In order, however, to impress the importance of this more fully upon your minds, let us glance for a few moments at the mechanism of respiration. This may be well seen in the case of a bottle which is air tight, containing an elastic bag, which communicates with the air by means of a tube through the cork. The bottle is provided with an elastic bottom, to which is attached a weight. Now, when this weight is allowed to act, the floor of the bottle will assume the appearance of the dotted line, and consequently there will be a vacuum formed in the bottle. The bottle being air-tight, the air must pass through the tube into the elastic bag, and thus fills the vacuum, or space. And now, if the weight be removed, the elastic floor will resume its former position, and a certain amount of air corresponding to that which was taken in will be expelled.

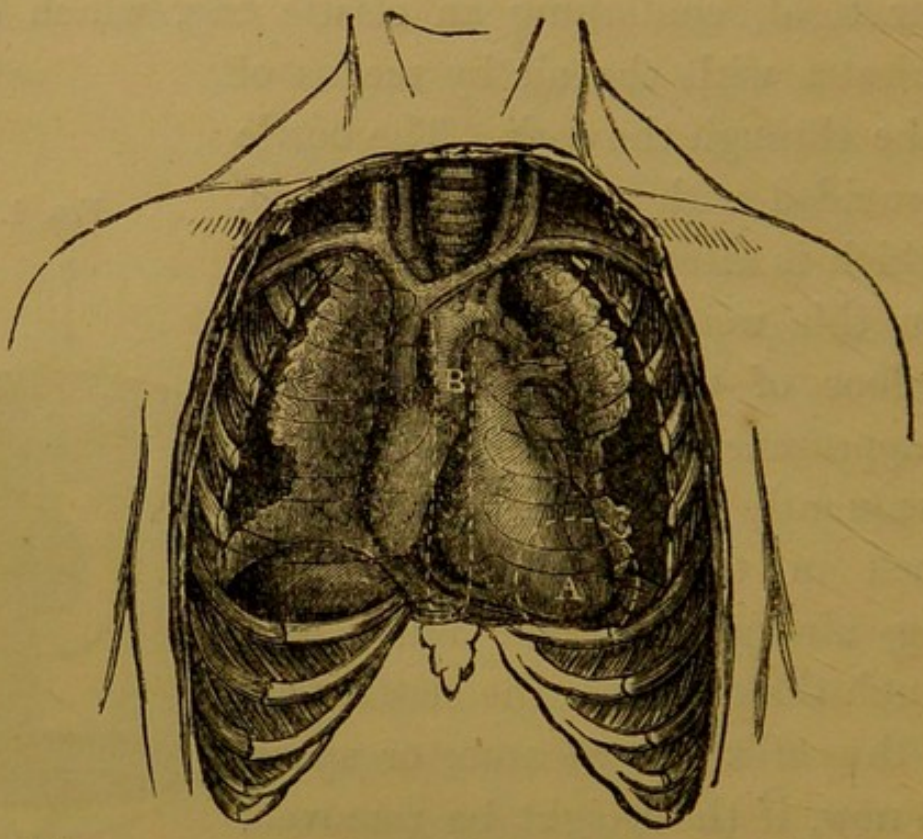
FIG. 1.



Now, this is just the case with the lungs, the organs by means of which we breathe. The lungs are the elastic bags; the trachea, or wind-pipe, the tube communicating with

the air; the chest, the air-tight vessel; and the diaphragm, a membrane separating the chest from the abdomen, the moveable floor, which, by its alternate rising and falling, causes a vacuum, the result of which is an inspiration; then the air, being expelled from this vacuum, gives rise to what is com-

FIG. 2.



A. The space over which mitral murmurs are heard.
B. The space over which aortic murmurs are heard (vide p. 96).

monly known as an expiration. This drawing of air in, and expulsion of air from the chest constitutes respiration.

Now for the use of this. The blood, or nutritive fluid, in its circulation through the body, undergoes great alterations; it gives up to the tissues, with

which it is brought in contact, some of its most important elements or constituents, for their nourishment and support; and, at the same time, receives from those tissues the result of their degeneration, or wear and tear; and, therefore, the blood, besides bringing nourishment to the different parts of the body, serves as a vehicle for the removal of substances which have done their work, and which are no longer fit to remain in the system. To separate these ingredients from the blood, and to carry them out of the body, is the great object of the excretory organs in general, such as the kidneys, and of the lungs in particular; for of all these injurious ingredients, carbonic acid is, without doubt, the most abundantly introduced into the blood, and is also most deleterious in its influence upon the system if allowed to remain. To effect its removal is, therefore, of great importance to the health and well-being of the body; and all that is requisite for this is the exposure of the blood to the influence of the atmospheric air. By this means an interchange takes place between the gaseous matters on either side,—carbonic acid being exhaled from the blood, and being replaced by oxygen from the air; and it is in these two processes conjointly that the function of respiration essentially consists,—viz., the introduction of oxygen, and the removal of carbonic acid.

The air is composed in every 100 parts, or volumes, of 21 volumes of a gas called oxygen, and 79 of a gas

called nitrogen, with traces of carbonic acid, ammonia, and other impurities. Near to the sea, another gas is also present, called ozone. Now the changes produced in the air by respiration are five in number: the oxygen is decreased, the carbonic acid increased, the temperature raised, and the watery vapour increased. The changes produced in the blood are likewise five-fold: the oxygen is increased, the carbonic acid decreased, the temperature raised, the watery vapour decreased, and a change in the color. The blood from a vein is, as you know, dark; this is blood which has performed its work as a nourishing agent, and now is simply acting as a vehicle to convey the impurities from the tissues. In this condition it goes to the lungs; but now mark the change: the blood, instead of being of a dark bluish tinge, becomes bright scarlet, —in short, it has been purified.

I have told you that traces of ammonia and carbonic acid are always found in the air. Of the former, there is about one part in every million parts of air; and of the latter, about four parts in every ten thousand parts of air. Although the quantity of these gases is comparatively very small, yet, when we take into consideration the whole of the atmosphere, they are in reality very large, and exercise an important part in the phenomena of vegetation; and it is to this that I wish to direct your attention in passing.

Ammonia is composed of nitrogen and hydrogen; whilst carbonic acid is a compound of carbon and

oxygen. Now, it is from ammonia that plants draw the nitrogen which they need for their seeds and fruit, but seem to have no power to assimilate the free nitrogen in the air; whilst carbonic acid furnishes them with the source from which they obtain the carbon they need in the formation of their tissues, liberating the oxygen, to be again used for the respiration of man.

There is one other constituent of the air I must say a word or two about, and that is the nitrogen. We have noticed there are 79 parts of this gas in every 100 parts of air. What change takes place in this? None whatever. This gas in the atmosphere simply acts as a diluent to the oxygen, and without which no one could live.

From all this let us gather a few practical hints. The popular test for pure and impure air is whether a candle will burn in it or not. If the candle will not burn, the air is considered unfit for respiratory purposes, and rightly so; but if the candle will burn, the air is thought fit for breathing. This, however, is an erroneous idea.

If a man be placed in a certain amount of air which contains some oxygen, and he breathes that atmosphere until there is from 10 to 12 per cent. of carbonic acid present, he will die immediately; but now, if a candle be put into that atmosphere, provided that it still contains some oxygen, it will go on burning, disregarding the presence of the carbonic acid altogether.

Carbonic acid is a poison which acts according to the quantity of the gas present. The smaller the proportion, the longer would a person be able to live in it; and the larger the proportion, the shorter time would a person live.

Let a bird be placed in a glass jar, containing a certain quantity of atmospheric air; at first he will be very lively and jump about, but after a time he will mope, sit at the bottom of the jar, and have his feathers ruffled; and now just at this time place another lively bird in the same jar, you will immediately see it exhibit convulsions, and die before it reaches the bottom.

Again, in Germany, some time since, there were two women, the one sick with fever, and the other a robust healthy nurse; and, as is customary in that country, they were burning charcoal to warm the room. After a little time, some persons upstairs thought they heard cries for help; upon coming down, they found the nurse lying insensible upon the floor; whilst the patient could make signs to her friends of the cause of the disaster.

How is it that in the case of the two birds and the two women they are not affected alike? The explanation is this, that the poison carbonic acid gradually deteriorates all the functions of the person who has breathed it for some time, so that they can live in it for a certain period with little or no inconvenience; but the others who are suddenly introduced into it,

have no time for this gradual deterioration to take place, and consequently die instantly.

Again, persons coming into a close room from the fresh air, say immediately, "How close it is here;" whilst the inmates look up in blank astonishment, and tell you they do not notice it. Again, in crowded places, as churches, theatres, etc., a sense of drowsiness is apt to come over you, all due to the same cause, for these places are, as a rule, admirably adapted for such experiments.

Now take all these hints to your wards. Think of the changes continually taking place in the atmosphere, by healthy persons breathing it. How much more readily then must these changes be produced by those who are sick, the exhalations from whom are highly morbid and dangerous, inasmuch as they are one of nature's methods of eliminating noxious matter from the body, in order that it may recover health. How careful we ought to be that these poisonous impurities do not accumulate, and so be breathed again; but by good ventilation insure their removal, the principal agents for which in a sick room are the windows, door, chimney, and any special apparatus that may be provided for this purpose.

The windows in most cases can be always kept open to the extent of an inch at the top; and it is no substitute for this to throw open the whole of the windows for an hour or so in the morning, and set all the ward sneezing and complaining of the cold.

The door is being constantly opened during the day, and is therefore a valuable means of introducing fresh air; but it should never be left open at the same time as the windows, and never longer than is really necessary. When there is a fire in the room, the chimney affords the best possible ventilator; for as the current of warm air is continually ascending the chimney, a fresh supply of air is as constantly being drawn in from the windows, etc., to supply its place.

As regards the special ventilators, you will find in your wards, all I can say is, use them; do not give your superintendent, or the doctor, occasion to tell you to open them. If the atmosphere be foul, the lungs and skin cannot relieve the system of the poisons it contains, and a draught upon the patient in this condition may give him cold; but this is the fault of the foul air, not of the fresh.

During the Crimean war, Miss Nightingale tells us, such a thing as catching cold was never heard of, although the poor wounded soldiers were placed in wooden huts, with pervious walls, which seemed only to afford a shelter from the snow without; they were well covered with blankets; and were all the better, certainly none the worse, for the cold air. At the same time, let me say in passing, that whilst fresh air is absolutely essential at all times, yet due regard must be paid to the period of the year, as well as the state of the atmosphere for

each day; for it is evident that the current of fresh air which in summer would be esteemed as a positive luxury, would, on a cold winter's day, if incautiously admitted, be a cause of discomfort, if not of actual injury. In all cases use your own judgment, therefore, as to the quantity of air which should be admitted, and pay but little heed to the advice of the patients, for they would have you block up all the safety valves of health. Remember that while fresh air is often the most effective restorer of health, the want of it is the cause of many serious and often fatal diseases.

Once or twice a day you should visit the lavatories and water-closets connected with your wards, and see that everything is in good working order, and perfectly clean. The windows placed between the lavatories and the door leading into the ward, should always be open, so as to ensure a current of fresh air always being kept up,—then the doors leading into the wards should always be closed. And of course nothing should be thrown down the closets, for the pipes soon get blocked up with tow, or other like substances.

The Bed. This should not be too wide, as the nurse would be obliged to lift the patient, if he was in the centre, either by kneeling on the bed, or at arm's length. The best is undoubtedly such an one as we have in this Institution, which consists of a good straw mattress, four or five inches in thickness, with

a hair mattress placed on the top; or the hair mattress may be used alone. Feather beds are not healthy; they are too soft, and the patient sinks into holes, so that if he is suffering from a wound, it would be very inconvenient to get at it to dress it properly. Patients, as a rule, should sleep in sheets; one of the exceptions being in rheumatic cases, where warmth is very essential. Great attention should be paid to the under sheet, that it is smooth, free from crumbs, and other irritating substances. There is nothing more annoying to the patient, and more productive of troublesome bed-sores, than wrinkles in the sheet, or the neglected crumbs of several meals. Each patient's bed should be made, if possible, tidied, and put straight every day. The bed clothes should at the same time be slipped off, and allowed the benefit of a free access of fresh air. In some cases this is impossible; but then it should be done as often as possible consistently with the patient's welfare.

Sometimes it is necessary to put a mackintosh between the bed and the under sheet, for the purpose of protecting the bed from discharges of various kinds, or from blood. In these cases also a draw-sheet will be found of great use; that is, a sheet folded up, and placed under the patient, which can be drawn away as soon as it becomes soiled, without lifting or disturbing the patient. The usual way of proceeding with a draw-sheet is to have a sheet folded or rolled up, one end of it only being placed under the patient. As

this becomes dirty, it is drawn away, and a fresh portion of the same sheet takes its place. I do not like this method, however, because the part that is drawn away must necessarily be offensive; and, therefore, it is not desirable to retain it in the bed, as you are obliged to do, until the whole sheet is soiled. I much prefer that the sheet should be taken away entirely, and a fresh one supplied.

If you want to change the clothes of a bed from which the patient cannot get up, proceed to roll up the clothes tightly to the middle, lengthwise, not across the bed; put on the clean things with half the width rolled up close to the other roll; lift the patient on to this newly made part, slip off the clothes he has just been lifted from, unroll the remaining part of the clean ones, and it is finished without any difficulty. And again, never expose more of a patient's body to the surgeon in his visiting round than is absolutely necessary. In the case of a broken leg do not turn the clothes up which cover the whole of the lower half of the body, but simply that portion of them which cover the injured limb. And, lastly, do not allow any portion of the patient's wearing apparel to be about the bed, either under the pillow or beneath the quilt. These should be always neatly folded up, and put away in whatever place is provided for them. For further particulars relative to bed-making, and for very useful information relative to the linen of your wards, I would refer you to a very excellent book just

published by Miss Florence Lees, entitled, "*Handbook for Hospital Sisters.*"

A nurse should make a point of seeing that all her patients have their faces and hands washed every day, their feet twice or thrice a week, and, if possible, a bath weekly. Many of your patients will be able to do this for themselves; but in every case it is the duty of the nurse to see it done efficiently. Disease is often assisted by dirt.

On the admission of any new case, the nurse should inquire of the surgeon whether or not the patient can have a warm bath. If not, she should carefully cleanse the patient as far as she possibly can without positive injury. This I know will be one of the most unpleasant parts of your duty; but nothing must induce you to shirk it,—the comfort, sometimes the recovery of a patient depends upon the care and attention of the nurse in this respect.

Slops of every kind should be removed out of the wards as soon as possible, and thrown away. On no account allow them to remain longer than necessary in the wards; the addition to them of a little chloride of lime, or Condy's fluid, is a very good practice to adopt, as they thereby become deodorized.

The body-linen of patients should be changed at least once a week, and if possible more frequently; but never begin to change until you have every thing ready that you are likely to require. Then be careful there is no draught upon the patient from any open

window or door, and see that the linen is all properly aired. Do not move or uncover the patient more than is really necessary; and in the case of males, let them do such things as they can or ought to do for themselves.

The Administration of Medicines. Medicine should be given at regular stated hours, careful attention being always paid to the directions of the doctor in this particular. As a rule, you will find the hours stated in your rules to be the most convenient ones; but sometimes medicines are particularly ordered to be given before or after meals. This is the case with arsenic, which is frequently given in cases of skin disease. It should never be taken upon an empty stomach. In all such cases, however, full directions will be found upon the bottles. Then the exact quantity of medicine ordered should be properly measured in a graduated glass for the purpose, such an one as you all have in your wards, as slight errors may often occasion serious consequences, especially with such drugs as opium, strychnine, prussic acid, and the like. Always rinse the glass out from which medicine has been given to one patient before giving it to another. And you will find it convenient to have a special glass for oily and strong-smelling medicines, such as castor-oil, valerian, or assafœtida.

The administration of medicines to patients is a matter unquestionably of great importance, but equally so is the feeding of patients. In many cases

the recovery of a sick person from some dangerous illness is due to the regularity and attention which the nurse has paid to the turns of a capricious appetite. Ordinarily, the nurse should see that the patients have what is ordered them by the doctor. Never allow, without first consulting him, any food or fruit to be given to them which, through ill-judged kindness, has been introduced by their friends. But it is as well for you to know that, in cases of vomiting, small quantities of food often repeated are more likely to be retained than large quantities given seldom, provided it is always given cold. This rule should be observed also in cases of diarrhœa. Milk, sago, arrow-root, and eggs alone being given, and these cold. When the patient is taking wine, or beef-tea, you should always take care that some is put by for the night, as it is often during this time he will most urgently require it.

And, in conclusion, see that the patients not only get the food which is ordered, and is best for them, but also that it is given in a proper manner. Let the patients who are up, in your wards, be seated around a common table covered with a white cloth, and having the knives, forks, and spoons orderly arranged. Then, before the meal is commenced, direct your patients' thoughts to the Author and Giver of all the blessings we enjoy, by a short appropriate grace. "Let all things be done decently, and in order."

LECTURE III.

Administration of Medicine by force—Administration to Children—Castor-oil—Powders—Symptoms produced by taking Mercury—Suppositories—Enemas—Uses—Administration—Blood-letting—Leeches—Cupping—Bed-sores—Laying out the Dead—Rigor Mortis—Accidents and Emergencies—Fomentations—Poultices: Linseed Meal, Bread, Charcoal—Hypodermic Injections—Issues—Setons—Introduction of Eye-drops—Temperature of Baths.

In the course of your nursing experience you will sometimes have patients who absolutely refuse to take medicine; in these cases it will be necessary for you to administer it by force. This is usually done by closing the nostrils with one hand, and, when the mouth is opened, pour the medicine well back into the throat with the other hand: the patient will be obliged to swallow it, as he cannot breathe until he has done so.

With children you will often have a difficulty, but much of the distress can be prevented by a little care and management. Their medicine is generally given in the form of powders, and a small powder can be mixed with a little bread and milk in such a manner as to be scarcely tasted. Put a little bread and milk in a tea-spoon, on the top of this the powder,—be careful not to mix it with the milk; and then cover the whole with a little more bread and milk: in this

way it may be swallowed almost unawares. Again, castor-oil is generally one of the greatest troubles of the nursery. This may be given without difficulty, if previously shaken up in a bottle with a wineglassful of hot milk, previously sweetened, and flavoured with a stick of cinnamon boiled in it. To adults its nauseous taste is much removed by mixing it with milk or coffee; or it may be given placed on a little brandy mixed with cold water; or in soup, which is perhaps the most palatable form of any.

Pills sometimes are better swallowed by patients when rolled up in a morsel of soft bread, or in conserve; remember there is always greater difficulty in swallowing a small than a large pill.

Powders are best given to adults in milk, water, or made into a paste with honey, jam, or treacle.

One of the most important duties of the nurse is to watch, and report to her doctor the results of the medicines which have been given. Medicines are always prescribed with a definite object in view, to produce a certain result, either as tonics, or as aperients, narcotics, etc. Sometimes they produce marked symptoms in a patient, such as vomiting, diarrhœa, headache, running at the nose, eyes, or mouth. In all such cases, the nurse should at once inform the medical attendant, as to push such remedies further might be dangerous and injudicious. Iodide of potassium, a remedy in very common use, sometimes causes great distress to the patient by the dull aching headache it

produces, with running at the eyes. When these symptoms arise, the medicine should be discontinued until the doctor is informed. Again, mercury is nearly always given with the object of producing slight soreness and swelling of the gums, with redness. This condition is usually spoken of as sponginess of the gums, or spongy gums: at the same time, a white line is seen along the gums by the side of the teeth. When the patient is under the influence of mercury, he will also complain of a peculiar metallic taste, and of his teeth feeling loose. If the medicine be persevered with, all these symptoms will be increased; a peculiar odour will emanate from the patient, with profuse discharge of saliva. In short, he will be violently salivated—a state of things always to be avoided. As soon as the patient experiences soreness of his gums, the doctor should be immediately informed, as in most cases his object will be attained. Whether the medicine should be wholly or partially discontinued is a question for the physician's judgment in individual cases; and, therefore, you must altogether be guided by the directions you will receive from him.

Suppositories are small conical preparations of various substances which are inserted into the rectum. They are generally used for one of two purposes: either as astringents, as in cases of diarrhœa, or to relieve pain. Patients, as a rule, will be able to apply these themselves; but if they are unable to do so,

the nurse must, by placing the patient on his left side, with the knees well drawn up. The nurse, standing behind the patient, should now place her right hand under the clothes, and request the patient to "bear down," at the same time introducing the suppository into the anus.

In your wards, you will be frequently called upon to administer enemata, and you will notice they are used for very many purposes: to procure evacuation of the bowels, for the relief of pain, to restrain diarrhœa, to introduce medicines in the system, and to introduce nutritive substances into the body; and they essentially consist in the introduction of some fluid into the body, per rectum, when its administration by the mouth is impossible, or, by the circumstances of the case, deemed unadvisable. The method of administration is as follows: the nurse should stand behind the patient, who is placed upon his left side, close to the edge of the bed (which should be previously covered with a piece of oil-cloth), with his knees well drawn up, the basin containing the fluid to be injected being placed upon a stool, or chair, close to the patient. The tube of the enema syringe, having been well oiled, should now be introduced into the rectum to the extent of four or five inches, in a direction first backwards, but afterwards upwards and a little forwards; but under no circumstances use any force, even though an obstruction may exist.

Certain points, however, must be attended to in the administration of enemata, for each of the purposes they are used for. When an enema is given for the purpose of relieving the bowels, a copious injection must be given: the fluid should be slowly pumped into the rectum until the patient complains of pain and inability to retain more, when the pumping should be stopped for a time, and the patient assisted to prevent the escape of the liquid. Sometimes the nurse will have to help him to do this, either by supporting firmly with the hand the perinæum, and parts around the anus, or by introducing two or three fingers into the rectum, alongside the nozzle of the enema pipe, and pressing them with the nozzle upwards. The operation over, the patient should be directed to lay ten minutes or more upon his left side.

Various fluids are employed as purgative enemata. Sometimes simple warm water, or gruel, is used; at other times, soap, castor-oil, or turpentine is added. Remember, however, that castor-oil and turpentine are lighter than water, and will therefore float on its surface; even if they are well stirred up with the injection, the oil must rise to the surface as the injection proceeds, and the tube of the syringe resting upon the bottom of the basin, the lower stratum is injected first; whilst the part which is most important is injected last, and cannot therefore reach the part of the intestine which is most at fault.

To obviate this difficulty, the oil or turpentine, well beaten up with a little gruel, should be injected first; after which the water is to be pumped in. In this way the oil will be pushed higher up the intestinal canal. The temperature of the injection should be about 85°.

When an enema is given to check diarrhœa, only a small quantity should be injected,—an ounce or two of starch, at a temperature of 100°, with the addition of 20 drops of tincture of opium or laudanum, twice or thrice a day, will be found beneficial.

Nutrient enemata, in order to be retained, should not exceed three or four ounces. Before such an enema is given, it must be ascertained that the rectum is not loaded with fæces.

A useful nutrient injection is two or three ounces of beef-tea, half an ounce of brandy, and one ounce of cream.

The Bleeding of Patients, or Venesection. Long before I can remember, blood-letting was considered the panacea for everything. If a man was admitted with an accident, it was always considered expedient to draw four or five ounces of blood from him before any other treatment could be successfully adopted. In those days there were men whose special occupation was the drawing of blood from their fellow-creatures, and they were known under the name of "Leeches;"—and so prevalent was the idea of the necessity of blood-letting, that even after a debauch

it was always thought desirable to take four or five ounces of blood. It is very rare, now-a-days, to bleed patients, but sometimes it is necessary; and then it is generally performed by local measures, such as leeches or cupping.

Leeches are applied for the purpose of taking a small quantity of blood from any locality, as over an inflamed knee-joint,—they should never be applied over a large vein. Any one who has seen them used, knows how difficult it is sometimes to get them to bite readily; they will either refuse to bite at all, or will fasten anywhere but on the desired spot. They will be more inclined to bite if the part has been previously well washed with soap and water, and then moistened with a little milk, or sugar and water; or if a scratch or two has been made, so that a drop of blood will exude upon the surface. Another, and very good plan, is to wash the part perfectly clean, then place your leeches in a wine-glass full of water, put a piece of paper over it, and turn the glass upside down upon the place where it is intended they should fix, and draw the paper away. You will now find that the leeches being cool and comfortable, and in their native element—water—will settle instantly. As soon as this has taken place, a towel should be wrapped round the mouth of the glass to soak up the water, and the glass withdrawn. In this manner you will get the leeches to fix on whatever spot

you wish. If you want the leech to be fixed close to the eye, take a small phial or test tube, fill it with water, and apply it in the manner previously described. When they are to be applied inside the mouth or nostrils, a thread should be passed through their tails; this does not prevent their biting, but the probability of their being swallowed is lessened. If, however, this should occur, by taking a little salt and water they will be rendered harmless. When enough blood has been drawn by a leech, the application of a little salt to their noses will always cause them to drop off. They should be then put on a plate with a little salt and water; and when they have relieved themselves of the greater part of the blood they have swallowed, they should be placed in a jar of cold clean water by themselves. Change the water every day for a week; then once a week will do. Any dead ones must be at once removed, or they will contaminate the water, and destroy the others. Sometimes they have to be applied to the lips of the womb; these must, however, at first be scarified, and a speculum used; so it will be always advisable to ask for the assistance of the medical attendant. The bleeding from a leech-bite may be encouraged if necessary, by the application of hot fomentation. But sometimes the bleeding is excessive; pressure, in such a case, with the finger, or a pad of lint, will generally be found sufficient to control it. If this, however, proves unsuccessful, a finely-pointed

stick of nitrate of silver may be inserted in each wound.

Cupping, which is the second method of local blood-letting, requires a great deal of nicety in its performance, and is by no means so easy as it would at first sight appear. It is of two kinds—dry and wet. The following articles are required: glasses of various sizes, specially prepared for the purpose; a spirit-lamp, or torch; some spirits of wine; some blotting-paper, cotton-wool, a saucer, and a scarificator for wet cupping.

The operation is performed in the following manner: the glasses selected, being previously warmed, should have the air exhausted from them by means of the flame of the spirit-torch, or by inserting pieces of wool or blotting-paper dipped in spirit, and then setting them on fire in the glass itself. The glass should now be placed suddenly over the selected spot, and gently pressed on to it, so that the edges may fit closely to the surface, care being taken not to heat the glasses too much, or the patient's skin will be scorched. The skin will now be seen to rise within the glass, which may easily be removed by inserting the nail of the thumb beneath its edge, and pressing the skin downwards. This completes the operation of *dry cupping*, which is generally used to relieve pain.

And now, if *wet cupping* be desired, the process already described for dry cupping should be pursued,

and the scarificator immediately applied to the part by placing the instrument, fully charged according to the thickness of the skin, flat upon the surface, and then touching the spring; this done, the glass should be immediately re-applied as before. The hæmorrhage can be easily stopped by applying a pad of dry lint, with a bandage. The usual site for wet cupping is the loins, just over the kidneys, and is used generally for inflammation of those organs.

Of all the annoying complications of surgical cases, *bed-sores* are the worst. They are caused by continual pressure applied to certain parts of the body, in persons confined to bed for a lengthened period from disease or accident. They occur over the most prominent points of the patient's body, such as the lower part of the back, the projecting points of the shoulders, etc. They vary in degree, from a slight abrasion of the skin, with a diffused redness around, to large deep wounds, involving all the tissues, and often extending down to the bones. Thy occur most frequently in cases of fever, or paralysis of the lower half of the body; and in any case where the patient's health is much enfeebled, and long confinement to bed is necessary. By a little care and attention they can be often prevented. When a patient is likely to remain in bed some time, steps must be taken by the proper arrangement of pillows, and by the use of water-beds and air-cushions, to prevent pressure being unduly exercised upon any one part. Clean-

liness and dryness must be thoroughly attended to, by the use of draw-sheets, and by the proper arrangement of bed-pans, urinals, etc. The skin on the exposed parts should be hardened by rubbing in a little brandy and water, or whiskey and water; or by the application of collodion, or soap-plaster spread upon leather. The best wash known is spirits of wine, with two grains of bichloride of mercury added to each ounce. If the skin has become broken or chafed, all pressure should be removed by means of cushions, or air pillows, and balsam of Peru or powdered cinchona applied. When sloughs have formed, their separation must be hastened by the use of charcoal or chlorinated poultices, and the remaining ulcers should be dressed with resin ointment or carbolic oil.

Laying out the dead. When a patient dies, his eyes should be gently closed for a few moments with the fingers, or with a small weight or coin, such as a penny or half-crown; the limbs should be stretched out, and carefully straightened, the lower jaw supported by a bandage, and the feet kept in position by means of a bandage connecting the great toes. If these points are neglected, the limbs are very apt to get fixed by a peculiar contraction of the muscles taking place, called *rigor mortis;* and so rapidly does this stiffening take place in some cases, that the position the deceased person was in is retained after death. Dr. Russell, the *Times* correspondent at

the Crimean War, mentions that after the battle of Alma, he was walking over the battle-field, when he suddenly came upon a man who was kneeling, and seemed in the act of firing. Upon going up to him, the man was found to be quite dead; his body was in a state of *rigor mortis;* and it had set in so rapidly that the man's position was not changed. In another similar case, a gentleman was sitting in his box at the theatre, with his head resting upon his hands, long after the performance was finished, as if he was still attentively listening; and upon somebody going up to him he was found to be quite dead! This *rigor mortis* passes off after a time, leaving the limbs quite lax. Again, as a rule, the quicker it comes on, the more complete it is, and the sooner it disappears; and *vice versâ*, the longer it is delayed, the more incomplete it is, and the longer it remains. After the body has been straightened, it should be covered with the sheet, and left for two or three hours. All blankets and other covering should be immediately removed.

The body should now be thoroughly washed, the hair combed, and a bandage applied as before to keep up the lower jaw. In the case of women you must also put on a cap. The body should next be enveloped in a shroud, which should be made after the fashion of a child's pinafore, that is, to be complete in front, and tied behind. It should also be long enough to cover the feet. The body should then be removed in

a shell, the head being placed upon a layer of cotton wool, tow being deposited down the side of the corpse.

The bed and bedding should be removed, and thoroughly fumigated. It will often be necessary to wash the bedstead with vinegar and water, or some disinfecting solution, as Condy's, Burnett's, or carbolic acid.

The next point to which I would direct your attention is the important subject of *accidents and emergencies;* important, inasmuch as it comprises one of the principal parts of your duty.

The patient should be gently carried into the hospital upon a stretcher. If it be a fractured leg or arm, one nurse should look particularly to the broken limb, and prevent its movement. The neglect of this rule often causes the most disastrous results. I have known a simple fracture of the leg become converted into a compound and very serious one, simply because the enthusiasm of the poor man's friends overcame their better judgment, — they, in their anxiety, carelessly lifting the broken leg, and sending the fragments through the skin.

The stretcher, containing the patient, should be laid upon the couch, and the poles withdrawn. Now quietly clear the room, whilst the doctor makes his examination. All tight clothing should be at once loosened and removed from about the neck; and, if the patient is exhausted and almost pulseless, a little warm tea, with some brandy in it, should be ad-

ministered, a hot water-bottle at the same time being applied to the feet,—the boots being removed with great care. The ankle should be supported with one hand, whilst the other is used in withdrawing the boot. In some cases, as in wounds or fractures about the foot, it is advisable to cut the boot down the side, rather than run any risk of further injury by rough manipulation. When the garters are taken off, the stockings can in most cases be removed without any difficulty; but they should be always slit up the side in injuries to the lower extremities.

The braces which keep up the trowsers should be unbuttoned in front and behind; it does not suffice to do this in front only, as the straggling ends will be only in the way, and will inevitably cause confusion. The trowsers should be then drawn gently off uninjured, except in the case of patients suffering from fracture or other accident to the lower extremity, when the outside seam of the leg of the trowsers on the injured limb should be ripped up, as the damage thus done can be easily repaired, and the patient gains largely in comfort. On taking off the coat and waistcoat, it is better to remove one sleeve at a time, always commencing with the sound limb, if the arm or hand is injured, as the other will follow easily enough.

In most cases it will be advisable at once to proceed with the washing of the patient. This, as I have told you, although very distasteful, must be

done thoroughly. There is nothing, I take it, more indicative of careless, lazy nursing, than to go round the wards, and find a man's toes peeping out from between two splints, begrimed with dirt.

Whilst one nurse is washing the patient, another should be getting the necessary appliances ready for the surgeon. If it is a fracture, get the proper splints padded; if it be a wound, get the ordinary articles required in dressing, such as a pair of forceps, scissors, pins, lint, cotton-wool, tow, bandages, sticking-plaster, one or two sponges, plenty of water, and a can of hot water for heating the plaster. After the surgeon has attended the case, the poles should be again placed in the stretcher-cloth, and the patient conveyed to bed, which has been previously prepared, according to the circumstances of the case, for his reception, with water-proofing, draw-sheets, etc. If the mattress is likely to yield, or if great firmness be required, as with a broken thigh; a fracture-bed, or wooden framework made to fit the bedstead, should be placed under the mattress to support it. In cases of injuries to the head, it is as well to cover the pillows with a piece of oil-cloth, or water-proof sheeting. Then always have hot-water bottles, sand-bags, bandages, cotton-wool, tow, lint, cradles, and pillows of various sizes, ready for use, as they will often be required, and should be obtained without difficulty. Sometimes you will be ordered to apply a fomentation to a part which may be contused; or it may be prescribed to relieve pain,

to prevent inflammation, or to encourage the bleeding from leech bites. They are best prepared by getting an empty vessel, such as a pail, or large basin; cover this over with a towel, and place the flannel on the towel; now pour the boiling water on, and then wring the flannel dry in the towel. Apply it to the affected part at once, and cover it with a piece of mackintosh, or oiled cloth. These should be changed frequently, as what was intended for a comfort will soon otherwise be converted into a source of annoyance to the patient.

Spongio-piline is used sometimes for the same purpose, as it comprises both flannel and water-proofing in one. It should be prepared for use either by pouring hot water upon the flannel portion, or by dipping the side in a saucer of boiling water for a few moments. Tincture of opium, or turpentine, is sometimes directed to be sprinkled on the fomentation, thus forming what is known as the opium or turpentine fomentation. Poppy-head fomentations are made by boiling the poppy-heads in water, and saturating the flannel in the decoction thus formed.

Another method of applying warmth and moisture is by means of poultices. They are of great use when applied to inflamed and suppurating parts. There is a great art in making a poultice, an art, which, I am inclined to think, some of you do not possess.

Linseed-meal poultices are those in most common use. Before commencing its preparation, however, see

that you have everything ready—the tin basin, or bowl, for mixing it in (this is better than a porcelain one, as it retains its heat), the boiling water, linseed-meal, spatula, and olive-oil. Now pour the water into the basin, and gradually add the linseed-meal with the left hand, whilst you stir it with the right, until it is brought to the consistence of porridge, or until it can be cleanly cut with a knife or spatula. It should now be turned out upon some tow of a sufficient thickness, and which has been previously prepared by pulling out the fibres to the required length, and placing them parallel to each other; the meal should then be spread with the spatula to the thickness of half-an-inch; each border of the tow must then be doubled upon itself, and afterwards folded over upon the meal, thus forming a neat margin to the poultice, which prevents the escape of the meal, or of the pus from beneath it. A little olive-oil, spread upon the surface of the poultice, prevents the possibility of its adhering to the part on which it is applied.

Bread poultices are seldom used in hospital practice, and are not nearly so comfortable and efficaceous as those of linseed. They are made by pouring boiling water upon the well-crumbled inside of a stale white loaf. This should be covered, and allowed to stand for a few minutes, when the water is to be strained off, and the resulting pulp spread with a spatula upon a piece of muslin, and applied hot or cold, according to order.

Mustard poultices are often used as a very effectual means of counter irritation. They may be made entirely of mustard, or the strength may be lessened by previously mixing the mustard with linseed-meal. If made entirely of mustard, enough should be taken to make a paste with boiling water. This should be spread in a thin layer on brown paper, and covered with a piece of muslin; it should then be applied, and retained in position by means of strips of sticking plaster.

Charcoal poultices are sometimes ordered to be applied to fœtid or sloughing wounds; and they are made by macerating the crumb of a stale loaf in water for ten minutes near the fire; then mix, and add some linseed-meal, gradually stirring the ingredients, so that a soft poultice may be formed. Mix with this some animal charcoal, and sprinkle the remainder on the surface of the poultice. For all common purposes the bread can be dispensed with; an ordinary linseed-meal poultice, with the addition of charcoal, being just as effective. Poultices of different characters may be readily prepared by adding suitable drugs to the common linseed poultice, such as laudanum, or chlorinated soda solution.

Sometimes, however, there is local pain, which resists all efforts to relieve it; and then another method is commonly adopted,—viz., the hypodermic, or subcutaneous injection of morphia into the body. This operation is performed by pinching up a fold of

the skin in the arm or leg, and then boldly pushing the tube of the injecting syringe in, and injecting the fluid. The orifice is so small that the liquid will not escape after the removal of the instrument, but it is as well to keep the finger on the opening for a second or two.

You will sometimes be called upon to make an issue; that is, an opening caused by the application of some caustic, generally caustic potash. You first of all take a small piece of soap, or common plaster, and cut a hole in its centre, and lay it upon the part where the issue is to be formed. A small piece of potassa fusa must then be placed upon that portion of the skin left bare by the opening in the plaster, and secured in its position by a piece of strapping over it. In a few hours, when it has done its work, the strapping is to be removed, and the part carefully cleansed with vinegar and water to prevent any portion of the caustic passing beyond the intended boundary. A linseed-meal poultice should now be applied; and, when the slough has come away, the ulcer can be kept open by fastening a pea or glass bead upon the ulcerated surface with plaster, and it may in addition be smeared with savin ointment.

There is one other little operation you will often have to perform, and that is the introduction of a seton. The most common seat for this is the temples, in eye affections. The skin should be drawn up by the hairs scattered upon it, rather than by pinching

up a portion of skin, as is the right practice in any other part of the body, because the temporal artery, a little vessel running up by the side of the eye, is liable to be transfixed; and a needle containing the silk should be thrust through the fold. The needle should then be detached from the thread, which is then tied to prevent its slipping out unawares. It should be moved backwards and forward every morning, and the matter well got out, else there will be a danger of inflammation being set up in the surrounding tissues.

FIG. 3.

The introduction of drops into the eye is an operation constantly required, and demands care for its effective performance. The patient's head being slightly thrown backwards, the lids should be separated with the forefinger and thumb of the left hand, and the drops applied (fig. 3) by means of a drop-bottle, (like those used in your wards,) camel's hair brush, or feather, to the outer angle of the eye. By this means the fluid is applied to the whole surface of the eye, as is proved by the fluid appearing at the inner angle.

And, lastly, let me give you a list of the temperatures of different varieties of baths:

	Fahrenheit.		Fahrenheit.
Cold	33°—65°	Tepid	85°— 92°
Cool	65°—75°	Warm	92°— 98°
Temperate	75°—85°	Hot	98°—112°

LECTURE IV

Operations—Preparation of the Patient—Arrangements—Washing of Sponges—General principles for observation at all Operations—Preparation of the Bed—After-treatment of Patients—Diet—Report—The Wound—Special Operations—Excision of Joints—Tapping—Hernia—Ovariotomy—Passing of Catheter—Cleansing of Catheters—Lithotomy—Lithotrity—Dressing of Wounds—Articles required—Spreading of Ointment—Duty of Probationer—Removal of soiled Dressings—Dry Dressing—Wet Dressing—Evaporating Lotion—Irrigation—Collodion—Carbolic Acid treatment of Wounds—Bruises—Contusions—Bites—Stings—Artificial Respiration: Marshall Hall's Plan—Sylvester's Method.

In the performance of a surgical operation we consider dexterity, care, and precision most important elements of success, and such undoubtedly they are; but there are other conditions, which, if neglected, may mar the success of the most dexterously performed operation. These conditions belong, in great measure, to your department, and I propose briefly today to direct your attention to them under the following heads: (1) *The preparation of the patient;* (2) *The arrangements for the operation;* (3) *Certain general principles to be observed at all operations;* and (4) *The after-treatment of the patient.*

(1) *The preparation of the patient.* By this I mean, not only the necessary arrangements of dress, etc.,

which must take place in every individual case, but the preliminary preparation, which has for its object the getting of every organ and function of the body into as healthy and tranquil a state as possible. In this particular you can materially assist the surgeon, by cheering up the patient, so as to look hopefully to the issue, by encouragement in the assurance of the great relief from pain, deformity, or inconvenience the patient will experience if the operation prove successful; for the operation, however slight or simple it may appear to you, must always appear to the patient a source of great anxiety and distress; and thus he is liable to become nervous, depressed, and altogether unfitted for the ordeal. Then again, the surgeon will in all cases examine the chest, and inquire into the state of the abdominal viscera, so pay particular attention to the history of the case. Then the alvine excretions and urine require to be carefully attended to: notice whether they are unhealthy or diminished, and, in all cases, reserve some of the urine for examination by the surgeon.

If possible, the patient should have a warm bath the night previous to the operation, as by this means the skin is made to act properly and efficiently; and you should take great care that the person who is to be operated upon under chloroform does not take any solid food for at least four hours before the time fixed for the operation. Some beef-tea should be given him at this time, and nothing else, except in

the case of weakly, feeble patients, when a little brandy may be given within a much shorter time. In all operations about the bladder and rectum, an enema should be administered on the morning of the operation. The patient having been well washed, his dress should now be carefully attended to. It is a good plan for the patient to wear nothing but a flannel dressing-gown, a pair of stockings, and slippers; in the case of females, flannel drawers should also be worn. Be very careful that the patients are well wrapped up whilst being conveyed to the operating theatre, lest cold be taken at this critical moment. In cases of operations about the arm or breast, the sleeve of that side should not be put on, as it would interfere with the surgeon, and have to be removed after the patient had taken chloroform. Immediately before the operation, also, all dressings should be removed; and the wound, if any, should be washed perfectly clean, and lightly dressed with wet lint and a bandage.

(2.) *Arrangements for the operation.* These must be made without any parade or alarm to the patient. The operation room should be well warmed; the operating table should have a light bed, or folded blanket, upon it, with the addition of one or more pillows, the stretcher-cloth, a piece of oil-cloth or waterproof sheeting, being placed over that part of the table at which the hæmorrhage will occur; and in addition, a piece of red cloth, or tow,

over the mackintosh, will be useful in soaking up the blood; whilst a tray filled with sawdust should be placed below to prevent drippings of blood, or discharge from a diseased limb, upon the floor. You must have a good supply of sponges, plenty of hot and cold water, olive and carbolic-oil, lint, bandages, strapping, pins, gutta-percha sheeting, a can to receive the vomited matter, in case of sickness of the patient, and a piece of calico sheeting, with one or two longitudinal slips in it, as the case may be, which can be used as a retractor to keep the flaps back in case of amputation. It is as well, also, to have a little brandy and some smelling-salts within reach, in case of sudden emergency. The sponges before they are used should be thoroughly cleansed from sand and calcareous matter, and after every operation should be well washed in a weak solution of bicarbonate of soda, to remove the blood thoroughly, then in cold water, and, lastly, they should be allowed to soak all night in a weak mixture of hydrochloric acid and water. They should never be used for any other purpose, and particularly should not be employed for wiping up blood from the floor of the operating theatre. The instruments should be close at hand upon a tray, arranged in due order; and it is as well to have the requisite dressings, sutures, ligatures, and the like, upon a second tray; and for night operations, one or two wax candles, or tapers, should be at hand.

(3.) *Certain general principles to be observed at all operations.* Much of the successful performance of an operation depends upon the attention and steadiness of the nurses. Remember always that you are not present at an operation to see it; you have certain duties to perform, and, as I have before said, upon the due performance of these, the success of the operation is in great part dependent. Do everything in the quietest possible way, endeavouring only to let your presence be noticed by the fact that everything in your department is ready the moment it is wanted.

Three nurses will, as a rule, be sufficient for an operation,—the nurse and probationer of the ward to which the patient belongs, and a third nurse, who has the office of holding the limb about to be removed. It should be grasped firmly by means of a towel, or bandage, wrapped round the part. The nurse should be in immediate attendance upon the operating surgeon, and be always ready to hand sponges or instruments to, or receive them from him; the probationer should see after the cleansing of the sponges,—these should be moist, but thoroughly squeezed out, so that they may be ready to absorb the blood directly they are applied to a wound. Nothing is more annoying than to have the wound filled with water by a careless observance of this rule.

After the limb has been removed, and the ligatures applied to the vessels; Nos. 1 and 3 nurses should be ready with basins of water handed to them by the

probationer, No. 2, to place under and wash the stump with. The water in the basin of No. 1, which should be used first, must be tepid, for the purpose of encouraging the bleeding, and thus affording the surgeon an opportunity of judging whether any active measures should be adopted for its arrest or not. After this the water in the basin of No. 3 nurse must be used, and this should be always cold. All traces of blood may now be carefully removed from the patient's body, and as far as possible from the clothes, and the patient conveyed carefully to bed by the porters who have been in waiting with the stretcher-poles outside the door.

When the operation is not a case of amputation, or in hospitals where there are students, No. 3 nurse can be dispensed with. There should be no unnecessary talking when once the patient is upon the table, all directions from the nurse to her probationer being conveyed by a brief word or two, by a look, or sign with the hand.

While the patient is in the operating theatre, his bed should be prepared for his reception, according to the nature of the case. When the patient is likely to be confined to bed for some time, a mackintosh and draw-sheet should be placed under the part which has been operated upon; and care should be taken in amputation to raise and support the stump with suitable pillows, which should be covered with some waterproof material, and a piece of gutta-percha tissue.

Sometimes it will be necessary to lay a sand-bag across the stump, especially if the patient is restless or uneasy. By this means the painful jumpings of stumps, so common after amputation, are prevented. The weight of the bed clothes should be kept off the wounded part by a cradle. A very good substitute for this I have frequently found by splitting up an old hat-box in the shape of a cradle. If the feet of the patient are cold, hot-water bottles should be applied; these should be removed as soon as they get cold, for if not, more harm is done than good: the patient's feet coming against them in this condition, he experiences a thrill and shock of cold which often set his teeth chattering.

(4.) *The after treatment of the patient.* The edges of the wound will, in some cases, not have been drawn together at the time of the operation; so the nurse must see that she has the needles and suture thread ready for the surgeon when he comes, six or eight hours after, with plenty of tepid and cold water, carbolic lotion, and syringe, for the purpose of removing all clots of blood, and thoroughly cleansing the wound before the sutures are applied. In addition, the nurse should of course have ready to hand all the articles in common use for dressing purposes, such as lint, bandages, etc. The patient should never be left alone for the first eight or nine days after the operation, as hæmorrhage might occur at any time, and immediate assistance be required.

The ward should be kept perfectly quiet, a screen be placed around the bed, and the patient not allowed to talk. He will generally complain of thirst, when a little ice may be given him. Unfortunately, sickness is a very common occurrence after chloroform, and often gives rise to great cause of anxiety, as the exhaustion which it produces is very alarming. Of course the treatment of this will be in great measure under the supervision of the surgeon. However, nothing but a little ice slowly sucked, or small quantities of iced aerated water, should be given without his order. For a day or two it is probable the patient will not be able to take anything but milk diet,—milk beaten up with the white of eggs, and a little lime-water, will often remain on the stomach when all other food is rejected.

If the patient is very restless, or if bleeding should take place, or in cases of excessive and distressing vomiting, the resident surgeon must be at once informed. Upon the visit of the surgeon, the nurse should always be in a position to give any information that may be required, as to whether the patient has slept, or been very restless, if he has had much pain, whether vomiting has taken place, and if the patient has passed any water.

The wound should not be disturbed the first day or two, any more than by substituting a clean mackintosh for the one which may be soiled by the blood. The directions, however, of the visiting surgeon must

be thoroughly carried out. The patient's life is in your hands, the slightest divergence from the strict path of duty may cause his death. What a heavy responsibility, therefore, rests upon you! Do try to realise this, and I am sure you will then thoroughly recognise the importance of your position. To see a patient gradually recovering from some serious operation, and to have the consciousness that careful nursing has done as much, if not more, than anything else to restore him to his convalescent state, will, I feel certain, be a subject of great gratification and thankfulness to you. Whereas, on the other hand, if through carelessness, neglect, or lack of knowledge, the patient should die, what a source of bitter reproach you will have here, and what a heavy charge will hang over your head, some day to be accounted for, and then to meet with a fearful but just reward.

There are one or two special operations that it would, perhaps, be advisable to say a word or two about.

Excision of joints, which consists in the removal of the entire joint, *i.e.*, the knee or elbow. In these cases, a splint, which is generally selected by the surgeon, will be necessary; the nurse will, however, be required to pad it. This subject I propose treating more fully when I come to speak about fractures.

Tapping.—In all cases of tapping for dropsy, the nurse should be provided with one or two buckets,

brandy, hot water, sponges, styptic colloid or collodion, lint, a flannel bandage ten or twelve inches broad, harelip-pins, ligature thread, and a needle with thread.

After this operation, the patient should be kept in bed until the wound has healed, still wearing the flannel bandage, which should be applied firmly round the abdomen after the operation.

Hernia.—This consists in the protrusion of a portion of the bowels from the abdomen into the groin. In most cases it can readily be returned, and kept in position by a truss; but sometimes it happens that the rupture cannot be reduced, and then very serious symptoms set in. If it cannot be returned by the surgeon, an operation must be resorted to for the purpose of reducing or returning it into the abdomen. A pad of lint should be applied over the wound after the operation; the patient should be kept upon his back, and the wound supported by the hand in all convulsive actions of the part, such as those produced by coughing or vomiting. No solid food should be given,—the diet generally ordered by the surgeon will consist of ice, iced-water, milk, beef-tea, and often wine and brandy.

Ovariotomy, or the removal of the ovary for disease. The patient should be kept quiet in bed for a few days previous to the operation, on a simple nourishing diet; and four hours before the operation should have some beef-tea and a little brandy. An enema will

always have to be administered, and the bladder emptied by a catheter. The temperature of the room should be raised to 70° Fahr.; and the patient prepared in the usual way by wearing flannel drawers and gown. It is as well to protect the drawers from wet by wrapping a mackintosh round the legs. In addition to the articles which are required at all operations, the room should be provided with flannel bandages, a flannel wrapper, three feet long and one foot wide, with two or three sets of tapes placed at different intervals, flannels in hot water, ice, two or three empty buckets, and a mackintosh with an oval aperture, corresponding in size and shape to the tumour. Around this opening in the mackintosh firmly gum the wrong side of some sticking-plaster, about an inch and a half in width, making them, as it were, one piece. The adhesive side of the plaster is applied to the abdomen, and the mackintosh is thus retained in position. After the operation the water will have to be drawn off every six hours by means of the catheter, and the patient kept upon such a diet as the surgeon shall order.

I have said you must introduce a catheter every six hours,—let me tell you how to do so. The patient should never be uncovered, but she should be placed upon her back, with the knees drawn slightly up. The nurse should now stand on the right side of the patient, pass the left hand between the thighs, and place the fore finger at the orifice of the vagina;

the catheter can then be readily introduced with the right hand, and, being made to glide over the finger of the left, will, invariably, enter the urethra, and be felt through the walls of the vagina, and beneath the arch of the pubes, as it passes to the bladder.

After being used, it is very important that catheters, particularly the smaller catheters, be thoroughly washed. The catheter should lie for a few seconds in the water; then hold it up with the handle or rings downwards, by which means any blood, etc., is at once washed out in the readiest way. After this has been repeated once or twice, the nurse may blow through the instrument into the water, so as to make sure the eyes are clear. Now dry the catheter with a towel, again blow through it to dry the interior, and introduce the stilette.

The common method of blowing down a catheter before it is properly washed, simply drives any clot of blood, etc., down to the eyes, and renders it almost impossible to extract it.

In *Lithotomy*, which is the removal of a stone from the bladder by cutting, the bed should be prepared in the usual way with mackintosh and draw-sheet; a pillow, also, covered with a waterproof, should be placed under the patient's knees, so as to remove all strain from the muscles of the abdomen, and a large sponge applied to the wound for the purpose of absorbing the urine which will flow through the incision for some days; this should be frequently changed, rinsed in

cold water and carbolic lotion, and wrung well out before being re-applied.

All that will be required in *Lithotrity*, or the operation for crushing the stone in the bladder, is to keep the patient in bed, and carefully collect and filter every drop of urine, so that all pieces of stone may be reserved for the surgeon's notice.

The dressing of wounds forms part of your daily routine of duty. I would, therefore, for the remainder of this lecture, direct your thoughts to that subject. And one great rule which I would insist upon is, that a wound must under no circumstances be uncovered, or any attempt made to dress it, before you know that everything that is likely to be required is at hand. A sure sign of a nurse's want of method and incompetence is, when, in the middle of the dressing of a wound, she is found in want of a pair of scissors, or some lotion, which is either at the other end of the ward, or in some other room, and which necessitates her keeping the wound uncovered for a longer period than is necessary or expedient. All that is likely to be required in an ordinary case of dressing is a pair of forceps, a pair of scissors, pins, lint, tow, cotton-wool, bandages of different lengths and widths, plenty of hot and cold water, a can containing some boiling water for warming the plaster, a draw-sheet, one or two mackintoshes, gutta-percha tissue, a dish or pan, for the reception of the soiled dressings, carbolic lotion, a syringe, and a dish containing the special

lotion for application; but, if the dressing be some kind of ointment, have it spread evenly upon a piece of rag, or the smooth side of some lint; take some of the ointment, work it well up with a spatula, and spread it smoothly and evenly over the one half of the lint, commencing in the centre; keep the blade of the spatula flat upon the surface, and always spread in one direction, and that away from you. Then turn the lint round, and spread the ointment over the remaining portion of the lint in the same way.

The probationer should now be ready to lift and hold the limb, taking great care to afford it all the support she possibly can. The old dressings must be removed by the nurse; and, in the event of their being adherent to the surface of a wound, should never be pulled sharply off, but be loosened by bathing with warm water. The dressings having been removed, the wound must be bathed with tepid water, and well syringed with carbolic lotion; the edges of the wound should be cleansed from discharges of different kinds by means of cotton-wool or tow, soaked in water. This is better than a sponge, which is very liable to carry infection from one patient to another. The limb should then be carefully dried, and the fresh dressings applied.

You should be exceedingly careful not to touch your eyes with the fingers whilst engaged in dressing a wound, as, in some cases, loss of sight, or other serious injury, has been caused by the presence of

a single drop of matter on the surface of the eye. This caution equally applies to towels soiled with discharge: they should never be used for the purpose of wiping the face.

When patients have extensive wounds, as in the case of severe burns, only small portions of the injured part should be dressed at a time; the whole surface should, under no consideration, be exposed to the air.

Dry dressings are very commonly used in this hospital for the first dressings of a wound. No special direction is necessary for their application, but they should consist of suitable strips of lint, with a bandage over all, to keep them in position. In removing these dressings, it will be necessary to soak them carefully with tepid water, in order not to tear open the fresh adhesions to which they will most probably be more or less attached. But, let us suppose the stump, after an operation for the removal of the thigh, requires dressing; the probationer must slip the fingers gently beneath the limb, and raise it from the pillow upon which it has been placed. The patient generally experiences at this time more pain than during the whole of the subsequent dressing. The stump is very apt to jerk and jump, owing to the spasm of the muscles; on this account it must be grasped firmly, but with great gentleness. As soon as the stump is raised, the pillow must be removed; but the mackintosh for the present may

remain, as it will afford a good protection to the bed during the subsequent dressing. The dressings having been well soaked with tepid water, which should be allowed to trickle over them into a basin beneath, should now be removed with a pair of forceps, strip by strip; and, whilst removing those in immediate contact with the edge of a wound, care must be taken not to drag it open, this is best avoided by lifting the two extremities of the strip of lint or plaster at the same time, and then making traction towards, instead of from, the margin of the wound.

Fresh strips of wet lint should now be applied: they should be two or three inches wide, and long enough to reach six inches up on both aspects of the limb. With one hand the nurse should place a strip beneath the stump, and hold it there; whilst with the other she brings the end over the face of the stump, and lays it upon the front of the limb. The moisture will give the lint sufficient hold to maintain its place; another strip is then applied in a similar manner to the side, but slightly overlapping it; then one upon the other side, in the same way; and so on, until the stump is covered, when a long strip of lint, carried over the ends of the other pieces round the limb, will keep them in position. The whole is now covered with gutta-percha tissue, and a bandage applied. The soiled mackintosh and draw-sheet should be removed, and fresh ones sub-

stituted, and the limb again placed upon the pillow. Very commonly the limb is placed upon a pillow without any gutta-percha or bandage around it, as greater facilities will then be given for continually damping the lint with water, or the special lotion which may be employed.

Water-dressing is of almost universal application. It consists of a double fold of lint, of a size suited to the extent of the wound, well soaked in lotion or water, over which is placed a piece of oil-silk, or waterproof tissue, to keep the lint damp, and avoid the evaporation of the moisture. This oil-silk or tissue should be slightly larger than the lint, and may be kept in position by a strip or two of plaster and a bandage. This dressing occasionally produces a number of troublesome pimples around the sore. When this happens, the moist dressing should be substituted by a dry one, such as zinc ointment, or powdered oxide of zinc, applied upon some rag or lint. In some cases of old standing ulcers of the leg, they will heal best when the lint and tissue are cut so as to exactly fit the shape and size of the sore.

Evaporating lotions are sometimes ordered to be applied to inflamed joints for the purpose of maintaining a constantly low temperature in the affected part,—a double piece of lint should be placed on the surface, and kept constantly wet with the lotion by the nurse. The lint must be fully exposed to the atmosphere, all bed-clothes being removed from it.

The bed, and personal linen of the patient, must be protected from getting wet by the judicious use of waterproofs.

Irrigation is a very effectual method to adopt when the temperature of a part requires lowering, or in cases where there is a danger of secondary bleeding taking place. It is most simply performed by placing a vessel containing water a little above the level of the patient's bed, from which some cotton-wick, or worsted, well wrapped round with a piece of lint, can conduct the fluid, after the manner of a syphon, to the affected part. Waterproofs must be arranged so as to protect the bed, and also to conduct the water into a suitable receptacle below.

Collodion is frequently applied to wounds of the face. It will often arrest the hæmorrhage, and keep the edges of the wound in perfect apposition. Grasp the part wounded between the finger and thumb, and thoroughly cleanse and dry it. The edges should now be placed together, and the collodion applied in a thick layer over the wound and the skin for some distance around it. Maintain a firm hold of the parts until the collodion is dry; then allow them to resume their natural position. It is worse than useless to paint collodion over a wet surface, or one from which hæmorrhage is taking place; and the same may be said of sticking-plaster under similar circumstances, if warmed in the ordinary way. But, if immersed in hot water, and then carefully applied to the part by the

gentle pressure of a cloth, it will be found to adhere; and in some cases, to a slight extent, control the hæmorrhage. Collodion contracts so very strongly, that it should be put on in one layer, once for all; not in repeated layers, else the last that are put on will drag off those which were first applied.

Another plan of dressing wounds, about which it would be perhaps advisable to say a word or two, is that commonly known as Professor Lister's treatment of wounds by carbolic acid. The basis of the carbolic acid plan of treatment is the exposure of the wound to the air as little as possible; and, when this is necessary, a spray of carbolic acid lotion is kept constantly playing upon it. All instruments, and the fingers of the surgeon or nurse, are first dipped in carbolic lotion before being employed. After the wound has been cleansed, Professor Lister's "protective plaster," previously soaked in carbolic lotion, consisting of one part of carbolic acid to forty parts of water, is applied. This is a greenish-looking plaster, very much resembling oil-silk. Over this, Lister's lac-plaster is placed — a light brown plaster, made, I believe, from shel-lac. This also must be soaked in carbolic lotion before being used. The whole is then kept constantly moistened with the lotion, and changed once in three or four days.

Bruises and contusions present every possible variety. In the treatment of them, cold will be generally used; and this must be applied in any way

most convenient—by irrigation, application of a wet bandage, or the use of an evaporating lotion.

Contusions are best treated by rest. Bed should be enforced; but if this is not attainable, the limb should be placed in a sling or otherwise: rest must, however, be strictly enforced. Sometimes a warm bath will be ordered in a case of general contusion, as, *e.g.*, that produced by a fall from a horse.

In sprains, support of the affected joint will be required, either by bandaging or careful strapping. The latter has the special advantage of enabling the patient to get about very soon with comparative comfort. In strains, cold is of the utmost benefit.

Bites of animals, and stings. The dog is the animal whose bite has to be most commonly dealt with; although the cat, horse, or rat, inflict injuries occasionally in this way. When a wound is actually present, you will be called upon to thoroughly cauterize the part. The bite is much more dangerous of the cat than the dog.

In stings, of which that of the adder is the only common variety in this country, the poison should be extracted by means of cupping glasses, and then a poultice applied; brandy, ammonia, and æther must be given to support the vital powers. Sometimes artificial respiration has to be resorted to; this may be performed in several ways, but those in most common use are the "Ready method," or Marshall Hall's plan, and "Sylvester's method." Marshall

Hall's plan consists in the patient being laid upon the ground, with one arm laid straight by the body. The body is then moved over to that side, and, by gentle motion, is turned on to the front of the chest, from which it is again brought upon the side, and a little over to the back. By this means, as the front of the chest is compressed, the air is driven from the lungs; and, as the body is brought round on to the back, the chest is allowed to expand, and the fresh air enters. These movements should be effected from ten to fifteen times in a minute, and a short rest taken when the lungs are well filled with air.

Sylvester's method, that adopted by the Royal Humane Society, consists in the patient being placed upon his back, on a flat surface slightly inclined from the feet upwards, the head and shoulders being supported on a small firm cushion placed beneath the shoulder blades or scapulæ. The arms are then grasped above the elbows, and are drawn gently and steadily upwards until they meet above the head. By this means, air is drawn into the lungs. The arms are now kept in this position, while the operator can deliberately count one, two; when they are turned down, and brought gently to the sides, against which for two seconds they are firmly pressed. This causes the air to be again expelled from the lungs. The process is repeated fifteen times in a minute, until there is an effort to respire, or until it is obvious that further continuance is useless.

LECTURE V

Circulation of Blood—Course — Capillaries — Systemic Circulation—Pulmonary Circulation—Proofs of Circulation — Its Uses—The Heart—Position—Structure—Columna Carneæ—Action of Valves—Tendinous Cords — Safety-valve Action — Action of Heart — Sounds of Heart—Arteries—Structure—In a state of Tension—Uses of Muscular Coat—Pulse.

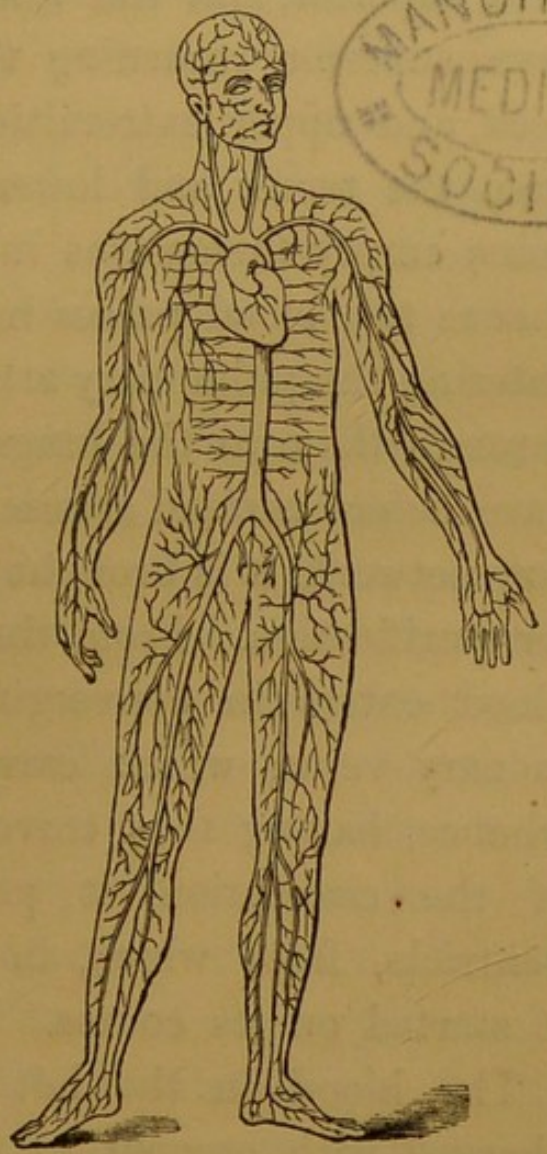
THE human body is, as perhaps you all well know, made up of a number of systems,—these systems all working in harmony, and tending towards one common end, and that end is life. Therefore, each of these is a vital system; and if there is one upon which life is more thoroughly dependent than another, it is the circulation of the blood, to which subject I would now direct your attention.

I think we cannot better pursue the study of the circulation, than by first considering the course which it pursues; then its uses; and, finally, the anatomy and physiology of its great centre—the heart. We have here a plan of the circulation (fig. 4): this is the heart, and these the arteries—vessels proceeding from the heart. I must somewhat anticipate the plan I have laid down, by telling you that the heart consists of four chambers,—two auricles, and two ventricles; a right auricle and a left auricle, a right ventricle and a left ventricle. You will notice, presently, that pure

blood is contained in the left auricle and ventricle, and impure blood in the right auricle and ventricle.

Now, if the blood circulates, we ought to be able to start from a certain point, and finally reach that point again. This we can do; and it matters very little where we start from, but for convenience sake, let us commence at the left ventricle of the heart. Starting from this point, the blood passes into a large vessel or artery called the aorta; from thence it passes on into smaller vessels, which vessels in their turn end in other smaller vessels; and so on, until all the arteries terminate in very small tubes, microscopic objects, in fact, which are called capillaries.

FIG. 4.



It is in these microscopic tubes, that the principal uses of the circulation are carried out. They commonly form a minutely anastomosing network, in which the blood is brought by the ramification of the arteries, or vessels, conveying blood from the heart, on the one hand, and by which it

is returned by the radicles of the veins, or vessels going to the heart, on the other. These small veins terminate in larger veins, and these in still larger ones, until the whole of the blood is returned to the heart, through two great vessels called the vena cava superior, and the vena cava inferior,—the vena cava superior returning the blood from the head, neck, and upper extremities; the vena cava inferior, from the trunk and lower extremities. Both these veins empty themselves into the right auricle; from thence the blood passes into the right ventricle, and entering the pulmonary artery and its branches, passes through them to the lungs, where terminating, as we have before noticed arteries do terminate, in a capillary network, it is brought nearest to the atmosphere for purification. From the pulmonary capillaries the blood enters in converging streams into the pulmonary veins, which carry it to the left auricle; whence, having thus traversed the pulmonary part of the circulation, it passes again into the left ventricle, from which, in the case here supposed, it started on its course.

The blood in the left ventricle is arterial, and charged with oxygen, as well as with materials for the supply of the different organs. So it remains in all the systemic arteries; but, in the systemic capillaries, it parts with portions of these materials, and its oxygen is in great measure consumed in uniting with the hydro-carbonaceous and other substances

which enter the blood-vessels from the refuse matter of the tissues. Thus the blood acquires the venous character; and in this state it traverses the systemic veins, the right side of the heart, and the pulmonary arteries; but in the pulmonary capillary vessels, emitting carbonic acid and water, and imbibing oxygen, it becomes again arterial, and so passes on to the left ventricle.

You have noticed, undoubtedly, I have used the word *systemic*. What do I mean by it? The circulation which I have now described to you is divided into two parts: that part commencing at the left ventricle, and terminating at the right ventricle, is called the systemic circulation, because by it the system is supplied with blood; whilst that portion of it which includes the passage of the blood through the lungs, is called the pulmonary circulation, and has for its sole object the purification of the blood.

As a test for you to know whether you have been able to follow me or not, I would ask how many of you can tell me the differences between the systemic and the pulmonary circulations? Of course, you would all answer that the systemic circulation has for its object the supply of the different organs and tissues of our body with suitable materials for their nourishment and support; whilst the pulmonary circulation has for its object the purification of the blood. Then again you would say, the arteries in the systemic circulation contain pure blood, and the veins impure

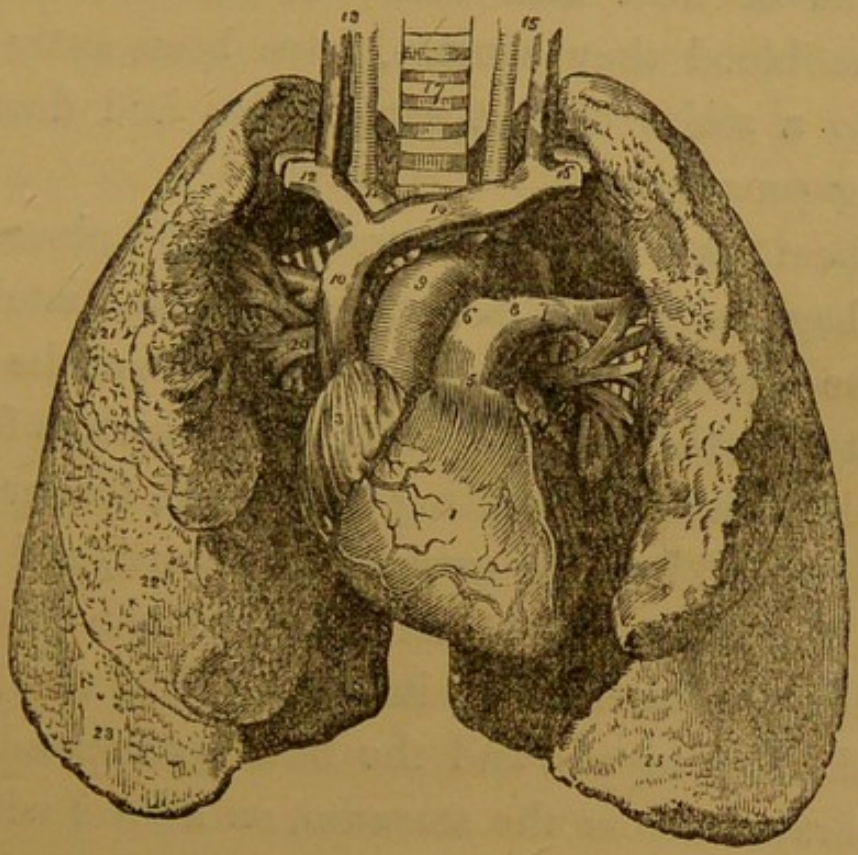
blood; whereas, in the pulmonary circulation, the arteries contain the impure blood, and the veins the pure blood.

I have now described to you the course of the circulation, and indicated its division into two parts; but, what reasons have we for stating that the blood circulates, or what proof have we in support of our assertion, that blood, starting from the left ventricle of the heart, will eventually reach the right ventricle, and so forth?

Now, we know that it circulates, for many reasons. To name three of these: first, we can see it circulating in any transparent part, as in the wing of a bat, or the tail of a fish, or, as I hope I shall be able to show you after lecture, in the web of a frog's foot. Then, again, if you wound an artery, say the radial, where we commonly feel for the pulse, the blood will *spurt out*, with every beat of the heart, away from the body, in a direction *away* from the heart. Now wound a vein, the corresponding vein to the radial artery will do, and you will notice the blood will *run or ooze* out, not spurt out, and this oozing will be in a direction *to* the heart,—thus showing that arterial blood flows from the heart, venous blood to it. And, thirdly, if a certain salt, say ferrocyanide of potassium, be injected into the jugular vein of one side of the neck, some time after the same salt can be detected in the opposite carotid artery by chemical means or otherwise.

Having now satisfied ourselves that the blood does circulate, what good does this circulation do? or what are the grand purposes it carries out, that even life itself is made dependent upon its due performance?

Fig. 5.



The Heart and Lungs: 1, the heart, the figure being placed on the right ventricle; 2, the left ventricle; 3, the right auricle; 4, left auricle; 5, pulmonary artery; 6, right pulmonary artery; 7, left pulmonary artery; 9, arch of aorta; 10, superior vena cava; 11, the arteria innominata, and, in front, the vena innominata; 12, subclavian vein; 13, 15, carotid arteries and jugular veins; 17, the trachea; 19, 20, the bronchi and pulmonary vessels forming the roots of the lungs; 22, 23, 25, lobes of the right and left lungs.

Its uses are mainly threefold; two of which I have already mentioned, viz., the conveyance of oxygen and nutriment to the several tissues of the body, for their nourishment, and the taking from those

tissues the refuse matters resulting from their wear and tear; but, thirdly, it serves another great purpose in the animal economy, viz., that of warming the body; thus helping to maintain a uniform and equable temperature, in spite of such changes as variations of heat and cold; and so the arteries, with the blood they contain, have been aptly compared to a series of hot-water pipes laid down for warming purposes.

The heart is a muscular organ (fig. 5), placed in a serous bag, called the pericardium, immediately behind the sternum, more to the left than the right side, between the lungs, with its apex, which is formed by the left ventricle pointing downward, forward, and to the left, and its base upward, backward, and to the right. The apex can be felt between the fifth and sixth ribs, one inch to the inner side, and two inches below the left nipple, and the base corresponds with a line drawn across the sternum, on a level with the upper border of the third rib.

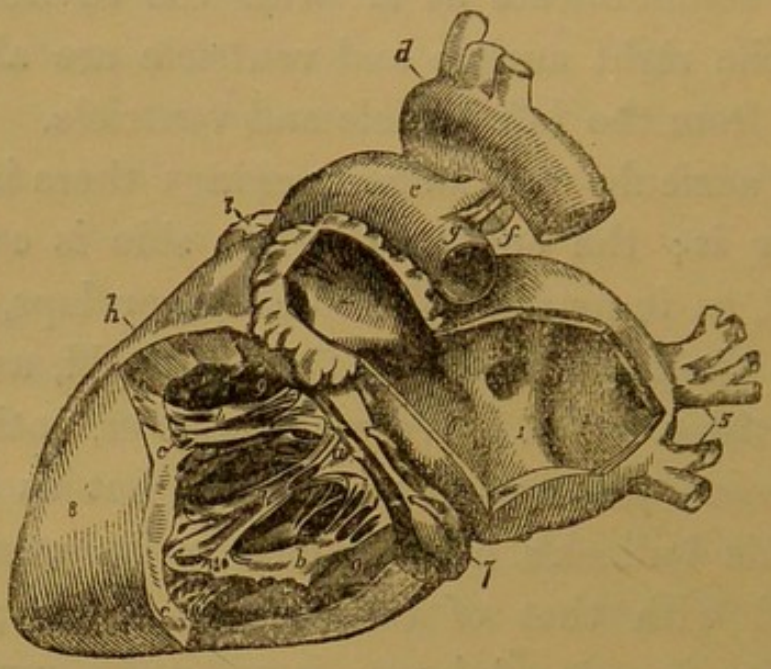
Think of this in your application of belladonna plasters, blisters, etc., to the region of the heart; and then you will be less likely to err with respect to the exact position the blister or plaster should occupy. The heart weighs, on an average, 10 oz., and is divided into four chambers, viz., two auricles and two ventricles, a right auricle and ventricle, and a left auricle and ventricle,—the auricle in each case being above the ventricle. There is an opening between the

auricle and ventricle of the same side, which is called, as the case may be, the right or the left auriculo-ventricular opening; but the cavities on the one side do not communicate at all with the cavities of the other: the right auricle and ventricle are altogether distinct from the left auricle and ventricle. At each of these auriculo-ventricular openings there is a valve guarding it; the one on the left side is called the *bi*cuspid, as it consists of two cusps, or laps, whereas that on the right is called the *tri*cuspid, as it consists of three cusps. We will, however, notice these valves more particularly presently. Let us now lay open this bullock's heart, which in its structure is identical with that of the human subject; but, as everything is so much larger, it will serve our purpose better for explanation.

This is the right auricle, and this the left. Upon laying open the right auricle (fig. 7), we find it lined with a smooth shiny membrane, called the endocardium; and in it we find the orifices of the vena cavæ and the opening into the ventricle. The left auricle is lined also with this membrane (fig. 6), and we notice here the auriculo-ventricular opening, as well as those of the pulmonary veins. There is no communication between the right and left auricle in any way. In the fœtus, however, there is an opening of communication between these chambers; but directly after birth it becomes obliterated. If it should continue to exist, we get a peculiar condition of the infant,—

it suffers from what is called blue-disease—the pure and impure blood get mixed in the heart, and dark

Fig. 6.



Left side of the heart, laid open from behind (from Wilson).

1. Cavity of the left auricle.
2. Cavity of the appendix auriculæ, near the apex of which are seen musculi pectinati.
3. Opening of the two right pulmonary veins.
4. The sinus, into which the left pulmonary veins sometimes open.
5. Left pulmonary veins.
6. Auriculo-ventricular opening.
7. Coronary vein, lying in the auriculo-ventricular groove.
8. Left ventricle.
9, 9. Cavity of the left ventricle; the figures rest on the septum ventriculorum.

a. Mitral valve; its flaps are connected by chordæ tendineæ *b*, *b*, Musculi papillares.

c, *c*. Fixed columnæ carneæ, forming part of the internal surface of the ventricle.

d. Arch of the aorta.

e. Pulmonary artery.

f. Obliterated ductus arteriosus.

g. Left pulmonary artery.

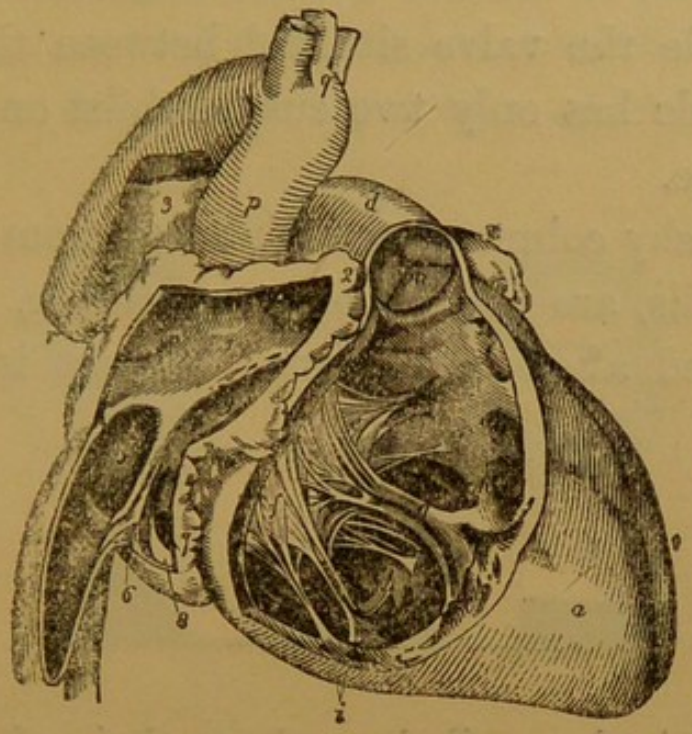
h. Right ventricle.

i. Apex of the appendix of right auricle.

blood circulates in the body, instead of bright scarlet arterial blood.

We will now open the remaining cavities, the ventricles. They are the same in every particular,

FIG. 7.



Right side of the heart laid open (from Wilson).

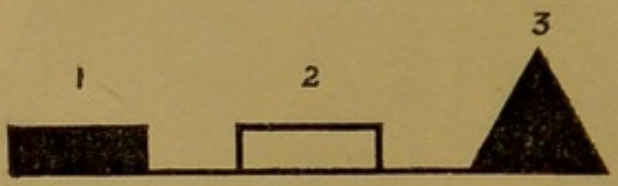
1. Cavity of right auricle.
2. Appendix auriculæ, in its cavity are seen the musculi pectinati.
3. Superior vena cava, opening into the upper part of the right auricle.
4. Inferior vena cava.
5. Fossa ovalis; the prominent ridge surrounding it is the annulus ovalis.
6. Eustachian valve.
7. Opening of the coronary sinus.
8. Coronary valve.
9. Entrance of the auriculo-ventricular opening. Between the figures 1 and 9, two or three Foramina Thebesii are seen.

a. Right ventricle.
b. Cavity of right ventricle.
c. Conus arteriosus or infundibulum.
d. Pulmonary artery.
e, f. Tricuspid valve; *e* is placed on the left curtain, *f* on the anterior curtain.
g. One of the musculi papillares, to the apex of which the anterior and right curtains are connected by chordæ tendineæ.
h. Columnæ carneæ.
i. Two musculi papillares of the right curtain.
k. Attachment by chordæ tendineæ of the left limb of the anterior curtain.
l, l. Chordæ tendineæ.
m. Semilunar valves of the pulmonary artery.
n. Apex of left appendix auriculæ.
o. Left ventricle.
p. Ascending aorta.
q. Its transverse portion, with the three arterial trunks which arise from the arch.
r. Descending aorta.

with the exception that everything is stronger, and more marked, on the left than the right side; and on the left side the valve situated between the auricle and ventricle has only two cusps, whilst on the right it has three.

These fleshy columns, or eminences, from the ventricular walls, are called columnæ carneæ, and they are arranged after three plans: one set is attached

FIG. 8.

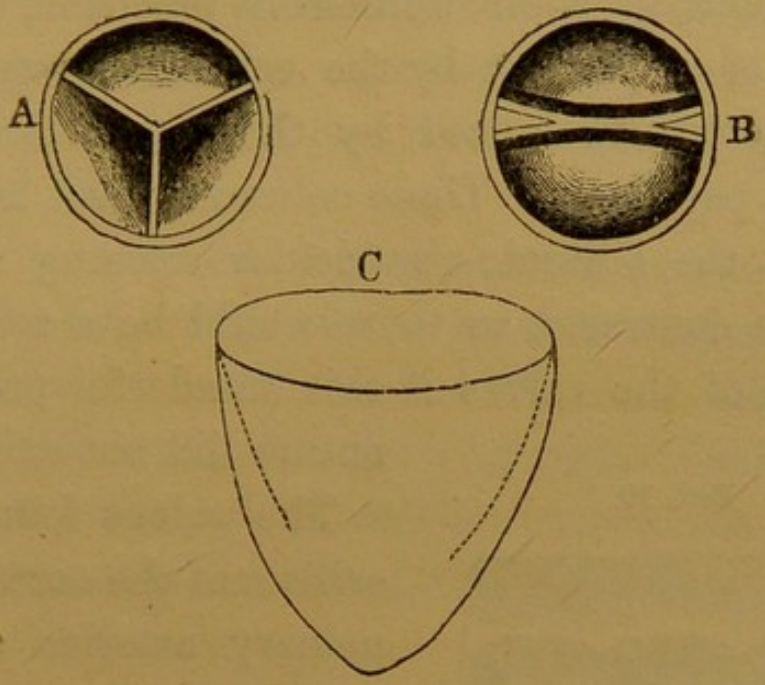


to the ventricular wall throughout their whole length (1); another is attached only by their extremities (2), and I can pass a probe beneath them; and the third set is pyramidal in shape (3); these have received a distinct name, and are called musculi papillares.

And now let us return to the valves. They are both fibrous and elastic in their structure; and, looking down upon them from above, when in action, they have this appearance (fig. 9)—the tricuspid (A), and the bicuspid (B). When blood is passing from the auricle into the ventricle, the valve lies flaccid against the ventricular wall; but when the ventricle is contracting to propel its contents onwards, the valve is in action thus (C), and completely blocks up the auriculo-ventricular opening: the flaccid valve is represented

by the dotted line. The valves are prevented from going into the auricle by these tendinous cords, which are attached on the one hand to the valves, and on the other to the musculi papillares, the third series

Fig. 9.

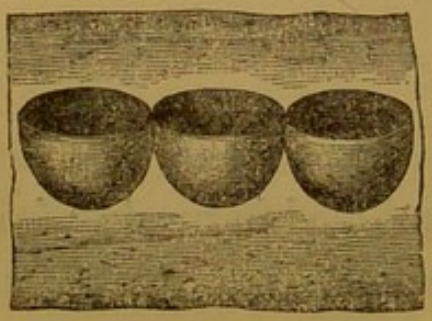


of the columnæ carneæ. When blood is passing from the auricle into the ventricle they are slack; but when the ventricles are contracting and expelling blood into the vessels, to use a nautical phrase, they are taut, and thus effectually prevent the valves from passing beyond the horizontal position.

But why are these cords attached to the musculi papillares? How is it they do not come direct from the ventricular walls? When the ventricle contracts, its cavity is diminished in every way, in length, breadth, etc.; and, consequently, if the cords were attached to the ventricular walls, they would be

thrown into folds, and thus their object of not allowing the valves to assume any other than the horizontal position would be defeated. But, being attached to the fleshy columns, this is prevented; for the columns contract, when the muscle of the heart contracts, with such wonderful precision, that the amount of cavity lost by the contracting ventricle is exactly counterbalanced by the contraction of the musculi papillares. These columnæ must be brought near to the auriculo-ventricular opening when the ventricle contracts, so there would be a tendency to eversion of the valves if this wonderful provision of nature did not exist.

FIG. 10.



The valves found at the orifices of the aorta and pulmonary arteries are semilunar, and in each case consist of three semilunar pouches (fig. 10), in shape exactly resembling a watch-pocket. They lie against the wall of the artery, when at rest; but, when in action, form a suitable barrier to prevent regurgitation of the blood back again into the ventricle. You can illustrate the action of the valves, by tying the end of the aorta or pulmonary artery, with the valves intact, upon a piece of glass tubing, when upon blowing down it, or by pouring water into it, they will immediately fly into action.

The valve upon the right side of the heart does not quite close, that is, it allows a little blood to pass its precincts; this is called the safety-valve action of the heart, because the lungs are apt to become gorged if too much blood is sent them; and in such cases as this, a little blood is allowed to flow backwards again into the general venous circulation for their relief. What another wonderful provision of nature we have here!

Next let us proceed to glance at the action of the heart. The total action of the heart occupies about one second, and consists in the dilatation and contraction of its cavities. Both auricles dilate and contract at the same time, and both ventricles do the same; therefore the action of the two sides of the heart is synchronous.

The auricles take $\frac{7}{8}$ of a second in dilatation, and $\frac{1}{8}$ in contraction. The ventricles occupy $\frac{4}{8}$ of a second in dilation, and $\frac{4}{8}$ in contraction. It follows, therefore, that during $\frac{3}{8}$ of the second the ventricle is dilating simultaneously with the auricle. In the systole, or contraction of the left ventricle, the apex of the heart is tilted upwards, forwards, and to the left; whilst during the diastole, or dilatation, it is brought downwards, backwards, and to the left.

The contraction of the ventricles is like a flash, being uniform everywhere; whilst that of the auricles is similar to a wave, commencing at the orifices of the veins, and ending at the auriculo-ventricular openings.

The contraction is different in the case of the auricles and ventricles, inasmuch as there are no valves at the entrance of the pulmonary veins, and the superior and inferior vena cavæ; and, therefore, regurgitation of the blood is prevented by the peculiar wave-like contraction of the auricles.

Upon placing a stethoscope over the region of any healthy heart, two sounds will be most distinctly heard, which have been aptly compared to the words lubb—dup,—and that is just the manner in which you will hear them—lubb, dup, then a pause, and then lubb, dup again. These sounds of the heart are caused by the closure of the auriculo-ventricular, and the semilunar valves. The first sound is caused by the closing of the bicuspid and tricuspid valves, and the second sound by the closure of the aortic and pulmonary valves.

In valvular disease of the heart, these sounds undergo changes, clearly distinguishable to the ear, which enable us to detect their existence; *e.g.*, if we get a murmur instead of the first sound, and the second sound clear and normal, we know at once we have to deal with disease of the auriculo-ventricular valves, either the bicuspid or the tricuspid; and to know which of these is affected, we have to notice where the murmur is heard loudest; if at the apex of the heart, then the valve affected is the mitral; if at the bottom of the breast-bone, then it is the tricuspid. And, in the same way, when the aortic or

pulmonary valves are diseased, you get a murmur with, or instead of, the second sound of the heart.

The following are some tables showing the action of the different cavities, the sounds they give rise to, the time they occupy, and the force of the contraction of the different cavities:

No. 1.	Aur. contract, ven. distend	... $\frac{1}{8}$ ...	pause, last part.
	Ven. „ aur. dilate	... $\frac{4}{8}$ ...	first sound and impulse.
	Ven. dilate, aur. dilate	... $\frac{2}{8}$ ...	second sound.
	Ven. „ aur. distend	... $\frac{1}{8}$ ..	pause, first part.
No. 2.	Aur. systole	... $\frac{2}{10}$ ...	of heart's action.
	Ven. „	... $\frac{4}{10}$ ...	„
	Ven. diastole	... $\frac{4}{10}$ ...	„

I think I cannot better conclude this brief account of the anatomy and physiology of the heart than by quoting the words of Professor Draper of New York. He says:

"In the olden times this organ was looked upon as the seat of the thoughts and the passions; it was the centre of all good and evil, purity and uncleanness, devotion and love. In the modern system the brain has succeeded to the functions which were once imputed to it."

"The heart, then, is no longer an altar on which flames are burning; no longer the seat of the passions, and the source of love. It is a machine,—but what kind of a machine? How great is the admiration we may express at its exquisite construction! This little organ can execute three thousand

millions of beats without a stop. In the course of a life such as we sometimes meet with, it has propelled half a million tons of blood; and, though momentarily wasting, has repaired its own waste all the time. The mathematical rhythm of its four moving cavities, the perfect closure of its mitral and semilunar valves, and the regurgitating play of its tricuspid have never failed it. To the eye of the intellect there is nothing lost in transferring it from the regions of metaphor and speculation to the domain of physical science."

Arteries, or the vessels which convey the pure bright scarlet arterial blood to the different parts of the body, consist of three coats; the external, of ordinary fibro-cellular tissue, the fibres of which are arranged in a longitudinal direction, forms a strong tough investment to the artery, and is principally designed to strengthen the walls, and guard against the too excessive distension of the vessel from the force of the heart's action. The middle coat makes up the greatest bulk of the artery, and consists of elastic tissue and muscular fibres; the elastic tissue is nearest to the external coat, and the muscular to the internal. The larger the artery, and the nearer to the heart it is, the less muscular fibres it contains, and the more elastic it is; and the farther away the artery is from the heart, the more muscular it is, and the less elastic. Consequently, the aorta is very elastic, and the radial artery very muscular.

In every contraction of the ventricle the blood is jerked into the arteries; and one of the great purposes of the elasticity of arteries is to guard them from the pressure which is so suddenly exercised upon them. If the arteries were brittle tubes they would give way under this pressure of blood, but being elastic, their walls dilate and stretch to receive the blood, and, in so doing, become more tense and resisting. So now you see the great advantage the superabundance of elastic tissue is to the aorta and those vessels near to the heart which receive all the force of the contracting ventricle. When the ventricle ceases to contract, the arteries are able, by this same elasticity, to resume their former calibre; and, in so doing, they exert pressure upon the blood, and thus tend to equalize its current. If the vessels were rigid tubes, the blood, instead of flowing as it does in a continuous stream, would have been propelled through the body in a series of jerks, corresponding to the heart's action, with intervals of almost complete rest during the inaction of the ventricles.

A dead artery will stretch as far as a certain point, when it will abruptly stop. This stoppage is due to the external coat; and thus an artery is different from a piece of elastic tubing, which stretches until it breaks, and if elastic enough obliterates the canal.

Arteries are always in a state of tension, as may be shown by cutting an artery, when the ends immediately retract; the degree of tension may be measured

by the amount of retraction. The reason the arteries are always in this state of tension is that the cavity of the canal may be preserved under every variety of movement, and every position of a part.

There are, however, two exceptions to this rule, and these are found in the brachial artery in front of the elbow-joint, and the poplitial artery which runs behind the knee-joint; it may be demonstrated in the brachial by bending the arm, and then placing the finger upon the radial artery, when it will be found to be stopped. Nature provides for this apparent defect by the abundant joinings, or inosculations as they are called, of the smaller arteries about the elbow and knee-joints.

One of the most important offices of the muscular coat of arteries is to regulate the supply of blood to a part in accordance with its requirements. When an organ is doing more work than usual, it requires more blood, consequently the vessels allow more blood to pass through them, for there is always a relation between the supply and the demand. Then, again, you see the action of the muscular coat of arteries in the blushing of the face from emotion, or the pallor of the countenance from fear or dread. There must always be a relation between the contained fluid and the containing vessel; and as you see this varies according to the demands of a part, the vessel must adapt itself to the blood. The elastic coat, being a passive force, is not able to do this; and

we have, therefore, a second use for the muscular coat. The internal coat is very thin and brittle, and affords a smooth surface for the passage of the blood.

And this brings me to our last point for to-day,—viz., the pulse. This you can only learn at the bed-side; accustom yourselves, however, to feel the pulses of patients, for though, in some cases, the pulse is of little value, yet oft-times it is the only landmark to the physician or surgeon of the arrest or progress of disease. The pulse in health is influenced by a number of causes. Age has a remarkable power over it, as is shown by the following table:

Period.	Beats per minute.
At Birth	140
Infancy	120
Childhood	100
Youth	90
Adult age	75
Old age	70
Decrepitude	75

Then, women have a quicker pulse than men. Rest, exertion, excitement, and posture all influence it. It is quicker when you stand than when you sit, and quicker in the sitting than the recumbent position. The pulse is always quicker after taking food than before doing so; in a warm temperature than in a cold; in tall men than in those of short stature.

The pulse in disease is subject to great variations. It may be frequent or slow; regular in its beats, or

irregular; hard or soft; sharp, jerking, or bounding. These characters must be studied at the bedside.

This lecture, which is purely physiological, I have delivered to prepare your minds in some measure, for the great and important subject I propose treating at our next meeting, viz.,

HÆMORRHAGES.

LECTURE VI

Hæmorrhages, three kinds—Arterial—Natural Methods of Arrest—Variety of Wounds—Changes—Application of Cold—Position of Limb—Pressure—Graduated Compress—Tourniquet, its application—Styptics—Cauterization—Acupressure—Ligature—Reef-knot—Hæmorrhage from the Head, from the Nose, from the Limbs—Hæmatemesis—Hæmoptysis—Venous Hæmorrhage—Course of large Blood-vessels.

THE arrest of hæmorrhage is, perhaps, one of the most important topics that can engage your attention, as upon its successful accomplishment often depends the life and safety of the patient.

Hæmorrhage is the escape of blood from vessels in which it is naturally contained; and is divided into three kinds, arterial, venous, and capillary or oozing, according to the kind of blood-vessel it proceeds from,—whether it be artery, vein or capillary. It may be caused by wounds, rupture, or laceration of the arteries, or by disease of the coats of the blood-vessels, without any wound, rupture or laceration; or, it may arise from disease involving surrounding parts. This is one of the greatest dangers of the sloughing which is so common after severe lacerated wounds, and in some forms of ulcers; but just notice, in passing, that the blood-vessels resist this morbid change more than any other structure. You will

frequently see a blood-vessel pulsating uninjured in the midst of sloughing and dead textures.

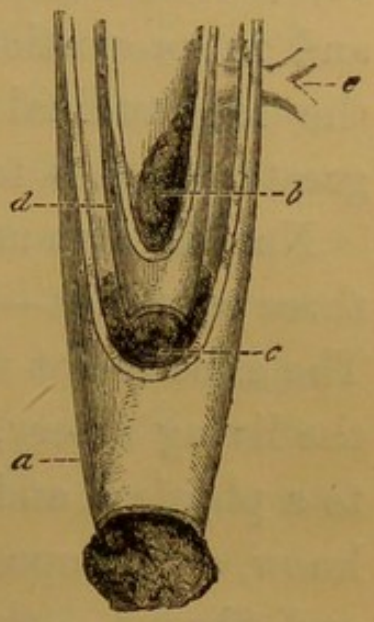
We will speak of the three kinds of hæmorrhage in turn, and first of the arterial. This is by far the most important and the most serious form of bleeding, and is often so profuse, that the life of the patient is in imminent danger. It is known by the blood that escapes being of a bright vermillion or scarlet colour; it likewise flows by jets corresponding to the beats of the heart, between which the flow does not cease, but becomes continuous.

In my last lecture I told you that arteries consisted of three coats; an outer or fibrous coat for affording protection and giving strength; a middle or muscular elastic coat for equalizing the force of the circulation throughout the vessel, and so to prevent any irregular distension of its walls; and an inner or serous coat, covered with a slight moisture for the purpose of presenting a smooth free surface for the passage of the blood.

The artery is also enclosed in a "sheath" of loose cellular tissue. Now, when an artery is cut across, its coats both contract and retract. The vessel first retracts (*d*) within its sheath, and then the edges of it contract by virtue of the muscular and elastic coats, and somewhat resembles the neck of a champagne bottle. By these means the canal of the artery is lessened, and the orifice closed; then the blood clots or coagulates (*a*) upon the surface of the wound,

external to the injured ends of the artery; this coagulation or clotting being greatly accelerated by the presence of the ragged ruptured ends of the investing sheath (*c*). Then again the blood, not flowing through the artery, is practically at rest, and so another clot (*b*) is formed internally, which extends up to the nearest branch (*e*), and is conical in shape, with the apex directed upwards.

Fig. 11.



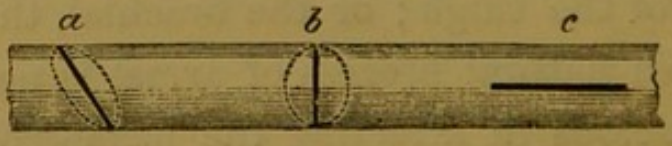
In checking hæmorrhage, these provisions of nature are greatly aided by the diminution of the force of the heart's action, which always accompanies the faintness consequent upon the loss of blood; for the blood, which flows very rapidly at first, owing to the equal way in which it is distributed throughout the body, soon produces an impression upon the brain, and a feeling of nausea and prostration quickly follows. As a consequence, the heart's action is diminished; then the blood begins to flow more slowly, and this facilitates the clotting of the blood, which takes place externally to the ruptured ends of the vessel. But if the wounded artery be of larger size, as the femoral, the artery of the thigh; or the brachial, the artery of the arm, this natural process of arrest is not likely to prove efficacious in arresting the hæmorrhage. And

again, if a vessel is merely punctured, the bleeding will be more troublesome, for there is no retraction of the ends; and more or less excessive, according to the direction of the wound in the artery. A transverse wound will bleed more than a longitudinal one; and in proportion as an oblique wound approaches the longitudinal or transverse, so will it have a greater or less tendency to bleeding.

Now take an artery, living or dead, and make these three cuts in it—longitudinal, transverse, and oblique. The experiment will succeed as well in the dead as in the living artery, so the result, whatever it is, is due to a physical, and not to a vital cause. Arteries, you know, are composed of three coats—elastic, muscular, and fibrous,—the last only gives strength to the vessel; and as the fact comes out that the same changes ensue in the dead as in the living artery, it proves that these changes must depend upon the elastic coat, for the property of elasticity is physical, whereas the properties of muscular tissue are vital.

But what are the changes produced in these several wounds of a vessel? The longitudinal remains longitudinal, the transverse becomes circular, and the oblique oblong. Thus:

Fig 12.



But elasticity will not produce this difference alone. I have here an elastic piece of tubing, and I make three cuts in it,—one in a longitudinal, another in a transverse, and a third in an oblique direction, and so they remain. But why is this? It is because the arteries are always in a state of tension. Directly I stretch this tubing, the cuts assume the appearances I have described to you,—the transverse becomes circular, and the oblique oblong; the amount however of retraction an artery makes when divided does not measure the amount of its elasticity, but the degree of tension it was in. Now, I think you will understand why bleeding is more severe after a transverse than a longitudinal wound; because in the one case the edges of the artery are kept in apposition, and so the blood at least hindered from running out; whereas in the other, the edges of the vessel are drawn asunder, and so hæmorrhage is facilitated.

As it is only in the comparatively small arteries that the natural processes will generally suffice to stop the bleeding permanently, we shall do well now to pass under review the different artificial methods usually adopted for the complete arrest of hæmorrhage. These are the application of cold, position of the limb, pressure, styptics, cauterization with the hot iron, torsion, acupressure, and ligature. It is the first four of these methods that you will have to do with as nurses,—the others should never be resorted to without the presence and consent of the surgeon. I

mention them here, however, to make your knowledge on this subject as complete as possible.

(1.) *The application of cold.* This is of great service, as it causes contraction of the vessels, and often proves successful by merely exposing the wound to the air. When this does not succeed, the application of a piece of lint, soaked in cold water, or of ice in a bladder will usually arrest the flow of blood.

(2.) *Position of the limb.* This is a matter of great importance, and should be carefully studied. If the hæmorrhage proceeds from the hand it should be raised by a sling to the opposite shoulder; whilst if it comes from the leg or foot, it should be supported upon a pillow in such a manner that the main artery of the limb may be as high as possible above the level of the heart.

(3.) *Pressure.* Direct pressure upon the bleeding part is a very successful means of suppressing hæmorrhage. When it occurs from small arteries, such as the temporal, or very deep-seated vessels, and a ligature is impracticable, all that will be required is a pad of lint and a bandage. It is not applicable, however, to all parts of the body, as the vessel should be immediately over a bone, so as to afford a certain amount of counterpressure. When the hæmorrhage proceeds from a puncture of a moderate-sized vessel, such as the brachial, pressure may be made by means of a graduated compress and bandage: the compress should be at least an inch in thickness, and made of

a series of pledgets of lint, circular in shape, and gradually increasing in size. It may be applied in the following manner: the main artery being held above the wounded part, the wound is to be opened and thoroughly cleansed, and a small pledget of lint placed at the bottom, on this another pledget, rather larger, and so on, until the lint is an inch higher than the skin, when a bandage is to be applied over all; first by making a turn or two below the pad, then by applying it tightly over the pad, and, lastly, by a few turns round the limb above the injured part.

The application of the tourniquet affords a temporary means of arresting hæmorrhage. It is applied upon the main artery of the limb above the point of bleeding. I trust at our next meeting to have an opportunity of showing you practically the use of the tourniquet, by pointing out upon the living subject the exact places where pressure should be exerted by the instrument. Before applying it, a few turns should be made round the limb, with a bandage, to protect the skin from immediate pressure, and the remaining portion of the roll should be placed over the artery to act as a pad. The tourniquet should then be applied, taking care to place the screw of the instrument on the outer side of the limb, except in the case of the popliteal artery, a vessel which runs behind the knee, when it should be put directly over that joint. The buckle of the strap often impedes the action of the

screw, by being drawn close up to the brass work; a few inches of strap should therefore always intervene between the buckle and the screw. Care should be taken that this is looked to before its application. An impromptu tourniquet can always be made by placing a stone, or weight, over the artery, and by tying a handkerchief round the limb, with a stick twisted in it to obtain pressure.

(4.) *Styptics.* These increase very materially the contractile power of the vessels. The most useful styptics are perchloride of iron in solution, alum, gallic acid, and matico. In order to apply them effectually, the part should be wiped dry, all coagula removed; and a piece of lint, or cotton-wool, soaked in the diluted solution, and then squeezed nearly dry, should be firmly applied and maintained in position by means of a bandage.

(5.) *Cauterization.* This was the only mode of arresting hæmorrhage known to the ancients, and consists in the direct application of an iron at a black heat to the wounded vessel. It is very seldom used now-a-days; but it is of unquestionable utility in cases where the hæmorrhage proceeds from a soft porous part that will not hold a ligature. The lunar caustic, or nitrate of silver, has the same effect, but its action is more superficial. You will remember I told you it could be used with benefit in cases of obstinate hæmorrhage from leech bites.

(6.) *Torsion.* In this, the bleeding vessel is seized

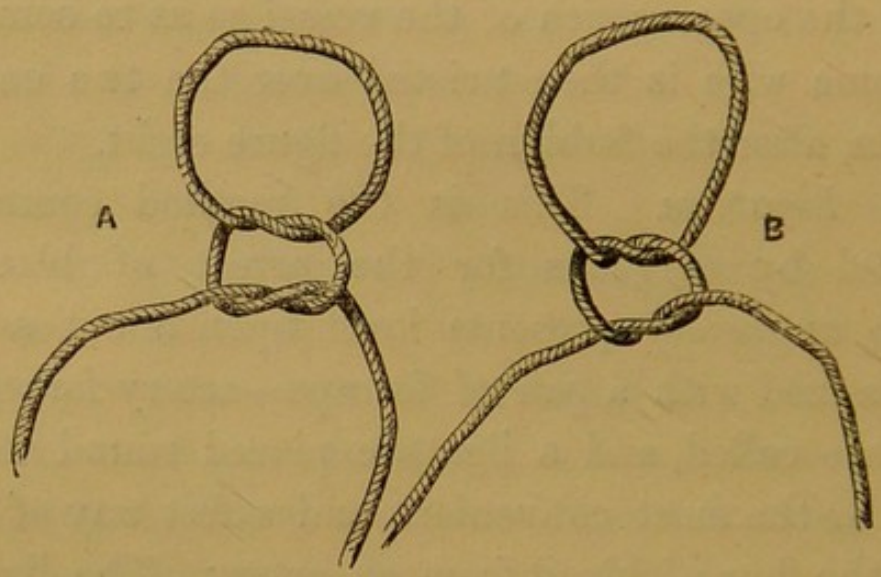
by a pair of forceps, and twisted. In many London hospitals this method of arresting hæmorrhage has quite superseded the use of the ligature; in our own hospital it is frequently used.

(7.) *Acupressure.* This is very seldom adopted here; it is performed by passing a hare-lip pin over or under the open mouth of the vessel so as to compress it; some wire is then twisted over the two ends of the pin, after the fashion of the figure eight.

(8.) *Ligature.* This is the method commonly adopted by surgeons for the arrest of bleeding. When an artery presents itself upon a cut surface it is seized with a pair of forceps—artery forceps, as they are called, and a ligature placed round it. It is by far the most convenient and safest way of stopping the flow of blood from an artery. The ligature should be of hemp, and tied round the artery in what is nautically termed a reef-knot. This is quite different from the knot generally tied, and known under the name of "granny's knot." You will do well to notice the difference between them. In the reef-knot (fig. 13, A) both ends of the thread pass either over or under the corresponding loop; while in the "granny" (B) the one thread is over, the other under; the result of which is that the loops are not so flat, nor do they hold so firmly as in the case of the reef-knot. To tie this knot properly, hold one end of the thread in each hand, then pass the left hand over the back of the right one, and place the end of the cord

which is in the left between the ring and little finger of the right hand; whilst with the left hand take hold of the thread which is in the right. By this an interchange is effected. Now draw out the right hand, still maintaining the hold of the thread between

Fig. 13.



the third and fourth fingers; there will now be no difficulty in drawing the knot, thus formed, tight. To complete the knot by making another tie, the same manœuvre is to be gone through, only taking care to begin with the opposite hand to that which commenced before.

Now let me quote a few common examples of bleeding from wounds, with the view of more forcibly impressing this upon your minds. And first we will suppose a man has presented himself at the hospital with an injury to his head. He has been struck with a stick in a drunken riot, or something has fallen upon his head and cut it. He comes with his head and

face covered with blood; and if the quantity of blood apparently lost could be taken as any criterion, you would be quite justified in arriving at the conclusion that he had met with a most terrible accident. But, it is well to remember, that very simple wounds about the head or face bleed profusely, and that a spoonful or two of blood will make a fearful mess. Many mothers have had a great fright by a child running in with his face, hands, and clothes all smeared with blood, which, when washed away, shows the injury to be a mere scratch.

In these cases of bleeding you must be perfectly cool and collected. The head must be thoroughly washed, the hair in the neighbourhood of the wound cut close, and the immediate edges shaved. Then a pad of dry lint and a bandage should be applied, and the surgeon sent for. Pressure will be also found to be generally sufficient to control all hæmorrhage from wounds of the face.

Bleeding from the nose, or epistaxis, when it results from blows, may easily be controlled either by sniffing up the cold air, or by making the patient sit erect, while you hold a cold wet sponge to his nose; in extreme cases, gallic acid may be used as snuff. Sometimes the nose may bleed independently of an accident, and then, as a rule, it is a provision of nature to prevent something much more serious; so, unless it goes too far, it need never in such cases alarm you.

Hæmorrhage sometimes occurs to a great extent

after the extraction of a tooth, for some persons have a great tendency to bleed; the slightest cut or scratch is followed by such excessive hæmorrhage, that life is endangered. Such persons should always mention this to the dentist, so that he may be prepared. A strip of lint, dipped in some styptic, and pressed firmly in the hole left by the tooth, will generally stop the bleeding.

When a man is brought to the hospital with a severe lacerated wound of the arm or leg, from which excessive hæmorrhage is going on, firm pressure must be made with the finger upon the main artery of the limb, until a tourniquet is properly applied.

But we will suppose an amputation has been performed, and the patient has been put to bed with his stump upon a pillow. After a time, a little hæmorrhage may take place from some small vessels which did not bleed at the time of operation, without causing any alarm; but if the hæmorrhage be more than this, the stump must be raised, the wound exposed to the air, while gentle pressure is made upon the main artery of the limb, and the surgeon sent for.

Hæmorrhage is very apt to occur after incisions are made in inflamed parts. This may generally be prevented by plugging the wounds with pieces of lint, so as to fill them up to the surface; a poultice, or a pad of lint, with a bandage, should then be

tightly applied, and the limb, if possible, kept in an elevated position. The plugs of lint may be either removed the following day, or allowed to remain undisturbed, until loosened by suppuration.

Secondary hæmorrhage is the bleeding which may occur whenever a ligature comes away in consequence of the vessel not having become occluded, or it may result from sloughing extending to vessels not previously implicated. Immediate arrest of the bleeding by pressure upon the main artery is of course the first object, and the surgeon must then be instantly informed.

Hæmatemesis, or the vomiting of blood. It is a frightful sight to see a person vomiting blood; but it is not always so dangerous as at first it might appear. The patient will throw up large quantities of dark grumous blood, often mixed with food. The patient should be put to bed and kept quiet, and small pieces of ice given him to suck.

Hæmoptysis, or bleeding from the lungs. The spitting of blood is always a very serious symptom, as it generally indicates the disorganization of the lungs. You will know it comes from these organs by its being coughed up rather than vomited, by its being of a bright scarlet instead of a dark colour, and by its being smaller in quantity, and not mixed with food.

Venous hæmorrhage is not generally attended with any fatal consequences. It is known by the dark

appearance of the blood, and by its flowing in a continuous uniform stream. The bleeding from a wounded vein may be easily arrested by elevating the limb, and applying a pad and bandage. If the vein is of a large size, and the application of pressure to it is impracticable, a ligature will have to be put round it; but this must always be avoided if possible, as inflammation of the vein is very apt to occur as a consequence.

The most common, and, at the same time, most dangerous form of venous hæmorrhage is from the rupture of large varicose veins, veins which are tortuous, dilated, and sacculated. They feel like cords beneath the finger, and are generally situated superficially upon the legs and thighs of old women, or others who have much standing to do. The hæmorrhage may easily be stopped by pressure upon and below the wound, but the limb should be supported in an elevated position for some time. The bleeding may go on unknown to the patient, until she falls down in a fainting condition, which may speedily prove fatal if not at once attended to.

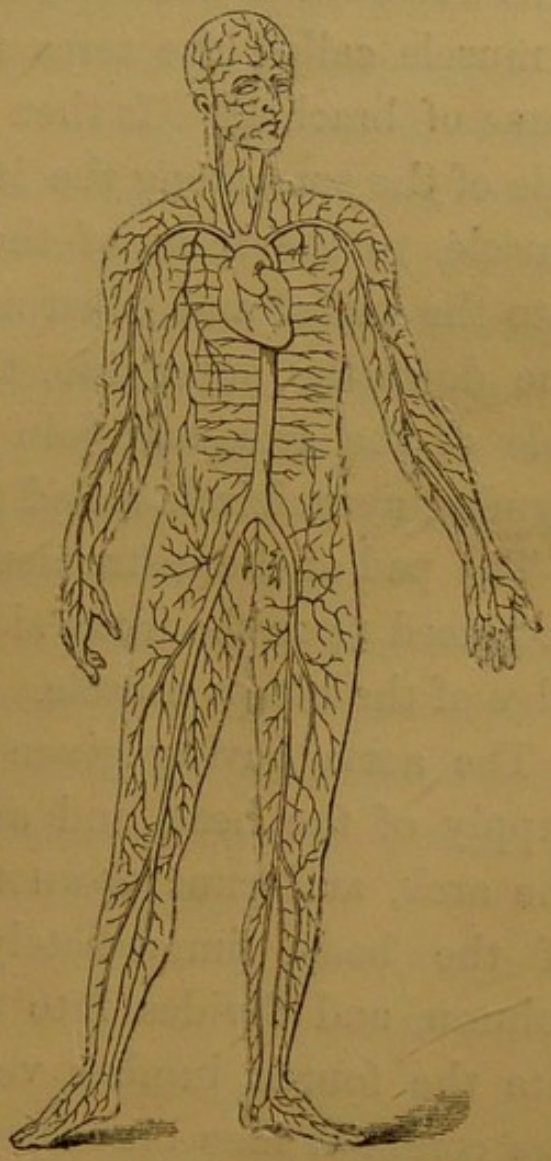
In all cases of varicosity of the veins, a bandage, or elastic stocking, should be applied before getting up in the morning, for the purpose of giving support, by firm and equable pressure, to the distended vessel.

Capillary hæmorrhage is nothing more than a mere oozing of blood, which will not give rise to any serious

result, and which can be easily checked by elevating the limb.

In conclusion, let me just map out for you the course of one or two arteries, so that you may the better know where to apply pressure, by means of the tourniquet, or otherwise, in cases of hæmorrhage.

Fig. 14.



The aorta, or large artery, which comes from the left ventricle of the heart, gives off a branch, called the carotid, to each side of the head and neck; and another, called the subclavian, for the supply of each arm. The carotid and subclavian arteries do not come directly from the aorta on the right side of the neck, but from a short trunk called the arteria innominata.

The carotids. All I need say about these is, that they run up each side of the neck, and enter the skull for the supply of the brain.

The subclavian turns outwards over the border of the first rib; and it is in this position, just above the

collar-bone, that pressure is made by means of such an instrument as the handle of a door-key in cases of amputation at the shoulder-joint, because a tourniquet cannot be applied. The artery at the lower border of this rib takes the name of axillary, and then runs downwards and outwards to the lower border of a muscle called the teres major, where it takes the name of brachial. It then proceeds down the inner side of the arm, along the inner border of the biceps muscle, to the front of the elbow, where it divides into the radial and ulnar arteries, which proceed, the one down the outer side, the other down the inner side of the arm, and join in the palm of the hand, forming a semicircle called the palmar arch.

The pad of the instrument, you see, must therefore be placed upon the inner side of the arm, by the inner edge of the biceps muscle.

The aorta, having given off the branches for the supply of the head and arms, makes a turn called the arch, and runs down through the whole length of the body, immediately in front of the spinal column, and divides into two large branches opposite the fourth lumbar vertebra. These are called the common iliac branches; they diverge from each other at an acute angle towards the articulation of the sacrum with the ilium; and after a course of about two inches, divide into the external and internal iliac. The internal iliac descends into the pelvis, and after a course of about an inch and a

half, divides into several branches for the viscera and parts about the pelvis.

The external iliac passes along the brim of the pelvis, and then running under a ligament, called Poupart's, which is placed between the anterior spine of the ilium and the symphysis pubes, it takes the name of femoral, and can be felt pulsating upon the inner side of the groin. It descends nearly perpendicularly along the front and inner side of the thigh; and at the juncture of the upper two-thirds with the lower third, it passes to the back of the thigh, then runs down behind the knee, under the name of popliteal, and divides into two branches, which ultimately join together in the sole of the foot, as the radial and ulnar arteries did in the palm.

The pad for controlling the flow of blood through the femoral must be placed upon the inner side of the groin; or if the tourniquet is to be applied lower down, as in cases of amputation of the leg, it must be placed immediately behind the knee.

LECTURE VII

The Skeleton—Its Uses—Result of Burning Bone –Of its Immersion in Acid—Division of the Skeleton—Structure of Bone—Cancellous portion—Medullary Canal—Appearance of a Transverse Section—Haversian Canals—Lacunæ—Canaliculi—Appearance of Longitudinal Section—Periosteum—Chemical composition—Growth of Bone—Names and description of different Bones—The Spine—Skull –Thorax—Upper Extremity—Lower Extremity.

BEFORE proceeding to the question of fractures and dislocations, let me give you in this lecture some slight description of the bony framework of our bodies, commonly called the skeleton, a specimen of which you have before you. The uses of the skeleton are twofold,—in the first place, it was essential to provide some solid and dense structure to act as a framework for the attachment of the softer parts, such as muscle; and then, secondly, it forms the boundary walls of cavities, as the thorax, which contains such vital organs as the heart and lungs, and so affords a very effective protection to these important organs.

If a bone is burnt, one-third of its bulk is lost, and two-thirds of it remain behind, which consist entirely of earthy matter. On the other hand, if the bone be placed in dilute hydrochloric acid, the acid will dissolve the earthy matter away, and the one-third of

animal matter will remain; the original shape of the bone being preserved in both cases.

Bone consists of an external dense layer of compact tissue, and an internal cancellous, or spongy portion. In the interior of this, in the case of the long bones, is a canal, called the medullary canal, which contains marrow.

In man the skeleton is composed of two hundred bones, which are usually divided into four classes:

(1.) *Long bones,* in which the medullary canal is bounded by a thick compact structure, such as the femur, or thigh bone; and the humerus, or bone of the upper arm.

(2.) *Flat bones,* as those of the skull, which consist of two layers or tables of dense hard bone, between which is a layer of cancellous structure called the diploë. The inner table is more dense and brittle than the outer one.

(3.) *Round bones,* such as the bones of the carpus, or wrist; and of the tarsus, or ankle. The interior of these bones is occupied by spongy, cancellous matter, which is covered with a thin layer of compact tissue.

(4.) *Mixed or compound bones,* which present different characters in different places, such as the scapula, or shoulder-blade; and the os innominatum, or bone of the hip.

Bone is one of the hardest textures of the body, and at the same time possesses a certain amount

of toughness and elasticity. If we examine a section of bone, we shall find that it consists of two kinds of tissue — one, dense and compact in texture; the other, spongy and fibrous, and presenting a reticular appearance, which, from its resemblance to lattice-work, has been called cancellous. As in this section of the femur which we have before us, so in every other bone of the body, we find the cancellous part of the bone always interior to the compact.

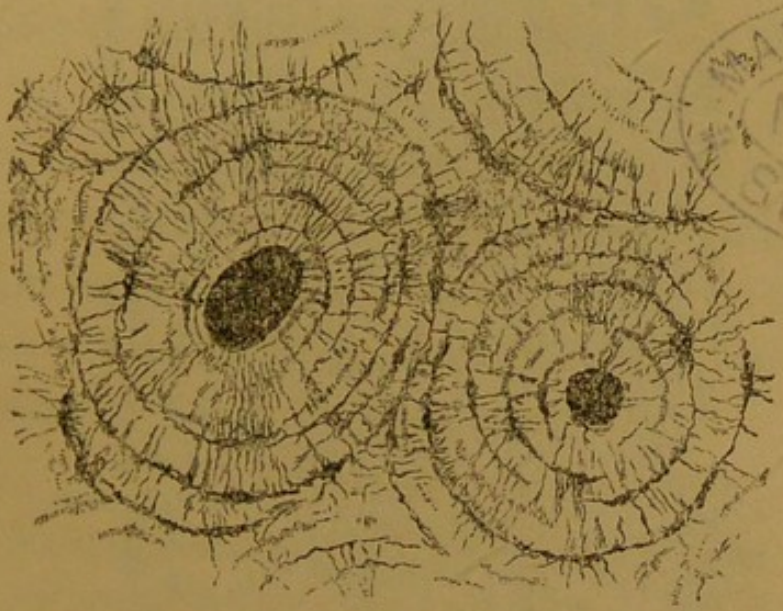
The cancellous portion of bone consists of extremely delicate layers of fibres, called "laminæ," the fibres of which are arranged after the manner of strings in a net, with perfect regularity. Where the fibres intersect there is a slight thickening. They are about the 2500th of an inch in diameter; and one horizontal layer of fibres is joined to another by other fibres which run obliquely between them. In the interstices of these fibrous layers we find a kind of marrow, of a yellowish appearance, which consists of 96 per cent. of fat, and the remaining four parts of areolar tissue and blood-vessels.

The medullary canal, or canal which runs down the whole length of long bones, contains a different variety of marrow, which is of a reddish colour, and consists of $\frac{3}{4}$ of water, and the remaining $\frac{1}{4}$ of an albuminous material, containing albumen, fibrine, earthy salts, and extractive matter.

The dense, or compact part of bone, is in reality

a porous mass, full of cells and passages. If we take a thin transverse section of a long bone, such as the femur, or humerus, and place it under the microscope, we shall see (fig. 14), as I hope you all will after lecture, a number of apertures surrounded by a series of concentric rings. These apertures are generally round or oval in shape, and are sections of canals known by the name of Haversian, which are channelled out for the conveyance of blood-vessels for the nutrition of the bone.

FIG. 14.*

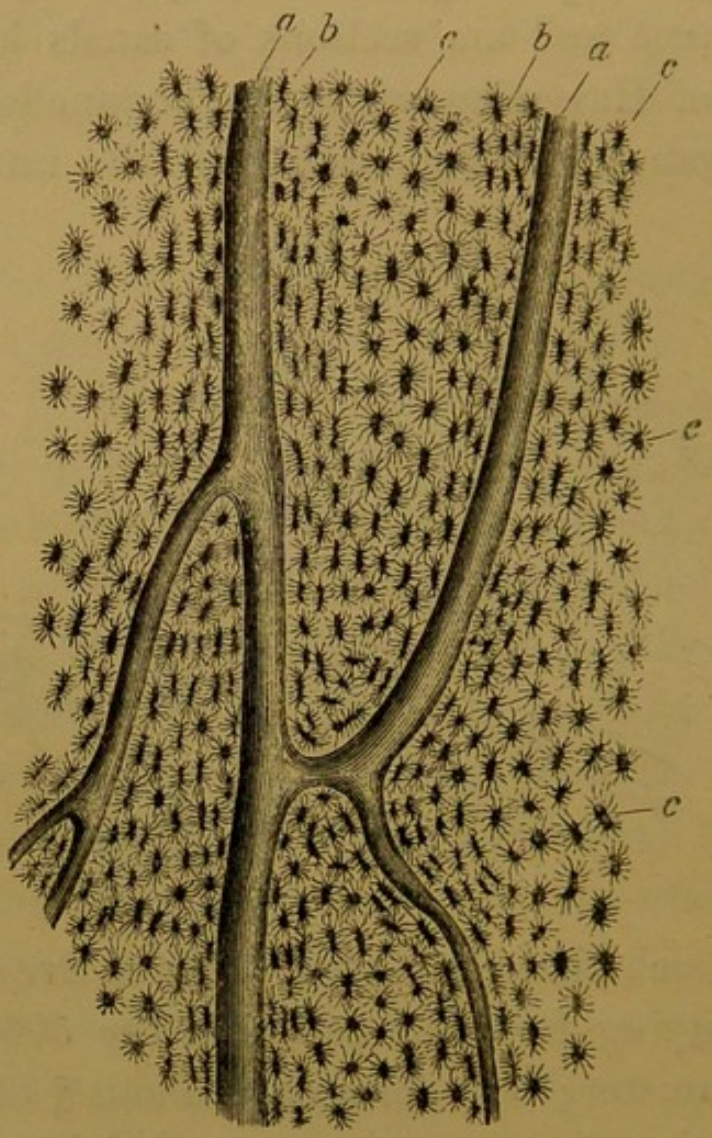


Around each Haversian canal are from five to fifteen laminæ, varying from the 300th to the 500th of an inch in diameter; they form only about $\frac{3}{4}$ of a circle, the remaining $\frac{1}{4}$, where they are deficient, having other laminæ dovetailing into them.

Between these laminæ, and likewise concentrically arranged round the Haversian canals, we find peculiar spider-like bodies, called "lacunæ," with irregular

processes, known as canaliculi, proceding from them, communicating with the canaliculi of other lacunæ. These lacunæ and canaliculi are a kind of small reservoirs, with tubular communications through-

Fig. 15.



a. Haversian canal. *b.* Lacunæ. *c.* Canaliculi.

out the whole substance of the bone; and thus the transmission of nutriment to every part is provided for. The lacunæ and canaliculi around one

Haversian canal do not communicate with those around another; but the canal, with its concentric layers of fibres and lacunæ, constitutes one distinct system, called the Haversian system.

If a thin longitudinal section of the shaft of a long bone be made (fig. 15), we find the Haversian canals which run in the direction of the long axis of the bone, and are parallel to each other, communicating freely by means of transverse or oblique canals. The exterior of bone is covered with a dense layer called periosteum, composed of strong fibrous tissue; whilst in the interior we find an extremely thin layer, full of blood-vessels, which is called endosteum.

In its chemical composition bone may be considered to be composed of two portions—organic and mineral. The former is principally gelatine, whilst in the latter phosphate of lime greatly predominates, as the following analysis by Berzelius shows:

Animal matter	33·30
Phosphate of lime	51.04
Carbonate of lime	11·30
Fluoride of lime	2·
Phosphate of magnesia	1·16
Soda and chloride of sodium	1·20
	100·

Bone increases in length by layers of cartilage being coalesced or joined to the extremities; and as the lower ones become ossified, another is laid on;—this growth goes on especially at the lower end of the

bone. They increase in width, by the periosteum being continually converted into osseous structure, whilst absorption into the medullary canal of a layer of bone from the interior takes place; and thus you will perceive that the marrow found in the medullary canal consists of old osseous matter. By this ossification of the periosteum, the laminated structure of bone is accounted for.

Let me impress this upon your minds by describing to you the following experiments. If a ring of metal be placed around an animal's leg, and he be killed some time after, the ring, which was originally placed around the bone of the leg, will be found in the medullary canal, thus showing that bone increases in width by fresh layers being placed on externally, whilst absorption goes on within.

Then, again, if a bone of an animal be taken, and four holes bored into it equal distances apart, the bone will be seen (after the animal has been killed) to have increased in length much more below, than it has above; thus proving that it grows faster at its lowest part or extremity.

If an animal be fed upon madder, his bones will become coloured red; and if he is fed alternately upon this, and his ordinary food, alternate layers of a red and white appearance will be produced.

Bone is peculiar to the vertebrata; in the invertebrata we find a horny substance, or carbonate of lime. Some fishes have a cartilaginous skeleton

all through life. In no fish is there a marrow-bone. And there is no medullary canal in the bones of the tortoise, turtle, or whale tribes. In birds, the bones are hollow, and filled with air from the lungs, except the penguin, which has no air in his bones; whilst in the humming-bird the air permeates every part of the bony structure.

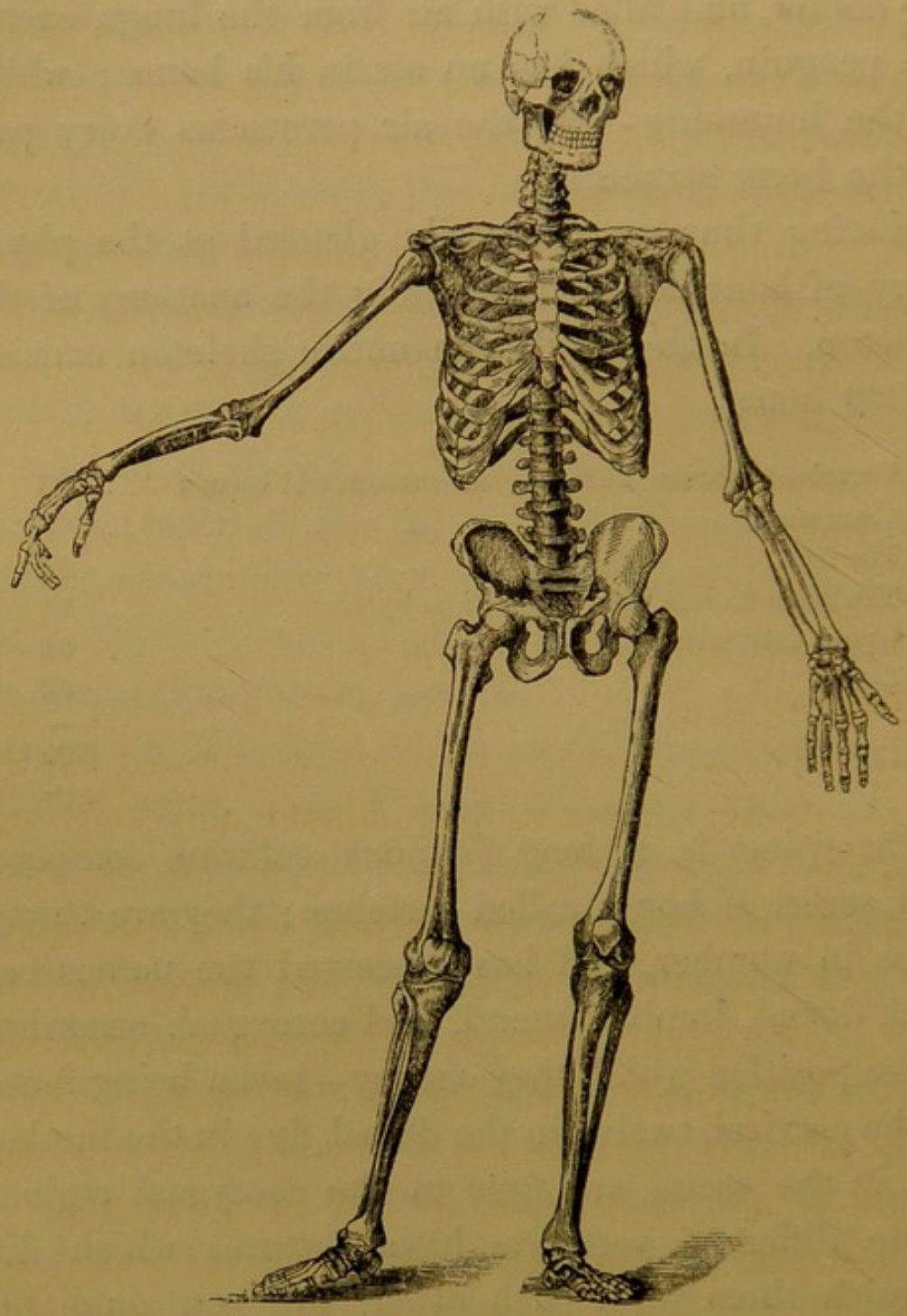
Having thus very cursorily glanced at the physiology of bone, let us now study the anatomy of the skeleton. In the adult the entire skeleton consists of 200 bones.

Vertebral column, including the sacrum and coccyx ...	26
Cranium	8
The face	14
The sternum and ribs, with the os hyoides	26
Upper extremities	64
Lower „	62
	200

The spine is a long flexuous column, composed of a series of bones called vertebræ; they are thirty-three in number, and have received the names cervical, dorsal, lumbar, sacral, and coccygeal, according to the position which they occupy—seven being found in the cervical, twelve in the dorsal, five in the lumbar, five in the sacral, and four in the coccygeal regions. These different vertebræ have features which distinguish them from each other, and you ought to be able to tell a cervical vertebra from a dorsal, and a dorsal from a lumbar, and so on.

A cervical vertebra may be distinguished by its body, which is wider, transversely, than from before

Fig. 16.



backwards; by the spinous process, which is short and bifid, that is, split; and by the transverse pro-

cesses, which are short, and pierced with a hole, in which one of the arteries to the brain, called the vertebral, passes up.

The first and second cervical vertebræ are slightly different, and have been called the atlas and axis, respectively. The atlas supports the head, and is peculiar in not having any body, or spinous process; the opening for the spinal cord is much larger here, to afford a greater amount of space for it, which is imperatively required in movements of the head. The axis has for its most distinctive feature this prominent portion of bone called the odontoid process, which is tooth-like in appearance; it has likewise a body and spinous process. These two bones allow of the rotatory, and up and down movements of the head.

The seventh cervical vertebræ is known by the spinous process being very prominent and long, and not bifid.

The dorsal vertebræ are known by the facets on the transverse processes, and on the bodies for the ribs. The spinous processes are also directed obliquely downwards, and overlap each other.

The lumbar vertebræ are distinguished by the bodies being larger than in any other portion of the vertebral column; the transverse processes are long, slender, and directed transversely outwards; and the spinous processes are thick and broad, and terminate in a rough, uneven border.

The sacrum and coccyx consist, at an early period of life, of distinct bones, which become fused into each other in the adult.

The sacrum is triangular in shape, with the apex directed downwards. It is situated at the lower part of the vertebral column, and at the back part of the pelvis; it has eight openings in it for the passage of the sacral nerves.

The coccyx is a small bone, caused by the fusion of five bones, and is at the lower extremity of the spinal column. This bone is very apt to get fractured in old people, by their sitting down rather violently in a chair, or by falling backwards.

The average length of the spinal column is about two feet, two inches; and, when viewed laterally, it is seen to make three curves, corresponding to its different regions, which are called cervical, dorsal, and lumbar. The cervical curve is convex in front, concave behind; the dorsal, concave in front, convex behind; the lumbar, convex in front, concave behind.

The skull, which contains the brain and special organs of the senses, such as the eye and ear, is divided into two parts—the cranium and the face. The cranium, so called from its acting as a helmet to the brain, is composed of eight bones, viz., the occipital, two parietal, two temporal, the frontal, sphenoid, and ethmoid.

The face is composed of fourteen bones, viz., the

two nasal, two lachrymal, two malar, two superior maxillary, two palate, two inferior turbinated, the vomer, and inferior maxillary.

The bones of the cranium and face are joined to each other by means of sutures; thus we have the sagittal suture running between the two parietal bones; the coronal suture connecting the frontal with the parietal bones; and so on, each suture receiving a special name according to its position.

I am not going to describe every bone of the face and cranium, individually, to you,—this would be neither profitable nor necessary; nor do I intend telling you the names of the nerves and other things that come out through these holes which we find at the base of the skull. But first notice in passing how they are protected from pressure by the firm bony boundary walls. What a wonderful provision of nature is this, and how essential it is to our well-being! We see here the brain, the centre of all our reasoning and mental powers, well guarded by being placed in a strong bony case; whilst equal provision has been made for the eye and the organs of hearing. How wonderful are the works of the Lord! How true are the words of the Psalmist—"All Thy works praise Thee, O God!"

The thorax, or chest, is a kind of cage intended to contain and protect the principal organs of circulation and respiration, and is formed by the sternum, or breast-bone, with the costal cartilage in front, the

bodies of the dorsal vertebræ behind, and the ribs on either side.

The sternum is a flat narrow bone about six inches in length, being rather longer in the male than the female; its inferior extremity is called the cuneiform cartilage.

The ribs are elastic arches of bone, and are twelve in number on each side of the thorax. The first seven are connected behind with the spine, and in front with the sternum; the remaining five are called false ribs, in contradistinction to the first seven, which are called true ribs. Of these the first three are connected behind with the spine, and in front with the costal cartilages, not with the sternum at all; the last two are connected with the vertebræ only, and are called floating ribs.

There is one rib I wish to direct your particular attention to, and that is the first; it is the shortest and most curved of them all, and has upon its upper surface two depressions, separated one from the other by means of a ridge and tubercle. The groove in front transmits the subclavian vein, that behind, the artery; and it is in this situation that we apply pressure upon the artery in cases of amputation at the shoulder-joint.

The upper extremity. The clavicle (so called from its supposed resemblance to an ancient key), or collar bone, forms the anterior part of the shoulder, and is joined on the one hand to the sternum, on the other

to the scapula. It makes two curves: the one nearest the sternum is concave anteriorly; that nearest to the scapula is convex.

The scapula or blade-bone, is a large flat bone, and joins the back part of the shoulder. The most striking feature about it, is the cuplike cavity which exists for articulation with the head of the humerus.

The humerus is the longest and largest bone of the upper extremity. It presents for examination a shaft and two extremities. The upper extremity presents a rounded head, which is joined to the shaft by a constricted portion called the neck, and two other eminences—the greater and lesser tuberosities. Immediately below the lesser tuberosity is the surgical neck, so called from its being the most common seat of fracture. The shaft of the bone is almost cylindrical in the upper half of its extent, prismatic below. The inferior extremity presents the articular surface for the radius and ulna, the bones of the forearm. The ulna works upon the portion of bone, called the trochlear, in an up and down manner; in other words, flexion and extension; whilst the concave head of the radius moves upon this portion of the humerus, called the radical head, in a rotatory manner.

The forearm is that portion of the upper extremity which is situated between the elbow and wrist. The ulna is a long bone placed at the inner side of the arm, parallel to the radius; but is the larger and

longer of the two bones. The prominences at the superior extremity are called the olecranon and coranoid processes, respectively,—the one posteriorly, is the olecranon, the other anteriorly, the coranoid process; this fits into the humerus, to form a perfect hinge joint. The lower end of the ulna is small, articulating with the radius, but altogether excluded from the wrist joint.

The radius is situated at the outer side of the arm, lying parallel with the ulna, but less in length and size than that bone. Its upper part is smaller, and forms only a small part of the elbow joint. The lower end is large, and constitutes the chief part of the wrist joint.

And now we come to the hand, which is divided into three segments: the carpus, or wrist; the metacarpal bones, which form the palm; and the phalanges.

The bones of the carpus are eight in number; proceeding from the radial to the ulnar sides, they are called scaphoid, semilunar, cuneiform, and pisiform; and those of the lower row in the same order, are the trapezium, trapezoid, os magnum, and unciform.

The metacarpal bones are five in number and are long cylindrical bones.

The phalanges are fourteen in number; three for each finger, and two for the thumb. There is nothing very striking about them requiring special notice.

The *lower extremity* consists of three segments—the thigh, the leg, and the foot.

The os innominatum, or nameless bone, so called from its bearing no resemblance to any known object, consists of three parts — the ilium, ischium, and pubes. These three parts in the young are separate and distinct bones, but at puberty they join together at the cup-like envelope called the acetabulum. It forms, with its fellow of the opposite side, the walls and anterior part of the pelvic cavity; this is completed posteriorly by the sacrum. You ought to be able to distinguish a male pelvis from that of the female. The bones of the male are altogether stronger and more massive. The anterior superior spines, those edges upon the superior part of the bone, seem to be bent in, in the male; in the female they are turned out. And then again, the pubic arch is triangular in the male; in the female, more or less oval, and much larger.

The femur is the longest, largest, and strongest bone in the body. Its superior extremity presents a head, which fits into the acetabulum of the os innominatum; a neck, which joins it with the shaft; and two eminences of bone, called the greater and lesser trochanters. Encircling the neck is a capsule, or cap, which helps to retain the bone in its position. In old people fractures are very apt to occur within this capsule, with the result of permanent lameness. The inferior extremity articulates with the tibia.

Upon the posterior and lower part of the femur, you notice a triangular smooth surface called the

popliteal space. This is where the large popliteal vessels are found.

The leg consists of three bones, the patella, tibia, and fibula.

The patella is a triangular bone, situated immediately in front of the knee joint, and having a bursa or bag, containing fluid, upon its anterior surface. This bursa often becomes inflamed and enlarged in consequence of kneeling, and gives rise to the so-called "housemaid's knee."

The tibia is the next largest bone to the femur in the body, and is situated at the front and inner side of the leg, and has, upon its outer side, a long slender bone called the fibula.

The foot, like the hand, consists of three divisions: the tarsus, metatarsus, and phalanges.

The bones of the tarsus are seven in number; the os calcis, astragalus, cuboid, scaphoid, the internal, middle, and external cuneiform bones.

The metatarsal bones, like the metacarpal, are five in number. The phalanges of the foot, likewise, both in numb and general arrangement, resemble those in the hand.

This completes my description of the skeleton. I know it is a difficult subject; but try and recollect the names of the different bones, for you will find this knowledge of great service in your work.

LECTURE VIII

Injuries to Bones—Dislocation—Agents of Security to a Joint—Causes of Dislocation—Clove Hitch—Dislocation of Jaw, of Shoulder—Fractures—Varieties—Causes—Signs—Mode of Repair—Rules for Measurement of Limbs—Splints—Gutta-percha—Leather—Special Fractures—Nose—Ribs—Arm—Thigh and Leg.

HAVING discussed the structure of the skeleton, I now proceed to the consideration of the injuries, fractures, and dislocations to which the bones are liable.

A dislocation is an abnormal separation of the articular surfaces of two bones from each other, as *e.g.*, the head of the humerus, from the glenoid cavity of the scapula; or the head of the femur, from the acetabulum of the pelvis. The agents of security to a joint are the ligaments, which immediately surround it, and the muscles, which are attached to the bones, and in their course envelope the joint. The more moveable a joint is, the more is it dependent on its muscles, and the less on its ligaments, for security; and the more fixed a joint is, the more is it dependent upon its ligaments, and the less upon its muscles.

The causes of dislocation are twofold—violence, and muscular action. Violence is divided into two classes —direct and indirect. Dislocation by direct violence is of rare occurrence; by indirect, very frequent; as, for example, when, by falling upon the elbow, the humerus becomes dislocated into the axilla. In this case, you see, the bone is used as a lever, and the force, being increased, causes the dislocation.

When a dislocation is caused by muscular action, it is generally produced quickly. The most frequent dislocation by muscular action is that of the lower jaw; the patella is another.

Very frequently, dislocations are the result of disease; *i. e.*, in scrofulous disease of the knee-joint, the tibia becomes dislocated backwards and outwards, and slightly rotated upon itself. And again, in hip disease, which is so common amongst delicate children, the femur is often dislocated.

The general signs of dislocation are deformity, pain and distress, limitation of movement, and impairment of function; ofttimes, also, the bone may be felt displaced. Deformity is the most striking feature; and if the change of outline occurs immediately after any violence, it is nearly always due to dislocation. This alteration of shape is generally owing to shortening of the limb.

Of course, in all cases of dislocation, you must at once inform the surgeon, who will attempt to reduce the dislocation by means of extension, which consists

in fixing one part of a joint, whilst another part is extended.

The clove-hitch is the knot ordinarily employed to obtain a firm hold of the limb. This is best made out of a jack-towel, by grasping it with the left hand, and forming a simple loop in it with the right. Holding the first loop with the left thumb, another similar loop is made, which must be grasped with the right hand, and then passed under the loop first made. The hitch is easily slipped over the limb to the required point.

The lower jaw, in some people, very easily becomes dislocated by opening the mouth too wide in gaping. It cannot possibly be mistaken,—the mouth is fixed widely open, and the patient cannot speak. It is readily reduced by pressing the thumbs, protected by a towel, to the angle of the jaw, or by placing a bit of strong stick across the mouth, like a horse's bit; then, with the stick or thumbs, press downwards and backwards; whilst pressure is made upwards, against the chin, until the bone slips into its place, being drawn into its proper position by the muscles of mastication.

After dislocations of the humerus have been reduced, which is generally accomplished by placing the foot in the axilla, and extending the arm, the limb must be confined for a few days in a sling.

In all cases of dislocation, it is advisable to obtain

the opinion of a surgeon, as serious injuries are often caused by dislocated bones. I remember the case of a man who had dislocated his shoulder, and, in so doing, ruptured his axillary artery. Amputation of the limb at the shoulder-joint was the only plan of action that held out any prospect of success; this the man refused to submit to, and consequently lost his life. This is by no means an uncommon accident. A month or two since, I was present at an operation for the removal of the arm at the shoulder-joint, from a precisely similar cause.

Fractures. A fracture may be defined as a separation of continuity in any bone. They vary, however, very much in character, and consequently in treatment. They are generally divided into four classes:

(1.) Simple, when the bone is merely broken across at one place, either obliquely or transversely.

(2.) Comminuted, when the bone is broken into two or more fragments.

(3.) Compound, when there is a wound of the soft parts communicating with the fractured bones,—this being caused either by one of the fragments breaking through the soft part, and appearing externally, or by the force which produced the fracture wounding the soft parts down to the broken bone. The mere existence of a wound in the immediate neighbourhood of a fracture does not necessarily make it compound, unless the wound communicates more or less directly with the fractured point.

(4.) Compound comminuted, when there is a wound communicating with the fractured bone, the bone itself being shattered into fragments.

You see, therefore, that in simple and comminuted fractures there is no solution of the continuity of the integument, and no external wound; but in the compound and compound comminuted fractures there is an external wound communicating more or less directly with the broken ends.

In some varieties of fracture it occasionally happens that the bone is only cracked, or partially broken; this occurs in the bending of bone in children, in which cases the fracture may be partial or incomplete, merely extending across the convexity of the curve made by the bone. Such fractures as these are called green-stick fractures.

The causes of fracture may be divided into predisposing, and exciting. In the predisposing, something is due to the exposure of one bone more than another; it is not that they have a composition which renders them more prone to fracture. We see this in the atrophy arising from old age; bones break more easily in old persons, it is said, because they are the subjects of senile atrophy, that is, wasting; the bones, becoming of a more delicate structure, break more readily. Then alterations of the shape of bones, as, *e.g.*, the neck of the femur, instead of being obtuse, becomes more and more at a right angle to the shaft of the bone in old people; and you know what a

common accident fractured intercapsular neck of the thigh-bone is, because old people, being so feeble, fall, and the bone snaps.

Then there are certain diseases which act as strong predisposing causes to fracture, as *e.g.*, what is commonly known as rickets in childhood, when we see the bones so prone to bend; or the disease of adult life—mollities ossium—which renders the bones more liable to fracture.

The exciting causes are violence, either direct or indirect. Comminuted fractures are generally the result of direct violence; compound, of indirect.

The signs of fracture. In the majority of cases there can be no doubt as to the nature of the accident. The distortion of the limb, with the pain suffered in a particular part, and the loss of power, will sufficiently mark the nature of the case, which will be further confirmed by the crepitus, a sensation produced by rubbing the ends of the bones together. When it is perfectly obvious that the bone is broken, it is only cruelty to twist and turn the limb about merely for the purpose of producing crepitus; but crepitus may not be always present, and yet the case be one of fracture, when, *e.g.*, the fragments of broken bones are driven into each other, causing what is generally known as an impacted fracture, or when a piece of muscle intervenes between the fractured ends.

Mode of repair. Let us suppose an oblique fracture of a long bone, say the femur, has happened;

how will it be repaired—knit, as they say in Yorkshire—after a splint has been adapted?

Bones should be studied in their physiology, pathology, etc., with, not apart from, other structures. Bones are hard, infiltrated with earthy matter, and comparatively not so vascular; they are therefore longer in being repaired than the soft parts, else the process of reparation is essentially the same.

First, blood is effused, for the first two or three days, between and around the fractured ends. After a time this blood becomes absorbed. Then, during the second week, a substance called lymph is thrown out between the fragments. This lymph is gradually converted into fibrous tissue, and as time goes on, becomes more and more dense. Soon specs of earthy matter make their appearance, which coalesce and increase; afterwards absorption of the intermediate parts takes place, and this formation becomes rapidly converted into new bone by the act of nutrition and moulding, and is known as intermediate callus. Eighteen or twenty-four months after, the fresh bone, which is of course dense, becomes more and more converted into cancellous tissue, and you can only detect where the fracture has been by a slight difference in outline.

It was originally stated, that bone was united by provisional callus; that is, that not only was callus found between the ends of the bones, but also surrounding them. You will see what I mean, ex-

emplified in the homely simile of a leaden pipe, when the plumber to unite the ends puts the solder in the shape of a fusiform mass around it. After a time, it is said, this callus is removed, because it is only used as a welding material.

Well, the facts of this are all true, but the interpretation is wrong. It has been thought that this provisional callus was constant, but it is not so, and therefore it is not absolutely necessary for repair; but where you get it is when there is great mobility of the broken ends; and so it is an accidental occurrence, and due to the mobility of the parts, and the great distance of the fractured ends from each other. If you get the fragments in complete apposition you get no provisional callus; if not, you do. This doctrine was taught, because experiments upon animals nearly always revealed the fact that provisional callus existed; but then dogs, or other animals, do not keep their limbs at rest—they are always limping about, and in those cases you get it, to grapple against the difficulty. And again, there is one set of bones in the human subject in which you always find it, viz., the ribs, because they cannot be kept perfectly at rest. It is the rule in animals, and the exception in man; because motion is the rule in animals, and the exception in man; and in most cases, where the ends are secured, the provisional callus disappears.

Treatment of fractures. The fracture should be set at once, and the fragments kept in position by proper re-

tentive apparatus. The reduction of a fracture consists in making extension and counter-extension on the lower and upper parts of the limb, until the broken ends of the bone come into contact. When this is effected, the proper splints must be adapted, in such a manner that the neighbouring articulations, as well as the broken ends of the bone, may be fixed so that no movement can take place. After a fractured limb has been extended, measure it to see if it is the same length as the other. In making these comparative measurements of limbs, great care must be exercised to take the same fixed points on the two sides,—an ordinary yard measuring-tape is the best instrument.

The following are the principal points made use of in measuring the limbs. In the lower extremity, or leg: from the anterior superior spinous process of the ilium to the lower border of the patella, which must be pushed up as far as possible, from this point to the outer or inner malleolus; or from the anterior superior spine to the malleoli.

In the upper extremity, or arm: from the end of the acromion process to the external condyle of the humerus. From the tip of the coracoid process to the inner condyle. From the condyles to the styloid process of the radius or ulna.

Before applying any apparatus the limb should be cleansed with soap and warm water; and in hot weather, the intolerable itching of the skin may be

prevented by dusting on a little powdered starch or oxide of zinc.

Great care must always be taken in the handling of any fractured limb, as the risk of converting what was only a simple break into a compound fracture, by thrusting the fragments through the skin, is very great.

And now for a few words upon the apparatus in common use for fractures. Splints of every possible kind and form have been invented for their treatment; but those of metal and wood are in most frequent use in our hospitals. The ordinary ones will, however, be indicated in describing the treatment of the individual fracture. Splints in all cases must be carefully selected, so as to fit the limb accurately; and, before being applied, should be carefully padded, either with tow, or cotton-wool. All splints before being re-padded ought to be thoroughly washed; and if employed for gangrenous cases, they should be repainted, if made of iron; or scraped, if of wood, before being again used.

Gutta-percha is a most useful material for splints; it should be cut an inch or two every way larger than the splint required, since it undergoes contraction upon being immersed in hot water. It should be placed in a large basin, or pan, of sufficient size to contain it without bending, and holding a large quantity of boiling water. It will save scalding the fingers, and also maintain the shape of the splint

better, if the gutta-percha be laid upon a piece of muslin, by which it can be immersed in the water, and held there until perfectly softened. Being then lifted out by the muslin, it should be allowed to cool for a minute or two, so as not to scald the patient's skin. It should be next applied to the part intended, and moulded to the limb by means of the wet fingers of the operator, and by applying a light bandage. In a quarter of an hour the splint may be removed, and padded or lined with wash-leather, a number of holes having been made in it to avoid the unpleasant odour of perspiration from the confinement.

Splints may be made out of thick sole-leather, which, having been cut to the appropriate length, is softened in hot vinegar and water before being moulded to the limb, in the same way as the gutta-percha; over which it has the advantage of not interfering with the action of the skin.

Special fractures. Any injury to the head, sufficiently severe to break the bones of the skull, or to cause the person to remain insensible, needs immediate medical attendance. The head should be shaved, and ice applied; at the same time all noise and excitement should be prevented.

Fractured nasal bones should be restored at once to their proper position by means of a director or bodkin introduced into the nostril. These will generally be kept in place, by the patient exercising ordinary care, without any plugging of the nostrils.

Fractured lower jaw may be treated by moulding a gutta-percha splint to it, or by applying a bandage three inches wide, and a yard long, with a slit in the centre four inches long, the ends of the bandage should be split up; thus you will have a four-tailed bandage with a hole in the centre. The central slit is now to be adapted to the chin, and the two tails corresponding to the upper part of the bandage are then tied round the nape of the neck; whilst the others are crossed over them, and tied over the top of the head. Of course milk diet and sops must be enforced.

Fracture of collar-bone. Fractures of the clavicle generally take place about its middle. The patient should be laid upon his back on a mattress until the surgeon arrives. This will often, in a great number of cases, be the only treatment required.

Fractured ribs. The patient will complain of great pain when he takes a deep breath, or if he coughs, or upon pressure being applied over the injured part. If pressure is made also near to the spine upon the ribs you will cause pain, not where the pressure is made, but where the bone is broken.

Large wide strips of plaster must be applied over the affected side, extending from the sternum to the vertebræ, and then a flannel bandage, six inches broad, over it. This must be drawn tight, and sewn on with large herring-bone stitches.

Sometimes the patient will spit blood owing to the

fractured rib having injured the lungs. In such cases the patient must be kept perfectly quiet, no stimulant given, and ice freely sucked. In all cases let the person lie on the injured side, as by so doing the sound lung has greater opportunities of free action.

Fracture of arm. Fractures of the humerus require a small splint in front and behind; or a rectangular splint on the inside alone, reaching to the wrist; or on both sides of the arm.

Fracture of forearm. Whether the shaft of the ulna or radius be broken, the treatment will be the same. Two light wooden splints will be required,—one for the inner, the other for the outer side of the arm. The inner splint should extend to the metacarpal bones, so as to prevent motion in the wrist-joint, but not to interfere with the movements of the fingers; it must also allow of the elbow being easily flexed. The outer splint must be longer.

In setting a fracture of the forearm, great care should be taken to get the broken bones in complete apposition: after this, the limb should be gently laid upon the back splint, and the front one placed upon it. The ends of both splints should now be firmly grasped, and the limb brought into a position between pronation and supination; the bandage should then be applied uniformly and evenly, and the arm suspended in a sling.

There is one fracture, however, of the radius, which

I must more particularly say a word or two about. It is called Colles' fracture, and occurs at the lower end of the radius, being caused most commonly by a person falling upon his hand, which had been put out to save him. It is necessary in the treatment of this fracture that the hand should be adducted; that is, the fingers should be pointing downwards, and for this purpose a pistol-shaped splint is used. The reason why the hand is placed in this position is that the fragments are otherwise very apt to get displaced. Fractures about the wrist or hand will require a hand-splint, such as that commonly used in this hospital.

Fractured thigh. A long splint, reaching from just beneath the axilla to a few inches below the heel will be required; also a perineal band, which is a most important part of the apparatus, and is best made by folding up a length of bandage in some cotton-wool, and enclosing the whole in a piece of gutta-percha tissue, or India-rubber cloth. Sometimes the skin is excoriated with the tissue; in these cases zinc-dressing should be applied.

The splint having been carefully padded, the foot should be attached to it by means of a bandage. The perineal band should then be adjusted, and extension of the foot made, whilst the band is tightened until the injured limb is of the same length as the sound one. The rest of the limb must now be bandaged, and sand-bags placed along either side of it.

Other splints are in frequent use for fractures of the thigh, such as the American iron splint.

Fractures of the leg. These, when simple, are treated by adjusting one or two side splints, as required, and confining all in a pillow. Or if the fracture be compound, or badly comminuted, the limb is placed upon a McIntyre, and swung, a side splint still being used, if practicable or necessary; but in all cases the wound must be left so that it can be dressed daily without disturbing the rest of the limb.

LECTURE IX

Bandaging—Material for Bandages—Rule for applying a Bandage—Varieties—Nature of Spiral Bandage, of Figure of Eight Bandage—Rules for Bandaging the Leg—Knee—Groin—Both Groins—The Finger—Thumb—Arm—Head—A Stump—Handkerchiefs useful as supports—The Starch Bandage—Gum and Chalk Bandage—Plaster of Paris Bandage—Strapping—Sand Bags—Slings—Rules for the Measurement of Patients for Elastic Stockings and Trusses.

THE subject of bandaging is one of which a thorough and complete knowledge is essential, and absolutely necessary for all of you, and can only be obtained by careful and constant practice.

The material used for bandages consists generally of unbleached calico, varying in length and width according to the purpose for which they are intended. The widths most in use are two, two and a half, or three inches; while the length varies from six yards for an arm, to eight yards for a leg bandage. A piece of unbleached calico should be taken, and the exact width of the required bandages marked out upon it; a thread is then drawn through the entire length, commencing at the marked spot; this not only serves as a guide for the scissors, but insures at the same time a regularity of width, and an absence

of the frayed edges which are so often annoying. The separated bandages must now be evenly and tightly rolled on themselves (for unless this is done it is impossible to apply it properly to a limb), either by the hand, or what is better, by means of that instrument known in your wards as a bandage roller, which may be readily attached to a table or bench.

In applying a bandage, the operator should grasp the roll in one hand, whilst with the other he applies the loose end to the surface of the limb, so that the outer surface may lie against it. By observing this rule, the bandage will always lie close to the part, and the bandaging will present a much neater appearance.

There are two kinds of bandaging in common use, —the spiral, and the figure of eight. The nature of the spiral bandage is indicated by its name, and consists in covering a limb by a series of spiral turns, each overlapping the one below for about one-third of its width. But owing to the enlargement of the limbs at their upper parts, it is necessary to make a number of turns; *i.e.*, folding the bandage upon itself, so as the better to adapt it to the shape of the limb. These turns should never be made over a prominence of bone, and always, where practicable, should be on the outer side of the limb; they can very readily be made with one movement of the wrist, provided that the bandage at this moment is held quite loosely,—

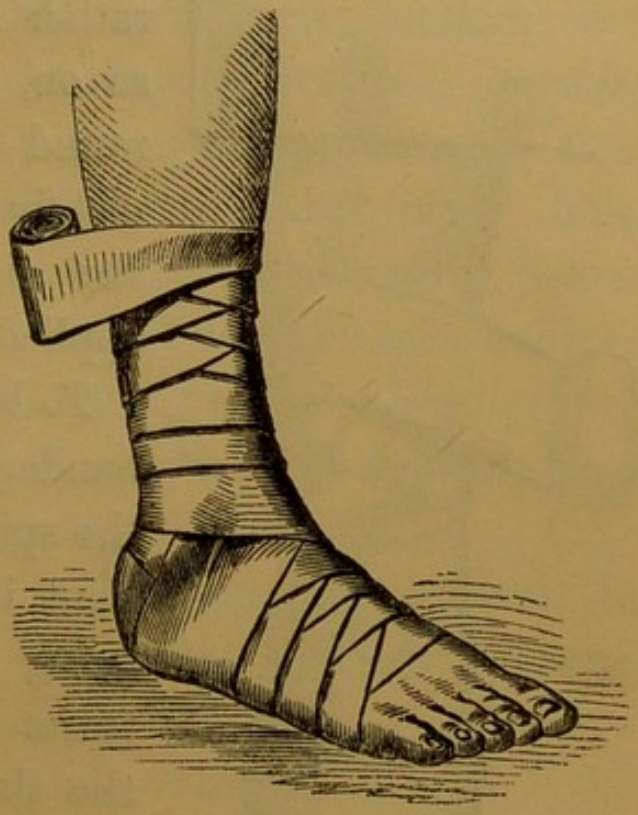
the roller can afterwards be pulled as tight as may be necessary. Sometimes it will be found a good plan to place the forefinger of the opposite hand upon the bandage, at the point where the turn is to be made, and then fold it over the finger. In whatever way the turn is made, the hand containing the roll should be held slightly above the level of the limb, and care be taken not to unroll more bandage than is actually required for its performance.

Figure of eight bandage. The nature of this bandage is also indicated by its name. Its application is much easier than the other variety: being made without any turns, it is peculiarly adapted for application to the joints, whilst the spiral is most applicable to the surface of the limb. Either may be applied separately, but a combination of the two will be found in most cases to be the best; as, *e. g.*, in the bandaging of the leg, where the spiral is used in the foot, the figure of eight for the ankle, and then the spiral is continued again, at first plain, and afterwards with turns in the leg.

In order to render the method of bandaging uniform, it should always be commenced from the inside of a limb, and thus the turns be brought to the outer side. To do this, you must be able to bandage equally well with both hands, an act easily acquired by a little practice, for the right leg will require to be bandaged with the left hand, and the left leg with the right hand.

To bandage the leg. The bandage must be firmly fixed with a figure of eight turn around the ankle; a few spirals and turns must then be made over the foot, beginning at the roots of the toes; the bandage should now take another figure of eight turn around the ankle, overlapping the former one by about one third of its width. The spiral folds may now be at once commenced, the first two or three being plain, and then the turns, commencing always on the outer side of the leg, and being continued as high as the bandage is required. In simply bandaging the leg, it is usual to leave the heel exposed; but it can very readily be covered, if necessary, by a few extra turns alternately underneath and at the back of the heel.

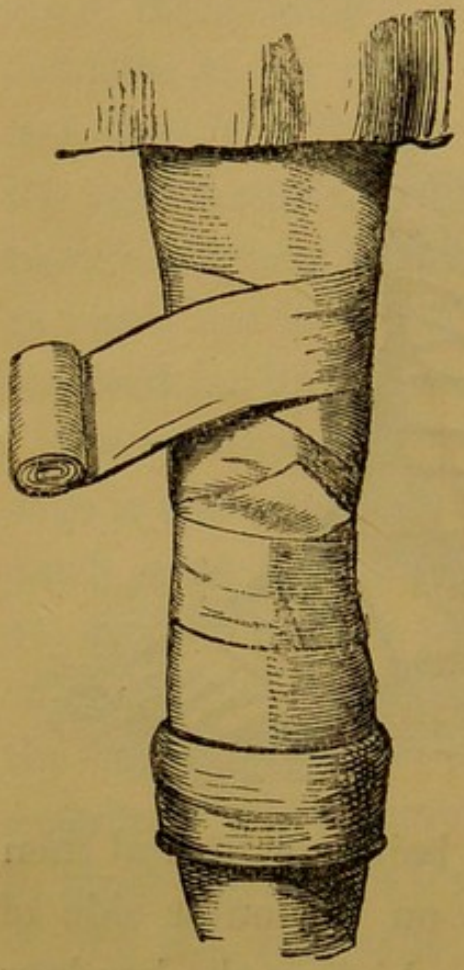
FIG. 17.



To bandage the knee. The figure of eight is necessary; the end of the bandage must be fixed by carrying it round spirally, immediately below the patella. The roller must then be taken behind the ham to the inner condyle, thus making a loop embracing the thigh just above the joint. It is then

brought behind the ham again to the inner side of the knee, overlapping the former loop neatly; then around the femur again, but rather lower than before, and so on, until the original loop round the femur is completely hidden by the fold of the figure of eight loops applied over it.

FIG. 18.



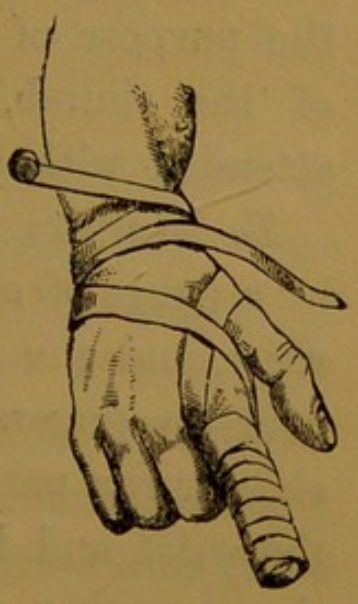
To bandage the groin. The bandage should be applied in the spiral form, whilst the patient is standing, the operator being in front. Two spiral turns should be made round the thigh of the affected side from within outwards; then the bandage is to be carried along the lower part of the groin, round the pelvis, and back over the pubes, crossing the former fold at the groin, and thus completing the figure of eight. A series of similar turns, each slightly overlapping the other, may then be carried round in the same way until the part is covered, and sufficient pressure produced.

To bandage the groins. You begin with the double spiral bandage in precisely the same way as with the single spiral. The bandage is carried over the right groin, around the pelvis, and brought over

the left groin to form a loop on the left thigh. It is now carried across the abdomen to the right side, encircling the body at the waist, whence it traverses the abdomen again to the right groin, crossing the commencement of the bandage there, and passing round the right thigh. A series of turns of this description will effectually cover both groins. The turns round the pelvis must be kept strictly below the brim, which you can all feel in your own bodies; but those round the waist must be at the level of the umbilicus: the integrity of the bandage depends very much upon these points being attended to.

To bandage the finger. A bandage three quarters of an inch wide should be taken, and a couple of turns made round the wrist, taking care to leave out the loose end. The bandage is then carried over the back of the hand, and in a series of spirals is taken to the tip of the finger, which it envelopes, and is brought back by regular spirals in the opposite direction to the root of the finger again; then crossing the former bandage on the back of the hand, it finally surrounds the wrist, and may be finished by making a knot and bow with the loose end.

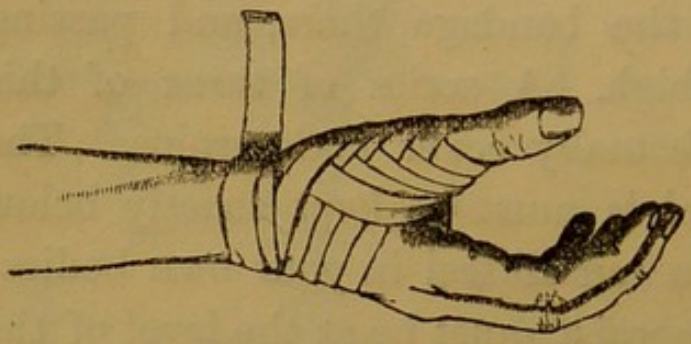
Fig. 19.



To bandage the thumb. A roller of the same width as that used for the finger should be fixed round the

wrist by one or two turns from within outwards, and is then to be brought over the back of the thumb to the lower border of the first phalanx, around which it must make a loop. Then crossing itself at the phalanx, and passing over the back of the hand, the bandage will arrive at the outer side of the wrist, under which it passes, before it descends upon the thumb to form another loop, which must slightly overlay the former one; and so on until the completion of the operation has taken place. This bandage is very useful for the purpose of maintaining pressure upon the ball of the thumb, in cases of wounds of that part attended with considerable hæmorrhage.

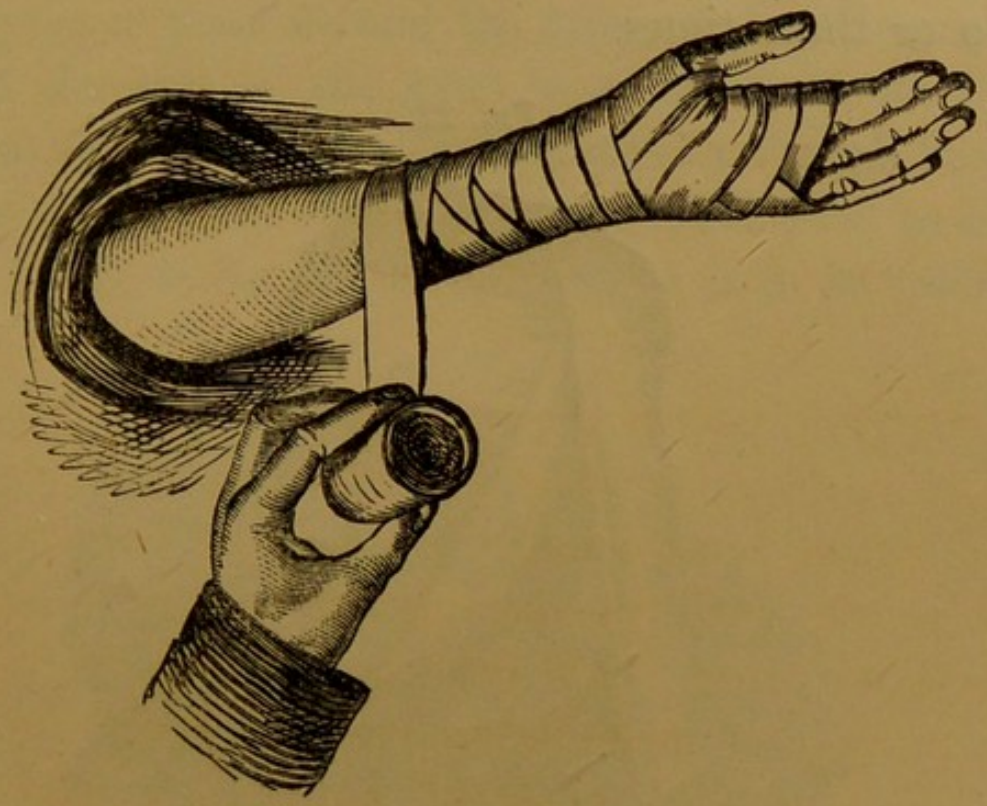
FIG. 20.



To bandage the arm. The roller must be fixed by a figure of eight turn around the metacarpus and wrist, and the bandage may then be commenced as near the fingers as possible, by a series of figure of eight turns passing over the back of the hand under the wrist, and down again over the root of the thumb, thus crossing on the back of the hand in regular succession. As soon as the bandage is brought fairly above the wrist, a few plain spirals may be applied, and the turns may then be commenced and carried along the outside of the arm. Around the elbow-

joint the figure-of-eight turns should be resumed, and the turns may be again commenced in the upper arm.

Fig. 21.



Bandages for the head. The simplest form of bandage for the head consists of a couple of turns round the forehead and occiput. This, however, is very apt to slip up, unless combined with a turn under the chin; the circular portion is to be fastened with a pin just in front of the ear, the bandage, being folded down over it, can be easily carried under the chin and over the vertex. When dressings are to be kept upon the top of the head, the turns under the jaw should be made first, so that they be kept in place by the circular one; or when it is desirable to avoid the unsightly appearance of the bandage

under the chin, the circular portion should be applied and fastened with a pin at the forehead; a turn can then be taken over the head, and pinned again at the occiput; and so on backwards and forwards two or three times.

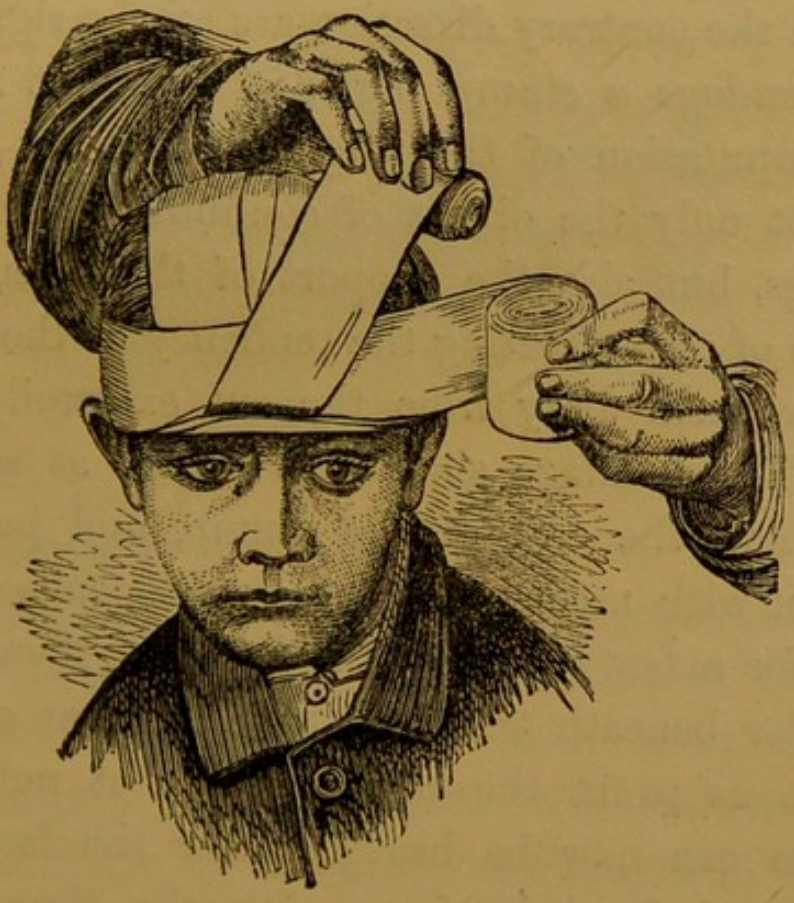
Fig. 22.

There is another kind of bandage for the head, which is called the *capeline.* It is an exceedingly useful one for keeping dressings upon the head; but it has the disadvantages of being rather difficult to apply, and of causing the patient some inconvenience through the heat which results from its application.

A double-headed roller two inches wide is required, one head being a third larger than the other. The

patient being seated, the operator stands behind him, and taking the small roll in his right and the other in the left hand, applies the intermediate portion of the bandage upon the patient's forehead, as low on the brow as possible, and the rolls are then brought round the side of the head to as far down on the occiput as convenient. The bandage in the left hand is now to cross the other, and to be transferred to the right hand; while the other bandage is to be folded

Fig. 23.



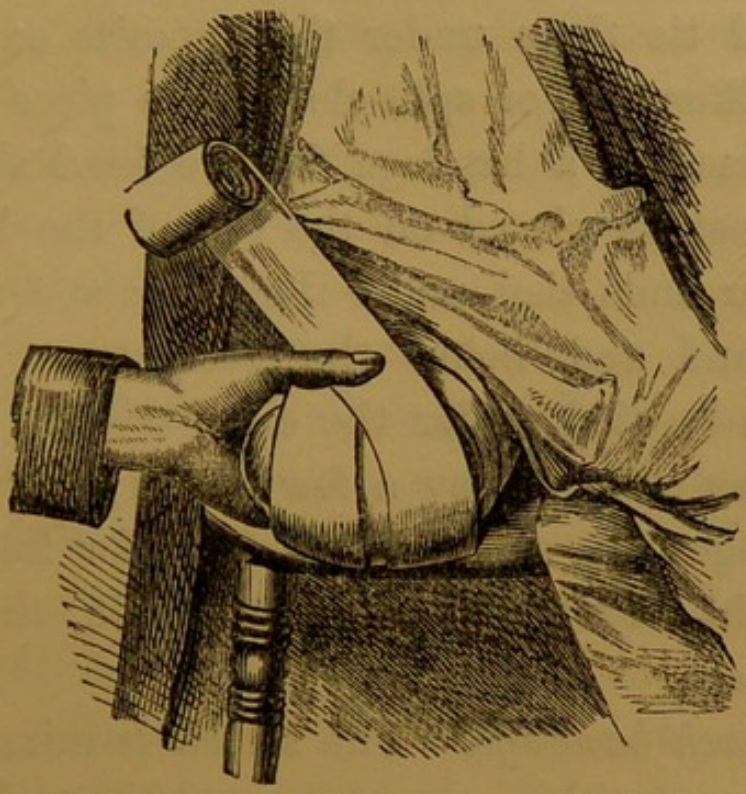
over it, and carried along the middle line of the head with the operator's left hand. The bandage now in the right hand continues its horizontal course around the head to the forehead, where it again crosses the

other bandage, and passes round to the occiput; it is then crossed again by the horizontal bandage, and passes forward to the right side of the medial line; and, being again crossed by the horizontal, passes to the occiput on the left, overlapping the former fold in the same direction. These turns are regularly continued until the whole head is covered, when the horizontal bandage is to make a few extra turns to keep all right. Observe, that all the folds from forehead to occiput are on the left of the middle line, while those in the contrary direction are on the right.

To bandage a stump (fig. 24), *e.g.*, that resulting from amputation of the thigh. You must have in view not only the object of confining the necessary dressings, but also the support of the flaps, for the purpose of counteracting the tendency of the muscles to draw them away from the cut extremity of the bone. The bandage should be begun at some distance from the end of the stump, and be carried round it with moderate tightness from above downwards for a few turns; the right hand then holding the roller beneath the limb, the left must grasp the part, so as to fix the bandage at that point. The bandage can now be brought over the face of the stump, and fixed in front with the thumb; then taken back again a little to the side of the first fold, and again secured with the fingers. This must be repeated until the stump is sufficiently covered, a few circular turns being made at last to secure

the folds in their proper places. This circular turn round the stump can be made, if preferred, after each fold across the stump, so as to secure it at once.

Fig. 24.



Handkerchiefs may very usefully be employed in some cases, either as temporary or permanent support. When it is merely wished to keep on dressings, or to give some slight support to the knee, the four-tailed bandage may be used, which is made by taking a piece of linen, a yard and a half long, and eight or nine inches wide. This must be split up in the middle at each end to within a few inches of the centre; the centre being then placed upon the patella, the four tails are brought under the knee, crossed, and tied two and two above and below.

In order to keep on dressings or poultices in the axilla, a common handkerchief may be used, the centre of which must be folded cornerwise under the axilla; then cross the ends over the shoulder, and carry one before and the other behind the chest, and tie them under the opposite axilla.

A handkerchief, or split-cloth, or a piece of linen, may be used as a bandage for the head also. The centre must be placed on the top of the head, the two hinder ends tied under the chin; and the front ends behind and below the occiput, or crossing, may then be tied under the chin.

And now let me say a few words to you about the bandages in most common use for fractures,—such as the starch, the gum and chalk, the plaster of Paris, etc.

The starch bandage. The starch is mixed in the ordinary way with warm water until it is of the consistence commonly used by laundresses. The limb should have a dry bandage applied over it as previously described, upon which the starch is to be painted with a brush, and made to sink well into the interstices; any inequalities which exist must be filled up with cotton-wool, soaked in starch. Sometimes it will be necessary, in addition, to place strips of pasteboard upon the bandage in the direction support is most required; but in any case a well-starched bandage (made by soaking a dry calico bandage in starch) must be applied over all. The

great dread in these cases is the dangerous and unbearable constriction of the limb, caused by the shrinking of the first dry bandage. If the extremities of the limb show the least disposition to this the whole apparatus must be taken away, by first moistening it with water, and then inserting the point of some scissors beneath it, and slitting it up: this danger may, however, be lessened, by taking great care never to use a bandage which has not been washed and thoroughly shrunk.

The gum and chalk bandage is made by placing an unfolded bandage in a mixture of equal parts of gum and chalk, to which boiling water has been added, thoroughly soaking the bandage in the mixture, and then rolling it up ready for application. It is applied to the limb in much the same manner as the starch bandage. The limb is first enveloped in cotton-wool, and a dry bandage applied, the gum and chalk bandage being then placed over all. This bandage has the advantage over the starch of becoming firm much sooner, of having more strength, and of not being so likely to cause constriction.

Plaster of Paris bandage. Some cold water being placed in a basin, the plaster, which should be the fine white powder used by modellers, must be shaken in, and the whole well stirred until it becomes the consistence of cream; then the bandage, which must be placed in another basin of water so that it may become thoroughly wetted as it is unrolled, must

be soaked in the plaster of Paris mixture, and again rolled up for application, which must be done in the manner described for the gum and chalk bandage. The setting of the plaster can be delayed by the addition of a very small quantity of size or stale beer to the water; whilst the setting is increased by the addition of salt.

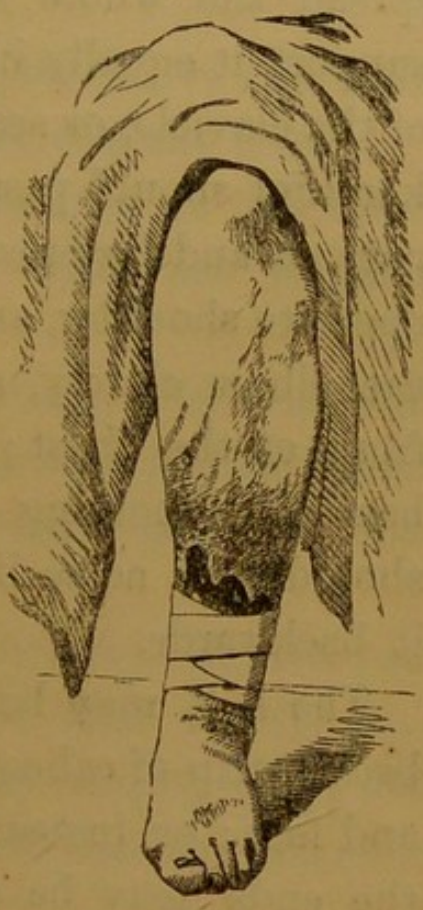
The assistant must maintain his hold of the limb for five minutes after the application of the bandage, when the plaster will be sufficiently set, and it will only require time for drying.

The day after the application, when the bandage has become dry, the surface should be painted with gum water, white of egg, or common flour paste, which will prevent the plaster from chipping.

Strapping. Another means of affording support to a limb, or part, is by the use of strapping. When applied to hold the edges of a wound together, it should be long enough to go for some distance on each side; the edges should be held firmly together while the plaster is applied. In removing strips of plaster from a wound, care must be taken not to drag it open; to avoid this, the ends of the plaster should be lifted at the same time, and traction gently made towards the wound. Plaster is readily warmed either by holding the plain side to a hot-water tin, or by dipping it into hot water: this latter plan is very useful when the plaster is to be applied to any irregular part.

Frequently the leg is required to be strapped, to give support to some old varicose ulcer, or for other reasons. The straps should be about an inch and a half wide, and twenty inches long. The nurse, standing in front of the patient, should apply the middle of the strap to the back of the leg, and bring the ends over the front of the limb, where they are crossed. The next strap is put on in the same way, but made to overlap the first; and so on throughout, care being taken that the straps are long enough, so as to allow of their passing, as in the figure, beyond the margin of the ulcer.

Fig. 25.



Sand-bags are very useful adjuncts in the treatment of fractures. They are long, narrow bags, made of a material sufficiently fine to prevent the escape of the sand, which must be the finest sea-sand, thoroughly dried.

Slings. The importance of a proper application of these supports is often overlooked. For injuries to the different bones of the upper extremity, three kinds of slings are generally required; a long, soft, yet stout silk handkerchief should be used.

If the upper arm be broken or injured, and splints

applied only to the upper arm, the sling should support the wrist alone; there should be no upward pressure upon the elbow, for that would tend to displace the broken fragments and shorten the arm. In fractures of the forearm, the handkerchief should be spread the whole length of the injured part, to support it equally in its whole extent. In fractures of the clavicle, or scapula, the outer end of the handkerchief should pass obliquely across the back of the patient, and be crossed over the front end upon the opposite shoulder, and tied under the armpit, hugging the elbow closely, and drawing it well forwards in front of the chest; at the same time covering the hand, and holding it well up towards the opposite shoulder, so as to lift the shoulder well up, and push it backwards.

The foot may be slung by means of a long and broad strip of calico, passing in a loop round the neck and foot; or instead of a loop passing over the foot, the ends may be sewn on each side of a slipper. By this means the patient can move about on crutches with little danger to the injured part.

You are frequently called upon to measure patients for elastic stockings, trusses, and the like. I wish, therefore, to give you in conclusion a few directions which may help you.

For anklets: take the circumference of the foot at the root of the toes, also the circumference in front of the ankle-joint, including the heel, as

well as the circumference of the leg just above the ankle.

For stockings: the circumference for an anklet, with those round the thick part of the calf, and just below the knee-joint, and the length from the knee to the instep.

For knee-caps: the circumference above and below the knee, also that round the centre of the knee.

For thigh pieces: the circumference at the upper and lower part of the thigh, with the required length.

For trusses: take the circumference of the body round the pelvis, just below the hip, stating which side the rupture (if single) occurs, and its character.

Trusses should be removed every evening, the part carefully washed, and dusted over with a little flour or violet powder, and the truss reapplied in the morning, always taking great care that the whole of the bowel is first returned.

LECTURE X

Sick Children—Tact necessary in their Nursing—Cries—Treatment of Infants — Weaning — Teething — Mumps — Thrush — Whooping-cough—Temperature of Room—Normal Temperature of the Body —Methods of determining it.

THE frequency with which you are called upon to nurse sick children induces me to-day to devote this lecture exclusively to a few of their more important ailments. The frequency of children's diseases is, however, not the only reason why I would this afternoon direct your attention to this special subject.

What a difference there is between a child in perfect health, and the same child when ill! When well, it is all joy, life, and fun; frequently, however, receiving a sudden check in the midst of its light-heartedness, causing it to cry immoderately; but after the squeezed finger, or other injured part has been "kissed to make it well," or some other equally successful mode of treatment has been adopted, we find the tears, like an April shower, dried up; once again to give place to all the joyous sunshine of healthy childhood. How very easy it is, under such circumstances, to attend to a child.

But if illness comes; first the child becomes indif-

ferent to what would previously have amused it. It loses its merriment, now and then it may make a fruitless attempt at playfulness, but, as its illness increases, it becomes more and more fretful and tiresome, so much so, that nothing seems to go right with it. It cries to be laid down; but, no sooner have you put it down, than it cries to be taken up again. It is thirsty, and asks or makes signs for a drink; but nothing you offer pleases its taste, and it pushes away the cup, irritated all the more by what you have with the most kindly feelings done to promote its comfort. This state of things continues for days and nights; but yet you hope on, bearing it all, and forgetting your weariness in your anxiety for the life of your little charge. After a time a change comes, amendment begins; still the little one is as cross and fractious, if not more so, than ever. And it is only by degrees that all those childish ways return which we so much enjoy and rejoice in, and which we discover the illness did not destroy, but only for a season took away.

Now, it is because I do not want you to be disheartened by all this, but thoroughly happy in the love and interest you must have in these sick ones, that I desire to point out to you a few of the ways in which you can efficiently and greatly help us, and thus tend to make our treatment more likely to be successful.

There is great tact necessary for the successful

nursing of children. By your kind quiet manner, and gentle voice, you must inspire confidence and win the love of the afflicted one. Be extremely careful never to alarm it; if you succeed in this, it will not be long before the child will thoroughly trust you. The next thing you must do is to learn the language of the child. If you have not cultivated your faculties of observation you will never learn this, for it is a language of signs, signs which will escape the notice of the careless. If you are not fond of children you will never learn it, for they soon find out who loves them; and, when ill, they will express their feelings, either by words or signs, to no one else. These signs of disease differ, not only according to the age of the child, but also with respect to the nature of the illness from which it is suffering. Cries are the only language which an infant has to express its distress. The baby must be ill, is all that this tells one person, but another who has nursed sick children, will gather from them much more: she will be able to judge whether it is suffering from its head, lungs, or stomach. The cries of a baby with stomach-ache are prolonged, loud, passionate, accompanied with the shedding of a profusion of tears, and the drawing up of the legs. As the pain passes off these are stretched out again, and with many little convulsive sobs it passes off into a quiet sleep. If it have inflammation of the chest, it does not cry aloud, it weeps no tears; but every now and then, after a deeper breath than

usual, or after a slight hacking cough, it will give a short sharp cry, which it seems to stifle before it is half finished, and this because the effort makes the breathing more painful. If the disease is in the head, it will utter a series of sharp piercing shrieks, and between whiles, a low moan or wail, or perhaps will lie perfectly quiet, as if dozing, till pain wakes it up again.

At such times the least observant can but notice the change from its usual condition in health; it is soon wearied, is fretful, either very sleepy or very restless, loses its appetite, the skin is hot, most likely it is thirsty, bowels either relaxed or confined, it may vomit, start in its sleep, and, if it is old enough, complain of pain here and there,—not that much importance, however, can as a rule be placed upon these voluntary statements of children, as they will frequently describe pain in the head or stomach simply because they have heard other people complain of pain in the head or stomach.

Some of these signs are of course wanting in the infant. We notice, however, the loss of the merry laugh and cheerful look; and we get, instead, the low moaning, and anxious countenance, the little thing clinging more closely to its mother's or nurse's breast. It will not leave her arms, even for a moment; and if rocked to sleep in her lap, and then placed in its cot, it will immediately wake up, and continue to cry until again clasped in a mother's embrace.

You must notice the position in which the child is most comfortable; whether it be lying down in bed, or propped up by pillows into almost the sitting posture; whether the light distresses it; whether the symptoms increase toward night, and what symptoms; fever, for instance, is generally increased; you must notice if it be much so. Always inform the doctor whether the child has been delirious, as this will often help him very much; whether it has been restless and why; if the cough has been troublesome, coming on in fits, or if it is short, hacking, tight, or loose; whether there has been thirst, sickness, or a disposition to vomit. These are all points to be observed. A good nurse will soon discover which are valuable, and will be ready, on the visit of the doctor, to give him a concise, clear, and useful account of the little patient.

And now, before speaking to you of some of the more common of children's diseases, let me say a few words upon the proper treatment of newly-born infants. The first thing with some people, after the child has been washed, and one or two caps placed upon its head, is to envelope it from head to foot in flannel; then it is thought advisable for it to begin life by taking a dose of castor-oil, sugar, and butter, or some equally obnoxious and unnecessary substance. Then I have known some people very fond of giving it some gruel. After this the child is put to bed, but, alas, not to sleep; so something must be given to make it sleep, or there will be no rest for others. If

it has been sufficiently crammed, and unfortunately not been sick, it will probably have a convulsive fit, and many a doctor has to attribute his broken rest to this ignorant, unwarrantable interfering with nature. Let me tell you that no oil or other medicine is required for the child; the first supply of milk it has is purgative, and quite different to the rest; then again, no infant needs food the first twenty-four hours; no child ever died of starvation in that time, but hundreds have died from over-feeding; of course, no soothing syrup or cordial is requisite. Leave all to nature, she will do her own work best, and the less you interfere the better.

In the dressing of the child, dispense with pins, use tapes instead; and if it is necessary for it to have a cap, let it be as light and thin as possible. If you cannot resist the temptation, give it a teaspoonful of milk and warm water, slightly sweetened, until the proper supply comes; but no gruel, butter, oil, or physic of any kind.

Fresh air is of extreme importance to children, especially to sick children. The rooms or wards in which they sleep should be as large and airy as possible. How often do we find children, suffering from some affection of the lungs or chest, lying in close ill-ventilated rooms, which increases the difficulty of breathing, and aggravates the cough. But whilst you are ensuring good ventilation, be very careful not to let a draught blow upon the child; you

may give it such a chill as will cause his death, without giving him fresh air at all; but depend upon it, the less fresh air you give to his lungs, the more liable he will be to cold.

Another point, which is of vital importance to children, is cleanliness. Healthy infants should have a warm bath twice a day—morning and evening; by this means the skin will be enabled to perform its proper functions.

After two or three months, the heat of the water may be gradually lowered, but in no case give a young child a cold bath without the doctor's orders. When a cold bath is advised, always wet the head first, and notice whether the child remains cold or shivers after he has been well and carefully dried. If so, the bath must be desisted from; but if the little thing gets hot, his skin all of a glow, then the use of the cold bath will be beneficial, inasmuch as the child will be less subject to the ill effects of draught and cold air. It is as essential to apply clean water to the skin, as to give fresh air to the lungs.

Now let me say a few words about habits. A child, by a slight amount of attention and regular attendance, can be taught a habit very early in life; in sleeping, for instance, great regularity should be observed in placing the child in bed at stated times. It is altogether foolish and unnecessary to rock a cradle, or walk about with a child until it falls asleep. Begin as you mean to go on; lay it in its

cradle awake; and if nature requires it, sleep will come, but if not, no amount of rocking or walking about will produce it. An infant a month old ought to sleep twenty out of the twenty-four hours, and this without either rocking or being carried about. Then again, it is quite a mistake to suppose that every time a child cries it is hungry; the crying may be due to some other cause, and it is the duty of the nurse to find out what that cause is.

During the first six or eight weeks, the child should be regularly put to the breast every two hours, less frequently during the night. As it gets older, it does not require to be fed so often. When the mother has not milk sufficient to nourish the child, other food, consisting of milk with one-third the quantity of warm or lime water, may be given, especially during the night. This is a better plan than bringing up the infant entirely by hand; but when by force of circumstances this is necessary, ass's or goat's milk should be used,—when these cannot be obtained, cow's milk will do sufficiently well. Two-thirds pure and fresh milk should be mixed with one-third of warm or lime water, and the whole slightly sweetened. The vessel containing this should be thoroughly rinsed out after every meal, and the tube, cork, etc., kept perfectly clean, and placed in water when not in use. Never give a child the bottle for the purpose of keeping him quiet, but observe the same regularity as if the child was suckling. In all these cases never

substitute sago, arrowroot, or cornflour; these, containing principally starch, are quite unsuitable, and the cause of most of the mortality in children brought up by hand. Of course meat or potatoes are absolutely unfitted, and are the common causes of many troubles.

Never wean a child suddenly, but by degrees; never as a rule allowing the breast after the ninth or tenth month, except in very unusual and exceptional cases. After the seventh month, which will be about the time the front teeth or incisors are cut, one or two meals of some light food, such as bread and milk, or biscuits for nursing purposes, should be given daily, and must be increased by degrees as the child is weaned. About the tenth month, one meal should be given daily of broth, or beef-tea, or yolk of egg. When it is from twelve to eighteen months old, a meal of finely minced meat may be given; but milk is a child's proper food, and should always be used where there is a choice or preference.

When a child is cutting his teeth, there will usually be a certain amount of fever and irritation. All that is necessary is to give a little calcined magnesia; but if diarrhœa be present, do not too hurriedly interfere. The gums will often be painful, red, and swollen, in which case it may be necessary to have them lanced,—this often saves the child, if properly performed, from nights and days of suffering; or a little butter may be gently rubbed with the

finger along the gums. Sometimes convulsions will occur; in these cases apply cold to the head, and give a small dose of purgative medicine, such as castor-oil mixed with a little milk, and at once send for your doctor. When teething, do not give the child any hard substances, such as coral or bone, to chew, as by so doing he is very likely to break the enamel off the point; but let him have a piece of india-rubber, which has been washed, and rubbed over with sugar or honey.

In the summer months, the more a child is in the fresh air the better; and also in the winter it may be taken out, if properly and sufficiently clothed. I say properly, for do not cover up its face, as is most commonly done, thus preventing the child breathing; and often in consequence causing its death. If it is necessary to protect the face from the wind or sun, look well to it that the handkerchief, or whatever you use, does not touch the face.

Then do not be too anxious to make your children stand or walk. Because one child stands or walks at a certain age, it is no reason why another should,—it is more a question of strength of the child to do it. The child will endeavour to stand of its own accord when it is sufficiently strong; and if you attempt to force it, you will run a great risk of having the legs bent.

There is a disease called rickets, which exists in children, and consists of a want of earthy matter in

the bones; this renders the bones liable to bend, because they are soft, like cartilage, and unable to bear the weight of the child's body. In such cases as these it is always advisable to consult a surgeon, as medicine will be required, and often treatment by the use of splints. See that the diet is simple and nourishing, and attend carefully to the state of the skin and secretions.

And now we will proceed to the consideration of a few of those diseases which we find most prevalent, and ofttimes fatal, in early life. Always remember that in infancy the body is not only more frail than in after-life, but that there is a close sympathy between its different parts and organs, one organ seldom suffering alone.

Mumps is not an uncommon ailment of children; it is an inflammation of the salivary glands, but principally of that one found just beneath the lower jaw, which is called the parotid; it may affect one or both sides of the face; but most commonly first one side, and then the other, is affected.

The child complains of pain beneath the ear, where we also notice a swelling extending along the neck, which is hot and excessively tender. These local symptoms are also attended with more or less fever; the disease is not of long duration, it reaches its height in about four days, and then rapidly declines. Warm fomentations, or the application of hot dry flannel to the neck and throat, are the proper and

most agreeable applications. Suppuration, or the formation of matter, is a very unusual result of this inflammation; but if it does occur, linseed-meal poultices must be substituted for the fomentation. In all cases the bowels should be carefully attended to,—some slight laxative medicine being all that is necessary.

Thrush is a very common complaint of infant life, often occurring as the result of improper diet in children brought up by hand; it is not very dangerous, and lasts eight or ten days. It consists of small roundish white specks or patches, scattered over the surface of the tongue and the lining membrane of the mouth. They look like little drops of tallow, which project a little above the surface; these soften down after a time and separate, leaving a reddish unbroken surface, or a superficial excoriation. There is generally a great difficulty in swallowing or sucking.

Care must be taken to correct any error in the diet, or any unwholesomeness in the quality of the food. Chlorate of potash with a little glycerine forms a very good wash for the mouth; this is preferable, I think, to the borax and honey in most common use.

Whooping cough. This is essentially a disease of early life, and, on account of its fatality, deserves our especial notice; and yet it is a disease which every old woman professes to cure. It generally commences as a common cold; but after a time the cough comes on in distinct fits, consisting of violent and convulsive

expiration; these fits being often so severe, that suffocation is threatened,—after this a long-drawn inspiration takes place, accompanied by the peculiar whoop, which once heard can never be forgotten, and which gives the disease its name. This whoop indicates two things: on the one hand, it shows there is spasm of the glottis, and on the other, that air does enter the lungs; therefore, in cases of severe whooping-cough, a loud whoop should tend to quiet our fears, as it proves to us that, in this attack at least, the spasm does not amount to actual closure, and therefore the child will not choke.

In the early stages you must pay particular attention to the temperature of the room, which must be kept at sixty degrees night and day. If the child is allowed to enter a cold room at night, the irritability of the bronchi is increased, and the cough aggravated. Pay particular attention also to the diet, which must be light and unstimulating; and also to the bowels, to avoid constipation. Be very careful to note, and inform the doctor, of any symptoms of inflammation of the lungs, or bronchitis; these diseases being unfortunately too apt to supervene, with often a fatal result.

The further consideration of these diseases I will resume at our next meeting; but before separating, I wish to direct your attention to a subject which is of the greatest importance, viz., the temperature of the body. The production of heat and the main-

tenance of a uniform temperature of the body are as essential conditions to the prolongation of life as the act of respiration. The average temperature of the human body in health varies from 98° to 102°; but in some diseases it is much higher, and therefore its rise or fall denotes to the physician or surgeon, that the malady has increased, or is subsiding.

Temperatures are taken by means of a small thermometer placed in the axilla, under the tongue, or in the rectum; if the thermometer is placed in the axilla, the arm should be first drawn away from the body, then the instrument placed between a fold of skin, and the arm brought down again to the side, so as to maintain the thermometer in position; it must be allowed to remain three or four minutes, and the point to which the mercury has risen carefully noted, before it is removed from the body. If the thermometer is a self-registering one, such as are used in this hospital, the last precaution is unnecessary.

LECTURE XI

Children's Diseases continued : Croup—Method for giving a Warm Bath —Structure of Lungs—Treatment after Tracheotomy—Vomiting —Diarrhœa—Fevers—Small-pox—Chicken-pox—Measles—Scarlet Fever—Typhoid or Enteric Fever—General Rules for Management in such cases.

THAT very formidable and often fatal disease of early life, "croup," consists of an inflammation of the larynx and trachea, which terminates in the majority of cases in the exudation of a false membrane upon the affected surface. The age when it is most likely to occur is from three to fourteen years; it is also more prevalent in low and damp situations, or on the sea-shore; it is comparatively rare in towns, but very frequent in rural districts.

It generally comes on gradually, with the symptoms of an ordinary cold, wheezing, a short dry cough, and hoarseness; sometimes a little rattling in the throat will be observed, and ofttimes the child will raise the hand to the throat, without complaining of more than slight soreness or uneasiness. After a time the child who at bedtime was thought to be well, or at most having a slight cold, is awakened in the night by the breathing becoming difficult, the inspiration becoming prolonged, and accompanied by a peculiar

audible sound, difficult to describe, but once heard never to be forgotten, and which gives the impression that air is passing through a narrow and constricted tube. The character of the cough is also different, it is attended with a peculiar ringing sound. With this the voice is husky and dry, the skin hot, the child dull, irritable, and fretful; there is great disinclination to speak,—the child will reply to questions by signs only. There is, however, great eagerness for drink, and deglutition generally is well performed.

If the disease goes on, the breathing becomes more and more laboured; the child will throw its head back as far as possible, in order to increase the capacity of the trachea; great anxiety and hopeless agony is depicted on the countenance, the eyes are dull, the lips livid, and a clammy sweat bedews the surface;—in the midst of all this the child dies!

In no disease is prompt treatment and careful nursing more important than in croup. Even in cases where an attack is apprehended, the child should be watched most zealously both by night and day. Directly the breathing becomes laboured, the doctor should be sent for, and the child at once placed in a warm bath. This is frequently a source of great terror and distress to little children. If the bath is brought into the room, prepared in the child's sight, and he is then taken out of bed, undressed, and put into the water which he sees steaming before him, he very often becomes greatly alarmed:

struggles violently, cries passionately, and frequently does not become quiet until he has sobbed himself to sleep. All this time he has been exerting his inflamed lungs to the utmost, and will probably have done himself ten times more harm than the bath has done good. Much better would it have been if the bath had been prepared out of the child's sight; if, when brought to the bedside, it had been covered with a blanket so as to conceal the steam; if the child had been laid upon the blanket, and gently let down into the water; and then, if you wish the baby to be quite happy in the water, give him some of his toys, or place one or two corks or bungs with feathers stuck in them for him to play with. By these means the bath, instead of being dreaded, will become a real delight to the little one.

The air of the room must be also warm and moist, the temperature being kept uniformly at 65°. This moisture of the room is easily maintained by a kettle boiling on the fire, to the spout of which a long tube must be attached; this serves to direct the steam into the apartment. By the observance of these little directions you may often succeed in warding off a severe attack, by diminishing the irritability of the air-tubes. Observe, strictly, the directions of the doctor, as to medicine and diet; and be always ready to make a full and accurate report, since his last visit.

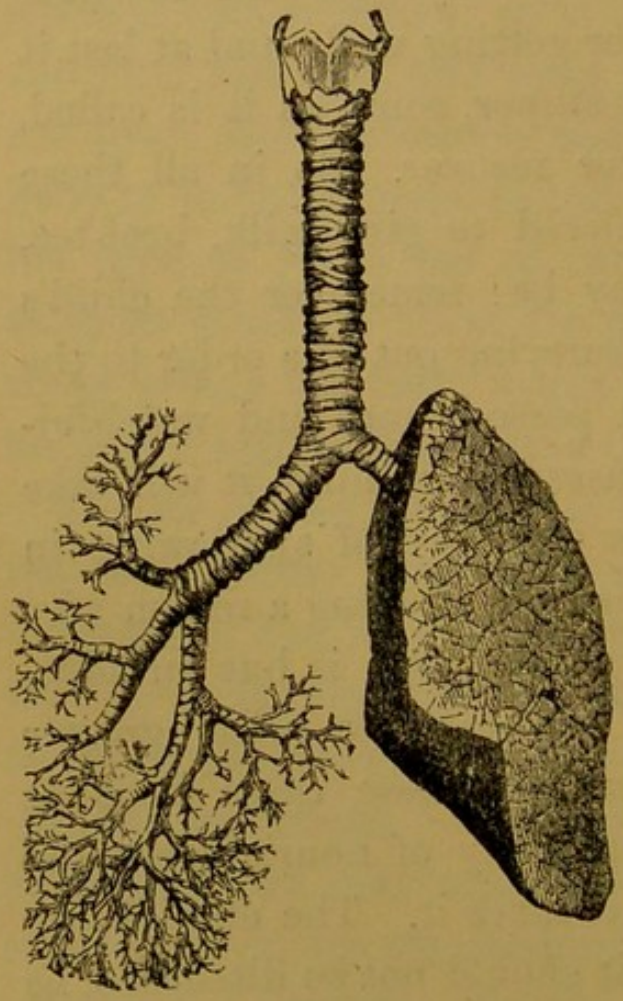
In croup (the latter stage), as in a number of other

diseases, the desire for food is altogether lost; the child, who at the time was fretful and restless, grows quieter, becomes disposed to dose, and would sleep for hours if not interfered with,—asking for nothing, and being very fretful if disturbed. In such cases, if you allow the child to go without nourishment simply because it does not seek it, or refuses to take it when offered, you will very materially diminish the probabilities of the child ever getting well; and at last it will pass into a state of stupor, coma as it is called, from which it will never recover. So in all these cases, when you are ordered to give milk, beef-tea, wine, or whatever it may be; remember the child's life depends upon your carrying out this order to the letter, with the greatest perseverance and watchfulness. What a child refuses one minute, it will take five minutes after. The difficulty of swallowing in some forms of disease, instead of being a reason why you should desist from your attempt, is but an additional ground for you to persevere with greater determination than ever. In these cases it is as well to note down the quantity of nourishment the patient takes, and when it takes it. The child being asleep is no reason why it should not be disturbed, as you know now that if the proper time for taking food passes by, it may pass into a sleep from which it will never awaken—the sleep of death!

Another important thing to pay particular attention to, is the posture of the child, especially in

inflammation of the lungs. You have noticed repeatedly in your wards, how much easier the patient who is suffering from some chest disease will breathe when placed in a sitting posture. And although your little patient may not be breathing very laboriously, yet remember, he will respire with much greater ease and comfort, if propped up in bed by means of pillows, than if you let him lie flat down. In children, however, under three or four years of age, it is very important to attend to this—because the lungs are apt to become gorged with blood, so that they cannot act. Let me try and explain this to you. The lungs are two bags situated one on either side of the chest, into which air enters through a tube called the windpipe, or trachea. The trachea divides into two parts, one for each lung, which is called a bronchial tube. This tube passes into the substance of the lung, dividing and subdividing, but without joinings or anasto-

FIG. 26.



mosings, until they reach the 1-100th of an inch in diameter, when they undergo a sudden dilatation into what is called an air-lobule. This channel or passage, in which the bronchi terminate, is called the intercellular passage, because upon all sides there are numerous clusters of air-cells, or vesicles. Upon the outer side of these vesicles is a network of capillary blood-vessels, whilst on the inner side is air. They are composed of a structureless, homogeneous membrane, with plenty of elastic tissue, which accounts for the elasticity of the lungs. This membrane allows of a free interchange to go on between the blood on the one hand, and the air on the other; so that the blood may literally be said to be bathed in air, and thus the purification of the blood takes place. We have already noticed how important this is to the health and well-being of man.

Now, when the lungs are inflamed, these air-vesicles become stopped up, by a swelling of the walls of these air-tubes. You know that a part will swell if inflamed, no matter where it is; and this is precisely the same in the lungs. As a consequence of this, some of the air-vesicles or cells become pressed upon by more blood than is natural to the part, and air therefore enters less easily than it should do, and in much smaller quantities. Now, if the child is lying down, not only is he unable to take a deep breath, and so fill his lungs completely, but the blood, flowing to an inflamed part, returns much less easily than it otherwise

might do. If you have an inflamed finger or toe, and you let the limb hang down, you know how painful it is, how it beats and throbs until you can scarcely bear it; whilst if you raise it, the pain abates, and the throbbing and redness disappear. You cannot alter the position of the lungs as you can the leg or arm; but, it must be clear to you, that the blood is less likely to settle in the lungs if the child is propped up in bed, than when allowed to lie flat; while, in addition, he will be enabled to take a deeper breath, and to do this more easily.

The child and the room must also be kept as quiet as possible. When a limb is inflamed you know how necessary it is to rest it, so that the treatment may be successful; and just as walking or lifting would injure the inflamed leg or arm, so does crying or coughing injure the lungs; the less he cries, and the less he talks, the better. To prevent this you must soothe him by every gentle means in your power. If the patient be a baby, sing it some simple ditty; or if you cannot sing, tell it some little fairy tale that you heard when a child, be it "Little Red-riding Hood," or "Goody Two Shoes." Children, when ill, require amusement; and this rule applies just as much to grown-up people. When well, they cannot always be reading scientific and instructive books, and much less can they do it when ill. Never before, perhaps, did you hear of concerts and entertainments being held in a sick ward; but you know how much your

patients appreciate these evenings, how much pleasure it gives them; and for days they have a topic for conversation, if it is only found in the speculative reasoning of how a plum-pudding could be made in a hat.

Many of these hints and precautions which I have given you under the disease croup, of course apply equally well to other diseases. Before, however, leaving this subject altogether, I would say a few words to you about your treatment of an operation very commonly resorted to in the worst form of croup, when suffocation is imminent. I mean *tracheotomy*, which is an operation for opening the trachea or windpipe, below the seat of inflammation, and thus allow of the entrance to and escape of air from the lungs.

After the operation, your whole energies must be directed to the attainment of three objects, viz., the keeping of the tube clear; the prevention of the access of cold air; and the support of the patient's strength. You should sit by the bedside, and keep the tube constantly clear, by removing the inner tube, cleaning, and then replacing it; or by the removal of the mucus by means of a feather. In a few hours, in a case of croup, the tube becomes blocked up with a sticky, tenacious material, which cannot be got rid of by a feather. In such a case the tube must be removed, and placed in scalding water, which will soften the mucus, and allow of its removal. The tube can

be then reinserted, its surface having been well rubbed with glycerine, which not only facilitates its removal, but tends to prevent the accumulation of mucus. The access of cold air, which would probably excite inflammation of the lungs, is best guarded against by keeping flannels, wrung out of hot water, constantly over the tube; these should be changed as often as they get cold. The amount of nourishment necessary must of course be left to the judgment of the surgeon.

Vomiting is an occurrence which often happens to young infants; and although it is violent and frequent, yet it is never or rarely attended with much constitutional disturbance. When it occurs in otherwise healthy children, it may generally be traced to a want of care and judgment on the part of the mother or nurse. The infant may have been roused from its sleep before the accustomed hour, or it may be over-fatigued or excited; or the mother may have been absent from her nursing for some time, and returns home tired, and at once gives the child the breast, and allows it to suck abundantly.

The child must at once be taken from the breast, and nothing given it for two or three hours. Then a teaspoonful of perfectly cold water may be given (cold drinks are more likely to be retained than warm ones). If this be not rejected, it may be followed in ten or fifteen minutes by a second or third. If this be borne, a little cold milk may be tried, or barley-water, beef-tea, or chicken-broth, or whatever the

doctor may order. Two points you must observe; and these are, first, see that the food is all cold, and, second, that it be given in small quantities. It is also as well in all these cases to keep the patient in the recumbent posture as much as possible. In from twelve to twenty-four hours the infant may be restored to the breast, with the precaution of allowing it to suck only very small quantities at a time, lest the stomach become overloaded, and vomiting once more commences.

There is just one subject which deserves a little notice, and that is with respect to the management of children suffering from diarrhœa; the skin in these cases is apt to become chafed, or even sore. To avoid this, extreme cleanliness is of the greatest importance; but this must be ensured without the use of soap, the less you use of that in such a case the better, for it is only apt to irritate and inflame the surface. A much better thing is thin starch, made as if for use in the laundry, though very much thinner; this not only serves every purpose of cleanliness, but also soothes the irritated and inflamed skin. After the child has been dried, a little zinc powder, flour, or violet powder may be dusted over the surface.

In cases of protracted diarrhœa, where the exhaustion is very great, the less the child is moved or lifted out of the cot or cradle the better, as faintings or convulsions are sometimes produced by suddenly moving a child, or lifting it out of bed.

FEVERS. By these I mean those contagious and infectious fevers, for the most part attacking a person only once, which set in with marked feverish symptoms, followed in a few days by a peculiar eruption, which is characteristic of the disease. I propose to describe these very briefly to you, and then give you a few general hints for their management.

Small-pox, or *variola*. This commences with the usual symptoms of fever, — hot skin, thirst, quick pulse, feeling of lassitude, pain in the head and back —the pain in the back is most marked and very severe—white furred tongue, and shiverings. At the end of forty-eight hours the eruption appears on the face and head,—a small pimple which feels like shot beneath the fingers. About the fifth day the eruption becomes vesicular, on the eighth day pustular, and by the ninth day they have attained their full size, and are marked by a brown central spot. There are two kinds of small-pox—distinct, and confluent; it is distinct, when the pustules are isolated; confluent, when they run into and join each other.

Attend rigidly to the directions of the medical officer; and about the eight or ninth day it is as well to muffle the patient's hands, so as to prevent his scratching his face, which he will try to do, to relieve the intolerable itching; and thus prevent the pitting which would disfigure for life. Many things have been recommended for this purpose, such as collodion,

castor-oil, and nitrate of silver. The choice of these must, of course, be left to the physician; but a very useful compound, which I have found of great benefit in these cases, is carbolic-oil, a composition of carbolic acid and olive-oil, in the proportion of one to twenty.

Chicken-pox, or *varicella.* This generally commences with slight fever, and within twenty-four hours a number of small reddish pimples appear generally on the back; the second day these become vesicular; and by the fifth day they have generally disappeared. This complaint seldom requires much medicine; a warm bath is of great service.

Measles, or *rubeola,* commences with all the symptoms of a common cold, running at the eyes and nose, sneezing, hoarseness, cough, difficulty of breathing; on the fourth day, small red circular spots, resembling flea-bites, appear; first on the face, neck, and arms; then on the trunk and legs: these spots run into each other, and form concentric or horse-shoe patches, and are of a darkish hue; about the eighth day they begin to fade, first on the face and neck, then the arms, trunk, and legs.

At the time the rash is disappearing, which it does with a mealy desquamation of the cuticle, diarrhœa is very apt to set in. The great danger of measles, however, is pneumonia, or inflammation of the lungs, which is very apt to supervene.

Scarlet fever, or *scarlatina,* sets in with the usual

predominating symptoms of fever; and on the second day a bright scarlet efflorescence is perceptible on the face, neck, and arms, whence it extends over the trunk. It is peculiarly distinct at the bends of the joints, on the chest, and abdomen; the rash is rendered pale by pressure, but immediately returns. It is accompanied by sore throat, and a peculiar condition of the tongue, which may either resemble a white or a red strawberry,—bright red points may be seen through the white mucous coating, or the whole tongue is of a bright red colour. The rash generally begins to decline on the fifth day, at which time also desquamation of the cuticle takes place, this separating as a scarf from the trunk and limbs. I have seen it come off from the hand just like a glove. The severity of the disease is marked by the extent of the throat mischief; the tonsils, instead of being simply inflamed, as they are in the milder forms of scarlatina, may become the seat of extensive ulceration, and even gangrene.

One thing I would earnestly impress upon your notice, and that is, during the convalescent stage, be particularly careful that your patient does not catch cold. A sudden chill during the desquamation of the cuticle is exceedingly dangerous, as the action of the skin is liable to become checked; extra work being thus suddenly thrown upon the kidneys, you get inflammation of these organs, and dropsy, and the ultimate result very questionable.

Typhoid, or *enteric fever*. This malady is generated by the contents of sewers or cesspools, and by the drinking of impure milk, water, or other liquids. It is known by the tongue being moist, furred, and red at the edges; by the bowels being relaxed, and the motions of a light ochre colour; frequently a number of rose-coloured spots appear on the abdomen. The temperature is always higher and much increased towards night.

On each visit of the physician, you must be ready to tell him the temperature of the body morning and evening, the number of times the bowels have been moved, if the motions are more solid, and whether the patient has taken his nourishment well.

I will not take up more of your time describing these several fevers, but at once proceed to give you a few rules, which I trust you may find useful. And first of all, in these cases give a warm bath; the warmth of the water is not only refreshing and grateful to the child's feverishness, but the bath likewise helps to throw out any rash, which is very important. Every twelve hours after this examine the child for a rash.

Then look to the temperature of the room. When the case is one of measles, this should be 60°. In other fevers it should not exceed 55° at the utmost. This temperature must not, however, be maintained to the exclusion of fresh air, and thus the child made to breathe over and over again impure and poisonous

gases. The ventilation of the room must be carefully attended to, in accordance with the rules I gave you in a previous lecture.

There is often a dread of using and enforcing cleanliness in these cases. It is thought that the rash would be driven in, or cold got, by washing the surface, or changing the linen; but if lukewarm water be used, and only a small portion of the surface cleansed at a time, there is no ground for such fear. The passage of a damp sponge over the surface is a source of very great comfort to the patient whose skin is burning with fever; the same remarks apply to the change of linen.

Then there is no objection to let the child have what he will crave for, namely, cold water. It is a poor substitute for this to give barley-water, toast-water, or lukewarm lemon-water. The quantity of water should not exceed two or three table-spoonfuls; but this may be quite cold, and may be repeated almost as often as it is asked for.

Next, do not worry yourselves if the child will not take anything for days together but tea, milk, or arrowroot, even though he may seem to get worse. Friends often fear in these cases that the patient will sink for want of nourishment. Remember the stomach cannot properly digest food when fever is running high; in such cases food not digested would not only disorder the stomach and bowels, but perhaps destroy all chance of recovery. The determination of

diet in these cases is often one of the most difficult points the doctor has to determine. Strictly, therefore, observe the directions of the medical attendant in all matters relative to the diet; and this, not only in giving all that is ordered, but in abstaining from doing anything that has not been directed.

LECTURE XII

Food—Life, a condition of change—Food, divisible into two classes—Classification — Description of the Organic Substances — Albuminous—Gelatinous—Amylaceous—Oleaginous—Object of Non-nitrogenous Food—Alcohol — Quantity of Food required — Influenced by various causes—Sick-feeding—Recipes—Conclusion.

For the maintenance of the life of man, three chemical conditions must be complied with: he must be furnished with air, water, and combustible matter. Under the same conditions also all animals exist; even in those which seem to furnish us with instances of departure from this general rule, the exceptions are rather apparent than real. To breathe, to drink, to eat, are the indispensable requisites of life. If there be among insects some which seem never to take water, or among fishes some which never taste solid food, these peculiarities disappear as soon as we rightly understand them. Where a high development has been obtained, as in man, experience assures us that the same inevitable results attend a cessation of respiration for a few moments, an abstinence from water for a few hours, or from food for a few days. The supply of a part of these necessaries of life is adjusted to the urgency of the want. The act of breathing is incapable of delay, and the air *is* accordingly everywhere present, and

always fit for use. We can bear with thirst for a little time, and the earth here and there furnishes her springs and other stores of water. But far otherwise is it in the obtaining of food. It is the lot of all animals to secure nourishment by labour; and even of men the larger proportion in civilised and savage countries submit to a hard destiny. To obtain their daily bread is the great object of life.

What is the physiological explanation of this necessity for a supply of air, of water, of food? Why is it that the system will bear so little delay?

The answer which physiology gives to these questions is one of ominous import. The condition of life is death. No part of a living mechanism can act without wearing away; and, for the continuance of its functions, there is therefore an absolute necessity for repair. It has been greatly to the detriment of physiology, and the practice of medicine, that this conception has not been thoroughly realized until late times. The aspect of identity which an animal presents is an illusion, hiding from us the true state of the case. It has been the fruitful source of errors which have retarded the progress of these sciences. What could their career possibly be when men had persuaded themselves that a living being possesses a capacity for resisting any change, and that organic structures never yield to external physical influences until after death.

But life, far from being a condition of immobility,

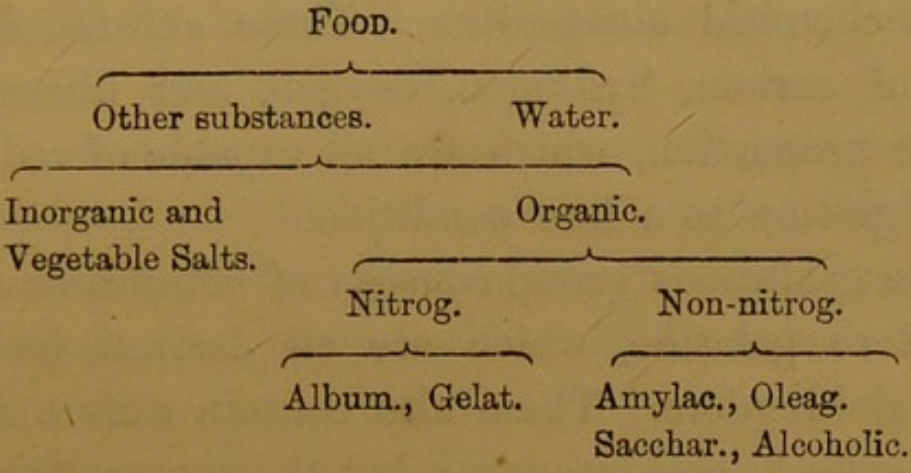
is a condition of ceaseless change. An organism, no matter of what grade it may be, is only a temporary form, which myriads of particles, passing through a determinate career, give rise to. It is like the flame of a candle, which presents for a long time the same aspect, being ceaselessly fed as it ceaselessly wastes away. But we never permit ourselves to be deceived by the simulated unchangeableness which such a natural appearance offers.

We recognize it as only a form arising from the course which the disappearing particles take. And so it is even with man, he is fed with more than a ton weight of material in a year, and in the same time wastes more than a ton away.

Now it is not my intention this evening to discuss individually these indispensable requisites of life; but I propose to devote the short time at our disposal to the important question of food; important, inasmuch as our health and strength is wholly referable to a right use and proper distribution of it. We perceive this, not merely in the calamities of actual want, as in the fever of famine; but also in the less prominent but equally significant decline of health in times of only partial distress, when the vigour and energy of the poorer classes are so reduced as to render them an easy prey to disease. Indeed the experience of our own hospital too often elicits the fact, that the wasted power of the patient has been the advent of incurable disease.

From a physiological point of view, food can be divided into two classes, histogenetic or tissue-making, and calorifacient, or heat-making; tissue-making food is likewise called nitrogenized, and heat-making non-nitrogenized food; the former is also sometimes designated nutritive, and the latter respiratory.

But you will find a far better classification of food in this table.



You see it is divided primarily into other substances and water, then the other substances into inorganic and organic. The organic alone are generally considered sufficient for the sustenance of the body, but the inorganic principles are really none the less requisite; for the body speedily disintegrates if all inorganic matters are withdrawn; but as a rule in all ordinary articles of diet, they are present in the required proportion, and thus the necessity which exists for their employment has very commonly escaped notice.

The organic compounds usually employed as food for man, are derived from the animal and vegetable

kingdoms, and consist of nitrogenous and non-nitrogenous principles. The nitrogenous is divided into the albuminous and gelatinous.

The albuminous group comprises all those substances, whether derived from the animal or the vegetable kingdoms, which are closely allied to albumen, the purest specimen of which is white of egg, and through it to the animal tissues generally in their chemical composition. These substances consist of carbon, hydrogen, oxygen, and nitrogen in a like proportion, which are all capable of reduction by digestion to a like condition.

The gelatinous group consists of substances closely allied to gelatine, which are all derived from the animal kingdom. These also contain carbon, hydrogen, oxygen, and nitrogen; but the proportion of the components differs from that of the preceding.

The substances forming the albuminous group are applicable to the support of the human body, both by affording the materials for the nutrition and reformation of its tissues, and also by serving, if required, for the maintenance of its heat; through the decomposition of which they are converted into hydrocarbonaceous matters, adapted for combustion in the lungs; and highly nitrogenized compounds which pass off by the kidneys. Do not let me, however, mislead you into the supposition that the tissue-making power of any kind of food depends upon the amount of nitrogen it contains, and that its

value therefore in this respect may be determined by chemical analysis. Without entering into details, let me take gelatine, a substance rich in nitrogen, but which possesses no tissue-making value, and in reality belongs to the calorifacient class, and is altogether deceptive therefore as regards any nutritive power in its administration in the sick room, in the well known forms of soups, jellies, etc.; these speedily undergoing oxidation in the system, the products escaping by the lungs and kidneys.

To the amylaceous group belong starch, gum, woody fibre, etc., all of which are readily convertible into sugar by a simple chemical process.

The saccharine group includes all those substances derived from the vegetable kingdom which are analogous in their composition to sugar; consisting of carbon, oxygen, and hydrogen alone, and having the two latter components united in the proportion to form water.

The oleaginous group, whether derived from the animal or vegetable kingdoms, has the characteristic feature of a great predominance of hydrogen and carbon, with a small proportion of oxygen.

I have made a fourth class of the alcoholic, inasmuch as its proportion of hydrogen and oxygen is different to either of the others.

The great object of all the non-nitrogenous principles of our food is the production and maintenance of a uniform temperature of the body. You know

that a thermometer always registers the same degree of heat when placed in any internal part of the body, and this in spite of the ever-changing temperature of the surrounding atmosphere. On reference to this table, you will see the relative proportions of carbon, hydrogen, and oxygen, in the different non-nitrogenous substances.

	Carbon.	Hydrogen.	Oxygen.
Starch	44·44	6·17	49·39
Cane sugar ...	42·10	6·43	51·47
Grape sugar ...	40·0	6·66	53·34
Hogs' lard ...	79·09	11·16	9·75
Mutton suet ...	78·99	11·70	9·30
Olive oil ...	77·21	13·36	9·43
Cod-liver oil ...	77·44	11·27	11·29
Butter	65·60	17·60	16·80
Alcohol	52·18	13·04	34·78

In the sugars, the oxygen and hydrogen exist in the proportion to form water. In the oils, the hydrogen is in excess of the oxygen to form water, and hydrogen is the substance which gives out most heat by its oxidation. It is quite clear, therefore, that the oils are the most important heat producers, as they have by far the greatest proportion of hydrogen.

Alcohol, according to its composition, ought to give out more heat by oxidation than the starches; whilst another of its properties is its high osmotic equivalent. By that I mean it is very readily absorbed into the system, and is therefore in action long before the starches are turned into soluble dextrine, or even the

fats emulsified. It is likewise a stimulant. Now, a stimulant is something which increases action, but does not give power,—power is the manifestation of action. Alcohol is a stimulant to the body generally, but especially to the nervous system. This is well seen in the brains of drunkards, which yield large quantities of it. But when it excites action it forces more into a man's daily toil, *i. e.*, a man may have done his usual daily work, and still wanting to do more, though he is jaded and worn out, will find that he is capable of resuming his work almost directly, because the stimulant he takes not only excites action, but it does this directly. But if it presses more into his day's work, it presses also more into his night's repose, because repose and repair must always follow exhaustion and waste.

When there is a deficiency of the oils and starches, alcohol may be given with great benefit,—it has also a local action upon the stomach. If you take two dogs, and give one of them alcohol, and then kill them, you will find the stomach of the one that took alcohol quite injected, whilst the other is quite pale; and therefore in some cases of dyspepsia, the gastric digestion is helped by taking a little stimulant, which, whilst it favours the absorption of food, enables a larger quantity of gastric fluid to be furnished by the increased afflux of blood.

Physiologically speaking, therefore, alcohol serves a profound purpose in the animal economy; when

wisely used and rightly understood, it is a valuable gift of Providence.

Two questions now naturally present themselves to our notice, viz., how far could an animal be restricted in his diet? and what kind of food do we thrive best upon?

If you feed an animal upon any one principle of food, would he live and thrive upon it? During the French revolution, when food was so scarce, it was thought that if the people were fed upon the gelatine obtained from bones they would survive; and a number of experiments were made upon dogs towards this end, they being fed upon gelatine and water only; and it was found they died just as fast as if they had lived only on water. The fact comes out almost as significantly in the case of every other article of our food, such as the albuminous, oleaginous, etc., the dog or other animal dying, in each case, of inanition. From these experiments the unwarrantable conclusion was drawn that every principle of our food was required, as no single one of them would of itself support life. But then the following experiments by Mr. Savory, the then Professor of Physiology to St. Bartholomew's Hospital, quite set aside this doctrine. He took a number of rats, and divided them into three classes.

Class one were fed upon the lean of veal, from which every particle of fat was removed, and thus they had a purely nitrogenous diet.

Class two were fed upon a mixture of lard, suet, sago, arrowroot, and tapioca. This diet, composed of both amylaceous and oleaginous substances, was given with the object of introducing every kind of non-nitrogenous food.

Class three were fed upon a mixture of the nitrogenous and non-nitrogenous principles. Now mark the result:

The third class did well,—their weight, temperature, and everything were normal.

Class number one lived, but they were not in such good condition.

Class number two gradually wasted away, until at last they succumbed, with all the symptoms of inanition, though they were abundantly supplied with food.

And therefore, as the result of all this, you see that although no single article of food alone will suffice, yet it cannot be said they are all required; but what is needed is that some of the nitrogenous principles be present.

And now comes the question. How much food is required for the sustenance of the body? This is influenced by two circumstances—one external, and one internal. The external cause is the temperature; the internal cause the waste going on in the body. If an animal be deprived of food, he loses $\frac{1}{23}$ part of his weight daily, and therefore $\frac{1}{23}$ part of plastic food is required.

But the quantity of food is influenced by several

causes, such as the constitution and habits, the period of life, the size, and the season. Active persons require more food than inactive ones; this is well seen in the case of a torpid reptile, who consumes little or no food, and may live for months after food has been deprived him; but a bird is incessantly eating,—he would die in a few hours, if food was denied him.

Then the period of life: young persons require more food because they are more active than old ones.

Then size: the influence is well seen in birds, such as linnets, etc., and in large birds. It has been calculated that a mouse consumes fourteen times as much food, relatively, in proportion to the weight of the one over the other.

And, lastly, the season: we require more non-nitrogenous food in winter than we do in summer, because a uniform temperature must be maintained in both cases; therefore the amount of non-nitrogenous food varies according to the depression of the external temperature. In some countries, such as Lapland, Iceland, and others, the natives subsist almost entirely upon oils, fats, and other kinds of respiratory food. And why? Because the temperature of those parts is so low, that large quantities of non-nitrogenous food has to be burnt or oxidized in the body, on purpose to maintain its normal temperature.

In cases of starvation, the persons lose $\frac{1}{3}$ part of

their weight daily, and this goes on until they have lost $\frac{2}{5}$ of their weight, when they die; but, during the whole of the time, the temperature has been preserved, until a few moments before death, when it rapidly falls, and so death is chiefly due to a depression of the temperature; this is shown by placing a bird dying from inanition into a warm temperature, when it will revive for a time. And here we have a great difference between the two great kingdoms; the warm and cold-blooded animals. In the first case, when food is denied, the animal will live for months, and then die from waste of tissue; in the second case, he will live only for days, and then die from a depression of temperature.

And now we will proceed to examine the question of food, more particularly in its bearing with reference to the sick.

The most casual observer amongst you must have been struck with the care and attention which is requisite in reference to the diet of the sick. Punctuality is of the greatest moment in the administration of food. Very often, in weakly patients, there is a nervous difficulty in swallowing, which is very materially increased by any other call upon their strength. Let the time fixed for the diet be rigidly observed, as patients, through disturbance in the taking of their meals, have been prevented from taking anything until the next respite; and thus a delay of ten or

twelve minutes, through unpunctually on the nurse's part, may often turn out to be one of two or three hours to the patient.

In acute cases, where life or death is to be determined in a few hours, it is of vital importance that the order for giving nourishment every two or three minutes be strictly carried out to the second. Much depends upon the attention of the nurse in these cases, and the responsibility only can be met by the most conscientious discharge of her duties.

Then never leave the untasted food of a patient by his side, in the hope that he will eat it at some other time; this simply prevents him from taking any food at all. Through the ignorance of the nurse in this respect, patients have been rendered incapable of taking one article of food after another. Let the food come at the proper time, and be taken away at the proper time, unless you wish to disgust him for taking food by having it always standing by him.

Next the patient should never be asked what kind of food he will take, whether he would like this or that; for he will invariably say he wants nothing. Let it be prepared out of his sight,—do not even let the smell of food cooking reach him; and then only take to him the quantity which he can consume at one time. The more alone an invalid can be whilst taking food the better: if it is necessary for the nurse to be present to feed him, she should neither talk herself, nor allow her patient to talk, especially about

food. Be very careful that all the articles are good; that the milk is not sour, nor the eggs bad. Very often we find things brought to the sick, which at once commends itself as being wrong to every mind but that of the nurse.

A good clever nurse will always be ready to whip up some little substance in a few minutes, rather than disappoint her patient. In all these things exercise your intelligence; as, *e. g.*, suppose a patient has been unable to take anything solid all day, perhaps he will eat a little toast with his tea; or if he could not take his dinner at one o'clock, he may wish for it at five. Somehow, nurses never think of these things; they leave it to the patients, the patient being too ill to teach the nurse, has to suffer for her want of judgment. Never let this be the case with you; have a rule of thought about your patient's diet; consider not only how much he has had, but how much he ought to have; and, above all, be continually exercising your ingenuity to supply defects and remedy accidents, which will certainly happen with the best and wisest contrivers; for the patient does not suffer the less because he cannot be helped.

And, lastly, let me give you one caution, and that is, take care that the beef-tea, broth, milk, or tea, is not slopped out of the cup into the saucer. You have no idea what a difference this small want of care makes, not only to your patient's comfort, but his willingness to take food.

And now, as sick cookery should do half the work of your patient's digestion, let me give you a few recipes in most common use for articles of food in the sick room or ward.

Gruel. A dessertspoonful of Robinson's patent groats must be moistened with a tablespoonful of cold water, and stirred till smooth; then add, by degrees, three quarters of a pint of boiling water, and stir over the fire till it boils; then let it simmer for eight or ten minutes. A little salt or sugar may now be added to the fancy of the invalid.

Toast-water. A piece of bread, two inches square, must be thoroughly browned through, but not burnt; then placed in a jug, and a quart of boiling filtered water poured over it. It must be then covered, and let stand until cold.

Cooling Drink. A very good cooling drink may be made by mixing together half an ounce of cream of tartar, the strained juice of a lemon, two tablespoonfuls of honey, and a quart of boiling water. The whole must be covered over, and when cold it is ready for use.

Lemonade may be made by taking two lemons, slicing them, and removing the pips. Then place the slices in a jug, with two ounces of loaf sugar, and pour on them a pint and a half of boiling water. When cold, strain the liquid through a piece of muslin.

Tamarind-tea. Put half-a-pound of tamarinds, and

two ounces of sugar-candy into a jug, and pour over them a quart of boiling water. Keep in the steam by covering the jug, and when cold, strain the liquid. The tamarinds will serve a second time by adding half the quantity of sugar-candy and water to them.

Barley-water. An ounce of pearl-barley must be boiled for two hours and a half in a quart of water, which is to be stirred and skimmed frequently. It must be then strained into a jug, and sweetened with a teaspoonful of sugar-candy. The strained juice of a lemon may sometimes be added with advantage.

Another way of making *barley-water* for the sick is to take two ounces of pearl-barley, and wash it clean in cold water; then boil for ten minutes in a quart of water. Now pour away the water, and put to it three pints of warm water; let it simmer till reduced to two pints, and strain it through a hair sieve.

Linseed-tea. Put an ounce of linseed, and half an ounce of Spanish liquorice into a jug, and pour over it a pint and a half of boiling water; let it stand till cold, and then strain.

Arrowroot. Moisten two teaspoonfuls of arrowroot with two tablespoonfuls of cold milk. When it is quite smooth pour in half a pint of boiling milk; then place it in a bright saucepan, and stir over the fire for three or four minutes. Two or three teaspoonfuls of powdered loaf sugar may be added to sweeten it.

Wine or brandy will frequently be prescribed with

arrowroot, it must of course be added in the proportions ordered.

Sago. Put a dessert-spoonful of sago into three quarters of a pint of cold milk, and simmer gently, stirring frequently, for an hour and a quarter; skim it as it approaches boiling, and sweeten with a dessert-spoonful of powdered loaf sugar.

To make *arrowroot* or *sago* with water, use the same quantities as in the foregoing directions, only substituting water for the milk.

Cornflour custard (boiled). To make a pint of custard: take one pint of new milk; two eggs, and two teaspoonfuls of cornflour; sweeten with white sugar, and flavour with essence of lemon or vanilla. Boil this in a jug plunged in a saucepan of boiling water, stirring continually for about fifteen minutes, then allow it to cool.

Cornflour Blanc-mange. Take one quart of milk, and mix with it four ounces of cornflour. The flour should be rubbed smoothly into a small quantity of the milk first, and then the rest added to it by degrees. Put it into a saucepan with sufficient white sugar to sweeten it, and flavour it to taste with either essence of lemon or almond. Boil for eight or ten minutes, stirring it well all the time. Then pour it into a mould, and allow it to get quite cold.

Infants' food. To two teaspoonfuls of cornflour, mixed with two tablespoonfuls of cold water, add half a pint of milk. Boil for eight minutes, and

sweeten slightly. It should be, when warm, about the thickness of cream.

Custard pudding. One quart of milk, mix with it three ounces of cornflour, and one or two eggs well beaten; add a little butter, and four tablespoonfuls of white sugar. Flavour to taste, and boil for eight minutes. Then pour it into a pie-dish, and brown it before the fire or in the oven.

Suet and milk is sometimes ordered. Put a table-spoonful of shreaded beef-suet in half a pint of fresh milk; warm it sufficiently to completely melt the suet, skim it, then pour it into a warm glass or cup, and drink it before it is cool.

Cocoa. The most wholesome is made from the nibs, add two ounces to a quart of water, boil it for five hours, and then strain; when cold, skim off the fat, the quantity will be reduced to a pint. It is always better made the day before, and then boiled up when wanted. Boiling milk should always be served with it.

Indian corn thick milk. Moisten a dessert-spoonful of Indian cornflour with a table-spoonful of cold milk, then stir into it half a pint of boiling milk; now stir it over the fire for four minutes, and sweeten with a large teaspoonful of pounded loaf sugar.

Boiled rice. Wash, and drain on a cloth, a table-spoonful of rice, then put it into a bright saucepan with three quarters of a pint of milk, and simmer for about an hour, stirring it frequently till the rice

has absorbed all the milk, and sweeten with a dessert spoonful of powdered loaf sugar. A well beaten new-laid egg, or a table-spoonful of fresh thick cream may be added, if ordered, two minutes before serving it to the patient.

Ground-rice pudding. Boil half a pint of new milk with two ounces of loaf sugar; moisten two small table-spoonfuls of ground rice with three table-spoonfuls of cold milk. When this is well mixed, then stir the boiling milk into it; put it into a clean saucepan, and stir over the fire for twelve minutes, and then let it get cold. Beat three new-laid eggs, yolks and whites separately; stir the yolks into the rice, and, if allowed by the doctor, two table-spoonfuls of cream. Beat the whites to a stiff froth, add them, and beat the mixture for five minutes. Rub a pie-dish with butter, pour in the mixture, and bake in a quick oven for some eighteen minutes, and then serve it at once.

Bread-crumb pudding. Put a thin slice of bread into a cool oven, and when perfectly dry, roll it till it becomes a fine dust. Beat up one new-laid egg with a dessert-spoonful of pounded loaf sugar; add three table-spoonfuls of new milk, put in the crumbs, and beat the mixture well up for ten minutes. Put the pudding in a basin previously rubbed with a little butter; now tie a cloth tightly over, place it in boiling water, and boil fast for thirty minutes.

Calf's-foot jelly. Split and chop across the foot; then put it, with three pints of cold water, in a bright

saucepan; boil, skim, and let it simmer very slowly for six hours. Remove all particles of fat, and put the jelly into a saucepan with six ounces of loaf sugar, and boil rapidly, skimming constantly for five minutes; then strain through a thick flannel bag. Brandy or wine may be added, according to the proportion ordered by the doctor.

Beef-tea. Put three pounds of fresh lean beef into an earthen jar, with a quart of cold water, and some salt. Tie the jar over closely with thick white paper, place it in a deep saucepan of water. Let it come slowly to the boil, and then continue to boil for five hours. Take great care that no fat is served with it. Dry toast, fresh made, may be eaten with it; or it may be thickened with a tea-spoonful of rice, arrow-root, tapioca, or Dr Barry's Revalenta Arabica. The meat may be finely minced; and the fat is best removed by passing a piece of bread over the surface.

When beef-tea is wanted quickly, Liebig's essence of beef may be used. An ounce and a half will make a pint of good beef-tea.

Flavoured by suitable condiments, Mr Darby's fluid meat may be taken as soup.

Gravy soup. Take a little carrot, turnip, onion, and celery, with a clove, small piece of mace, and pepper; boil the whole gently, and strain, and, for each half-a-pint of liquor, add a table-spoonful of fluid meat, with a little salt.

Vermicelli soup. Place in an oven a covered jar

containing a little onion, sliced celery, bruised spices and pepper, with water; when the onion and celery are thoroughly softened, strain, and add the fluid meat in the proportion of a table-spoonful to half a pint, with salt, a small knob of loaf-sugar, and vermicelli previously boiled.

Veal-tea may be made exactly the same as beef-tea, and may be varied in the same way.

A very good meat-tea is made by equal quantities of beef, veal, and mutton, stewed in the same way, and for the same length of time.

Mutton broth. Put three pounds of scrag of fresh-killed mutton into a saucepan, with three pints of cold water, one turnip sliced, a sprig of parsley, and a tea-spoonful of salt. Place it over a slow fire; when it comes to boiling heat, skim carefully, then let it simmer gently for three hours and a half. Strain the broth through a sieve, and skim off all the fat. Well-boiled rice, tapioca, or barley may be put into it, if preferred.

Chicken broth. Break up the bones of any cold chicken, whether boiled or roasted; put them into a saucepan, with a pint and a half of the liquor the chicken was boiled in, or cold water, a sprig of parsley, the heart of a lettuce, and half a salt-spoonful of salt; simmer till it is reduced to a cupful, and strain. Take off every particle of fat, and serve it with fresh toasted bread cut into strips.

Minced chicken. Cut up the cold chicken, take off

the skin, and chop the meat as fine as possible. Season it with half a salt-spoonful of salt, and a tea-spoonful of either potato-flour, oswego, or well-baked flour; put it into a bright saucepan, with a tea-cupful of gravy made from the bones, or the same quantity of milk. Simmer very gently, shaking the saucepan frequently for half an hour, and serve with boiled macaroni placed around it. Soak an ounce of Genoa macaroni in warm water for an hour; boil it in a quart of water for two hours, then drain it on a sieve and serve.

Boiled whiting. Take a small whiting and place it in boiling water, boil it quickly, skim, and let it simmer for ten minutes. Put it upon a hot plate, and pour the following sauce over it: beat the yolk of a new-laid egg with three table-spoonfuls of new-milk, strain it into a small saucepan, and stir it over the fire till it is as thick as cream, and then serve it at once.

Fried soles. Scrape, but do not skin them, wash them, and wipe them dry, dip them in beaten egg, and then strew them over with bread-crumbs. Have a pan of fat, and be sure it boils before you put in the soles; fry them a light brown, and turn them once; lay them over napkins for the fat to drain off, and serve them on a fish-plate with plain melted butter.

This brings me to the end of my course, and to the close of the last lecture I am ever likely to deliver in

this Hospital. I am fully conscious they have been imperfect in many respects; they have been very unequal to my own desires. I trust, however, I have made myself intelligible in trying to impart that knowledge which will enable you successfully to do good to others in the exercise of your calling. I also wish to express my grateful thanks for the courtesy and attention you have all uniformly shown towards me; and I trust it is unnecessary for me to assure you that I shall always continue to take a lively interest in your welfare, and that it will give me great pleasure if I can render you any future service. In conclusion, I beg of you to strive to your utmost to make the nursing department of this Hospital one of the best in the kingdom.

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THE END.

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