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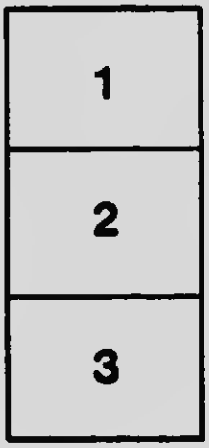

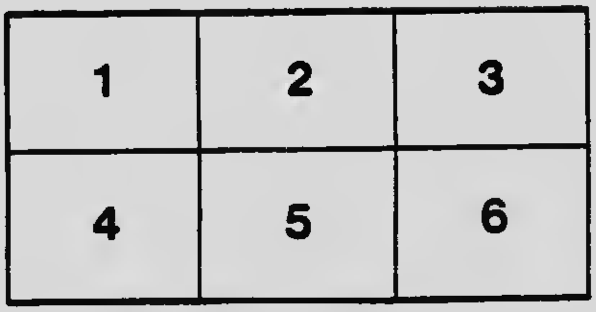

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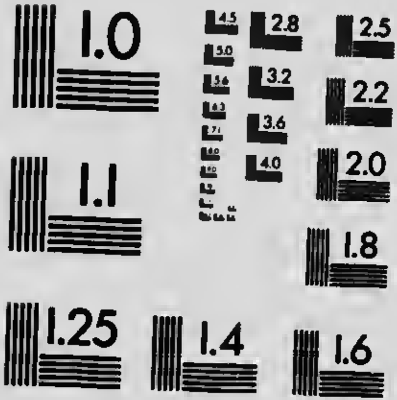

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Nurse in Training

CONTENTS

Nursing as a Vocation

MARION E. SMITH

Superintendent of Nurses, Philadelphia Hospital

While I claim no originality in the idea, for some years I have thought that only women who are deeply religious should take up the life of grave responsibility which inevitably follows the reception of a nurses' diploma. And Dr. S. Weir Mitchell's words to graduate nurses last year so voices my sentiments that I am going to quote them. He says:

"I have often wanted to unite the entire self-devotion of the sisterhoods with the perfect training of the secular nurse. Do not misunderstand me here. I do not believe in sisterhoods. I have seen and admired the union of perfect training and high sense of religious duty combined in the lay nurse; but it is rare, very rare, in your profession and in mine.

"Some nurse with the head, some with the heart, some with both head and heart. Nursing knowledge can be got, but nursing, the highest nursing, is more a question of character than of acquirements. Really believe me, it is a question of goodness, of that side of character which makes for the righteous life, sweet temper, unselfishness, truth, that honesty which is eager to do more than merely earn wages. I like to say all this, and I delight to repeat what I say whenever I get a chance, that there is a limit to every one's intellectual or technical attainments. There is none to our growth in goodness. And let me say here, that such goodness as I crave for the true nurse is the best policy and has commercial value.

"I have just let fall a word about the sisterhoods. As these good women are certainly devoted, earnest and courageous, it is a good thing to know that by degrees they are admitting the need of secular training.

"But because work is paid work it has no need to be worse than unpaid work; nor, indeed, is it. These good women will at last match your training. Is there not something they can teach many of you to-day? Yes. It is that all honest work is Christ's work, paid or unpaid. It is how you do it, and with what spirit, that is of moment, and we will be all the better for the thought that we are in His service and bound upon His errands."

The life of a nurse to be ideal must be that of a Christian. We who educate her expect her to be gentle, conscientious, altruistic, self-respecting, sympathetic, and take the golden rule for her guide. Are these not the attributes of a follower of Christ? Far be it from me to undervalue the work done by the majority of nurses. I think I do not exaggerate when I say it is generally well done, and that the nurse gives more than she gets; money cannot pay for the skill which brings to the bedside renewed health and strength, and, perhaps, even the "sweet boon of life."

If she have fought with death and dulled his sword,
If she have given back our sick again,
Is it a little thing that she has wrought?
Then life and death and motherhood are naught.

And at the gates of life and death should not an earnest, Christian woman stand by the bed?

Many an otherwise good nurse is undesirable, because she has a flippant manner, or because her mind is choked with the cares of this world; dress is often a stumbling block, preventing the saving of money and taking much of the nurse's care and time, making it impossible to have

"A mind at leisure from itself
To soothe and sympathize."

The life of a nurse is a hard one, especially that of a private nurse. She has many trials and temptations—long monotonous days and nights, the unreasonable relations of the patient and the quarrelsome servants, a burden of anxiety, and very hard work besides, and what has she to look forward to between cases?

As a rule, a dreary boarding-house, often overcrowded—say in a room with one double bed, which belongs to three nurses—or two beds rented by four. This is not uncommon in Philadelphia at least. Under these conditions, if nursing is simply a means to an end, how can the enthusiasm and unfailing sympathy and patience last, if the woman has a worldly heart and mind? Then there is the patient's side; surely it is important to have a nurse who nurses with the "head and heart," pure hearted, pure minded, with high ideals and lofty standards Florence Nightingale says:

"Nursing is an art, and if it is to be made an art it requires as exclusive devotion, as hard a preparation as any painter's or sculptor's work, for what is having to do with dead canvas or cold marble compared with having to do with the living body, the temple of God's spirit? It is one of the fine arts."

I feel I touch on dangerous ground when I say that occasionally women whose lives are not above reproach do enter the nursing ranks; but that such is the case is beyond doubt, and is one of the strongest pleas for my cause. I need not enlarge upon the dreadful opportunities that it gives such women to enter closely into the home life of our best people. What is the remedy for these evils? I frankly say I do not know, but my suggestion and thought is that a nursing order should be established—call it what you will, sisterhood or deaconesses, where its members could enter for a certain number of years, say not less than six, and where a rigidly distinctive dress be worn and a life of religious discipline lived, with the same hospital training that is now given as preliminary, or after a year spent in the order.

GENERAL NURSING

Dr. Osler, in 1897, made the following suggestion: "An organized nursing guild, similar to the German deaconesses, could undertake the care of large or small institutions, without the establishment of training schools in the ordinary sense of the term. Such a guild might be entirely secular, with St. James, the apostle of practical religion, as the patron. It would be of special advantage to smaller hospitals, particularly to those attached to medical schools, and it would obviate the existing anomaly of scores of training schools, in which the pupils cannot get an education in any way commensurate with the importance of the profession. In the period of their training, the members of the nursing guild could be transferred from one institution to another until their education was complete. Such an organization would be of inestimable service in connection with district nurses. The noble work of Theodore Fliedner should be repeated at an early day in this country. The Kaiserwerth Deaconesses have shown the world the way. I doubt if we have progressed in secularism far enough successfully to establish such guilds apart from church organizations. The religion of humanity is thin stuff for women, whose souls ask for something more substantial upon which to feed."

A large house with a superior sister of deaconesses, who would manage the nursing sister's lives and look after their interests and comforts. I doubt if many people realize what the loneliness of a private nurse in a large city is, and what possible temptations come to a young and attractive woman, who has no one to protect or care for her. I have had glimpses of what it can be, from the nurses' own lips, and I know whereof I speak. There is no unity among private nurses; it is generally each one for herself, or a few for each other. I will only say in conclusion, that while skill and conscientiousness are the most important things in nursing, and that not even religious fervor can make up for incompetency, given an who can be depended upon to be absolutely honest in words and the Christian woman, makes the highest type of nurse, the woman who can be depended upon to be obsolutely honest in words and purpose, unfaltering in her devotion to duty, dignified and gentle in conduct, the woman who can say from her heart:

Oh, Lord, my God, this work I undertake
Alone in Thy great name and for Thy sake.
In ministering to suffiering I would learn
The sympathy that in Thy heart did burn
For those who on life's weary way
Unto diseases divers are a prey.
Take, then, mine eyes, and teach them to perceive
The ablest way each poor one to relieve;
Guide Thou my hands, that e'en their touch may prove
The gentleness and aptness born of love;
Bless Thou my feet, and while they softly tread
May faces smile on many a sufferer's bed.

Sanctify my lips and guide my tongue,
Give me a word in season for each one;
Clothe me with a patient strength all tasks to bear,
Crown me with hope and love, which know no fear.
And faith, that coming face to face with death,
Shall e'en expire with joy the dying breath.
All through the arduous day my actions guide,
And mid the lonely night, watch by my side.
So shall I wake refreshed, with strength to pray:
Work in me, through me, with me, Lord, this day.

TRAINING SCHOOL FOR NURSES.

The Boston Medical and Surgical Journal notes that to-day the United States has of the training schools for nurses that Florence Nightingale hoped for, more than one thousand, with 200,000 hospital beds and 29,000 pupils. But these pupils, says the Journal, are trained for institutional needs, rather than for the wider service of the state, and while hospitals are training schools for nurses for hospital work, the great need of the country is for intelligent nursing in the homes; that the hospital that trains the nurse in surgery is doing service mainly for that hospital, and not for the more important field that lies beyond. The importance of training young women as nurses has long been recognized in Indianapolis, the first really effective recognition being given in our city hospital under the management of Dr. W. N. Wishard. With the coming of interurban electric lines, the call from the surrounding district for intelligent and capable nurses from this city for rural homes has increased and this demand will probably continue to increase, so that this important vocation for women is not likely soon to be overcrowded.

It is for those who wish to accomplish all the good they can as they go through life, and at the same time earn an honest, respectable livelihood, as well as for those who in some special field of charitable labor, are anxious to help carry comfort, consolation and salvation to the bodies of Earth's suffering one's, that this course of lessons has been prepared and placed on sale.

The institutional nurse is all right in the well appointed hospital, where everything is convenient for her work, but it requires a different kind of nurse for home work. This course in nursing has been prepared specially for home efforts, and will be found by far the best education securable for practical everyday nursing in the homes of the sick and afflicted. To missionaries, or intending missionaries, deaconesses, and religious workers of every kind, whether at home or abroad in the mission field, this course will be found useful and helpful and will enable them to be of far greater usefulness in their field of operations. With the sincere hope that it may help and bless multitudes, this complete course in medical, surgical and obstetrical nursing is sent forth on its mission of hope and mercy.

THE AUTHOR.

Complete Course in General Nursing

Lecture 1

INTRODUCTORY.

It is desirable and absolutely essential at the very outset of this course of lectures, that the closest relationship of mutual interest be established between teacher and pupil. To-day, as this initial expression of ours reaches you, we wish you to feel with its reception, the vigorous handshake of your teachers who bid you welcome.

Ours is the only institution of its kind in the world. From its very inception, unparalleled success has followed its teachings. No old stereotyped methods are tolerated. We place within your grasp a system of instruction planned expressly for you, and while it is possible that we may never see you face to face, yet we wish you to feel that with each lecture there comes the presence of the living teacher.

Each week you will hear from us. Follow out instructions to the letter. Be systematic in your study, and true to yourself and us. This course need in no way interfere with any other legitimate work in which you may be engaged. Ask any question that you may wish connected with the subject. It will be mailed you as we mail your next week's lecture. In your hand is placed a text or reference book. Outlines and instructions for its systematic use will be given you from time to time. When the term is ended, you will be familiar with every topic mentioned therein.

THE NURSE.

Technical Training.

Bear in mind that no amount of technical knowledge alone will make a nurse. There are personal qualities absolutely essential and without which, no system of instruction of any nature will open to you in its broadest sense, the door of success. Cold, mechanical intellectuality can never be substituted for inherent human sympathy and tenderness. Like the poet, the true nurse "must be born." She must possess those inborn qualities of mind which prompt her to seek a closer relationship with the pain and disease-stricken members of the race. She must herself furnish the character and inspiration for the work. The most perfect system of technical training, which, while absolutely essential, is nevertheless only supplementary. Any course of instruction must be considered as

"Machinery just meant,
To give the soul its bent."

Personal Health.

No nurse or doctor, in poor health, should ever assume the grave responsibility of caring for the sick. Bring to your patient an atmosphere of strength (health), not weakness (disease). For this reason you should first, foremost and always, practice that mode of living that will bring to you the highest condition of physical and mental health and vigor. Professedly lack of time in no way will excuse you from doing this. It is your duty and really requires less time than it does to live improperly and unhygienicly.

Personal health is an essential part of your stock in trade, and you owe it to your patient and calling. No specific rule can be formulated, to this end, that will apply to all. You are a law unto yourself. One thing is sure—if you cannot apply the laws of hygiene personally, you certainly are not able to direct it to others. It may not be amiss, however, to call your attention to a few general suggestions which you will apply as your judgment may dictate.

(a) Regularity in sleep and eating. Eight hours in 24 is estimated as the average time of sleep required by an adult in health. Some will need more, some less. Study your own requirements in this respect. As a nurse, your duties will sometimes prevent you from securing the desired amount. Come as near as you can. Sacrifices are common experiences of every laudable and exacting profession of this active age. You will always remember that "Sleep is Nature's sweet restorer," and it is only at that time many of the component parts of the body and brain rest. This fact you will corroborate many times when you get into service and study its results on your patient.

(b) Food. Eat slowly, plain, substantial foods at regular intervals. Masticate well; drink but little during meals, but plenty of pure water between meals. It greatly aids the excretory organs (kidney and skin) to eliminate the waste products coincident to the chemical changes constantly occurring within the body.

(c) Bathing. This to a healthful person has a two-fold object. First, as a means of securing absolute and perfect cleanliness of every portion of the body. Second, as a tonic and stimulant to the skin and nervous system. The temperature and quantity of the water, the frequency of the bath, etc., should be arranged to best bring about the two results above enumerated. Study yourself. If the bath is not followed by a feeling of buoyancy and vigor, then you are in error in regard to its administration. An entire lecture will be devoted to the bath when the proper place is reached in this course of lectures.

(d) Exercise. No form of exercise is better for you than that of walking in the open air. In this day of physical exercises and calisthenics and games for women, you will find plenty of opportunity in this direction.

(e) Dress. Dress plainly, but always neatly and appropriately, and with due regard to the laws of health. Most studiously avoid that principle which allows a rich silk dress to hide a cheap, soiled under-garment. It is largely how you dress, rather than what you wear.

(f) Mental and Social Culture. Keep in touch with the great world around you. Certainly, your profession comes first, but you must, if you wish to succeed, be more or less conversant with the various lines of activities in which others are engaged. If you neglect this, soon you will be in a rut, and can only talk shop, a vital error into which it is sincerely hoped that you may never fall.

In addition to the study of your professional books and journals, you should read the daily newspapers. Know something of the latest books of fiction. Be not averse to mingle to a certain extent in the society functions of your city, town or community. All this aids in giving you a broader view of human nature, and thus widens your sphere of usefulness.

Lecture 2

Relationship of the Nurse to the Medical Profession.

In the last lecture forwarded, an effort was made to point out some of the qualifications necessary for every aspirant to the Art of Nursing. Certain specific duties to yourself were there indicated, and in order to emphasize the importance of such, were thus given in the very first lecture of the course.

In this lecture we wish to have you thoroughly appreciate the very close relationship that must always exist between you and the medical profession. The two are so intimately associated that a successful achievement in one invariably means advancement in the other; while on the other hand, a failure in one, or any of its members, always reflects correspondingly upon the other. Both you and the doctor must work side by side with the one ultimate common objective point, i.e., The relief of human misery and suffering. And yet, while you have this unity of purpose, both will occupy distinctively different spheres of action. As the commander of an army plans a campaign and assigns to various officers, specific detail work which he in no way attempts to perform individually, and as the commander is held responsible for the grand ultimate, so it is with the doctor. He it is who makes the diagnosis, maps out the plan and is in the widest sense held responsible for the cure. To you, as nurse, he will assign the detail work. To the doctor you will be responsible for its performance and yet you must not be an automaton. The doctor may direct you what to do, but not always how to do it. Your own individuality must always be a prominent feature of your work.

It is clearly the province of the doctor to say when a patient should be put to bed, and how long to remain; on the other hand, it is just as distinctively your business and duty to make the patient comfortable while there, and to know that the bed is clean and properly made. The doctor should be the only one to prescribe the poultice—you the one to make and apply it.

Never utter a word to the patient that you would hesitate to say in the presence of the doctor. Be loyal, and never by word or act do that which will lessen the patient's confidence in the physician's skill and ability.

In attending in the physician's absence, you will be held responsible for the welfare and comfort of the patient, according to instruction given. A correct report of all that pertains to the case should in a clear manner be prepared for the doctor's inspection on his arrival each visit. (Just how this may be done, will in a future lesson be carefully explained to you.) While you will, generally speaking, carry out to the letter every direction given by the physician, yet there will sometimes arise unforeseen contingencies when it might be absolutely necessary that you use your own individual knowledge and judgment, at least until the doctor has been summoned.

Avoid mentioning to a patient the name of any physician other than the attending one. Never be guilty of so great a breach of ethics as to even intimate a change of physicians. You should aid the doctor in every way to maintain the entire confidence of the sick one. Become acquainted with the medical men of your town and vicinity. It will be through them that the major part of your engagements will come.

However, it might be here stated that in many communities you will frequently be called to practice your art where no physician is in attendance and when you will have full charge. Notwithstanding this, you will always remember that you are a nurse and legally authorized to practice as such, but have no legal right to practice medicine.

Every case will serve as a great object lesson where you can put into operation the various lessons you have learned in this Course of Training. No one will be more willing to assist you in this direction than the attending physician. Observe him carefully and you will gather valuable information each time he visits the patient.

The Nurse's Relationship and Duties to the Patient.

You occupy, as does the doctor, a purely professional relationship toward the patient. It is your technical and professional knowledge for which you are engaged and for which you are financially remunerated by the patient. For this very reason it is for you to determine what the nature of the services rendered shall be. At the most, the patient's authority in this direction can only be subordinate or suggestive.

Many times you will enter homes where the facilities and accommodation are meagre indeed. It is your duty to do the very best you can under the circumstances. You assume the responsibilities and conditions when you accept the position. It is in just such a place that your training, capability and inherent sense of the eternal fitness of things can be best demonstrated. The most humble, poverty stricken room will afford ample means to prove the inestimable value of the trained nurse.

An intelligent distribution of sunlight, air and water, tinctured with a liberal supply of skill and human hope and sympathy will ever make you a welcome visitor.

Preserve inviolate any secret or knowledge connected with your patient's private life, that may come into your possession, by reason of your professional relationship. Do not talk to your patient about the diseases of other people. It has a depressing and untoward effect. This great world of ours is bubbling over with beautiful, interesting, healthful topics. It is from this source you should select your subjects for conversation. Be quietly happy, buoyant, and optimistic, and it will reflect itself in your patient and will increase the potency of the doctor's medicine.

Lecture 3

THE HUMAN BODY.

(Note)—Before commencing this lecture, read again carefully, lectures I. and II.

Inasmuch as your work as a nurse will be devoted almost exclusively to the care (hygiene) of the body in an abnormal or diseased condition, and as your efforts will be directed toward its removal and a re-establishment of health and physiological conditions, it is deemed most proper that you have as a basis for future study, a clear conception of its normal structure (anatomy) and function (physiology).

Although the body, the physical vehicle of the soul, is harmoniously united into one grand system of organs through which the life forces radiate, we find it arranged in many connected series of similar parts, each series known as a system—for example, the muscular or nervous systems. We also find "groups of different organs associated for the performance of some specific office"—such a grouping known as an apparatus, for instance, the teeth, mouth, stomach, intestines, etc., belong to the digestive apparatus.

For convenience of study and in order to follow out Nature's systematic arrangement of the body, we will first take up the study of the bony or osseous system, i.e., Osteology. There are over 200 bones in the body, each one, of whatever size or shape, made up in general of a dense subfibrous basis, filled with minute cells traversed in all directions by branching and connected canals (Haversian) which allow the passage of blood vessels and nerves, thus affording the nutrition necessary for its growth and healthful maintenance. Chemically, about one-third of the bone is composed of organic or animal matter—gelatine and blood vessels; two-thirds inorganic or mineral, viz.: phosphate and carbonate of lime, fluoride of calcium, phosphate of magnesia and soda, and chloride of sodium.

The animal matter gives elasticity to the bone, while the mineral produces brittleness. In youth, a marked predominance of the former is present, while later in old age, the reverse occurs.

For this reason, the broken (fractured) bone in the aged takes much longer for repair than when the same accident occurs in the child. In the disease known as rickets, there is an abnormal deficiency of mineral matter and a poor quality of the animal constituent.

I. USES—

1. To protect delicate organs.
2. To serve as levers on which the muscles may act to produce motion.
3. To give shape to the body.

II. Form—
1. Long—To facilitate extensive movement.
2. Short—For strength and compactness.
3. Flat—Covering a cavity.
4. Irregular—Special purposes.

III. Names—

- 1. Head
  - Skull
    - Frontal 1
    - Occipital 1.
    - Temporal 2.
    - Spheaoid 1.
    - Parietal 2.
    - Ethmoid 1.
  - Ear
    - Malleus 2.
    - Incus 2.
    - Stapes 2.
  - Face
    - Nasal 2.
    - Superior Maxillary 2.
    - Lachrymal 2.
    - Malar 2.
    - Palate 2.
    - Inferior Turbinated 2.
    - Vomer 1.
    - Inferior Maxillary 1.
  - Hyoid.
- 2. Trunk
  - Spinal Column
    - Cervical vertebrae 7.
    - Dorsal vertebrae 12.
    - Lumbar vertebrae 5.
  - Thorax
    - Ribs.
      - True 14.
      - False 6.
      - Floatiag 4.
    - Sternum
      - Manubrium.
      - Gladiolus.
      - Ensiform appeadix.
  - Pelvis
    - Sacrum.
    - Coccyx.
    - Innominatum 2
- 3. Upper extremity
  - Shoulder
    - Scapula (shoulder blade).
    - Clavicle (collar bone).
  - Arm
    - Humerus.
  - Forearm
    - Ulna
    - Radius.
  - Hand
    - Carpus (wrist) 8.
    - Metacarpus (palm) 5.
    - Phalanges (fingers and thumb) 14
- 4. Lower extremity.
  - Femur (thigh bone).
  - Patella (knee pan).
  - Tibia (shin bone).
  - Fibula (small bone of leg.
  - Tarsus (instep) 7.
  - Metatarsus 5.
  - Phalanges 14.

In the preceding outlines, an effort has been made to systematically classify the bones, and give, as it were, a bird's-eye view of the entire osseous system. A glance over the page of outlines tells the story. When you have it properly learned, then you can reproduce it on paper from memory. It is not enough to simply know the names. You should have a clear conception of the location of the bones as well as their names. Note the classification and spelling. As is usual, in the study of medicine and its allied branches, the Latin names are used almost exclusively. However, in common use many corresponding English names are used—for instance, upper jaw instead of superior maxillary; lower jaw instead of inferior maxillary; cheek bone for malar; breast bone for sternum; hip bone for innominatum; chest bone for thorax, etc.

The hyoid bone mentioned in outline is a U-shaped bone at the base of the tongue.

JOINTS.—The connection made by the different bones, one with another, is called a joint, or articulation. When there is a forcible displacement of such, then it is said to be out of joint or dislocated. In the formation of a joint, we find the articular end of the bone covered with a tough non-vascular structure. In nearly all of the movable articulations, the two ends are held firmly together in approximately dense, strong, but flexible bands called ligaments. Completely enclosing the joint cavity and attached to the ligaments is a thin, delicate membrane known as the synovial membrane. There are several kinds of joints, the most important of which are the hinge joints at the elbow and knee, and the ball and socket joints at the hip and shoulder.

NOTE.—Read carefully description of the bones given in your text-book.

Lecture 4

THE MUSCULAR SYSTEM.

(Note—Before beginning this lecture, again read carefully the three preceding ones.)

Connected with the bones, cartilages, ligaments and skin, either directly or through interposition of fibrous structures termed tendons or aponeurosis, are over 500 contractile organs known as muscles. It is due to this contractility and relaxation that all the movements of the body are executed. Every muscle is either under the control of the will (voluntary) or not (involuntary.) The voluntary muscle is usually attached to bone. The involuntary usually not. Both have fibres. The voluntary has these fibres arranged in bundles each fibre wrapped in a structureless membrane known as sarcolemma. The involuntary has no sarcolemma and its fibres interlace. The first class presents a striated appearance; the latter unstriated. The names of the muscles are given in Latin and invariably named from their—

1. Form as deltoid, or 2. Location as tibialis, or
3. Use as flexor, or 5. Number of divisions, as biceps, etc

Muscles differ greatly in size. The stapedius, a small muscle of the internal ear, weighs only about a gram, while the gastrocnemius constitutes almost the entire bulk of the back of the leg. The stapedius is only about two lines in length—the sartorius, or tailor's muscle, is nearly two feet.

Most interesting changes occur in the muscles as age advances. In youth the tendinous termination of the muscles is only of sufficient length to allow of a firm and proper attachment. Later in life the tendon increases in length, and thus proportionately decreases the extent of the contractile portion. This accounts for the suppleness of youth, and the stiffness and immobility of the aged. Any system of muscular training or massage that overlooks this important fact, is certainly in error, as grave and irremediable injury may be produced.

As has been mentioned, the predominant property of the muscle is to contract or shorten. By the exercise of this all of the movements of the body are performed. Without this, power, locomotion would be impossible, the movements of the heart (a muscle) would cease and death would quickly supervene. Remove the water from the muscles, and its contractility ceases. Destroy its connection with the nervous system and the same result occurs. The immediate element of contractility is the muscle cell, one of the basic anatomical parts of the fibre. As the fibres are shortened by contraction, at the same time do they increase transversely. A most astonishing degree of muscular development may be brought about at almost any period of life, by following out systematically certain scientific methods of muscular training.

While the bones form the frame-work and give outline to the body, the muscles, when properly developed, give symmetry and beauty.

STIMULATION OF MUSCLE.

A muscle may be excited or stimulated either directly or through its motor nerve. Such stimulus may be:

(a) Electrical. (b) Mechanical. (c) Chemical. (d) Thermal.

Every effort to excite the muscular system into activity must be directed along one or more of these lines, and are points not to be overlooked by the nurse who wishes to stimulate and strengthen the muscular system of a patient.

An electrical (faradic) current will illustrate the first. A prick, cut, blow or vigorous friction, the second. A strong solution of salt, a dilute solution of a mineral acid will act as a mild chemical stimulant, an illustration of the third. Sudden application of heat or cold, illustrates the fourth means mentioned.

RIGOR MORTIS.

A term signifying the rigidity of death, and is due to chemical changes in the substance of the muscles which occur within a variable time after death. The muscles become stiff, rigid, non-elastic. In general, this rigidity occurs in from 10 minutes to 7 hours after death—in exceptional cases it does not occur until 18 hours after death. It will last anywhere from 1 to 6 days. Cold delays and heat favors the appearance of the rigor mortis. It appears soon following certain diseases, as cholera, diseases of the brain or cord, or in cases of sudden death.

The muscles are affected in regular order from above downward—the jaw, neck, trunk, arms, and legs in succession. In consequence of the active chemical changes incident to the rigor mortis, quite frequently the body will warm. Another fact to be remembered, that occasionally the primary contraction and fixidity of the muscles during the establishment of the rigor mortis state, will induce certain movements which might mislead an ignorant watcher to believe that the supposed dead was alive.

Lecture 5

The Nervous System.

To correlate and to bring into one harmonious whole, all of the various organs, structures and activities of the body, is the prime function of the nervous system. Disconnect the nerve supply from any organ, no matter how healthful it may be in structure, and it immediately ceases to act—it becomes paralyzed. Entirely suspend the action of the nervous system, and synchronously all the vital processes cease, respiration terminates, the heart no longer beats, and death ensues.

Before entering upon a general discussion of this topic, let us for a moment view under the microscope the minute structure. The older histologist who viewed largely with an anatomical eye, saw essentially two main elements (and incidentally two secondary) as below indicated.

1. Nerve Fibres—Medullated or white. Non-medullated or grey.
2. Nerve cells.
3. Connective tissue.
4 Peripheral termini.

A grouping of the nerve fibres into bundles is called a nerve trunk or nerve. A grouping of the cells, ganglia.

A typical nerve fibre has three portions:

1. Axis cylinder (central conducting portion).
2. Medullary sheath (white substance of Schwann).
3. Neurilemma (enveloping connective tissue).

Nerve cells are of various sizes and shapes, and are usually grouped as before stated, into centres or ganglia (grey matter).) These ganglian cells are the largest in the body, and have a groundwork, dense, resticulated, enclosing a large, translucent nucleous and usually a nucleolus. From these cells project poles or horn-like processes, varying in number and hence called unipolar (one pole), bipolar (two poles), tripolar (three poles), multipolar (many poles), etc. These poles have usually sub-branches. One, however, does not, but extends singly to form the axis cylinder to another fibre.

The axis cylinder is supposed to be the track along which travels nerve force to and from every part. The cell a centre of energy or reservoir from which it radiates. Every nerve fibre has the axis cylinder which varies in size from 1/2,500 to 1/15,000 inches in diameter.

The white substance of Schwann is absent in the non-medullated fibre.

The connective tissue of the nerve which serves to unite its elements is classified as follows:—

1. Epineurium—sheath of entire nerve trunk.
2. Perineurium—surrounds bundles composing nerve trunk.
3. Endoneurium—permeating and uniting the elements of the bundle.
4. Neurilemma—surrounds individual fibres of a bundle.

The very latest idea in regard to the structural elements of the nervous system, and one which also much more clearly elucidates many physiological phenomena, is the so-called

Neuron Theory.

According to this, the nervous system is made up of a vast number of units called neurons, each of which is similar in structure and consists basically of a cell body containing a nucleus, which, in turn, has a nucleolus.

Now observe, from the cell body spring processes of two kinds—

1. Dendrite. 2. Axons.

Before describing the cell body and its processes, fix clearly in mind that these neurons are each absolutely independent of the other, and are not connected structurally or functionally, except by contiguity.

In the cell body we find a protoplasmic mass imbedded in a network f fibres. The cell-body has the following functions:

1. Originate afferent impulses.
2. Modify afferent impulses.
3. Receive and recognize sensory impulses.

The dendrites are branch-like projections or extensions of the cell body. The axons usually arise from the cell body, but occasionally from a dendrite. They vary in length from the fraction of a millimetre to nearly 100 centimetres. The short axons divide into many branches. The long ones at intervals give off lateral branches called collaterals. These collaterals, by contiguity, in connection with the neurons lying close to the axons, bring into association the various neurons of the entire nervous system.

The life of a process depends on the cell-body. If that cell body dies, then the dendrites or axons from it also degenerate and die, and following this, all tissues reached by such, must correspondingly suffer.

In the grey matter of the brain, cord and ganglia of the peripheral nerves are groups of neurons controlling some function of the body. Such a group is called a centre. The axons previously mentioned, by their extension and association, form the so-called tracts. These tracts are found principally in the peripheral nerves and white matter of the brain and cord, and may be likened unto so many pathways along which courses nerve force.

As nerve force has two distinctive qualities, i.e., that which gives motion and that of sensation, so there are necessarily two kinds of tracts, motor and sensory.

For convenience in study and also to distinguish certain physiological qualities, the entire system of nerve structure outlined in this lesson may be grouped into two grand divisions.

1. The cerebro-spinal nervous system, which includes the brain, spinal cord and nerves arising from each. Functionally, two classes of nerves arise from this division:

(a) Motor—Supplying the striated or voluntary muscles.

(b) Sensory—Distributed to the organs of sense, skin and other parts endowed with sensibility.

Cranial Nerves.

Twelve pairs arise from the cerebro-spinal centre and are transmitted through foramina in the base of the brain to parts exterior:—

1. Olfactory (nerve of smell).
2. Optic (nerve of sight).
3. Motor oculi (to certain muscles of eye).
4. Patheticus (to superior oblique muscles of eye).
5. Trifacial (great sensitive nerve of head and face, also motor nerve of mastication).
6. Abducens (to external rectus muscle of eye).
7. Facial (motor nerve of muscles of expression).
8. Auditory (of hearing).
9. Glosso-pharingeal (to tongue and pharynx).
10. Pneumogastric (sensory and motor—extensive distribution through neck and thorax to abdomen).
11. Spinal accessory (two parts—one to pneumogastric; the other, the spinal portion).
12. Hypoglossal (motor, nerve of tongue).

Spinal Nerves.

Arise from spinal cord. There are 31 pairs arranged in groups to correspond to the regions of the spine through which they pass.

Cervical	8 pairs.
Dorsal	12 pairs.
Lumbar	3 pairs.
Sacral	5 pairs.
Coccygeal	1 pair.

Each spinal nerve arises from two roots—an anterior conveying sensation from the part to which it is distributed, and a motor, conveying motor influence to the muscle. Generally speaking, it may be understood that these nerves are distributed to the trunk and limbs.

Brain.

The most highly developed and important portion of the nervous system. Situated in the cavity of the skull. It is not the seat of the mind, as is erroneously stated by many writers, but is the vehicle through which the mind operates or manifests itself on the physical plane of nature.

As the different strings or keys of a musical instrument emit sounds or vibrations of various qualities, so are different parts of the brain constructed to manifest qualities of mental vibrations, or phenomena. The mind is not resident in the brain any more than sound is in the musical instrument.

The brain occupies the cavity of the skull and weighs on an average in the adult male 49½ ounces, in the female, 44 ounces. There is, however, a wide variation in the relative weights of different brains. Cuvier's weighed over 64 ounces. Dr. Abercrombie, 63 ounces, and Depuytren, 62½ ounces. The brain of an idiot rarely weighs over 23 ounces. The human brain, with the exception of that of the whale and elephant, is larger than that of any other animal. The brain may be studied from four anatomical and physiological standpoints or parts:—

1. The Cerebrum—The largest divisions filling the front and middle portions of the base of the skull; ovoid in form—by a longitudinal fissure divided in two lateral hemispheres. Grey matter forms a layer from a ¼-inch to ½-inch in depth on its surface. The amount of the grey matter is much increased by being arranged in convolutions. Mental vibrations through this grey matter exhibits the qualities of memory, volition, the emotions, etc. It also contains highly specialized centres of sense, sight, hearing, touch, smell, taste, etc. The interior portion is made up of white brain tissue. The cerebrum constitutes the greater portion of the brain.

2. The Cerebellum—Lies in the back and lower part of cranium, about one-eighth the size of the cerebrum. It is oblong in form and flattened from above downward. Through this portion of the brain radiates force which controls the co-ordination of muscular movements and maintains muscular equilibrium. Remove this part of the brain from a pigeon and it has no power to fly, but still retains its original quality of mentality.

3. Pons Varoli.—The bond of white fibres arching the medulla oblongata and connecting the lateral lobes of the cerebrum.

4. Medulla Oblongata.—May be said to be that portion of the spinal cord within the cranium. It is about 1¼-inch in length, three-quarters of an inch thick, half an inch wide at its upper end, and is continuous below with the spinal cord. In fact, the spinal cord may be considered, generally speaking, as a projection or extension of the brain downward into the spinal canal. By means of fissurres the medulla oblongata is divided into a number of columns consisting mostly of white matter, and in direct continuity with corresponding columns of the cord. Along these columns travel motor and sensory impulses. In the medulla are also found a number of specialized centres which preside over special physical, vital action. Among these centres may be mentioned:

(a) Respiratory centre.
(b) Vaso-motor centre.
(c) Cardiac centre.
(d) Centre for deglutition.
(e) Centre for voice.
(f) Centre for mastication.
(g) Centre for expression.
(h) Centre for salivary secretion.

Sympathetic Nervous System, etc.

The sympathetic system consists of numerous ganglia and nerves which supply the viscer glands and blood vessels of the body. The nerves of this system are closely connected and freely intermix with the nerves of the cerebro-spinal system. In fact, the two systems are so closely associated in function and structure that it is impossible to study one without reference to the other. The sympathetic system has numerous ganglia, and its nerves form a multiplicity of plexuses which, for the most part, surround the blood vessels and are conducted by them to the viscera. The ganglia take part in the reflex and automatic actions of the body.

Note.—Before closing this lecture, we wish to speak to you personally. No doubt you are appalled at the long, hard names that have been given you and the more or less abstruse technical descriptions that have been presented, especially in this lecture. Yes, unless we mistake much, you are beginning to wonder when you are going to learn something about nursing. We may be mistaken in this surmise with you, but about this point in the course, such an idea occasionally arises in the mind of the inexperienced student. Remember, there is no royal road to learning any science, art or profession worth the having. A substantial building must have a substantial foundation. No superficial or surface work will be accepted or tolerated in this course of training. We aim to lay such a broad foundation of basic principles as will insure to every graduate the essential elements of success. Every lecture has been planned with an especial object in view. This you will see clearly long before the close of the course.

Several lectures will yet follow this on the anatomy, physiology and hygiene of the body. Your mastery of these as they reach you from week to week is absolutely necessary. Thoroughly learned, it will constitute a foundation upon which you can build a magnificent structure. The materials of such, you will select from lectures given later on interesting topics associated with the art of nursing.

Note.—Read what your text-book says on the nervous system.

Lecture 6

DIGESTION.

In the widest sense, digestion may be understood to be all those processes whereby food, when taken into the body, is converted into tissue or sustains cell life.

ORGANS.

For convenience in study, the various digestive organs are arranged in two divisions: (a) alimentary canal; (b) accessory organs. The alimentary canal is the musculo-membranous tube, about 30 feet in length, extending through the entire body from one extremity to the other. Along through this canal passes the food which at various intervals in its course is subjected to the action of various fluids poured into the canal by its secreting coat, also by the several accessory organs. The alimentary canal, while one continuous structure, has special names applied to its different parts, viz.: 1. Mouth; 2. Pharynx: 3, Œsophagus (gullet); 4, Stomach; 5, Intestines(large, small).

The entire alimentary tract is lined by a continuous mucous membrane which secretes or manufactures a fluid known as mucous. This mucous keeps the lining moist and lubricated. A brief description of the various parts of the alimentary canal are here given.

The mouth requires no special description, although an important step in the digestion of the food occurs here

The Pharynx is the second division of the alimentary canal, situated between the mouth and œsophagus. It is about 4½ inches long, has three coats, mucous, fibrous and muscular, and has seven openings communicating with it, viz.: one into the mouth—one to the œsophagus, one to the larnyx, two to the nose, one to each ear (the Eustachian tubes).

The œsophagus (gullet) is the tube leading from the pharynx to the stomach. It is about 9 inches long and lies behind the trachea (wind-pipe) the heart and the lungs, and passes through the diaphragm. The œsophagus has also three coats. The middle or muscular has the fibres running both longitudinally (lengthwise) and transversely (crosswise). This arangement is to facilitate the act of deglutition (swallowing).

The stomach is situated in the abdominal cavity and is a most important organ, and may be considered as an extreme expansion of the canal. In it certain kinds of foods are dissolved and changed. It is about 12 inches long (transversely) and four inches in breadth (vertically). The greater portion of the stomach is on the left of the median line. The entrance of the œsophagus is called the cardiac end, while the opposite extremity is called the pyloric end. This last is guarded by a valve formed of mucous membrane and called the pylorus.

Coats of stomach: Serous (outer) muscular; sub-mucous; mucous.

The muscular has fibres running three directions—longitudinally, transversely, obliquely. By contraction and relaxation of these fibres the contents of the stomach, during the process of digestion, are kept constantly in motion. The mucous coat has a honey-combed appearance due to depressions (alveoli) at the bottom of which are openings of little tubes. These tubes open into glands, of which there are two kinds (a) the pyloric, so called from their abundance in the pyloric end of the stomach; (b) the cardiac, because of their appearance in the cardiac region. Granular cells, called chief cells, are found in both regions. These cells produce the so-called pepsinogen, which is converted into the pepsin of the gastric juice.

There is also another kind of cells, large or ovoid, called parietal, which produces the hydrochloric acid of the gastric juice.

The intestines, though continuous, are best studied under two divisions: large and small. The small intestine is about 20 feet in length and has three divisions, viz.: (1) The duodenum, eight or ten inches long, continuation of canal from pylorus; in it, important digestive changes occur. (2) The jejunum, second division of the small intestine, about 7 feet in length, and with the ileum lies coiled chiefly in central part of cavity of abdomen. (3) The ileum is about 12 feet, chiefly in central part of cavity of abdomen.

Along the small intestine the mucous coat is covered by a layer of columnar epithelium. This is arranged in folds, to which the name valvular conniventes has been given. By means of these folds, the area of the mucous mebrane is greatly increased.

The large intestine is about 5 feet long and has three divisions. (1) Caecum, 2½ inches long and the same in diameter, forms a blind pouch, the beginning of the large intestine. Attached externally to the caecum is a worm-like tube 2 to 6 inches long, and called the vermiform appendix. Inflammation of this appendix is called appendicitis.

The second part of the large intestine is called the colon. It surrounds in a manner the small intestine, which, as before stated, occupies the more central part of the abdomen.

The colon has three divisions. The ascending along the right side of the abdomen. The transverse passes transversely to left. The descending passes downward on left side to lower part of abdomen.

The rectumforom is 6 to 8 inches long, and is the terminal portion of the large intestine. No digestive changes occur in this part. Through its walls, however, pre-digested foods are readily absorbed when introduced under proper conditions, as is frequently done by enemata. Instances are on record where persons have been thus nourished for days and weeks.

Villi.

Projecting from the mucous membrane are prominences (the villi), some triangular, some conical, some filiform. It is estimated there are about five millions of them. They are intimately connected with the process of absorption.

Brunners Glands.

Secreting an alkaline mucous which has the power to change maltose to glucose, and located in the sub-mucous coat of the duodenum and upper jejunum are certain racemose glands known as Brunners. Whenever the body is burned to any extent, these glands inflame and ulcerate.

Crypts of Lieberkuhn.

In the mucous membrane of the small intestine, and opening between the villi, are minute blind tubes called the crypts of Lieberkuhn. They secrete the greater portion of the so-called intestinal juice—an alkaline fluid containing 95 per cent. water, salts, and a ferment called invertin.

The Solitary Glands.

Small white bodies of lymphoid tissue scattered throughout the intestine. Groups of these are called Peyers Patches. They are situated for the most part in the lower part of the ileum. There are about 20 of them, and in typhoid fever they sometimes become inflamed and ulcerate, thus perforating the intestine.

Accessory Organs of Digestion.

Teeth, tongue, salivary glands, liver, pancreas, spleen. An entire book could be written about the teeth. Only the essential points of practical utility to the nurse are given here. Each tooth has three portions:—

(a) Crown, projecting above the gum.
(b) Root, part within the alveolus.
(c) Neck portion constricted between the other two.

The alveolar depression in which the teeth are set, is lined with periosteum, which is reflected over the root, up to the neck. Here it becomes continuous with the fibrous structure in the gums. The dentine forms the bulk of the tooth. A hollow cavity is found in the interior. This is continuous and traverses each root opening by an orifice at its extremity. This cavity is filled by the so-called dental pulp—a substance made up of tissue cells, vessels and nerves. These enter at the opening in the root. The crown is covered by the hardest substance in the body, enamel. Extreme temperatures of heat and cold, forcible contact with very hard substances, will sometimes crack this enamel, and thus by exposure of sensitive parts beneath, institute a condition of pain and decay.

The proper preservation of the teeth is one of the most important duties belonging to the individual. The dental art has been carried to such a perfection that we rarely hear nowadays of the extraction of a tooth simply because it aches.

Form and Use.

As to form and use, there are four kinds of teeth:—

(1) Incisors—in front—four in each jaw—sharp for cutting—have one root.

(2) Canine (eye teeth), two in each jaw, one on each side of incisors—sharp, with single, long root—adapted for tearing.

(3) Biscuspids—four in each jaw—two on each side of canines—usually one root, sometimes two. No bicuspids in the temporary set.

(4) Molars—six in each jaw in permanent—four in temporary—adapted to grinding—two to five roots. The third molar in each half of jaw does not appear until late, usually about 20 years, and hence called the "wisdom tooth." (Dens Sapientæ).

During the life time of the individual two sets of teeth appear:—

(1) Temporary—milk or deciduous—appear in childhood—20 in number—ten in each jaw.

(2) Permanent—Follow the temporary—32 in number—16 in each jaw.

Approximate Time Table of Appearance of Teeth.

Temporary (Milk).

Those of lower jaw usually precede those of upper jaw.

(Note.—The figures indicate time by months).

Molars, 24-12; canines, 18; incisors, 9-7-7-9; canines, 18; molars, 12-24.

Permanent.

(Note.—Figures indicate years).

Molars, 17 to 25, 12-6-13; bicuspids, 10.9; canines, 11 to 12; incisors, 8-7-7-8; canines, 11 to 13; bicuspids, 9.10; molars, 6 12-13, 6 17 to 25.

Lecture 7

DIGESTION—ACCESSORY ORGANS—Continued.

The tongue needs no especial description, and yet it is an organ frequently examined by the physician and nurse during the progress of a disease. The great bulk of the organ is muscular, consisting of two symmetrical halves, separated by a fibrous septum. A liberal blood supply comes from the lingual, facial and ascending pharyngeal arteries. The dorsum (upper surface) of the tongue is convex, the anterior two-thirds rough and covered with papillæ; the posterior one-third smooth and covered by projecting orifices of mucous-like glands.

The mucous membrane of the tongue is covered by three varieties of papillæ:—

1. Circumvallate—8 or 10—forming the boundary between the anterior two-thirds and the posterior one-third. In these are found the gustatory buds, which are supposed to be connected with the sense of taste.

2. Fungiform—abundant on the sides and tip—also participate in the sense of taste.

3. Filiform—most numerous of all. Mostly on the dorsum. Are tactile organs.

Certain conditions must be present in order that the sense of taste can be exercised. For instance, the substance must be in a state of solution or soluble in the saliva. All insoluble substances are tasteless For this reason, calomel is a good cathartic for children.

The mucous membrane must also be moist, else the sense of taste will be absent. This is illustrated in the parched, dry condition of the tongue during a fever. The sense of taste can only be excited when the substance by osmosis passes into the papillæ, and stimulates the terminal filaments of the nerves. The sense of taste is not entirely confined to the tongue. The tongue has in addition two other functions, viz.: to aid in the articulation of words; to assist the processes of mastication and insalivation.

The appearance and condition of the tongue is a most important consideration to the physician, when making a diagnosis. This will be more definitely elucidated in later lectures.

THE SALIVARY GLANDS.

Arranged in pairs. There are three, and their general function is to secrete a fluid (saliva) which is poured into the mouth, and there changes starchy foods to sugar. These glands are:—

1. Parotid. 2. Submaxillary. 3. Sublingual.

They are compound racemose (resemble in form a bunch of grapes) glands, with numerous lobules, each supplied with a duct and blood vessels, and all bound together by connective tissue. They divide, and redivide in the lobule, finally terminating in a cluster of tiny sacs or acini, as they are sometimes called. These sacs are lined with cells, which gather from the blood certain elements, and convert same into the

SALIVA.

A sticky, frothy, alkaline fluid containing about one-half per cent. solid matter, and having a specific gravity of 1004. It is estimated by authorities that from 30 to 80 fluid ounces are secreted in 24 hours. As two-thirds of our food consists of starch, you will readily see how important a secretion is the saliva. Its production is a reflex act, due to one of two influences:—

(a) Excitation by food placed in the mouth; (b) mental stimuli induced by sight, smell, or thought of food.

The arteries supplying the glands are influenced by two opposing sets of nerves:—

1. Vaso-motor, which by action:—
   - (a) Narrow their calibre.
   - (b) Lessen supply of blood to gland, and therefore
   - (c) Lessen amount of secretion.
2. Vaso inhibitory, which by action—
   - (a) Antagonize the vaso motor.
   - (b) Increase calibre of vessel.
   - (c) Increase blood supply.
   - (d) Increase secretion.

The reflex act of the salivary secretion may be briefly sketched as follows—to illustrate—the smell of victuals excites the flow of saliva "makes mouth water." Here the fine particles of food excite the terminals of the nerve of smell, the sensation is carried to a centre, and thence reflected (turned back) along the vaso-inhibitory nerves mentioned above. In every case the original impression is received at a centre and then reflected along on one of the two sets of nerves. Paralysis of the vaso-motor nerves that supply these glands would greatly increase the flow of saliva.

Let us briefly notice some of the anatomical features of these glands individually:—

1. The Parotid, the largest, weighs from one-half to one ounce. It is situated on the side of the face, just below and in front of the external ear. The disease known as mumps or parotiditis is an inflammation of this gland. Its duct (Steno's) which carries the fluid into the mouth is about 2½ inches in length, and opens in inner surface of the cheek opposite second molar tooth of the upper jaw.

2. The Submaxillary is situated just below the angle of the lower jaw, and weighs about two drachms. Its duct (Wharton's) is about two inches long, and opens on the summit of the small

papillæ at the side of the frænum linguæ. (A thin central band which unites the lower portion of the anterior part of the tongue to the floor of the mouth.) In the babe it is sometimes incised in that condition known as "tongue tie."

3. The sublingual, the smallest, situated beneath the mucous membrane of the floor of the mouth, at the side of the frænum linguæ. Shaped like an almond, and weighs about a drachm. It has 8 to 20 ducts, which open separately into the mouth. One or more join and form a tube (duct of Bartholin) which opens into Wharton's duct.

COMPOSITION OF SALIVA.

Water	99.50
Inorganic (sodium chloride, calcium carbonate, calcium phosphate	.25
Solids (organic) mucin, serum albumen, serum globulin, carbon dioxide, ptyalin	.25
	100.00

The calcium carbonate and phosphates accumulate frequently on the teeth and is commonly known as "tartar."

The liver is the largest gland in the body, and in the adult weighs from three to four pounds. It is situated in the abdominal cavity, chiefly on the right side, just below the diaphragm. Or, as it is technically called, in the right hypochondriac and epigastric regions. It measures transversely 10 to 12 inches. Anterior to posterior surface, 6 to 7 inches, and about 3 inches thick at back part of right lobe. Many conditions may change the normal position of the liver:—

1 Position of body—sitting or standing.

2. Breathing, with a deep inspiration, it can frequently be felt beneath the ribs.

3. In emphysems (air in lung—thus pressing down on diaphragm).

4. Phthisis (consumption).

5. Tight lacing.

6. Tumors in the thoracic or abdominal cavities.

Blood is carried into the liver by the portal vein and hepatic artery. After being subjected to various changes, it is carried away by the hepatic veins. Look on the under surface of the liver, and you can see five well marked fissures dividing the surface into five lobes. Observe the upper surface and you notice five distinctive bands or ligaments, the obvious reason of which is to hold the liver in position. These ligaments also more or less mark the lobes on the upper surface. Enclosing the entire liver is a fibrous sac, known as Glisson's capsule. This capsule sends down fibrous prolongations which divides the liver substance into many tiny chambers known as lobules, each lobule averaging about 1/12 of an inch in diameter. Each lobule has two capillary plexuses (a) blood,

(b) bile. In the meshes of this network, the hepatic (liver) cells are located. These cells are polyhedral in form, and are about 1/1000 of an inch in diameter. From the blood brought by the portal vein and hepatic artery, these cells manufacture the bile which is directly poured into the bile capillaries, and from these finally is carried from the liver by two trunks (one from the right lobe, the other from the left) which unite and form the hepatic duct, about 1½ inches long. On the under surface of the liver is a fissure, or a sac of a pear-shape, about 4 inches long and 1 inch in diameter. It holds from eight to ten drachms, is called the gall-bladder, and serves as a reservoir for superabundant bile. Its duct is called cystic duct, and is about 1 inch long. By the junction of this with the hepatic duct, the common bile duct (Ductus Communis Choledochus) is formed. This common bile duct is 3 inches in length, and it opens into the duodenum.

The liver in the adult has at least three functions:

1. Secretion of bile.
2. Formation of glycogen.
3. Action on albuminous substances.

We can only hastily examine these three functions.

The bile is a product of the hepatic cells previously described. It has a golden-brown color, a specific gravity 1018, and is alkaline. About 1,500 c.c. is secreted in 24 hours.

Composition of bile:—

Water (sodium glycocholate)	86.
Biliary salts (sodium taurocholate)	9.
Cholesterin	.3
Mucous and coloring matters	3.
Salts	1.7
	100.

This bile has in its influence on digestion several different actions:—

1. Emulsifies fatty foods.
2. Facilitates absorption of fatty matters through intestines
3. A purgative.
4. An antiseptic.
5. Precipitates pepsin, peptones, and parapeptones, which have escaped from the stomach into the duodenum.

Let us for a moment examine the so-called glycogenic function of the liver. From many similarities of glycogen to starch and also sugar, it is sometimes call [illegible] animal starch, sometimes liver sugar. It is a white, tasteless, inodorous powder, insoluble in alcohol, soluble in water, and is principally formed in the liver, from the saccharine and amylaceous elements of the food. The ultimate disposition of the glycogen formed by the liver, is somewhat uncertain, but is supposed to be utilized in the system by entering the blood in small quantities as sugar or glycogen in the white corpuscles.

Diabetes is a disease characterized by the persistent presence of sugar in the urine, brought about by rapid conversion of glycogen into sugar in the liver.

(Note.—1. Read carefully the preceding six lectures.

2. Carefully study this lecture.

3. Read what your text-book says on the subject.

Lecture 8

DIGESTION—ACCESSORY ORGANS—Continued.

We here continue the discussion of the accessory organs of digestion, begun in the last lecture. Carefully again review all that has been given, before entering upon this.

THE PANCREAS.

In structure, this gland approximates very closely that of the salivary glands. It is described as a compound racemose gland, and lies in the abdominal cavity transversely behind the stomach, about the junction of the first and second lumbar vertebræ. In very emaciated persons, or when it is abnormally enlarged, it may be felt in the linea alba (anterior central line between two lateral halves of the body) two or three inches above the umbilicus (navel).

It is transversely oblong, and resembles somewhat in shape a dog's tongue. The right broadest extremity is called the head. The left, narrowest, is termed the tail. The intermediate portion is called the body. With a variable weight ranging from 2 to 3½ ounces, occasionally reaching 6 ounces, it has the following average dimensions—length, 7 inches; breadth, one-half inch; thickness, three-quarter inch.

On the posterior (back part) of the organ is a lobe-like fold which is sometimes detached and is called the lesser pancreas.

A little below the centre of the pancreas, running from left to right, is a duct known as the pancreatic duct or canal of Wirsung. This duct terminates in the duodenum usually in common with the ductus communis choledochus. The duct is about the size of a goose quill and conveys the pancreatic juice (secretion of the pancreas) into the upper intestine as above stated, there to exert a specific influence on certain kinds of food.

PANCREATIC JUICE.

A clear, sticky, alkaline fluid resembling saliva, but of a greater specific gravity, and containing about 2 per cent. of solid matter. It is estimated that about 12 or 16 ounces are secreted in 24 hours. You will remember that the saliva had but one ferment or enzyme, ptyalin. The pancreatic juice has four, each acting specifically on a different kind of food.

(a) Trypsin, changes proteids into peptones.

(b) Amylopsin, changes starch into dextrin, and sugar.

(c) Steapsin, a fat splitting ferment, emulsifying and saponifying fats.

(d) Rennin, a curdling ferment, curdles the casein of milk.

About 1 per cent. of the pancreatic juice is made up of salts (sodium carbonate and chloride, potassium chloride, and calcium phosphate).

THE SPLEEN.

Although authorities differ somewhat as to the functions of the spleen, it is generally believed among its other functions to exhibit an influence upon the process of digestion. Unlike the typical gland, it has no duct, but has the appearance of an organ loaded with blood.

Extreme variations in its size and weight are observable in different individuals, and the same person under different conditions. It is situated in the extreme left hypochondriac region in close proximity to the tail of the pancreas, and has on an average the following dimensions—5 inches long, 4 wide, 1½ thick, and weighs 7 ounces. In certain fevers it has been known to weigh 20 pounds. In old age it gradually decreases in weight and size.

The spleen has two coats (a) external or serous, (b) internal, fibro elastic. This forms the frame work of the organ by giving off in all directions through the interior, fibro elastic bands which, uniting, gives a sponge-like appearance. Within this is the spleen pulp, a soft mass of dark reddish brown color, made up of branching cells, and intercellular substance. The large size of the splenic artery admits of great quantities of blood being carried to the organ, and it is believed by observers that the spleen is a great equilibriating reservoir, holding the blood in reserve when not needed in other abdominal organs. During digestion, its supply is greatly increased, during starvation much diminshed. Removal of spleen in dogs has a marked influence on the animal's taste and desire for foods. In addition to the mentioned influence of the spleen on digestion, authorities are united in ascribing an intimate connection of the spleen with the blood. It has been demonstrated that blood entering the organ has one white corpuscle to 400 red; on leaving it has one white to 60 red. Notwithstanding all this, the congenital absence of the spleen has occurred without any observably corresponding loss to any function of the body.

PROCESSES OF DIGESTION.

The processes of digestion are as follows:—

1. Mastication (chewing).
2. Insalivation (mixing with saliva).
3. Deglutition (swallowing).
4. Chymification (change of food in stomach to chyme).
5. Chylification (change in duodenum to chyle).
6. Absorption (introduction into circulation of properly prepared foods).
7. Assimilation (process whereby ingredients of blood become tissue).

Let us from a practical standpoint briefly examine in order these processes. The first two, mastication and deglutition, are performed in the mouth by the combined action of the tongue, teeth, mucous and salivary glands. They form a most important step in the change of food to tissue, and should be perfectly completed before the third process is entered upon. These two processes are not simply to enable us to swallow the food, but to thoroughly bring into contact the smallest particle of starchy foods with the active ferment of the saliva, the ptyalin. This ptyalin, as you have been told, changes the amylaceous or starchy foods to a certain kind of sugar.

Deglutition is usually divided into three acts:—

(a) The passage of the food to back of the mouth; (b) its passage across the orifice of the larynx; (c) its seizure by the constrictor muscles and its passage through the esophagus into the stomach. The last two stages are involuntary.

Chymification is the result of a process performed in the stomach and is due to the action of pepsin, the active principle of the gastric juice, and incidentally another ingredient, hydrochloric acid, all combining to change proteid (albuminous) foods to peptones. Opening on the surface of the mucous membrane of the stomach are tiny ducts communicating with glands beneath.

The glands secrete the

Gastric Juice.

A thin, colorless fluid of an acid reaction, containing one-half to one per cent. of solids. It has a specific gravity of 1001 to 1010. The amount secreted in 24 hours is estimated at 22 to 24 pints. In the 1 per cent. or less solids are found pepsin, hydrochloric acid, mucin and salts. As food reaches the stomach, a peristaltic action of its muscular walls begins, and a sort of churning motion ensues. Thus the finest particles of food are brought in contact with the necessary elements to effect another step forward in the digestive metabolism (change).

Before the year 1822, but little was known of stomach digestion. In that year Alexis St. Martin, a Canadian boatman, was accidentally shot, and the wound failing to entirely unite, left him with an aperture in the side communicating with the stomach. Dr. Beaumont, the surgeon, made a series of most interesting observations upon digestion, and our present knowledge is based largely on this remarkable case.

As soon as foods reach the stomach normally, the flow of the gastric juice begins. The duration of stomach digestion is variable and depends on the nature of the food. It will average from 1½ to 5½ hours. Digestion is sometimes aided by the administration of artificial pepsin.

From the stomach, the chyme, as the changed food is now called, passes through the pylorus into the duodenum, where it comes in contact with the pancreatic juice and the bile, both of which you will remember are alkaline fluids, a fact which at once ends the action of any pepsin escaping from the stomach. It might be stated that the flow of the pancreatic juice and bile is stimulated greatly by the incoming foods which reflexly excite glandular action by stimulation of the orifices of the respective ducts opening into the duodenum. In order to secure a clear conception of what occurs here, you will again review what has been given in regard to the function of the two secretions that are poured into the intestine at this point. Then from your reading, form a central picture of the food as it emerges from the stomach. The completion of the process of digestion in the duodenum gives us a milky like fluid called chyle, and the process itself is called chylification.

Starchy foods not completely changed by the ptyalin of the saliva, are here finished by the amylopsin of the pancreatic juice. Proteid foods not changed by the pepsin are now acted upon by the trypsin. The albuminoid wall of the fat globules was destroyed by the pepsin in the stomach. The fat globule itself is now attacked for the first time by the steapsin and bile. The intestinal juice, succus entericus, as it is now called, also lends an influence upon the food in the intestines. Its action feebly simulates that of the pancreatic juice. Now the process of absorption begins and we see the diffusible peptones and salts enter the portal vein, to be subjected later to changes in the liver. We also observe the fat in a fine state of division entering the lacteals (absorbents, or lymphatic vessels of the intestines), thence carried by the thoracic duct (a tiny tube 15 to 18 inches long, extending from second lumbar vertebræ to root of neck) into the venous circulation at junction of the left internal jugular and subclavian veins. Excrementitious substances not absorbed as stated, are passed along into large intestine and thence excreted, this act known as defecation, a rather unimportant act in itself, and yet a most significant one in its bearing on the health and functional activities of the body. As the changed and prepared substances are carried along the circulation, each tissue and cell appropriates to itself the elements needed for its growth and maintenance, discarding those not required. This is one of the most wonderful processes in the human body, and is known as assimilation.

Lecture 9

Foods.

A thorough knowledge of foods, their classification, nature, preparation and effects upon the body in health and disease, is a most valuable and necessary acquisition of the trained nurse. To give a brief summary of such information as may be useful and practical in this direction is the prime object of this lecture.

There is a constant waste attending the physiological activities of the body. In the adult, this waste is estimated at 8 pounds per day and it is to compensate for this that we take food. A failure to do so brings about that condition known as starvation. It may be said in general that death will intervene when the body has lost two-fifths of its weight. Food may be defined as "material, which when taken into the body, is capable of repairing tissue waste and producing energy."

An analysis of the human body discloses the fact that it is composed of certain combinations of chemical elements known as physiological ingredients. Strictly speaking, a physiological ingredient is "a substance which can exist in the body under its own form." To preserve a normal equilibrium of these ingredients is the prime function of the foods. A classification of foods, therefore, must agree in the main with a classification of the physiological ingredient.

Classification of Foods.

I. Nitrogenous (proteids)—
  (1) Albumen proper; (2) casein; (3) fibrin; (4) vegetable casein; (5) gluten.

II. Non-nitrogenous—
  (1) Carbo-hydrates—(a) amylaceous; (b) saccharine; (c) gum; (d) cellulose.
  (2) Hydro-carbons—(a) Fats; (b) oils.

III. Inorganic.
  (a) Water; (b) salts.

A glance at this outline at once indicates that every food must belong to one of three great groups: non-nitrogenous, nitrogenous, or inorganic. After determining this, then one would have but little trouble in finding to which of the subdivisions it belongs.

Nitrogenous foods contain nitrogen, hence the name. They are also called albuminoids, in consequence of a resemblance to the albumen of an egg. Another name given is proteid. This class of foods undergo digestion in the stomach and intestines, being converted into peptones, by the action of pepsin or trypsin, and thus highly diffusible or capable of absorption:

Albumen—resembles white of egg.
Casein—found in milk, also cheese.
Fibrin—principal part of lean meat.
Vegetable casein—in beans, peas and some other vegetables.
Gluten—in all grains, especially wheat.
Functions of nitrogenous foods:—
1. Develop and renovate the tissues.
2. Assist in the formation of the secretions.
3. Produce force.

Non-nitrogenous foods contain no nitrogen; sometimes called calorifacient or heat producing. You will observe there are two great classes of non-nitrogenous. viz.: carbo-hydrates, in which carbon predominates, and hydro-carbons, in which hydrogen is the predominating element. The sub-classes of the first are:—

Amylaceous, containing starch, as grains, seeds, roots and many fruits.

Saccharine, containing sugar.

Gum, vegetable mucilage.

Cellulose, woody fibre.

The hydro-carbon class has two sub-divisions, oils and fats, both alike in chemical composition, but differ in physical properties.

The amylaceous (starchy) foods are changed by the ptyalin of the saliva and amylopsin of the pancreatic juice. In previous lectures it has been shown how the hydro-carbons, fats and oils, were acted upon by the steapsin of the pancreatic juice, also by certain elements of the bile.

The connective tissue wall of the fat globule being in itself nitrogenous, is dissolved off by the gastric juice (pepsin). It then becomes emulsified in the small intestine as just mentioned, absorbed, enters the lactea's (absorbents) also a portion enters the portal vein. This class of foods is utilized in the body for force production, either immediately, or stored as adipose tissue to be used as required. Hydro-carbons form the chief foods of the inhabitants of the arctic zone, while those of the warmer regions live almost entirely on the carbo-hydrates—starches, sugars, etc.

The inorganic foods—water and salts are most important. Water alone forms more than two-thirds of the entire weight of the body. Remove it from any muscle, cartilage or tissue and all the characteristic properties of the structure are lost. It acts as a solvent, and by its means alone is circulation of nutrient matter possible. In it must all foods be dissolved before absorption can take place, and by its aid are all excretory products removed from the body. It is estimated that 4½ pounds are taken into the body in 24 hours, while perhaps one-half a pound is formed within the body by chemical action.

Quantity of water in the body (percentage):—

Enamel of teeth	0.2
Bones.......	22.

Muscles	76.
Blood	78.
Milk	87.
Urine	93.
Gastric juice	97.
Saliva	99.

Between these extremes it is present in different tissues in varying degrees. The amount discharged from the body is equal to the amount taken in with the food, plus the amount formed within. The chief avenue by which it passes out are:—

Large intestine, as feces	4%
Lungs, as watery vapor	20%
Skin, as perspiration	30%
Kidneys, as urine	46%
	100%

Various salts exist in the body; the chief ones are sodium, calcium, potassium, magnesium and iron. The most important one, however, and the only one necessary for consideration is sodium chloride (common salt). It is estimated that there is a total quantity of three or four ounces in the body. Salts in general have the following uses in the body:—

1. To regulate specific gravity of the blood and other fluids.
2. To regulate chemical reaction of the blood and other fluids.
3. To preserve the tissues from disorganization.
4. To control osmosis.
5. To enter into composition of certain structures.
6. To enable blood to hold certain materials in solution.
7. To serve special purposes, as formation of hydrochloric acid and coagulation of blood.

The foods, generally speaking, have a sufficient quantity of the salts to supply the needs of the system. This is true with one exception, i.e., sodium chloride (common salt). Hence, the cook has always to supply an extra quantity of this to the food. Plants are especially rich in potassium salts, but deficient in sodium, thus the herbivorous animal needs more than he can get from his natural food, and must be given common salt additional. The wild herbivora for this reason, eat earth rich in this salt. Such a place is called a "deer lick," and will be visited by the herbivora of an extensive region.

Carnivora get a sufficient supply from the vegetable eating animals whom they devour. Vegetarians need an extra supply of sodium chloride.

It will no doubt occur to you that one of the fundamental principles of a proper food supply is to learn what constituent is deficient and then give that food which is rich in this particular element, thus affording the natural agencies of the body an opportunity to re-establish a normal equilibrium. For instance, patients who need more iron are given eggs, lean meat, cereals, peas, beans, and "greens" rich in chlorophyll (coloring matter). Those who need bone-making salts, may be given in abundance, milk, which is richly supplied with calcium salts.

The normal diet of a healthy man can only be determined by experiment, and even then it will not apply absolutely to every one. It can only be approximated.

The following is given as an average:

Dry Food.	Ounces.
Nitrogenized	4.5
Non-nitrogenized—	
Hydro-carbons (fats)	3.
Carbo-hydrates (starches)	14.2
Salts	1.

Thus, about 23 ounces of dry, solid food are estimated, about one-fifth of which is nitrogenous. If we estimate that 50 per cent. of ordinary foods is water, then these 23 ounces will correspond to 46 ounces of ordinary solid food. In addition, about 50 to 80 ounces of water are usually taken.

A long, tabulated list of foods with the exact chemical percentage might be here given, and might at times be useful as a matter of reference; however, you could not commit it to memory as it would be of questionable practical value if you did. Therefore, a mention of the chief articles of food, with such explanations as may be deemed necessary to give you an intelligent working information of the subject, is all that will be attempted.

The carbo-hydrates and water predominates in the vegetable foods. The sugars require little or no digestion and are readily absorbed and assimilated. From starch, many of the sugars are manufactured. They are also obtained from the grape, cherry, fig, date, banana, onion, turnip, cabbage, honey, etc.

The cereals (wheat, corn, rice, rye, oats, barley), with potatoes, are the common source of starch. Tapioca, arrowroot, sago, are almost pure starch.

The legumes—beans and peas—contain starch in large quantities, also a liberal supply of nitrogenous (proteid) elements.

Roots and tubers, beets, potatoes, carrots, parsnips, turnips, radishes, have much sugar or starch, which is easily converted to sugar. It is this class that is particularly rich in salts, especially potassium.

Green vegetables represent very little nutriment, but sharpen the appetite for heavier foods. Spinach is rich in iron; lettuce and celery are nerve sedatives; rhubarb is a laxative; asparagus, a diuretic. Fruits are used:

1. To furnish nutriment in the form of sugar—fig, prune, grape, date, banana, cherry.

2. To convey water to the system—the melon, orange, lemon, grape and pear are best adapted to this use.

3. To introduce salts and acids into the system. The salts are citrate tartrate and malate of sodium and potassium.

Citric acid and citrates in lemons and oranges.

Tartaric acid and tartrates in grapes.

Malic acid and malates in apples, pears, peaches, apricots, gooseberries, currants, etc.

The tomato contains oxalic acid, which is injurious in uric acid diathesis.

4. Therapeutic agents—(a) Diuretics; (b) laxatives; (c) antiscorbutics.

5. Improve digestion.

FATS AND OILS.

Twenty per cent. of the body consists of fat. But a small quantity is supplied by the food, and is mostly obtained from the sugars and starches.

ANIMAL FOODS.

In these, the nitrogenous or proteids predominate. The most important is milk. Thompson gives the following analysis:—

	Dairy Milk.	Human Milk
Reaction....................	Faintly acid.	Alkaline
Sp. Gravity..................	1029.7	1031.3
Bacteria.....................	Always present..	Absent
Fats.........................	3.75	4.13
Lactose (Milk sugar).........	4.42	7.
Proteids.....................	3.76	2...
Salts........................	.68	.2
Total solids..............	12.61%	13.33%
Water.....................	87.39%	86.67%

Unquestionably, milk is the ideal food, and life can be longer sustained on it than any one other food known.

EGGS.

Represent a concentrated food of the nitrogenous class, although they contain considerable fat The albumen of the egg is most easily digested when in the uncooked state. As a means of palatability, they are usually cooked. The cooking process should be very sparingly done. The mixing of the eggs with the various milk preparations gives the most satisfactory results.

MEATS.

From the meats, we get the great bulk of the nitrogenous food supply. You will remember, however, that the cereals and legumes are bountifully supplied in this direction.

COOKING.

This is the most important feature of the whole field of dietetics. The most perfect specimen of food, in its uncooked state, may be, by improper cooking, not only rendered inert, but absolutely injurious to the system.

Three distinctive objects should predominate in the art of cooking:—

1. To render it more easily masticated and digested.

2. To render it more palatable by reasons of the flavors developed.

3. To kill any germs that may be present.

To know how to prepare properly the food for your patient, is an art of the greatest utility to you as nurse. "Tell me what you eat, and I will tell you what you are" is a well known expression, indicating a recognition of the potent influence of food. Volumes have been written, and yet there is much to be learned.

(Note.—Read and study all your text-book says on the subject, and gather such other information as you can from practical and experienced cooks.)

Lecture 10

Circulation.

The word circulation is a general term and signifies that process whereby the absorbed nutritious elements of the food are carried by a system of organs and vessels, not only to every tissue of the body, but also certain elements are carried from each structure.

Circulatory Organs—Heart, arteries, veins, capillaries.

1. The heart is a muscular, conically shaped organ between the lungs, and enclosed in a membraneous sac known as the pericardium. It measures about 5 inches in length, 3½ inches broad, and 2½ inches thick. In the male it weighs on an average 10 to 12 ounces; in the female, 8 to 10. An observable peculiarity is its increase in weight and dimensions up to an advanced period in life.

This important organ occupies rather an oblique position in the chest. Its broad end (base) is directed to the right upward and backward, in the interval between the fifth and eighth dorsal vertebræ. The apex points to the left, downward and forward, to the interspace of the fifth and sixth rib cartilages, three-quarters of an inch to inner side and 1½ inches below left nipple. The heart is partly covered by lungs especially during inspiration. To give you an idea of the relative position of the heart, we will ask you to map out on your own chest wall the following outline within and beneath which the heart normally lies. You can do this nicely with a colored crayon or pencil. For the base, draw a line transversely across the sternum (breast bone) on a level with the upper border of the third costal cartilage. This line continues one-half inch to right of sternum and one inch to left. Now draw a second line to locate the lower border or end. This line will begin at the point of the apex heat and extend to the right edge of the sternum. (The "apex beat" you will find by the sense of touch; it is where the apex of the heart strikes the chest wall at each pulsation and is quite clearly felt, in fact can usually be located by the sense of sight.) After drawing this second line, you will next connect or join by an outward curve, the right end of the first and second lines next, in a similar way connect the left ends of the first two lines. This last line will curve to the inner side of the nipple. The four lines drawn will relatively give you the boundaries of the heart. An examination of this organ discloses within, four cavities, or chambers. The two upper ones, called auricles; the two lower, ventricles. As a septum divides the heart into two lateral halves, so there is a right auricle and a left auricle; a right ventricle and a left ventricle.

A minute description of these cavities will not be attempted here, and would be of no essential value to the student. Suffice to say that the auricles receive blood, and empty same into the ventricles. From the ventricles, by muscular contraction of their walls, the blood is expelled; that from the right into the pulmonary artery and thence to the lungs; that from the left into the aorta, and thence to various parts of the body. The blood entering the right auricle does so by means of the superior and inferior venæ cavæ (two large veios). The blood entering the left auricle enters by the four pulmonary veins and comes from the lungs. Between the auricle and ventricle of either side of the heart there is an opening, that on the right called the right auriculo-ventricular opening, and guarded by valves. The tricuspid, that on the left, is called the left auriculo-ventricular opening, and is guarded by a valve, the mitral.

The valves mentioned prevent the regurgitation of blood. The right auricle is a little larger than the left, and is capable of holding about 2 ounces. The left ventricle is longer than the right, and forms the apex of the heart, by its projection beyond the right. In consequence of its contents being projected a much farther distance than the contents of the right, we find its wall three times as thick.

The cavities of the heart are lined by continuous membrane called the endocardium. It is made by a single layer of tessellated epithelium. An inflammation of this lioing is called endocarditis. The mitral and tricuspid valves have already been mentioned. There are still two other sets, one guarding the pulmonary artery, the other the aorta. They are called the semi-lunar valves, are formed by reduplication of the lining membrane and consist of three semicircular folds. The contraction of the auricles occur simultaneously, and is called the auricular systole.

The same occurs in the ventricle, and is called the ventricular systole. A relaxation of these same parts is called a diastole.

There are two sounds of the heart. The first is best heard at the "apex beat." It is synchronous with the ventricular systole, and is louder, longer, and duller than the second. This sound is caused by three factors:

1. Closure of auriculo-ventricular valves.
2. Muscular sound of contraction of ventricles.
3. Cardiac impulse against chest wall.

The second sound is heard best at the junction of the third costal cartilage with the sternum. It is short and sharp, and is caused by closure of the semi-lunar valves. Between the first and second sounds, the pause is short, but between the last and first, it is much longer.

Arteries.

The arteries form the channels through which the blood is carried to the system, assistiog the heart in maintaining the circulation. They have three coats:—The external is made of connective tissue; the middle of two structures, muscular and elastic; the internal of three layers, epithelium, sub-epithelium and elastic.

Some five ounces of blood are forced into the arterial system by each ventricular systole. This sends a wave impulse along the arteries which can be felt in the radial (wrist) and other arteries as the pulse. The blood coming from an artery (except it be very small) always comes in spurts or impulses. From a vein as a steady oozing or stream. In the adult, the pulse beat in health averages about 72 times a minute. The pulse as a diagnostic point will be referred to later.

CAPILLARIES.

The capillaries are a fine network of minute canals or vessels, with thin, permeable, elastic walls. In position, they stand between the termination of the arteries on one side, and the beginning of the veins on the other. Their walls are a continuation of the epithelial layer of the arteries.

VEINS.

The veins carry the blood from the capillaries to the heart, in exactly an opposite direction as do the arteries. They usually lie along side the arteries, but join more freely and have a greater capacity. Their walls are also much thinner than those of the arteries. The veins have three coats:—

1. External—Connective tissue, and elastic fibre. In some veins, this coat has considerable muscular tissue.
2. Middle—Made sparingly of muscular fibres.
3. Internal—Does not differ materially from that of the arteries.

Most of the veins are liberally supplied with valves to prevent re-flow of the blood toward the capillaries. In some of the veins, as the venæ cavæ, portal, hepatic, pulmonary, renal and uterine, these valves are absent.

The forces which propel the blood through the veins are: 1. Vis a tergo (heart's action). 2. Vis a fronte (aspiration of the thorax). 3. Muscular contraction.

The fluid conveyed through the organs of circulation is called the blood, a description of which will now be given.

BLOOD.

Its color in the arteries is a bright red or scarlet, while that in the veins is darker or of a purple hue. It has an alkaline reaction, this alkalinity depending on the presence of disodic phosphate, and sodium bi-carbonate, and is a condition necessary to the maintenance of life. It has been observed that just previous to death from cholera, the blood becomes acid. The specific gravity is about 1055. An odor characteristic of the animal from which it came can always be clearly demonstrated by the addition of sulphuric acid. Its chloride of sodium gives a salty taste. About one-third of the entire weight of the body is blood, and its distribution to the various parts of the body is as follows:

One-quarter to the heart, lungs and great blood vessels.
One-quarter to the skeletol muscles.
One-quarter to the liver.
One-quarter to the rest of the body.

The temperature of the blood varies in different portions of the body. The mean temperature is about 39 deg. C. The superior vena cava 36.78 deg. C., while the hepatic vein, the highest in the body, varies from 39.9 deg. C., at the beginning of digestion, to 41.3 deg. C. when it is at its highest point.

Elements of the Blood.

Briefly, blood may be said to be a fluid holding corpuscles of two kinds in suspension. This fluid is called the liquor sanguinis or plasma. In 100 parts or volumes of blood, the corpuscles would form 36 volumes, the liquor sanguinis, 64.

There are two kinds of corpuscles, the red and the white. Viewed under the microscope, the red corpuscles are circular discs, bi-concave, a central depression and raised border. The average diameter 1/3200 of an inch. No trace of a nucleus is observable. Proportionately, there are many more red than white corpuscles—variously estimated, all the way from one white to 350 red, or even as high as 1 to 750. The average number per cubic cent. in the male is 5,000,000; in the female, 4,500,000. The red color of this corpuscle is due to the presence of hæmoglobin—an element which has the power of combining easily with oxygen gas, and thus we learn that the general function of the red corpuscle is to carry oxygen from the lungs to the tissue. It is generally believed that the red corpuscle consists structurally of two parts—a delicate extensible, proto-plasmic material (the stroma), which gives it shape, and the hæmoglobin, which forms 95 per cent. of the solid matter. This haemoglobin is a very complex substance and is widely distributed throughout the animal kingdom. In definite proportion it contains the following elements:—carbon, hydrogen, nitrogen, sulphur, iron and oxygen. Hæmoglobin has the power of uniting with oxygen gas, forming a compound known as oxyhæmoglobin, and is formed whenever the blood is brought in contact with air. Hæmoglobin is the parent substance of the bile and urinary coloring matters. It is believed that the red blood corpuscle is disintegrated while yet in the blood stream, and that there is a continual reformation, chiefly in the red marrow of the bone. In that condition known as anæmia, there is a marked diminution of the red blood corpuscle.

White Corpuscles.

Are sometimes called colorless, or leucocytes, are larger than the red ones, averaging 1/2500 of an inch in diameter. They are usually spheroidal types of true cells, and present amoeboid properties, i.e., send out processes of their own which grasp surrounding substances, and additionally have the power of auto-locomotion. They are similar to the corpuscles of the lymph, chyle and pus. They are greatly increased (1) after eating; (2) after loss of blood; (3) during suppurative processes; (4) after use of bitter tonics. Are more numerous in the veins than in the arteries. It is supposed they are formed from the lymphoid tissues of the body. The ultimate destiny of the white corpuscle is as yet not definitely determined. Some claim they are finally converted into red corpuscles.

During inflammation, they pass through the capillary walls and may become pus cells. It is believed that they are also converted into cell elements of the tissues. An abnormal increase of the white corpuscles in the blood gives that condition known as leucocytosis

Liquor Sanguinis.

This is a clear yellow, alkaline fluid, in which the corpuscles float. Its composition may be described as serum plus the elements of fibrin. This serum can best be explained by withdrawing some blood from the circulation—in two or three minutes it begins to coagulate. At the end of some hours, the coagulum has settled toward the bottom of the vessel and at the top is a thin, yellow, transparent, alkaline fluid, known as serum. Chemically, it consists of albumen, paraglobulin, extractives, fatty matters, salts, water and gases.

The clot or coagulum at the bottom is made up of the corpuscles entangled in the fibrin. This fibrin is formed during the act of solidification in the following manner:—In the living blood are two so-called fibrin factors—fibrinogen, and fibrino-plastin—these are acted upon by another element, also present in the blood, and called a fibrin ferment. The result of this is the formation of fibrin. This property of coagulation is one of the important safeguards in the preservation of the life of the individual.

Lecture 11

Respiration.

By respiration we mean the act commonly called breathing. It includes both inspiration (breathing in) and expiration (breathing out). Briefly, its function is to bring air in contact with the blood and allow the absorption of oxygen simultaneously with the elimination of carbon dioxide gas. Respiration occurs in the adult about 20 times a minute.

Organs of Respiration.

The organs of respiration are primarily the lungs, assisted by the nose, larynx, trachea, diaphragm, and the ribs and muscles of the thorax.

The lungs, two in number—the right weighing about 24 ounces, the left 21 ounces—are situated in the thorax (chest), and are covered by the visceral layer of the pleura. This pleura is a double-layered serous membrane—one layer covering the lung as far as its root, and the other layer covers the inside wall of the chest. The layer first mentioned is, however, only a continuation or a deflecttion of the first. The interspace is called the cavity of the pleura. Each lung has a pleura entirely distinct from the other. An inflammation of the pleura is called pleurisy or pleuritis. Quite frequently as a sequence of such, the two layers become adherent, and produce the most excruciating pain during the respiratory act. The general shape of the lungs is conical, the apex projecting into the root of the neck, the base resting on the arch of the diaphragm. The color of the lungs at birth is pinkinsh white. In later life, it is a slate colored mottle. Later, it becomes still darker. The substance of the lung is light, spongy and porous—will float in water, and in consequence of the presence of air, will crepitate when handled. When the lung substance will not float in water, then it is considered to be good evidence that no air has ever entered the lung. A significant factor in determining whether a child was still-born or not.

The mediastinum is the space between the two lungs; it is occupied chiefly by the heart. For convenience in examination, we may divide the lungs into six divisions:—1, lobes; 2, lobules; 3, infundibula; 4, bronchi; 5, air sacs; 6, blood vessels and nerves.

The lobes are the primary divisions, the right having three, the left two lobes. The lobes are each made up of lobules. Each of these consist of the extremities of one of the bronchi, and the air cells which terminate in it, also the ramifications of the pulmonary capillaries, lymphatics, and nerves.

The bronchus divides and re-divides in the lobule, finally terminating in the dilations of the infundibula. The pulmonary arterial branch entering the lobule divides similarly, and then terminates into capillaries surrounding the air sacs. These air sacs are about 1/100 inch in diameter. They are small dilatations or sacculi in the walls of the infundibula. As they are surrounded by a plexus of blood vessels, the air is thus brought into close relationship with the blood in the capillaries, and thus an interchange of gases occurs, as before stated.

The trachea(windpipe) is a cartilage-membranous, cylindrical tube about 4½ inches long, and nearly an inch in diameter. It extends from the larynx opposite the 6th cervical vertebræ to the 5th dorsal vertebræ, where it divides into two branches (bronchi). The right bronchus going to the right lung, the left going to the left lung. The trachea has 16 to 20 incompleted cartilaginous rings. One-third of the space behind being filled with a membrane. These rings are made of hyaline cartilage, and serve to maintain a certain degree of rigidity. This same arrangement is present in the bronchi. The mucous lining is covered by ciliated columnar epithelium. The cilia work towards the outlet of the trachea, and thus serve to expel mucous and foreign substances. Of course there is a generous supply of muscular fibres in the walls of the trachea and its branches.

The larynx is the organ of the voice. It is placed at the upper part of the trachea and forms the prominent projection in the neck called "Adam's apple." It is smaller in the female than in the male, structurally the same as the trachea, but its nine cartilages are more complexly arranged. Dividing the larynx into two cavities are four fibrous bands called vocal cords. The two upper are called false, while the two lower are called true vocal cords. The space between which admits the air, is called the glottis. The nose is the beginning of the air passages, and is its only proper channel for the admission of air. The habit of mouth breathing is most injurious indeed, and with no pathological condition present, should never be indulged in. In children its persistent indulgence should necessitate a careful examination of the nasal passages by a competent physician.

The diaphragm is a thin, musculo-tendinous partition separating the chest from the abdomen. Its upper surface is convex, and upon which rest the lungs. As we inspire, the chest enlarges and the convexity becomes less marked and vice versa. It might be said that the entire enlargement of the chest downward is caused by the contraction of the diapraghm. By raising the ribs an arterolateral enlargement of the chest is effected. This is done by the contraction of certain muscles (external-intercostals, internal-intercostals, pectoralis major and minor, etc). The intercostals are between the ribs—the pectoral muscles chiefly cover the external side and front portions of the chest wall. Ordinary expiration is effected by the elastic recoil of the linings and costal cartilages, a forced expiration requires the pressure of the contracting abdominal muscles. Other muscles also participate.

Vital Capacity.

The vital capacity of the lungs is about 225 to 230 cubic inches, and is of air that can be expired after taking the deepest possible inspiration.

Tidal Air.

The tidal air is 25 to 30 cubic inches, and is the amount which passes in and out at each breath.

Complemental Air.

Is about 100 cubic inches, and represents the air which can be drawn into the lungs after an ordinary inspiration.

Reserve Air.

Is the air which can be expelled at a forcible expiration, over and above the tidal—is about 100 cubic inches.

Residual Air.

Is also about 100 cubic inches, and represents the air remaining after a forcible expiration.

Frequency of Respiration.

It varies at different periods, and under different circumstances. In the new born, respiration will occur about 44 times a minute. At five years, 26 times. At 20 years, 20 times. At 30 years, 16. During sleep, it will be one or two less. Muscular exercise will increase it, as will many diseases, especially of an inflammatory kind. One of the chief diagnostic points in pneumonia is a rapid respiration.

Changes of Air in Respiration.

1. The expired air is warmer than the inspired. 2. The expired air is saturated with aqueous vapor. 3. The expired air contains 4 to 5 per cent. less oxygen and 4 per cent. more carbon dioxide (CO_2) than the inspired air. In addition to the CO_2, the expired air contains ammonia and other poisonous substances. An atmosphere containing 8/100 per cent. of CO_2 with the accompanying impurities, is unwholesome, while 1/10 per cent. of CO_2 with its proportional impurities, is very injurious. In round numbers, ordinary air has the following composition in every 100 parts:—There are 21 of oxygen, 79 of nitrogen, 4/100 of carbon dioxide.

By respiration certain changes occur in the blood, viz.: it is cooled, it loses water vapor, it gains oxygen, it loses carbon-dioxide. In the mutual action that takes place between the air and the blood, every 24 hours, it is estimated that the air loses 37 ounces of oxygen, and the blood 14 ounces of carbon. The body demands a certain amount of air ingredients in definite proportions. If for any reason there be an abnormal variation in any one, then marked respiratory changes immediately occur. If the blood in the body contains an increase of O, no effort will be made to breathe, and we have that condition known as opnœa. If the O sinks below the normal, then we have increased respiratory action, and a difficulty of breathing, called dyspnœa. Now increase the manifestations just stated, and the blood becomes more deficient in O. Expiration becomes convulsive and more marked than the inspiration. Finally, these convulsions cease, the pupils dilate, the conjunctiva becomes insensible and coma occurs, and the person is asphyxiated or is suffering from the condition known as asphyxia. It is only a name to indicate oxygen starvation. At a post mortem (autopsy—after death examination) the right side of the heart will be found distended, but the left side empty. Rigor mortis (rigidity of the muscular structures occurring several hours after death) causes the left ventricle to contract, and thus it is found empty.

Breathing is a reflex act, but can be modified by the will. The centre that presides over the reflex phenomena is situated in the medulla oblongata. The different nerves are the vagi; the efferent, the phrenics, and intercostals.

Ventilation.

It is manifest that if at each inspiration, oxygen be abstracted from the air and impurities be added, in the course of time serious results will occur. To provide for a renewal of the oxygen and a removal of these impurities is the object of ventilation.

It is impossible to maintain the air in a dwelling house in as pure a condition as that of the external air. When carbon-dioxide is in excess of 6/10 per 1,000 volumes of air, the organic matters become offensive to the senses.

When it has a ratio of 8/10 or 9/10 per 1,000 volumes, it becomes close and foul. Experiments have shown that 3,000 cubic feet of fresh air per person are necessary to dilute the carbon-dioxide exhaled to the normal standard. The sick in the hospital require at least 4,000 cubic feet.

The amount of air required per person, per hour, depends on the size of the room. If a room only contains 100 cubic feet, the air would have to be changed 30 times an hour to introduce the required 3,000 feet. 100 cubic fet is manifestly too small. 600 cubic feet is a reasonable air space. With 1,000 cubic feet of air space, the air can be changed three times without creating any sensation of draught.

Numerous devices have ben devised for the proper ventilation of rooms. Ventilation would be a comparatively easy matter if the question of heat was not a consideration. One thing is sure, fresh air must be admitted, and the impure driven out. Do this, keeping your room at the right temperature without submitting your patient to a draught. Another point to be remembered is the change effected in the air by the products of gas or other illumination

Lecture 12

Skin.

One of the most important structures of the human body is the skin. Upon its proper care depends greatly the health of the individual.

In order that you may obtain a clear idea of its functional activities and that you may be enabled scientifically and practically to render such attention as may, in your capacity of trained nurse, be necessary, the anatomy of the structure will first be outlined. It is the most external covering of the body, and has two distinct layers. The most external is derived from the epiblastic membrane of the developing embryo. The layer is called the epidermis or cuticle, sometimes the scarf skin. The inner layer is called the true skin, cutis vera, corium or derma. This layer is derived from the mesoblastic membrane. The hair, nails and teeth are simply appendages of the skin, developing in the same way, and being subject directly to the same methods of growth. The epidermis forms a defensive covering to the surface of the true skin, and also limits the evaporation of watery vapor from its surface. It exhibits a varying thickness in different locations. The cutis vera is fibrous, but the cuticle is composed of cells arranged in the following layers:—

I. Horny layer—(1) Stratum corneum. (2) Stratum lucidum.

II. Malpighian layer (Rete Musosum)—(1) Stratum granulosum. (2) Stratum of prickle cells. (3) Stratum of elongate (pigment) cells.

And now we will examine more closely each of these sub-layers.

The stratum corneum is as indicated in the outline, most external and of varying degrees of thickness. Where the parts are much exposed to friction, there it is the most observably marked—as the palms of the hands and soles of the feet. It is chiefly old, flattened, exhausted cells. That which is commonly known as dandruff is simply cells from this layer.

The stratum lucidum has cells quite similar to the external layer, but is clear or translucent.

The stratum granulosum has flattened cells with opaque granules, hence the name. The fourth layer from the outside has polyhedral prickle cells with large nuclei, and projecting spines. From this, the name stratum of prickle cells is given.

The fifth, or deepest layer of the epidermis, is explained quite clearly by its name stratum or elongate pigment cells. It is in this layer that is found the coloring matter of the skin. That which makes one person of a lighter or darger complexion than another In fact, all facial blemishes or discolorations, such as tan, freckles, moth patches, etc., are due to irregular distribution of the coloring matter of this layer. In the people known as Albinos, the pigment layer is absent. By friction and chemical action, the epidermis are being constantly removed, while from the true skin are formed cells which are pressed outward to take the place of those destroyed.

As the epidermis has no nerves and no blood vessels, it is most admirably adapted for protection.

The derma or true skin is composed of a dense network or fibro elastic tissue, in which are muscular fibres, blood, lymphatic vessels and nerves, also oil and sweat glands, hair and hair follicles. The muscular fibres above mentioned are highly developed in the true skin of many animals, thus enabling them to wrinkle or move the skin with great facility. A good magnifying glass will bring to view many tiny eminences on the surface of this layer, called papillæ. These papillæ have, entering at the base, a terminal loop of a blood vessel, also nerves with oval enlargements called tactile (touch) corpuscles. In these the sense of touch resides. That they are extremely sensitive may be demonstrated by the removal of the epidermis, as in case of a burn, and note the pain induced by even the contact of the air. Beneath the true skin is found the subcutaneous tissue, which has within it blood vessels, nerves, lymphatics, muscular fibres and fat. The removal of this fat gives a rough wrinkled appearance to the skin. In the subcutaneous tissue are situated the sweat glands; they are also called perspiratory or sudoriparous glands and consist of a fine tube which forms a duct, and its blind extremity coiled up like a ball as the gland proper. Surrounding this gland for the purpose of supplying necessary blood constituents is a plexus of capillaries. The gland is lined by a secreting epithelium. A secreting tube, if unwound, will average about one-quarter of an inch long. The perspiratory glands are very numerous, but varying in numbers to the square inch in different parts of the body. In the palm of the hand are 42; on the forehead, 190; the cheek, 85. It is estimated that there are over two millions on the surface of the body, and that if they were straightened out and put end to end, they would extend a distance of about 13,000 feet. These glands are constantly active and their secretion continuously bathes the surface of the skin, either perceptibly or not. In some the perspiration is more profuse than in others. Exercise will increase it, as will also heat and certain drugs. Certain psychical and pathological conditions may also markedly effect its secretion. The average total amount is estimated at two to three pounds daily. The importance of a free unimpeded perspiratory flow is illustrated by the deleterious effects of "catching cold," where there is a sudden check of it, thus placing on the lungs and kidneys extra excretory work. In consequence of the rapid evaporation of the sweat its appearance on the surface is ordinarily more or less imperceptible.

COMPOSITION OF PERSPIRATION.

Water	99.
Urea	.15
Neutral fats, fatty acids, cholesterin, sodium, and potassium chloride	.85
	100.

It has a salty taste, due to the sodium chloride (common salt) and is acid in reaction. Although it is believed that the sweat is really alkaline and its activity is due to the decomposition of fat. In the disease known as ureamia, the urea may be so increased as to crystallize on the surface of the skin. In diabetes, sugar may be found in the sweat, as also may uric acid in gout. The chief function of the perspiration is to regulate the temperature of the body, and dispose of injurious excrementitious products.

In the medulla oblongata (portion of cord within skull bones) is a centre known as the sweat centre, which by reflex action controls the function of perspiration.

The sebaceous glands are little sacs or lobules, one or more opening into each hair follicle. They are lined with polyhedral cells. These glands are most abundant in the scalp and face, but are absent in the palms of the hands and soles of the feet. They are situated in the true skin, and their ducts open usually into the hair follicles, but occasionally upon the surface. On the nose and face they frequently become much enlarged from the accumulation of secretion. The largest glands are found in the eyelids, and are called Meibomian glands.

The sebaceous glands secrete an oily matter which lubricates the skin and hair. This product is called sebum and consists of water, salts, albumen, epithelium, fats and fatty solids. This secretion keeps the hair and skin oiled and pliant; it also prevents too great an absorption of water through the skin, or too great an evaporation from its surface. The varnix caseosa which covers the child during the latter period of its intra-uterine life is the same substance, as is also the cerumen or "ear wax" found in the external auditory meatus.

HAIR AND NAILS.

are, as has already been stated, merely modifications of the epidermis.

Hairs have each a shaft and a root. The shaft is cylindrical and consists of fibres of elongated fusiform cells. In the coarser hair, there is a medulla or pith. The root swells out into a knob, which fits into a cavity in the skin called a hair follicle. The follicle has two coats:—1. An outer continuous with the true skin. 2. An inner, continuous with the epidermis. This layer comes away when the hair is pulled out and for this reason is called the hair sheath. Whenever the coat continuous with the true skin is destroyed, then the hair can never be reproduced.

An estimated average of the number of hairs in the scalp is 120,000.

The Nails.

Are flattened elastic structures, modifications of the epidermis placed upon the dorsal surfaces of the terminal phalanges of the fingers and toes. Observe your own and thus get an idea of their appearance.

The root is implanted in a groove in the skin. The body is the exposed portion. The free edge is the anterior portion. The matrix is the part of the cutis vera beneath the body and root. Near the root the tissue is opaque and whiter than the rest, and from its shape is called the lunula. When the nail is destroyed, a new one will be formed if the matrix is intact. The nails give a support and defence to the fingers and toes and assist greatly in picking up small objects. Their care and artistic attention adds much to the beauty of the hand.

Lecture 13

BATHING.

As the last lecture was devoted to a discussion of the skin, it is most appropriate that the subject of bathing should be introduced here. There is undoubtedly no other hygienic measure of such significance and universal application as that of bathing. And yet, its value as a sanitary measure is not fully appreciated. The bathing establishments of the ancients were many and most magnificently furnished. The Orientalist has always looked upon bathing as a religious rite. The devotee of fashion has regarded it as a diversion. The large amount of waste matter thrown off through the skin, and the continual lodgment upon it of foreign material, should make bathing not only a religious duty and a perpetual fashion, but an observance as essentially necessary as the taking of pure food or the breathing of fresh air.

An eminent English sanitarian has said: "Skin cleanliness augments the nutritive effects of food." He further says that: "The same food required to make four children thrive that are kept dirty, will make five thrive whose skins are daily washed and kept clean." A statement indicating that assimilation of new materials is promoted by getting rid of the old.

Specifically, what does bathing do for the individual? It assists the skin in the discharge of its functions, and removes dirt, odors and poisonous materials, as a result of which we find the pores open, excretion promoted, and following this, body temperature regulated, and protection from colds, fevers, eruptions, and many internal disorders. We thus see that bathing, when done properly, not only promotes health, but fortifies against disease. The age, health, peculiarities, occupation, etc., of the individual, also the state of the weather, all are important factors in determining how and when to bathe, and what kind of a bath to use. No absolute rule can be given that will apply in every case. There are, however, certain well known facts and principles which, if learned, will enable the nurse to not only properly care for herself in this direction, but will be a sure guide for the intelligent management of any case that may come under her observation.

TEMPERATURE.

Hot bath	90 deg. to 112 deg. F.
Warm	92 deg. to 98 deg. F.
Tepid	85 deg. to 92 deg. F.
Temperate	75 deg. to 85 deg. F.
Cool	60 deg. to 75 deg. F.
Cold	30 deg. to 60 deg. F.

The extreme temperature, or the hot and cold baths, must be used with more or less caution, especially if the person is greatly fatigued, or if suffering from a delicate constitution or some debilitating disease.

The tepid or temperate baths are admissable with almost any person or condition.

The hot bath is much more cleansing than the cold, but if carried to any great extent has a very relaxing and weakening effect on the whole system. On the other hand, the cold bath has, when the person has become accustomed to its use, a most stimulative and tonic effect. In fact, the tonic influences of the bath can never be fully realized until one can experience the pleasures of the cold bath. It is quite astonishing how one can become accustomed to the cold bath by gradually lowering the temperature from time to time, or by following quickly, a hot or tepid sponge, by one of cold.

In taking the cold bath, always remember that a reaction must immediately follow, or undesirable results may be experienced. As the cold bath is not taken for its special cleansing properties, but as a systematic stimulant, it should only last a short time, in the majority not over 5 or 8 minutes; then follow with a brisk rubbing with a rough towel, flesh brush or anything to make the skin dry, and bring the blood to the surface. A light, brisk exercise, if permissable, is frequently advisable. Old or feeble people rarely should use any but tepid bath, following the same with a dry rubbing with hands, or a crash towel. The value of a bath is determined by its results; no matter what kind is used, there should be a reaction whereby the bather feels buoyant, the skin glows, appetite increased, and the mind clearer. Should these conditions not follow, but on the contrary a depression, chilliness, and a paleness of the skin, then you can rest assured that the bath has been improperly given.

Time for Bathing.

Strong and healthful persons can bathe at almost any hour in the twenty-four. Generally, it is best to bathe when the vital powers are the strongest. Hence, advisedly, the bath should not be taken when greatly fatigued, or preceding or following a hearty meal. A bath on retiring, especially by a nervous, weak person, will frequently bring a refreshing sleep.

All that has been said here has reference to the ordinary fresh water baths. There are a great variety of others.

Kind of Bath.

1. Fresh water—this needs no explanation further than that given.

2. Sea water—a most vigorous tonic effect is noticeable, due largely to the presence of salt, which is not only found in considerable quantities in the water, but impregnates the air as well as the

seashore. Of course, there are other factors experienced by the bather in the surf, such as the dashing of the waves against the body, the muscular exercise of swimming, etc. He should, whether swimming in fresh or salt water, always come out before a feeling of fatigue or chilliness is experienced, then rub dry and dress quickly. Quite an artificial substitute for the sea bath is made by adding a handful or two of the so-called sea salt, found at the drug stores, to the water in the bath-tub.

3. Mineral baths—are found naturally in various parts of the world. The water used comes from springs or wells and is usually highly impregnated by salts or minerals of various kinds—some with sodium, potassium and calcium; others with iron; others with sulphur. The water is generally applied hot, and thus a cleanliness of the body is obtained and a stimulating of the absorbent glands, whereby it is claimed that a certain portion of the medicinal properties of the mineral is taken into the system.

4. The Turkish bath—is a valuable method of cleansing the body, and equalizing the circulation. It is in one sense not a bath at all, but consists of submitting the body to the presence of hot-dry air. The temperature of the air will range from 95 to 160 deg. F. By passing from one compartment to another, the patient may avoid the unpleasant, even dangerous effects of high heat, suddenly applied. As the heat increases the action of the heart becomes greatly augmented. A sense of intense bodily heat is experienced, and a ringing in the ears frequently occurs. The circulation and temperature raises. Soon the entire surface of the body breaks out with a profuse perspiration and elimination through the skin becomes most active. In many chronic diseases, the Turkish bath is of the greatest importance. Many persons in the pink of health attribute much of their strength and vigor to the regular use of the hot, dry air of Turkish bath. Of course, following and in connection with this bath, all debris is removed from the surface of the skin by water, soap, and a vigorous massage. The whole affair is finished by a cold plunge, a brisk rub, then wrapped snugly in a woolen blanket, and the bather usuall falls into a refreshing sleep.

Sidney Smith, writing from a Turkish bath in Germany, said: "They have already scraped enough off to make a curate."

5. "The Russian Bath"—differs from the Turkish bath in this important particular, that the air is moist, in consequence of which a much lower temperature is necessary. It does not produce such a marked impression on the system as the Turkish bath, and is therefore better adapted to the conditions of the weak and delicate.

6. The Sun Bath or Solarium—was greatly esteemed by the ancients as a remedial agent, and is also at the present time in high repute, especially with delicate, nervous persons.

7. The Roman Bath—consists in the inunction of oil or vaseline, and has the effect of softening the skin and increasing the warmth of the body. The South Sea Islanders before and after

bathing in the sea, anoint the body with cocoanut oil. They claim that it increases their powers of endurance.

8. The Mud Bath—is used in some countries of the east. It is simply the application, or complete covering, of the body with clay or earth highly impregnated with certain medicinal agents or minerals.

Methods of Applying the Bath.

The method used must (1) depend on the nature and condition of your patient. (2) The particular means at hand, and (3) the objects sought. These three points must always be uppermost in your mind when administering a bath to yourself or your patient. Ever remember that a feeling of exhilaration and comfort should always follow. If you are in a household where there is a modern bath-tub, with hot and cold water, Turkish towels, perfumed soaps, etc., you will proceed in a different way than when your patient is in an indifferently heated room, with a tin basin as the nearest approach to the bath-tub, and your only means of procuring hot water is by heating the same in a kettle over the kitchen stove. Your ingenuity and common sense in connection with your knowledge of principles pertaining to the subject, will guide in the proper management of any case. In your text-book you will find simple directions for applying the foot bath, the sponge bath, the tub bath, hot and cold, the acid steam bath, shower bath, sheet bath, hot and cold, etc. The cold pack is a most efficient way of reducing temperature, and is frequently given under physician's orders in cases of typhoid fever, etc.

The Hip or Sitz bath is one of considerable utility in specified cases. According to indications, will it be hot or cold, warm or tepid. The patient sits in a tub sufficiently filled with water to cover the hips and lower abdomen. The vessel should be sufficiently raised so that the feet may rest easily when the patient is sitting in the water. From 5 to 30 minutes may be taken for the bath. It is efficient in many cases of retarded menses, constipation, neuralgic pain in the rectum or functional disturbances of the pelvic or lower abdominal cavities.

Cold Bath Treatment of Fevers.

This is one with which the nurse should be familiar. It was first used in the last century by an English ship surgeon, but not until 1861 was it systematically used for the treatment of typhoid fever. It is now looked upon with much favor. It is contraindicated in old or feeble persons or those with weak hearts or extremely nervous. It should not be given if peritonitis or hemorrhage is present.

The baths are given every three hours, as soon as the temperature has reached 102½ degrees, the patient remaining in the tub 20 minutes. The temperature for the first two or three baths is 80 degrees or 85 degrees; later, it may be reduced to 70 degrees, if the patient is more or less generally robust. No further attention is given to the temperature after the patient has entered the tub. Children are generally given a temperature of 80 degrees, and kept in the tub but ten or fifteen minutes.

PREPARATION.—Prepare your bath-tub by stretching across the tub canvas strips attached by clamps to edge. They are so arranged that the patient does not lie on the bottom of the tub, but rests as in a hammock, allowing the water to freely come in contact with every inch of skin surface. These strips may be from 1½ feet to 2 feet in width. The head should be given a comfortable support: all this with the water at proper temperature, should be arranged before your patient is removed from the bed. Now disrobe, under cover, your patient, wipe dry if perspiring, and with a sheet thrown over him, two persons—one at the upper, the other at the lower extremity, will gently place him in the bath. (In carrying, direct your patient to hold himself stiff.) The sheet is used as a covering in the tub. Now rub constantly with the bare hand or a lint mitten. A cold cloth is placed on the head, previous to entering the bath, and is frequently changed. At the end of the time prescribed, return your patient first placing over the lower sheet of the bed a macintosh or rubber sheet, and on this a linen or cotton sheet. Now lift your patient, remove the sheet, and replace it by another dry one. Carry to the bed. Tuck snugly around him the last sheet used as a covering, also the one on the bed. Over this, put a blanket or two. Leave him ten minutes, then rub dry: remove the rubber and sheets, and redress and arrange the bed clothes. Take the temperature one-half hour afterward. Food is never given in the bath, but immediately following. If distress, difficulty of breathing, vomiting, cyanosis, should occur in the bath-tub, of course remove at once. Some authorities vary the above plan by adding ice to reduce gradually the temperature from 85 degrees to 70 degrees, while the patient is in the tub. It has been observed that in addition to the reduction of temperature that there is an improved condition of the nervous system and a more rapid elimination of the toxins by the urine.

SOAPS.

The oily nature of the sebaceous matter which is always present, and which retain the dust and dirt coming in contact with it, necessitates the liberal use of soap in connection with the water. This should be free from rancid fat and from too large an amount of alkali and coloring matter. Medicated soaps are sometimes useful, but should be prescribed by a physician. Pure, old white castile soap is very good. The ordinary Ivory soap that may be procured at any grocery store gives very good satisfaction. A more expensive, but excellent quality, is Colgate's Cashmere Bouquet soap.

(Note.—Read everything your text-book gives on the subject of baths or bathing.)

Lecture 14

The Kidneys.

The kidneys are the great excretory glands of the system, and functionally are closely related to the skin. The processes of life, growth and repair, that are constantly operative within the body necessarily imply a corresponding waste and production of excrementitious matter. It is the function of the kidneys in connection with the skin to draw and carry from the body all material of this nature. Any interference or suppression of this function, whereby these poisonous elements are retained, soon induces irregular organic disturbances, and, if continued, finally disease and death. The kidneys are two in number (occasionally but one), situated in the abdomen behind the peritoneum, on either side of the spinal column. Each kidney is about 4 inches long, 2½ inches in breadth, and 1 inch thick. In the adult male, each weighs from 4½ to 6 ounces, and from 4 to 5½ in the female. The upper extremity is on a level with the upper border of the 12th dorsal vertebra, the lower extremity on a level with the 3rd lumbar vertebra. In consequence of the encroachment of the liver, the right kidney is a little lower than the left. The kidneys are imbedded in a mass of fat and areolar tissue. Occasionally, in consequence of being insecurely fixed in this bed of tissue, the kidney will slip out of its normal position, and we then have the condition known as "floating kidney."

The kidney has a characteristic bean shape, and is quite frequently subjected to various surgical operations. An incision of the kidney is called nephrotomy. A removal of the kidney, nephrectomy. A removal of stone from the kidney, nephro-lithotomy. The organ may be reached from two directions—by lumbar incision or by abdominal section.

Briefly, the kidney may be said to consist of an intricate system of blood vessel plexuses in intimate relation with a system of urine tubes, the whole supported by a small amount of connective tissue. Into these urine tubes is poured from the blood vessels mentioned, the various excrementitious substances which collectively are called the urine. This is finally carried by a tubular structure —the ureter—from the kidney to the urinary reservoir—the bladder; thence is taken from the body through the urethra.

Go to the butcher shop and get a kidney of the hog, sheep or calf. It will give you a very good idea of the human organ. This is an excellent plan for you to pursue in studying the anatomical features of any other organ of the body. Carefully examine the exterior, then measure and weigh it. Now read again the description given in the lecture and also the text-book. You are now ready to dissect it. With a knife, cut it longitudinally in halves, thus giving you an ocular demonstration of its internal parts, as will be presently briefly described. If you can see the organ while still intact in the animal, observe how it is imbedded and retained in position; also how the ureters connect with the bladder. A fibrous capsule invests the kidneys and gives it strength and contour.

As stated, the shape is like a bean, the internal border being concave (hollowed) and presenting a fissure—the hilum—at which the vessels, nerves and ureter enters the organ. As you cut longitudinally, you will observe an external or cortical portion—the cortex—and an internal portion—the medullary portion.

The cortical substance occupies the greater portion of the gland, being nearly one-half inch in depth at the surface. It is of a light red color and with the aid of a lens can be seen to be studded over with bright red points—the Malpighian bodies. Besides these bodies which will be described, it also contains parts of the uriniferous tubules, also blood vessels and nerves. The medullary portion occupies the centre of the gland, and has the urine tubules arranged in pyramidal-like shapes—some 8 or 12. Blood vessels and nerves are also present as part of the structural elements of each pyramid. The apices project into the dilated portion of the ureter at the hilus, which forms the so-called pelvis. This pelvis is arranged into three compartments, each one known as an infundibulum. Each of these infundibula has several cup-shaped depressions, known as calyces. Each calyx has projecting into it, the apex of a Malpighian pyramid. On the apex or papilla of each pyramid, there open about 20 uriniferous tubules. These urine carrying tubules commence in the cortex with a closed dilation, known as Bowman's capsule. The tubule makes a very circuitous route through the kidneys and finally ends at the apex of the Malpighian pyramids, pouring the contained urine into the calyces. The urine then overflows into the infundibula, and is finally drained from the pelvis into the bladder by the ureter. As a matter of convenience in description, various names are given to different portions of the tube. Toward the terminal point, the tubes coalesce. Thus there are many less opening into the pelvis than there are beginning in the cortex. The active elements of the tubules lie in the epithelial cells lining the same.

The blood supply of the kidney is furnished by the renal artery, which passes into the hilum outside the ureter, pelvis, and infundibula. After entering the kidney between the pyramids, it pursues its way into the cortex, where its afferent branches penetrate the capsules of Bowman, in which it forms a plexus or folds upon itself, forming the so-called tuft or glomerulus. The vessels —efferent—coming from the capsule pass out to form a plexus around the uriniferous tubules. From this last plexus emerges the renal vein which finally leaves the hilum and discharges into the inferior vena cave.

The kidney is supplied by about 15 small nerves, having ganglia upon them, and derived from the renal plexus, which in itself is formed by (1) branches from the solar plexus; (2) semilunar gauglion; (3) lesser and smallest sphlanchnic nerves.

These communicate with the spermatic plexus, thus explaining the sympathy that exists between the kidney and testicle.

Urine.

Is produced by the functional activity of the cells lining the uriniferous tubules. It is a clear yellow or amber-colored fluid. acid in reaction, and a specific gravity of about 1020 in the adult. and 1005 in the new-born child. The quantity excreted in 24 hours is about 1500 cc. (near 3 pints). It is constantly being formed. and is collected in the bladder. Water constitutes 96 per cent., the solids. 4 per cent. About one-half of the solids is urea. The following table shows the composition of urine:—

	Percentages.
Water	96.
Urea	2.
Uric acid	.05
Hippuric acid	.04
Creatinin	.11
Phosphates, chlorides, sulphates	1.5
Mucous and other ingredients	.3

The water, urea and uric acid form the most important ingredients—the others are of lesser significance. Certain factors, even in health, may change some of the properties of the urine.

At the beginning of digestion, it may be alkaline, or its acidity increased during the afternoon or night. It may be almost colorless when its specific gravity is low, or of a deep, reddish brown when concentrated. The reaction is affected by the food. In the carnivora, the urine is acid; in the herbivora, it is alkaline.

The acidity of the urine is due to the presence of acid sodium phosphate. Marked variations in the amount of urine passed may be induced in different ways. The quantity of drink taken, amount of exercise, condition of skin, also nervous system.

In some diseases, as diabetes, it is greatly increased. In others, as the various forms of albuminuria, it is markedly diminished. A nurse should know how to make the ordinary tests of urine, which are briefly described here.

1. Find total amount excreted in 24 hours—should be about 1500 cc. To do this, have person empty bladder at a certain hour. then at the same time the next day. Save in a vessel the entire amount.

2. Observe the color—there are nine shades—pale yellow, light yellow, yellow, reddish yellow, yellow with red, red, brownish-red. reddish brown, brownish black. The coloring matter probably does not consist of one substance alone, but of several. The best known is urobilin.

3. With litmus paper, test the reaction. If acid, the blue litmua paper will turn red when it is dipped in urine. If alkaline, the red litmus paper will turn blue.

4. With an urinometer, test the specific gravity. To do this, fill cylinder about three-quarters full, then gently lower urinometer into it. The specific gravity will correspond to the figures at the aurface of the water. In conection with this, the solids may be estimated. Multiply last two figures of the apecific gravity by 2⅓. The product will be the amount of aolids in grains that are in 1000 grains of the urine.

5. Test for albumen with heat and chemically pure nitric acid. Pour urine into a test tube sufficient to fill up a couple of inches, then bring to an active boil by holding in flame of alcohol lamp. If a thick, cloudy deposit appears, then add a few drops of nitric acid. If the deposit does not disappear, then albumen is present.

6. Test for sugar. Procure a couple of ounces of Fehling's solution. Pour some into a test tube. Now dilute with three or four times the quantity of water; heat to boiling point; now add a little urine. If sugar is present, a yellowish red precipitate of cuprous oxide will form.

These are the common tests. Many others are used. It is interesting to trace the formation of the various urinary ingredients, but the limits of this course will not permit.

The Bladder.

The bladder forms a receptacle for the temporary lodgement of the urine in the intervals of its expulsion from the body. It is a musculo-membraneous sac situated in the pelvis, behind the pubis, and in the male, in front of the rectum. In the female, the uterus and vagina are between it and the rectum. Age, sex, and distention influence its shape, position and relations. When moderately distended, it measures in the adult about 5 inches in length, 3 inches in diameter, and contains about a pint. The bladder is held in position by five so-called true ligaments. It has four coats, beginning externally and passing inwards, named as follows:—

(a) Serous—derived from the peritoneum. (b) Muscular—has three layers of unstriped muscular fibre. (c) Sub-mucous—a layer of areolar tissue connecting muscular and mucous coats. (d) Mucous—thin, smooth and pale rose color. It is continuous with the lining of the ureters and the urethra. Its epithelium is of the transitional variety, consisting of polyhedral flattened cells.

The upper part of the bladder is supplied by the hypogastric plexus of the sympathetic nerve, while the base and neck are supplied by the 4th sacral nerve.

The Ureters.

The two tubes which connect the urine from the kidneys to the bladder. They are about 16 to 18 inches long, and have a diameter about equal to a goose quill. The ureter has three coats—

fibrous, muscular, and mucous. In pelvic operations, the surgeon has to exercise great care that the ureters are not accidentally cut or severed.

THE URETHRA.

Is the tubular canal through which the urine passes from the bladder externally. Its external orifice is called the meatus. In length and direction the urethra of the male and that of the female differ markedly.

The male urethra is about 8 or 9 inches in length, and is divided into three divisions, beginning at the bladder:—

(a) The prostatic portion—the most dilatable part, 1¼ inches long.

(b) The membranous portion—the narrowest part, extends from the prostatic portion three-quarters of an inch.

(c) The spongy or penile portion constitutes the remainder. It is about 6 inches in length.

The female urethra is a narrow membranous canal, only about 1½ inches long. It is just beneath the symphysis pubis, in the anterior wall of the vagina, and its direction from the meatus is upward and backward. Its diameter when undilated is about one-quarter of an inch. The urethra sometimes becomes the seat of inflammation—a condition known as urethritis. Such may be induced by the presence of a germ, as the gonococcus in gonorrhœa, or by irritation, as might be produced by superacidity of the urine, etc.

Cystitis or inflammation of the bladder is another condition which may arise as a sequence of urethritis, or for similar causes may be affected primarily. It is an exceedingly painful affection. By day and night the calls to urinate are frequent and imperative. The act affording no relief, but on the contrary, is accompanied by smarting and tenesmus.

Eclampsia or puerperal convulsions is a form of spasmodic seizure which may affect pregnant women, either before, during or following labor. Its cause has been shown to be due to (a) renal insufficiency (an abnormal decrease in the amount of urine excreted); (b) a decrease of the urea; (c) and, usually, not always, the presence of albumen.

Suppression of urine is a condition where the kidney fails to perform its normal action, and consequently no urine is passed, and none is found in the bladder.

Retention of urine is when the kidney has performed its natural action, but for some reason the urine is retained in the bladder.

Incontinence of urine is a condition frequently found in young children, and also in the old. It consists of an inability to control or prevent the involuntary flow of the urine. It may be due to different causes, and should demand medical attention, as should the various urinary disturbances just enumerated.

The Catheter.

Frequently, before or after giving an anæsthetic, or preceding a surgical operation, or perhaps in urinary retention, the use of the catheter is necessary, and the nurse should therefore be thoroughly conversant with the proper method of doing it. The female nurse would scarcely be expected to pass the catheter on the male adult, but might be expected to do so on the child.

Catheters are made from different materials, such as glass, silver, copper or rubber (hard or soft). The soft rubber is sometimes called the gum elastic. The inflexible catheter (glass, silver, etc.), has a specific shape, differing for the male or female. The gum elastic catheter is, of course, the same for both, and may be used interchangeably. No further description will be given here. The nurse will procure a catheter and see for herself. In the use of the catheter, always be absolutely sure that it is in a perfectly aseptic condition. The metal or glass ones may be made so by boiling in water. The rubber catheter may be made so by boiling in water. in a 1 per cent. soda solution. Sterilized oil or glycerine may be used as a lubricant. After a catheter is used, it should be made most scrupulously clean before putting away.

For a catheterization, the patient should lie in the dorsal position (on the back) with the knees somewhat separated. A sheet or blanket is thrown over the hips, leaving the vulva exposed. Now, with the left hand separate the labia, and with the right thoroughly cleanse with a soft cotton or sponge, and boracic acid solution, the meatus and adjacent parts. Now remove your catheter from the antiseptic solution and introduce gently. Have a basin ready to receive the urine. When the bladder is empty, place a finger over the extruded end of the catheter, and thus prevent any escape of urine when removing the instrument. Catheterization may be performed upon yourself. Examine plate, and read carefully everything given in your text-book on the urinary organs and the urine.

Lecture 15

The Sick Room.

One of the very important factors connected with the care and recovery of your patient is the character and appearance of the sick room. As you well know, people in perfect health are most materially affected by environment. In one whose general physical and mental condition is weakened and below normal, in which Nature's harmony of action is disturbed, the effect of surroundings is much more marked. And here it is that you as the nurse can be of the most inestimable value. Here it is that your knowledge, your common sense, and your artistic taste can be applied along lines that distinctively belong to the nurse. Be not careless or unobservant of the little things pertaining to your work, and especially in connection with the details of the sick room and its appearances. It is in the management of just such minutia that is demonstrated those qualifications that distinguish the successful from the unsuccessful nurse. The artistic, trained hand of the intelligent nurse is shown at a glance, even though the apartment bo the most humble and plain. Indeed, it is in just such a place that the nurse can demonstrate her ability. It requires no skill to artistically adorn or arrange a room when the question of finance is no consideration.

Cleanliness.

The thorough, vigorous and persistent use of soap, water and scrubbing brush cannot be substituted by any other device known.

No arrangement of rich draperies, costly pictures, or bric-a-brac can atone for the existence of that cobweb in the corner, that dust under the sofa, that dirty garment under the bed, or that soiled pillow slip or sheet under the patient. Everything in the room or pertaining to the patient must be clean—the nurse included. And now, a word of caution—notwithstanding these emphatic injunctions to "keep clean," it is just as necessary that all this should be done systematically and quietly, with the least possible display and disturbance.

Light.

It is always hest, if at all possible, to have your patient in a room in which the natural light may enter—where the sunlight may come and the sky be seen. The sun is known to be the centro of the physical life currents, and the tonic influences of the sun-bath has long been recognized. In many conditions, the sunlight is a powerful stimulant and must at times be greatly modified, or at intervals completely suppressed. Especially is this so in many nervous headaches, etc., when drawing the curtains and experiencing a period of absolute quietness, quickly brings grateful relief.

Ventilation.

It is estimated that about 1,000 cubic feet of air space should really be provided for each person. This would be equivalent to a room 10 feet long, 10 feet wide, and 10 feet high, for each person. The majority of dwellings give much less space than this. In any event, provision should be made for the admission of pure air, and the exit of foul air. Opposite appertures, such as two windows, a window and a door, or a transom or perhaps a fireplace. The process of ventilation has been described as the circulation of air through a channel which must have two ends, each of them in the open air. It is absolutely impossihle to maintain the air of the dwelling room in as pure a condition as that of the external air.

The object of ventilation, of course, is to rid the air of its gaseous impurities and watery vapors which result from the respiration and transpiration of the individuals occupying the room. It has been estimated that 3,000 cubic feet of fresh air per hour for each person is needed to dilute the carbonic acid gas exhaled to a permissahle respiratory standard. We thus see a relation existing between the size of the room, the number of persons, and the frequency of ventilation. If the room only contained 100 cubic feet of air space, it would have to he changed 30 times per hour in order to introduce the required 3,000 feet in that time. It is evident, therefore, that a small room is more difficult to ventilate than a large one.

In your ventilation of the sick room, particular care must be exercised that the patient he not submitted to the baneful influences of the entrance and exit current, or, as it is called, the "draft." More trouble is experienced in ventilating a room in the crowded city, than in the country, where the greatly increased purity of the air, and the facility with which ventilation may be conducted, simplifies this important feature in the maintenance of health. Another element in connection with this subject which must not he overlooked—it is dangerous to have your patient in a room where there is defective plumbing or sewerage—a poorly drained or uncleaned basement or cellar has also been known to do much damage by the action of unhealthful and poisonous odors, gases and germs emanating from such.

Temperature of Room.

Arrangements should be made for the maintenance of an even temperature. Not too hot, nor yet too cold. Too great a degree of heat is apt, if continued for any length of time, to produce an exhaustion and weakness detrimental to the health of the patient. On the other hand, too low a temperature may drive the blood largely from the surface to internal organs, bringing ahout a chill and serious injury. The nurse's feeling in regard to the temperature are not always a safe guide. A thermometer costing but a trifle, hung in the room, will exclude any necessity of guess work in this direction, and is the only way to be accurate. An average temperature ranges from 68 degrees to 75 degrees. Some cases, under certain conditions, will require more. Your patient's feelings and the doctor's orders will direct you. It is questionable practice to allow the temperature to fall markedly while your patient is asleep.

Furniture.

Much furniture in the sick room is more or less objectionable. Chiefly is this evidenced by the increased labor and difficulty of preserving the necessary condition of cleanliness. Not only this, but its frequent moving or changing, while cleaning and dusting, is more or less an annoyance to the sick. Of course, the ideal in every house cannot be realized, and the nurse must not attempt to revolutionize and introduce too many innovations in strange homes. Such a course in many cases would make you unpopular, and decidedly obnoxious—a condition of things which you, above all others, must most strenuously avoid.

The methods and procedures that you can execute successfully in one home, must be greatly modified in another. First comes the scientific knowledge of the subject, then the native tact as to how best you can utilize such. Let the circumstances of each home and each patient be your rule and guide of action.

Carpets and Rugs.

The most perfect system of antisepsis and cleanliness cannot be maintained with carpets on the floor. They are discarded entirely in all modern hospitals and sanitaria. A loose rug or two occupying a limited space is at the best the most that is allowable. The carpet that is nailed fast is a most convenient nidus for the lodgment of pathogenic germs. If you find your patient in a carpeted room, of course you will be obliged to accept it as it is. Superfluous rugs may be removed.

Flowers.

Contrary to the general opinion, a sick room liberally supplied with flowers and growing plants is conducive to the production of an increased supply of oxygen. The carbonic acid gas exhaled by the patient is absorbed by the plant, then decomposed, its carbon retained, and its oxygen given back to the air. In addition to this practical phase of the question, nothing can so easily and artistically relieve the gloominess and give an expression of cheer to the sick chamber as an evergreen plant or a pot of flowers. Yes, a tiny bunch of pansies, or a single American Beauty will do it.

Visitors.

It is your duty as a nurse to see that the instructions of the attending physician should be most strictly followed. Be definite in regard to this. Should the doctor fail to clearly direct you, it is your duty to ask him. The custom of calling to visit the sick should, generally speaking, be discountenanced. Many a time does the doctor call and find his patient with face flushed, nervous, perhaps an increase of temperature, only to learn that some brainless, chattering, long-winded sympathizer has been in to spend a curious hour in gossip. Occasionally we do find an intelligent caller who will enter the sick room like a burst of sunlight through a rifting cloud. With a magnetism and a cheery expression of hope, such a one will leave an atmosphere of strength and buoyancy long after his departure. There are people of this kind. There are nurses whose mere presence is as important a factor in the recovery of the patient as the doctor's medicine.

Do not tire your patient by much talk. Remember, she must have mental as well as physical rest. Light conversation on cheerful topics may be allowed between patient and nurse, always observing that the same be not too long continued.

Food.

The doctor will tell you what class of foods to give. You must know how to prepare them properly. Every nurse should not only be thoroughly conversant with the science of cookery, but also the art. It is not always possible in every household to get every delicacy in the market. Nor is it necessary. The most appropriate foods for the sick are usually the simplest and most inexpensive. Natural tact, knowledge and ingenuity will serve you here as well as elsewhere. It is, ordinarily speaking, poor judgment to ask the sick one what she wants or feels like eating. Of course, if she should express voluntarily a preference, that is quite another consideration. Serve everything in small quantities and in the most attractive way possible. After the patient has finished, remove immediately from her sight all that may remind her of the meal. A meal should never be served until the room, bed and patient have first been made clean, comfortable and attractive. To serve a meal to a patient whose toilet has not yet been made, is an offence of which you will never be guilty. A moist napkin to cleanse the hands after the meal should not be forgotten.

The Toilet.

This includes everything pertaining to the general comfort, condition and appearance of the patient. Every square inch of the entire surface of the body should at all times be kept scrupulously clean. Soap, water and towels in your hands must do this. This can be followed by an application of alcohol, witch hazel, or any grateful and refreshing application to the body, face and hands and hair. Another delightful application is Cologne or violet toilet water. Do not overlook the hair, nails or teeth. Occasionally allow the patient to rinse the mouth with some listerine, or even a little lemon juice in water, or a pinch of common baking soda in water leaves a refreshing condition. A mild antiseptic douche, unless contraindicated, occasionally given, is very acceptable.

BED.

In hospitals, the bedstead is usually of iron, and generally painted white. A bedstead of this kind is more or less attractive. A good set of springs that do not sag or sink in the middle, upon which may be placed a clean, firm mattress. On this, may be spread a heavy blanket or two, followed by the sheets, quilts, and spread. A feather bed should never be tolerated. It is a hot-bed of filth, germs and foul odors, and has a decidedly weakening effect on the patient. A single pillow only should be on the bed. A change of dry, clean, ironed and aired slips and sheets should be made every day. By gently sliding your patient, with her assistance, to ono side of the bed, you can roll the sheets upon which she has been lying snugly against her. Then replace the same by the clean ones, also rolled to correspond with the ones about to be removed. Now have your patient returned again to the opposite side of the bed, and upon the clean sheets just placed. Next, remove from the bed the soiled ones, and unroll and spread out the clean sheet. All this, of course, applies to the under sheets. The removal of the oversheet needs no explanation.

MEDICINES.

Unless some unforeseen circumstances should occur, directions should be strictly followed in regard to the administration of the medicines. They are usually diluted in water. Ordinarily, the patient should never be awakened to give the medicine. Wait until she wakens. Never leave the medicine bottle or glass where the patient can constantly have them in view.

SLEEP.

Amiel has said: "To sleep is to strain and purify our emotions, to deposit the mud of life, to calm the fever of the soul, to return into the bosom of maternal nature, thence to re-issue healed and strong." Unquestionably, sleep is the great strength giver and health and happiness materially depend upon it. During sleep the functional activities of brain and body are enjoying physiological rest, with its consequent results of physical recuperation.

Lecture 16

EXCRETIONS.

The excretory system is a most important one, and must receive careful attention on the part of both physician and nurse. Any interference with its functions means a corresponding degree of ill-health, a poisoning of the entire organism, and a retardation in the recovery of your patient. The character of the skin as an organ of excretion has been already explained, and will therefore not be further discussed here.

FECAL DISCHARGE.

The periodical discharge of intestinal bowel excrementitious substances called defecation. The material thus evacuated is sometimes referred to as the feces or stool. In the healthful person, the act should occur once or twice per day.. Inactivity in this direction is called constipation—a functional condition, which, although generally speaking, receives but indifferent attention by the ordinary person, is one that unquestionably produces more ill-health than any other functional abnormality in the entire body. Medicines and food that excite greater action of the bowel are termed cathartic, or if very mild, they are called laxatives. Among the drugs may be mentioned calomel, aloes, podophyllin, Leptandrin, cascara sagrada, glycerin, caster oil, senna, epsom salts, croton oil, citrate of magnesia, seidlitz powders, protoid of mercury, etc. Among the laxative foods may be mentioned rhubarb, figs, dates, bananas, apples, vegetables, corn-bread, whole-wheat bread, water and ordinary liquid, or semi-solid foods of almost any description.

More difficulty is usually experienced in maintaining regularity of action when a person is confined to the bed, than when able to be around upon the feet. To mechanically assist and excite proper evacuation of the contents of the rectum and lower intestine, will frequently necessitate the use of the

ENEMA.

This is performed by introducing into the bowel by means of a syringe, certain fluids, usually water. The syringe used may be either the fountain (rubber bag) or the common bulb syringe. If the fountain is used, you can attach same to the wall by a nail or hook. A tall bed post will do. The higher the syringe is attached, the swifter will be the current. Hot soap-suds make a very good ordinary enema. No danger of using too much fluid. Use plenty of fluid and introduce slowly is the rule. Have patient retain as long as possible. If the desired results are not obtained, repeat until secured. Frequently, hot water and glycerin are introduced in the proportions of glycerin, 1 ounce, to water 1 pint. Sometimes epsom salts in the proportion of a heaping tablespoonful to a quart of hot water. A very useful enema to bring about an action of the bowel after an abdominal operation, especially where there is tympanites (bloating) is:

One tablespoonful spirits turpentine and two ounces glycerin, one pint soap-suds (hot). Mix and introduce, encouraging patient to retain as long as possible.

In using the bulb syringe, the fluid to be introduced will necessarily have to be prepared in a vessel, and placed in near proximity to the patient. A very good position for your patient to assume during the administration of the enema is the dorsal (lying flat on back), with the hips elevated. To avoid any possibility of wetting or soiling the garments or sheets, it is well, when convenient, to have a rubber sheet or oil cloth under the patient. A little care, however, should preclude any possibility of any accident in this direction. Frequently, where more or less difficulty has been experienced in securing an action, it has been found most beneficial to place the patient on the left side in the Sims position, hips elevated. This allows, from the direction of the colon, a more easy flushing of that portion of the intestine. To properly introduce the nozzle of the syringe without pain, one should be conversant with the relative directions of the anus and rectum. The rectum after following the curve of the sacrum and coccyx, suddenly bends backward and terminates in the anus. Therefore, in introducing the nozzle or finger, it will for about an inch be directed toward the navel, then it sweeps backward toward the small of the back, and can then be carried along as far as required. Oil or soap the finger, introduce it, and find for yourself the direction. In introducing the nozzle, see that it is lubricated. Now, take hold of it with the thumb, and first and second fingers, and slightly introduce same, then change the point of seizure to a point an inch or more behind the hard nozzle, crown upward — the nozzle will thus change its direction to conform to the natural curve of the canal. Now allow the fluid to slowly enter. When the patient complains of inability to retain more, you must shut off the entrance of the fluid, until the uneasy feeling of the patient has passed away, then allow flow as before, ceasing and beginning again as just described, until patient can absolutely retain no more. Remove nozzle and have fluid retained as long as possible. Of course, the bed pan or receptacle must be properly placed beneath the patient, if she is unable to arise for that purpose. If the patient is weak and sensitive, be sure that the pan is comfortably warmed. Frequently, the careful nurse will have the same covered with soft cotton, thus making it even more comfortable. In removal of pan, have patient raise hips slightly, and see that it is done carefully and cleanly.

It might be said that the general directions here given apply particularly to adults. In the case of a child, certain modifications must be adopted to suit the particular age and condition. The rectal capacity in a child is much less than that of an adult; for instance the infant, ½ to 1 ounce; 2 to 5 years, 2 to 6 ounces; 5 to 15 years, 6 to 16 ounces.

Irrigation or High Injection.

This is a modern expedient of great practical utility. The apparatus required consists of—

1. A rectal tube. 2. A flexible rubber tube, 3 or 4 feet long. 3. A funnel shaped vessel to contain the fluid to be injected. To insure gravitation of the fluid to the ileo-caecal valve, the woman should be placed in the Sims position—the male in the knee chest position.

First insert the rectal tube to the sigmoid flexure. 2nd, attach the flexible tube. The hydrostatic pressure can be regulated by the height of the vessel holding the fluid.

Medicated or Nutritious Enema.

Although the rectum as an absorbent surface is inferior to that of the stomach, yet frequently the administration of medicines and foods in this way is for various reasons most advisable. All substances so used should be non-irritating, of small bulk and alkaline. If an acid solution is introduced there must be sufficient of the acid to maintain the solution, otherwise it will not be absorbed, in consequence of the normal alkalinity of the rectal contents. The salts of morphine, atropine, and strychnine are absorbed as quickly as in the stomach, in fact, much more quickly. Medicines are introduced in this way by means of a suppository, or in solution—such a solution having a temperature of about 100 degrees, and quantity not exceeding 2 ounces. All fecal matter should be first thoroughly removed. The application of remedies in this way is an important resource to the therapeutist, in cases of inability to swallow, gastric irritability and in many children's maladies.

Bed Sores.

A bed sore is an abrasion or sloughing of the skin, and if long continued, of the deeper tissues beneath. It may be produced by pressure, undue moisture, heat, dirt, or any agency that will disturb the normal integrity and function of the parts. While in certain extreme conditions a bed sore may appear in spite of the watchful care of the nurse, yet its presence stands as a reproach to her.

Many patients have a low, devitalized condition of the skin, and subcutaneous tissues, and if not carefully watched, will in a few days develop those most objectional disturbances. Especially is this so when for any reason they cannot change without aid any position in bed. To avoid the appearance of such, a nurse will observe the following:

1. Keep especially clean the parts that rest on the bed.
2. See that the under sheet is clean, dry and absolutely free from wrinkles or creases.

3. Several times during the 24 hours, slightly raise the patient, smooth out the sheet, and allow the air to pass under.

4. Bathe the prominent resting points—the buttocks, the shoulders, and especially the heels, with alcohol, or witch hazel.

It will tend to toughen and strengthen these parts.

Should a bed sore occur in spite of your efforts, then you will observe the following:—

1. Double the prophylactic, or preventative measures already enumerated.

2. Relieve all pressure of the parts completely by using a rubber ring made expressly for this purpose and sold at the physicians' supply houses. This ring is sometimes inflated with air, sometimes with water. If you have not this, then you must improvise a substitute. Take a clean piece of oakum or absorbent cotton, twist into a firm roll two or three inches in diameter, wind around it a bandage or cover it with cotton. Unite the two ends so as to form a ring upon which allow your patient to rest easily, and have it so placed that all pressure upon the sore will be removed.

3. Apply any soothing, healing, mildly astringent such as witch hazel, arnica, zinc ointment or subnitrate of bismuth. Any of these may be applied freely. Even common starch powder finely ground and sifted freely upon the parts is an excellent remedy.

THE URINE.

The discussion of this subject, the functions of the kidney, bladder and urethra, and manipulation of the catheter in the artificial withdrawal of the urine, was given in lecture XIV. Again, carefully review that entire lecture with such reference as your textbook may give on the subject. Any medicine or food that increases the functional activity of the kidney and a corresponding increase of urine is a diuretic. Among the many drugs of this class may be mentioned, any of the preparations of juniper, buchu, squill, sweet spirits of nitre, acetate or citrate of potash, turpentine, lithia, mineral water, pumpkin seeds, water, nitrogenous foods.

Lecture 17

Animal Heat.

The living bodies of all animals have a temperature peculiar to each species. This specific temperature is known as vital or animal heat.

When this temperature is higher than that of the surrounding atmosphere, as in man, quadrupeds and birds, the animals are called warm blooded. Fishes and reptiles are called cold blooded animals, in consequence of their temperature varying but little from that of the air or water in which they live.

One of the most striking phenomena in the life of man, and we may say of all warm blooded animals generally (mammals, birds and plants also to a certain extent), is the constant temperature maintained by the body, no matter to what varying degree of temperature the body may be subjected.

In man, this temperature is in health about 98½ or 99 degrees F. And this holds true, no matter whether he lives in the tropics, or in Greenland. Of all animals, birds have the highest temperature, that of the chicken, for instance, being 111 degrees F. Among mammals the rabbit has a peculiarly high temperature, amounting to 105.8 degrees F. The phenomena of animal heat is the result of intricate chemical changes constantly going on in the physical mechanism. It is, in fact, the liberated heat of metabolism or change, which must ever be constantly occurring to maintain the health and life of the body. The fixidity or uniformity of temperature is maintained as a resultant of two sets of processes—

1st. Those by which heat is gained to the body:—

(a) Arterial blood coming in contact with active protoplasm, producing chemical changes.

(b) By friction of muscles.

(c) By ingestion of hot liquids and foods.

2nd. Those by which heat is lost to the body:—

(a) By means of the skin—evaporation of the perspiration, radiation and conduction, 77.5 per cent.

(b) By the lungs—evaporation of the water of respiration, and warming expired air, 20 per cent.

(c) By escape of urine and feces, 2.5 per cent.

A knowledge of the principles just enumerated will enable the physician or nurse to scientifically adopt such means as will increase or decrease any abnormal temperature, as may be desired in individual cases.

The warmest blood in the body is that in the hepatic vein. Under the tongue it is about 98.5 deg. F. In the axilla (armpit), 98 deg. F. In the rectum, 100 deg. F. The temperature of the muscles is increased in contraction 1.8 deg. F. Mental exertion also increases the production of heat. In fact, every action, mental or physical, electrical or chemical, produces heat.

AGE.

The temperature at different periods varies slightly. Lower in infancy, increasing during growth, decreasing in old age. An indication as to proper clothing and protection during the different ages.

DAILY VARIATIONS.

The temperature is not exactly the same at all times of the day. The lowest between 2 and 6 a.m., rising during the day, and between 5 and 6 p.m. is at its height, falling again to the minimum in early morning.

MAXIMUM AND MINIMUM TEMPERATURE.

Raymond mentions a case of drunkenness where the temperature fell to 75.2 deg. F. followed by an increase and recovery. The "London Lancet" mentions a case of myxœdema where on the day previous to death, the temperature varied from 67.2 deg to 77 deg. F. The same journal records a case of shock produced by a fall on the spine, where the temperature fluctuated from 116.6 deg. to 122 deg. F., and for several weeks did not fall below 107 deg. F.

These, of course, are exceptional cases, and do not in any sense typify that which will ordinarily come under the observation of the nurse.

THE THERMOMETER.

This is an instrument used to measure temperature, and whether used to ascertain the degree of heat in the body, in the air, or in any liquid, as water, has in each case a similar constructive principle. A quantity of mercury is contained in a thin glass bulb, the cavity of which is continued into a tube of a very fine bore in the stem. Subjecting the mercury filled bulb to the action of heat, the mercury expands and rises in the tube, on the outside of which are lines and figures indicating degrees.

In the centigrade thermometer, the point at which the mercury stands in ice cold or freezing water, is called zero, and marked 0 deg. The point at which the mercury rises in boiling water is marked 100 deg. The intermediate part is numbered accordingly in degrees and tenths of degrees. In the Fahrenheit thermometer the freezing point is marked 32 deg., and the boiling 212 deg., thus making between the two points 180 deg. instead of 100 deg. as in the centigrade instrument. There is another thermometer occasionally used. It is called Reaumer's—in it the freezing point is called 0 deg., as in the centigrade, but the boiling point is marked 80 deg. If you wish to reduce Fahrenheit to Centigrade, first subtract 32, then multiply the remainder by five and divide the product by nine. If you wish to reduce Centigrade to Fahrenheit, multiply by 1.8 and add 32 to the product.

The temperature of an animal is measured in one of the natural cavities, as the rectum, vagina, mouth (under the tongue), external ear, or the axilla, or occasionally on some portion of the skin.

The Fahrenheit thermometer with either mercury or alcohol in the bulb, with the glass stem enclosed in a wooden case, is usually used to measure the temperature of the air, or of water The thermometer used to register or take the temperature of a person is usually referred to as a clinical thermometer. Before taking the temperature of a patient, you should first shake down the mercury in the stem until it stands at about 95 or 96. It matters not exactly as long as it is below that of the patient. To shake down the mercury you will take firmly between the thumb and forefinger (at the first joint) the end of the thermometer opposite the bulb. Now, holding it firmly, extend the hand, and arm at right angles to the body. Now, suddenly and swiftly swing the hand downward, bringing it to a quick stop with the arm extended and parallel with the side. This quick movement with the sudden stop will jar downward the mercury to the required point. Should it not do so at first trial, of course you will repeat until it does.

The next thing you must always do is to cleanse your thermometer. This can be done by dipping it into a glass of cool water and then wiping it off with a clean napkin, or a corner of the clean napkin can be dipped into the glass of water, and then the thermometer wiped off. This must always be done in the presence of the patient. It is well to cleanse the thermometer before putting it again into the case in which it is usually carried.

The frequency with which the temperature should be taken depends entirely on the doctor's directions and the seriousness of the disease. If very serious, every hour. In ordinary cases, every three or four hours. The thermometer should be well inserted in the mouth, beneath the tongue, and allowed to remain from one to three minutes. In very young children, it is best to take the temperature in the axilla or armpit. This you will do by putting the bulb snugly into the extreme part of the armpit, letting the stem lie between the arm and side, in which position it may be held by taking the child's arm and firmly, but gently, pressing the same against the side.

In older children, by a little tact, you can usually take the temperature in the mouth. You will observe that the lips are closed while the thermometer is in the mouth. This is done to keep out the cooling influence of the air. The temperature will always be registered on the clinical chart immediately after taking the same. Another caution—your patient should never be allowed to know what his temperature is. The same thing might be said of the pulse. These are facts, which if told at all, must be given by the doctor.

The Pulse.

The word pulse is derived from the Latin word "pulsus," meaning to strike or beat. It signifies the beating or pulsation of the arteries produced by the contractile action of the heart. It, of course, occurs in all the arteries, but is most easily observed in the radial (wrist) artery, also quite easily felt in the temporal arteries (at the temples).

An examination of the pulse taken in connection with other symptoms is of the greatest value in determining the character and gravity of different diseases. At first the inexperienced person will be able only to observe that the pulse beats so many times a minute. In fact, this is all that many doctors and nurses ever learn. No one, however, who aspires to any proficiency should be satisfied with such meagre information when so much more can be gotten by the intelligent observer. One should not only observe the frequency, but the force, the fulness, hardness, etc., all of which are definitely related to the nature of the disease. The average pulse rate of the adult is about 72. This varies more or less with the particular person. Some have a pulse of 60, others of 90, and yet both be in perfect health. It is said that the pulse of Napoleon I., and also the Duke of Wellington, were but 40 per minute. As the pulsations of the heart are involuntary, any influences that act on the nervous system operate also on the heart. Its movements are decreased by sorrow, depression of spirits, fear, etc., while on the other hand, mental excitement, joy, anger, etc., quicken its action. Heat increases the action, but cold decreases it. After a meal, the pulse is increased from 4 to 8 beats. From 2 to 5 increase is noticed when one stands, as compared with the sitting position. Vigorous exertion, walking, etc., increase the heart's frequency. At birth, the number of beats is normally about 140 per minute; at the end of the first year, 120; at the end of the second year, 110; at end of third, 95; 7th year, 85; 14th year, 80; middle life, 72 to 75; old age, about 60. When a condition of debility accompanies old age, we frequently see an increase of pulse beat. The radial artery may be felt by placing firmly but gently the ends of the 1st and 2nd fingers over the artery, which is best felt on the inner sides of the wrist, just back of the joint, and parallel with the inner side of the thumb when it is extended.

Pulse Characteristics.

1. Dicrotic Pulse—that in which the fingers are struck twice with each pulsation (the first impression is forcible, the second light).

2. Thread Pulse—the pulsating artery seems so narrow as to resemble thread.

3. Gaseous Pulse—the artery seems full and soft as if filled with gas.

4. Hard Pulse—one that does not yield under the fingers.

5. Intermittent Pulse—one in which every now and then, a pulsation is skipped or wanting.

6. Jerking Pulse—the artery seems to strike the fingers with a jerk or a sudden start.

7. Quick Pulse—a quick or sudden beat—not necessarily close together.

8. Small Pulse—the pulsations are both slender and weak.

9. Tense Pulse—the artery seems filled or stretched to its utmost capacity.

10. Wiry Pulse—resembles the thready pulse, except that it is also very hard.

There are other terms that are sometimes used in describing the pulse, but they convey in the words themselves their real meaning—among such might be mentioned the terms bounding, feeble, frequent, full, vibrating, soft, tremulous, etc.

The Hypodermic Syringe.

The hypodermic, or as it is now more properly called, the hypodermic syringe, is a special instrument designed to introduce under the skin and into the subcutaneous tissue, certain remedies or medicines. Such drugs, of course, first being in solution. The capacity of the syringe being not over a drachm. There are various instruments of gold, silver, glass or rubber, but all are constructed on the same general principle. Generally speaking, the syringe has four separate parts:—

1. The needle (hollow).

2. The barrel, usually of glass.

3. The screw cap to the barrel—to be removed when about to be used.

4. The piston or plunger that fits snugly into the barrel.

5. Hypodermic syringe case, in which is placed the syringe, and in which also are kept the needles, vials with medicines in tablet form, etc.

How to Use the Hypodermic Syringe.

Absolute cleanliness must be observed in every particular. Not only the syringe and needles must be made perfectly antiseptic, but before injecting, the area of tissue in which the needle is to be introduced must be made by washing and application of alcohol, bichloride solution, or boracic, or soda solutions perfectly free from all impurities. Two ways to fill the syringe for use:

1. Remove cap—draw into barrel (about full) pure warm water. Drop into the barrel the tablet necessary for the dose. It dissolves quickly. Now screw on the needle firmly. Now drive out the air by turning point of needle directly up and pushing slowly on the piston until a bubble of water appears at the needle

point. You are now ready to introduce the needle into the tissue of the patient.

2. Take off the cap, then draw the pure or sterile water into the syringe as before. Then empty the same into a teaspoon, into which you dissolve the medicine (tablet). Now again draw the same into the syringe, then drive out the air and adjust the needle as before. The last method is a very good one, as you can quite readily heat the water in the spoon over a lamp, especially is this of advantage if you are in a hurry. Besides this, it is sometimes more or less difficult to get the end of the barrel open for the introduction of the tablet. In selecting a part into which to introduce the needle, you will avoid:—

1. Puncturing a vein.
2. Bony prominences.
3. Inflamed parts.

The fleshy portion of the arms, the abdomen, the thighs, and the calves of the legs are suitable places for entrance. A one-half inch or more of the needle should be introduced. Some do this by picking up the skin and inserting the needle along under the surface of the part thus lifted. Others make an error by directing the needle at right angles to the bones and directly toward it. Better to adopt neither of these plans, but rather that by which the needle will enter at an angle about between these two—an angle of 45 deg.

With the left hand, or fingers of same, make the skin tense, over the area which you propose to enter. Then with the right hand, insert quickly, the needle; withdraw slightly, and empty slowly. Withdraw quickly. Rub or massage the part so as to distribute the fluid injected. Ordinarily, the medicinal effects will be noticed in from 5 to 15 minutes.

Local Application.

Local application for the relief of superficial and deep seated pains are often of great efficiency. Any nurse should be conversant with the preparation of such. Of course, ordinarily, the doctor will tell you when to apply them, but you should know how to prepare them.

1. The mustard plaster—(see text-book).

2. Flaxseed poultice. Should be changed much more frequently than indicated in the text-book. Should be kept hot, never allowed to become cool. A cold flaxseed meal poultice does more harm than good.

3. Turpentine Stupes—A tablespoonful of spirits of turpentine put into a quart of boiling water, then cloths folded four or six times, wrung out in this and placed over the region of pain of any kind, frequently gives most gratifying relief. To maintain the heat and turpentine vapor closely in contact with the skin, it is a good plan to cover the cloths so wrung out, with an additional covering of heavy material or oilcloth.

4. Hot water—May be applied in a variety of ways. Cloths wrung out of boiling water, or the hot water bag or bottle.

5. Hot bricks or flat irons—Heated in the oven or on the stove. Then covered thickly with many folds of cloth of almost any material, serves a valuable purpose many times.

In every case of hot applications, be extremely careful that the patient is not unconsciously burned. This accident has happened more than once with serious consequences. Especially must it be guarded against when the patient is more or less devoid of sensation, as in anæsthesia or partial paralysis.

6. Cold applications.—By means of cloths wrung out of ice water, or by means of a water bag or an ice bag filled with small pieces of ice, the stimulating, yet soothing effects of cold water may be applied.

7. Liniments—Their efficiency depends largely upon the rubbing and friction incident to their application. A hint to the nurse.

8. Vaseline or Oil Applications—An old, but popular remedy in some troubles, especially of the chest and throat, is made by covering liberally with goose oil or vaseline, a cloth sufficiently large to cover the affected area. This is then applied directly. Over it another cloth to protect the clothing. If it has no therapeutic value, it will protect the patient in that respect from the influence of changeable temperature, such as frequently occurs during the night time, or sleep.

Lecture 18

FEVERS.

Fever is a condition exceedingly interesting from a physiological point of view, and a knowledge of its phenomena is of great significance in practical medicine. It is a pathological process believed to originate from the effects produced by the presence of poisonous products of bacteria (microscopic organisms.) The theory is, that these bacterial poisons, acting directly upon the so-called "heat centres" of the nervous system, produce a resultant excitation which gives the invariable increase of animal heat, and its attendant symptoms, a raise of temperature. And thus we note the effects of certain antipyretics or drugs which restore the centres to their normal condition by preventing the development of the bacterial poisons, or by stimulating their elimination or antagonizing their action. There are other theories in regard to this phenomena, but the one just briefly mentioned, is accepted by some of our best authorities.

Some of the common characteristics of fever are:—

(a) A rise of temperature.
(b) Increase of heart action.
(c) Respiration usually increased.
(d) Generally an excess of urine and ammonia in the urine.
(e) A diminution of alkalis and CO_2 in the blood.
(f) Increased metabolism or chemical changes within the body.

The degree of temperature experienced by a patient is a significant symptom. However, it will be remembered that its gravity depends much on the type of fever.

Antipyretics or febrifuges are remedies used to lower temperature—quinine, aconite, antipyrine, acetanilid, cold applications, etc., all belong to this class. All fevers belong to one or two classes:

1. Idiopathic. 2. Symptomatic.

Antipyretics are cardiac depressants.

The idiopathic or essential fever exists independently of any other affection, while the symptomatic is merely incidental to some other associated disturbance. The names given to the various idiopathic fevers usually convey some idea as to cause or origin.

There are certain general principles that must be observed by both physician and nurse, no matter what the particular disease may be. Notwithstanding this, nothing must be done mechanically, but intelligence, prompted and directed by acute and specific observation in each individual case, must ever be pre-eminently active. To this, we have frequently heretofore referred; in fact, the last word in regard to this subject can never be spoken.

Three great principles—cleanliness, cheerfulness, and regularity—must ever be emphasized in the management of the sick room wherein is confined the patient afflicted with fever. The cleanliness consists in keeping him personally clean, sponging him with cool or tepid water, vinegar, bay rum, cologne water, etc. It should not tire, but you will use it in such a way at such times as will always leave a sense of grateful, refreshing invigoration. See that all articles of clothing, both of the patient and the bed, are spotlessly clean. Remove cumbersome useless furniture and see that every square inch of floor, walls and ceiling is cleansed from any impurity, and kept absolutely hygienic. Soap, water, scrubbing brush, towel, and the proper muscular gymnastic movement on the part of the nurse, can accomplish wonders in this direction. All of this must ever be accomplished with that infallible auxiliary and tonic, cheerfulness, on the part of the nurse.

With the omniscience that must characterize the presence of the two essentials mentioned, you will always remember the indispensibility of the third attribute, regularity. You must ever bear an equable condition of action—be not spasmodic in your attentions to the patient and his surroundings. The influence of proper ventilation, light and air cannot be overestimated. We see this so clearly demonstrated by comparing the death rate of fever patients in the large cities, and the same disease in the country, where those beneficient agencies can be so much more freely utilized.

All fevers are more grave during the summer time and heated season. Any means taken to cool the atmosphere of the sick room is most grateful and salutary. Hence, many means have been adopted, leading to this end, such as:—

(a) Allowing ingress of fresh air.

(b) Wringing cloths out of ice water, then hanging them at an open window.

(c) Allowing blocks of ice to melt in the room.

(d) Using a hand ball atomizer, charged with ice water or cologne, and by this means filling the room with spray.

(e) Cold sponge or bath, or complete immersion of the patient in cold water.

Never disturb your patient needlessly. How frequently do we see the ignorant nurse in her misguided efforts "to do something" guilty of one or all of the following annoying, injurious acts:

(a) Keeping herself constantly in motion, but doing nothing.

(b) Constantly questioning the patient.

(c) Keeping the patient awake when desirous of sleeping.

(d) Constantly pressing drinks or food on him.

(e) In fact, never resting themselves, nor allowing the patient to do so.

A fever patient should be put to bed early. Disastrous results so frequently follow when in the earlier stages the patient is permitted to walk about. Especially has this been noticed in typhoid and yellow fever. How long should a patient be kept in bed? Until the evening temperature for several days has been normal. Then at first for a few days allow the patient to sit up for from 10 to 30 minutes, gradually increasing.

And now as to diet. Great care must be exercised in this respect. The food that is acceptable in one kind of fever, is frequently contraindicated in another. And yet, generally speaking, there is such a thing as fever diet. It is invariably a restricted diet of bland, easily digested substances. And so we see for fevers the list of broths, soups, teas, gruels, milk and farinaceous foods. As the febrile symptoms begin to abate, then comes the administration of digestible, nutritious, semi-solid foods. Later, a complete resumption of the solids.

All the way through the entire progress of the disease, the nurse should exercise her ingenuity to prepare and furnish the patient with a great variety of palatable, pleasant and appropriate foods. Do not force your patient to eat day after day, some one article of diet. The doctor will indicate to you what class of foods to furnish the patient, but remember the single class may have a score or more of varieties, and you must know how to prepare them. Something has been said in this direction in the lecture on foods. Your text-book also gives you some valuable information what a variety of refreshing drinks you can furnish your fever patient. Among some we might mention:—

(a) Pure cold water in any quantities.
(b) Barley water.
(c) Crust coffee, served cold.
(d) Orange juice.
(e) Lemon juice in water.
(f) Pure grape juice in small quantities frequently given.
(g) Black currant water (water allowed to stand for a time on the pure jelly, or preserved or canned fruit).
(h) Lime juice in water.
(i) Any of the popular mineral waters, served cold.

Every article of food or drink should be served in small quantities and in the most attractive way possible.

When should you use stimulants? Not until ordered by the physician. It might be said that stimulants are indicated whenever there are signs of failing circulation, or enfeebled heart action. The depression and weakness so frequently present at the latter stages of the fever, demand many times the administration of the alcoholics in small doses: among those used are: brandy, rye whiskey, pure port wine, malt liquors, beer, porter, etc.

You have already been told the general principles underlying the administration of the various kinds of baths. How to use such for gentle tonic effects, also how to apply the same for reduction of temperature, as is frequently done in certain fevers, notably typhoid.

It is not the province of the nurse to either diagnose, or treat any disease—this is all done by the physician. Hence, an extended description of the various fevers would be out of place here. A few, however, will be mentioned with the briefest kind of reference to some broad characteristics:

1. Simple Continued Fever—This is a fever of a continued form, not due to specific cause, and usually of short duration. Rarely fatal in temperate climates, and when death does occur, shows no characteristic lesion. In addition to the name, simple continued fever, it is sometimes called ephemeral fever, and sometimes sun or heat fever. It is found in every clime, and has a transient character. From a duration of one, two, or three days, it may extend to ten or twelve. In this fever, we must bear in mind that it is non-specific, non-miasmatic, non-contagious, and non-symptomatic. (It does not follow trauma, surgical procedures, local inflammations, etc.)

Causes—1. Exposure to heat or cold. 2. Excesses in eating and drinking. 3. Mental and bodily fatigue. 4. Violent emotions.

Symptoms—Begin abruptly with a lassitude, a chilliness, and a rise in temperature. Then follows all the phenomena of fever—hot skin, rapid pulse, thirst, headache, pain in back and limbs, constipation, decrease of urine, a loss of appetite, a coated tongue. All these conditions may disappear in a day or two and thus we say it terminates by crisis. Should it be prolonged from two to twelve days, and gradually disappear, then we say it is a recovery by lysis. Prof. Flint speaks of a child where the entire period of attack did not last but a few hours.

Prognosis—Highly favorable—a decided tendency to recovery.

Treatment—Must be largely symptomatic. Nothing special. A common sense nurse is of the greatest use to the doctor and patient.

Influenza.—This disease has a variety of names—catarrhal fever, epidemic catarrhal fever, "la grippe," etc. In Russia, it is called Chinese catarrh. In Germany and Italy, the Russian disease. In France, the Italian fever, Spanish catarrh, etc. In each case, however, it is one and the same disease—a continued fever of mild intensity, occurring in epidemics, and is due to a specific cause. Its predominant symptoms are:—

1. Catarrh of respiratory tract.
2. Catarrh of digestive tract.
3. Great debility.
4. Marked nervous symptoms.
5. Tendency to inflammatory complications, especially of the lungs.

Epidemics of this disease have occurred at varying intervals in the world's history. Every country has had its experience in this direction. It is referred to in an old writing of Hippocrates. In 415 B.C. there was an outbreak in the Athenian army in Sicily. In the ninth century, it spread all over Europe. It confined itself to the east until the 17th century, when it made its first visit to North America. In Vienna, at one time, three-quarters of the population were stricken with such suddenness that it was given the name of "Lightning Catarrh." And so it has reached every country from time to time. Every age, sex, social condition, or occupation may be the unwelcome recipient of an attack. The disease is supposed to be of germ origin, and more or less contagious. Its duration, without complications, is from two to ten days. If complications occur, then, of course, several weeks may elapse. A fatal termination in uncomplicated cases is rare. Its influences are more disastrous in the very young and the very old. Look after the excretions and secretions. Keep the skin active, give refrigerant drinks, light food, etc. Complications must be anticipated and treated as they occur.

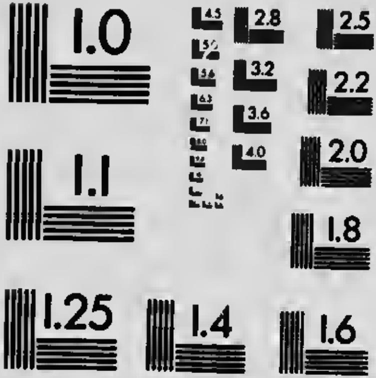
Cerebro-Spinal Fever.—A malignant, continued fever, occurring epidemically, and caused by the specific action of a germ. It is a miasmatic, contagious disease, and is sometimes called spotted fever, sometimes congestive fever. It effects by inflammation the meninges of the brain, spinal cord and medulla All classes and ages are subject to it. Most frequently between 10 and 18 years. The premonitory symptoms vary in different individuals. In some the invasion is abrupt. A person in apparent good health is suddenly seized with a chill, loss of consciousness, becomes comatose and dies within a few hours. In others, it comes on more slowly, with lassitude, headache, pains in joints, nausea, vomitting, then the fever. Pain in the back and upper part of the spine is characteristic. Soon the muscles of back get stiff and rigid. Prostration soon appears. The temperature as a rule is low, but may rise to 107 degrees. High pulse is characteristic. On the third or fourth day, tetanic, muscular condition of the extremities usually develops. An herpetic eruption will appear on the face, neck and lips. Other portions of the body may be effected. It is a grave disease and in severe epidemics 80 per cent. of the cases are fatal.

As a nurse, you will remove all anti-hygienic influences, and isolate the person. The most nutritious, easily digested foods only must be given. The doctor will prescribe the proper remedies, and will advise you as to external applications.

Typhoid Fever.—An acute, endemic fever of long duration, and due to a poisonous principle associated with certain forms of decomposing animal matter. It presents a gradual and insidious commencement—a dull headache, a red tongue, occasionally becoming dry and brown. There is abdominal tenderness, sometimes diarrhœa, splenic tenderness, nose bleed, slightly elevated rose colored spots on the abdomen, late prostration, and a tardy convalescence. This fever is sometimes called enteric fever, remittent fever, night soil fever, mountain fever, gastric fever, autumnal fever, etc. After death, examination shows always, lesions of the solitary and agminate glands of the ileum, also enlargement of the mesenteric glands and the spleen. This is, without question, the most important fever that you will be called upon to nurse, and while the constant attention of the skilled physician

MICROCOPY RESOLUTION TEST CHART

(ANSI and ISO TEST CHART No. 2)



is required at all times, yet but little medication is demanded. So much depends upon the intelligent nurse in this fever that we wish to impress upon you the necessity of becoming thoroughly acquainted with the general characteristics of the disease. Each case will be of more or less extended duration, from three to six weeks. Near the close of the siege, your patient will not only be generally weak, but each organ will be specifically so. It is a self-limited disease, with constantly occurring varying complications. Watchfulness to perceive the first appearance of any such, always remembering that to sustain strength for the final, critical stages, must be ever kept in mind. Read and study your text book on the subject. To know what nourishment your patient can properly take, and then be able to prepare it, is absolutely essential to your usefulness as a nurse.

Lecture 19

Surgery.

One of the most important and responsible positions that you will be called upon to fill in your work as a nurse, is that connected with surgery. The most skilful and brilliant surgical operation may terminate in unfortunate, unexpected and deplorable results in consequence of some ignorant, careless act of the nurse. To be competent to give the surgeon such assistance in this direction as may be required before, during and following any surgical procedure, will make your services of inestimable value, and much sought. Certain qualifications should characterize the successful surgical nurse, among which might be mentioned:—

1. A knowledge of technical principles, and love of the work.
2. A general knowledge of the technique or steps of the surgical operation.
3. Firmness and absolute presence of mind under all conditions.

The possession of the above three qualities will enable the nurse to (a) Properly prepare the patient for the operation; (b) Give intelligent aid to the surgeon during the same; (c) Properly care for the patient during convalescence.

Personal Appearance of the Nurse.

The confidence of the patient is a most material incidental factor in the management of not only a surgical case, but any other as well. An attractive personal appearance, with strongly-marked individuality, usually aids in forming a favorable impression in this direction. A very delicate figure with a sickly, pinched, expressionless face, is not a very cheerful inspiring picture to confront day after day, one with lowered vitality and depressed nervous condition. As before said in these lectures, a nurse should ever be in the pink of health, and always optimistic. A sickly, soured, untidily dressed nurse or doctor should never be tolerated for one minute. Look particularly after your baths, the appearance of the nails, the hair, and condition of the teeth. Dress plainly, but absolutely clean in every detail—as particular of the undergarment as the gown. If you wear linen cuffs and collars—remember—always spotlessly clean and white.

Antisepsis.

This is the foundation stone on which rests the surgery of the day. It is the outgrowth of an investigation of that science known as bacteriology, wherein by means of the microscope, we have contacted visibly, a great world teeming with millions of hitherto unseen lives. Entities that exert a specific influence in the production of disease, or the maintenance of health. The last lecture of this course (lecture 24) will be devoted entirely to a discussion of this interesting subject.

When you come to study in detail lecture 24, you will there learn that decomposition or putrefaction does not occur in the human body unless brought about by the presence of special microscopic organisms, usually the cocci or bacilli. The surgeon has learned that wound infection cannot occur when the conditions necessary for the reception and development of these germs are absent.

The three essentials for such are:—

1. Nourishment.
2. Moisture.
3. Suitable temperature.

There are many avenues through which the micro-organism may enter, as:—

1. Introduced by the instrument causing the wound.
2. By the clothing.
3. By dirt entering before the surgeon is called.
4. By being introduced by the surgeon—his instruments, hands, dressings, ligatures, solutions, etc.
5. By the nurse or assistant, through some faulty preparation or personal carelessness.
6. May occur from organisms living in the skin, or encysted in internal tissues.

Modern surgery aims at the prevention of infection by bacteria, and attempts the destruction or inhibition of the growth of germs already present, and in this laudable attempt arises two terms:—Asepsis and antisepsis. The first signifies a clean wound, free from germs, while the second refers to the means employed to destroy organisms already present. You will now begin to see that "clean" and "surgically clean," are two different expressions. The first is only a relative term, but the latter means absolute freedom from pathogenic germs. To bring about in the patient as nearly as may be possible this "surgically clean" condition previous and preparatory to operation, is an important work and usually assigned to the nurse—sometimes several days in advance, sometimes, in urgent cases, but a few hours, or perchance a few minutes.

No matter what the specific nature of the surgical operation may be, there are several preparatory procedures that should not be lost sight of, nor in any way slighted. The thoroughness, of course, must depend more or less on the length of time preceding the hour set for operation.

1. A thorough and complete bowel evacuation, by saline or calomel cathartics, or by enema—usually both. If a female, then several vaginal douches. Most especially must this be done thoroughly if the surgical operation is to be performed in this region.
2. A thorough cleansing of the skin by means of the bath, etc.
3. A register of temperature and pulse.

4. Analysis of urine—This the surgeon will usually attend to, and will direct the nurse how to obtain a sample for that purpose.

5. A thorough preparation of the field of operation must be done—(a) by shaving the part (sometimes done by the nurse, sometimes by the doctor or his medical assistant at the time the patient is brought upon the operating table; (b) scrub thoroughly by means of green soap and a brush—Synol liquid soap is a good article for this purpose: (c) follow this by sponging off with bichloride solution 1 to 3,000; (d) now cover the field of operation with a sterile dressing — such as borated gauze, carbolated gauze, bichloride gauze, or simply absorbent cotton well moistened with alcohol. All this should be done, if possible, previous to the day of operation.

On the morning of the operation, repeat the enema, douche, bath, change sterile dressing, make patient's toilet, arrange hair, teeth, etc., dress in a clean white gown, give no breakfast, except it may be a small cup of weak tea or coffee, and perhaps a cracker, or a bite or two of dry toast.

Sick Room.

You will at this point read again lecture XV. It will bring to your mind the essentials with reference to the room in which your patient must lie, or in which the operation will be performed. Where it is convenient it is preferable to operat[illegible] an adjoining room to the one the patient will occupy during [illegible]covery. Then, at the close of the operation, the patient can be removed at once from any objectionable feature pertaining to the room that may have arisen in consequence of the operation; where this cannot be done, then crowd the bed well to one corner, thus securing more space for the surgeon and his assistants. The room should be prepared as nearly as possible the day previous; select a room where the best light can be furnished. A table upon which the patient will lie during the operat[illegible] must be obtained. The ordinary kitchen table does very well [illegible] this purpose. You will arrange same by first placing over it a [illegible]avy blanket or quilt, folded so that it will not hang over to any extent, the edges of the table. Over this may be placed a rubber cloth or an oil cloth, or simply a clean white sheet. Sometimes the surgeon will place over this what is known as a Kelly pad, upon which the patient may rest, and which will conduct any fluids, water, etc., to a vessel upon the floor. You will remember that with the arrangements of the table, you must always have resting on the floor at one end of the table, a small tub, or a large slop bucket, to catch any fluids, water, blood, etc., that may arise from the operation. A plain kitchen chair must be provided for the surgeon. In abdominal operations he will not need it, but in the majority of others, he will. A couple of stands or small tables, or two or three short stools, or the same number of short benches, should be covered well with absolutely clean, sterile towels. These stands should be conveniently near for the purpose of holding a wash bowl, a couple of large pitchers, one with boiling, the other with cold water. A bowl of antiseptic solution (bichloride), and a half pint or two bottles of alcohol. A stand with a large clean towel spread over it, and resting upon the same a large, clean, sterilized platter for the purpose of holding the surgeon's instruments, is convenient. Usually, the surgeon will have his instruments thoroughly sterilized before leaving his own home. If he has not done so, then he may probably ask the nurse to do so for him. In such a case, you will take such instruments as he may select; put them in a clean pan, cover well with water, putting a heaping tablespoonful of common baking soda to each quart of water. Boil for 20 or 25 minutes, then wipe thoroughly dry and well, taking care not to soil them in any way during this process; as each is wiped, placed it on a clean towel or platter. If they are not going to be used at once, this platter can be put in the oven and kept exposed to dry heat. It is well to have a couple dozen of clean towels, well sterilized by heat, for use at the operation. This you can do by placing them folded one upon the other on a large pan or platter. Put them in a hot oven, heating them thoroughly, but not allowing them to burn, of course. When this is done well, then open the oven doors and take them as needed during the operation.

A large fountain syringe filled with water that has been made pure by boiling, should be attached to the wall by a nail or hook, at a convenient height and distance, to be used during the operation if needed. In operations on the perineum or cervix, the use of the douche in some form is absolutely necessary. Sometimes the surgeon will desire the solution to be of bichloride, sometimes carbolic acid, sometimes boracic acid. This you must learn from him, and arrange accordingly.

In many of the surgical operations in the country and smaller towns, where it is difficult to get medical assistance, the nurse, under the directions of the operating surgeon, will be obliged to assist directly in the operation. This she will do by holding and passing the instruments needed from time to time:—threading needles, using the douche, etc. Occasionally in minor operations, she may, acting by the doctor's request, administer an anæsthetic. This, however, is rarely necessary, and should only be done when absolutely impossible to secure a skilled physician for the purpose. Of course, the elaborate preparation herein described would not be necessary in the thousand and one minor operations that are so frequently performed. The kind of operation for which these directions were outlined specifically, would be all abdominal operations, such as ovariotomy, hysterectomy, the removal of abdominal tumors, appendicitis, operations of the vaginal outlet, the bladder, the rectum, the kidney, etc. Operations on the breast, eye, ear, amputations, etc., are really not so dangerous as those where the abdomen is entered. In all cases, however, remember, what a microscopic germ may do under certain conditions, if allowed to come in contact with the unprotected tissues. Nothing must touch the wound that is not "surgically clean," no matter how small and insignificant the wound. A prick of a needle, upon which was a single germ, has necessitated the amputation of an arm, and more than once cost a life.

Previous to the operation and usually when the anæsthetic is being administered, a hypodermic with 1/30 of strychnine sulphate should be prepared in readiness to be used on the patient, should any signs of failing heart or collapse arise during the anæsthesia. As soon as the operation has been completed and the patient removed to her bed, someone, usually the nurse, should be at her side until she has recovered from the anæsthetic. In the meantime, especially if the operation was prolonged, and the patient's heart somewhat weak, heat in various ways should be introduced beneath the coverings, and in close proximity to the patient. This you can do by hot irons, bricks, bottles filled with hot water, hot water bag, etc. Remember always that they should be well wrapped with cloths and watched closely that they do not burn the patient. She is insensible, and great injury could be done without her being aware of the fact until awakening. As soon as she awakes, there is usually a desire to vomit—sometimes this will continue for several hours. Have a small basin or large towel in readiness for an emergency of this kind. Usually not a drop of drink of any kind is given until the vomiting has ceased. Many surgeons in abdominal operations commence immediately after the operation to give the patient small doses of calomel every hour, at the same time about every three hours or four, giving a saline cathartic (liquid citrate of magnesia, 4 ounces, or sulphate of magnesia (Epsom salts), two teaspoonfuls in a half glass of water, and so continue without any other food or drink until an evacuation has been secured, after which liquids or semi-solids are given cautiously, finally reaching a point where the lighter forms of solid foods are given. In every case, you must learn exactly what the surgeon desires you to do in regard to the food and drink, and then follow it to the letter. The record of the temperature and pulse which you began before the surgical operation must be continued for the first few days—should be taken about every three hours. The clinical chart must also note everything in regard to the patient that is in any way related to her condition—the excretions, pain, sleep, medicines, foods, gases, etc.

The first dressings are usually not removed for several days. This the doctor will do himself. You should not think of making any changes of such until specifically directed to do so by the surgeon. Watch sharply how he does change them, as later he may desire you to aid him in this direction. Should any of the bandages become loosened in his absence, it would be your duty to pin or re-attach them until he comes at the next visit. Keep everything scrupulously clean about the patient, the bed and the rooms. Never let the doctor find a stain or a particle of dirt anywhere.

He will tell you what class of food to give, but you must know how to prepare a variety of kinds in each class.

Your text-book gives you liberal instruction in this direction. You will also, from time to time, gather original information for yourself. There are so many delicate, palatable, acceptable drinks, foods and relishes that may be arranged for the invalid by the ingenious thoughtful nurse.

(See supplementary Lecture on dietetics.)

Lecture 20

Contagion and Infection.

The terms contagion and infection are more or less correlated, and are frequently used interchangeably. Each has, however, a distinct specification when used in connection with an explanation relative to the transmission of disease. A contagious disease cannot be transmitted or communicated except by direct contact, or by inhaling the effluvia from one already affected.

An infectious disease may not only be communicated by contact, but may be carried through the atmosphere and transmitted to persons at a distance. Among the contagious diseases may be mentioned:—Typhoid fever, tuberculosis, pulmonalis (consumption), while as examples of infectious diseases might be given scarlet fever, smallpox, diphtheria, measles. Frequently it is impossible to trace the source of an infection.

There seems to be an inherent resistive force in many persons which makes them, as it were, immune to the attack of any contagious or infectious disease. Others, again, are peculiarly susceptible in this matter. It is an easy matter to carry in the clothing the germs of infection, and it is a noticeable fact that so frequently an infectious disease has been transported from a sick room to a crowded assemblage—the cars, theatre, church, or, perchance, the domestic circle. The individual in whose clothing such a germ was transmitted, may not in any way be effected, but the micro-organism may find suitable soil for growth and development in many others. Thus does the physician, and most rigidly should the nurse, observe the greatest precaution in passing from a case of infectious disease to other people. The doctor frequently prevents this danger by clothing himself in a tight fitting suit of linen or rubber previous to entering the home, and laying it off on leaving. The ordinary fever germ takes root in the human body as seed does in the soil, and develops gradually, taking from 5 to 10 days before its presence can be noticed. Some germs are carried in milk or water—such as typhoid, tuberculosis, and diphtheria. They may be carried in butter, oysters, ice cream, etc. Children are particularly susceptible to contagion and should at once be isolated, should any disease of an infectious or contagious nature appear. Many of the diseases are not contagious until fully developed. It is believed that smallpox is contagious before the disease shows itself. When the skin begins to peel off in scarlet fever, is its most contagious period. In the fine particles of skin thus wafted through the air is the germ. For this reason, about this time it is good practice to rub the patient well with carbolized vaseline or some antiseptic solution to destroy the microbe.

In consumption, the sputum is the medium by which the germ of the disease (tubercle bacillus) is carried. If the sputum be always moist, then the germ cannot be carried; as soon, however, as it becomes dry, and is exposed to the air, it can be and is inhaled by thousands of people. For this reason, your consumptive should never be allowed to expectorate on a handkerchief, cloth, floor, carpet or ground—always in a cuspidor in which is a liquid solution of some antiseptic. This is a precaution not to be overlooked. Such persons should rinse out the mouth frequently with some pleasant antiseptic solution like Listerine, and should never kiss any other person. Another precaution should be to sleep alone.

A nurse who has the responsibility of attending to one with a contagious or infectious disease should wear a plain dress, so that it may be easily and frequently boiled and disinfected. The head should also be clothed in a cap or handkerchief to prevent germs from being carried in that way. In nursing such a case, you, for your own protection, will maintain as healthful a bodily condition as possible. Get out-door exercises, regular sleep, six or eight hours in the 24, and never enter the sick room when tired, without eating or drinking something. Do not inhale your patient's breath in any way. Never eat in the sick room. Follow out these suggestions fully and you need fear but little the danger of contracting the disease, no matter what it may be. Remember that fear in itself has a most weakening effect on the physical resistance, while absolute fearlessness is an invincible guard who stands at the threshold and bids the invading germ to halt.

In spraying the nose and throat of a patient, it is a good precaution to have a handkerchief wet with 1 in 5,000 bichloride solution, placing the same over your nose and mouth.

After the patient has recovered, the greatest care should be exercised that no germ is left in the room or in the clothing of the patient or others after recovery. Before allowing the patient to leave the room, give her a thorough bath, taking especial pains with the hair. After you have done that, soap and water will do, then sponge off well with a weak solution of bichloride or alcohol, or Listerine. Now dress your patient with an entire change of clean, sterilized clothing, and she can then leave the room, to which you should at once turn your attention. Every article of clothing should be disinfected; this may be done by soaking for several hours in a solution of carbolic acid (5 per cent., or about 1½ oz. of acid to a quart of water). After this, boil for several hours in water made alkaline by adding common baking soda. If there is a special establishment in your town for disinfecting bedding, then you could send the mattress there. If there is not, then the mattress should be disposed of in only one way—burn it. The room itself must receive most careful attention. This may be done by fumigating with sulphur in the following way:—Put a good sized piece of lump sulphur in a small tin or earthen vessel. Now put this vessel into an iron kettle partly filled with water, then tightly close windows and doors, and set fire to the sulphur. Let it burn for six or eight hours Next open the windows and allow the air to pass through freely. The next step is to take a 1 to 500 bichloride solution an' wash every inch of walls, ceiling and floor, also the furniture. There is another method of late use. It is the production of formaldehyde gas by means of formalin lamps and pastiles. It is a perfect disinfectant and easily applied. These formalin lamps can be procured at any large druggist's, with full directions.

All books and papers used by the patient, or remaining in the sick room during the progress of an infectious disease, should be destroyed.

Excretions.

The greatest care should be exercised in this direction. Before using the bed pan, always put some carbolic solution in it, then before emptying same, cover with carbolic solution, formalin, or any other disinfectant. A most valuable disinfectant is milk of lime. You can prepare it yourself and have it in readiness for use at all times. Take freshly slaking lime in a stone jar or wooden trough, and then add to it four parts of water, forming the milk of lime. It makes an efficient disinfectant for typhoid and cholera stools, or any other where suspected infection might occur. In using this, a quart might be added to each discharge, allowing it to remain for some time before emptying in the vault or closet. To disinfect the closet, chloride of lime is excellent—six ounces to a gallon of water is the standard solution.

Care of the Dead.

In the cities and larger towns, the public officials take charge of all cases of death when of a contagious or infectious nature, and thus the nurse has nothing to do with the matter; in fact, in the ordinary city or town, the undertaker is, in all cases, at once called and takes entire charge of, and prepares the body for burial. In the country and smaller towns this is not done. For this reason, in such cases, the nurse should at least know what precaution is necessary when a patient has died from any contagious disease.

1. None but fully authorized persons should enter the room —relatives and visitors should be kept out.

2. The body should be wrapped in a sheet wet with bichloride solution, and the face covered with a cloth wet with the same.

3. No funeral, private or public, should be held.

4. The body should not be removed from the room until it is to be interred.

5. The interment should take place as soon after death as possible.

6. The body should be kept constantly wrapped in the bichloride sheet until interment, which, if by burial, should be at least five feet under ground.

7. The ideal and scientific disposal of all dead bodies is by incineration or cremation.

Vaccination.

Vaccination means the introduction of vaccine lymph into the human body for the supposed purpose of rendering one immune to the disease of smallpox. History has proven that immunity from smallpox is not secured by vaccination, and the modern adveentes of Jenner's discovery only claim that vaccination modifies the character of the disease, smallpox. Medical men are by no means a unit regarding the supposed virtues of vaccination, and no less an authority than Professor Cruikshank, M.D., the eminent bacteriologist of King's College, London, England, has had no hesitation in denouncing the practice of vaccination as dangerous and tending to render the vaccinated subject to tuberculosis and other serious diseases. In the great conflict of opinion on this subject we must allow the nurse to be guided by facts, history, and statistics, in reaching a conclusion as to whether vaccination is helpful or injurious.

Perfect cleanliness, at all times. Isolation of the most rigid character, and effective quarantine are all that should be attempted in a free country where there is any fear of a smallpox epidemic. To force a patient to submit to a surgical operation, even of the most minor character, is incompatible with the freedom claimed by Canadians in this twentieth century.

In connection with the discussion of this subject, three terms or names present themselves:—

1. Isolation—a term generally used where a single attendant is confined to one room.

2. Segregation is isolation on a larger scale; as, for instance, when colonies of lepers are confined to some locality.

3. Quarantine—the adoption of restrictive measures to prevent the introduction of diseases from one country, or defined area or territory, to another.

Lecture 21

OBSTETRICS.

One could write volumes on this most interesting topic, and still leave much unsaid. In our "Special Obstetric and Gynecologic Course," the details of the subject are more minutely described, and more explicitly elucidated than can possibly be attempted in this course.

The phenomena of ovulation, menstruation, impregnation, gestation, fœtal growth, dimensions, presentations, pelvic measurements, etc., must be, except in the merest outlines, entirely omitted here.

FEMALE GENERATIVE ORGANS.

Internal—

1. Uterus.
2. Fallopian Tubes.
3. Ovaries.
4. Vagina.

External-

1. Mons Veneris.
2. Labia Majora.
3. Labia Minora.
4. Clitoris.
5. Commissures.
6. Hymen.

ACCESSORY.

Mammary Glands. — All of the internal organs, with a possible exception of the most external part of the vagina, are contained within the pelvis. The uterus (womb) in the virgin, is of a pear shape, and measures about 3 inches long, 2 in width at the fundus or upper part, 1 inch thick, and weighs from 1 to 1½ ounces. The cavity is small—that portion corresponding to the body is triangular with its base upward. This continues downward in a filiform shape, through the cervix opening into the vagina.

The uterus is composed largely of muscular structure, and may be called the organ of gestation, receiving the fecundated ovum in its cavity, retaining and supporting it during the development of the fetus, and is the principal agent in its expulsion at the time of childbirth, or parturition Its position in the pelvic cavity is maintained by three factions:—

(a) Its oblique direction.
(b) The support of contiguous structures.
(c) Ligaments—2 anterior, 2 posterior, 2 lateral or broad, 2 round.

The fundus of the uterus is the broad upper end. The cervix is the lower rounded and constricted extremity. This end of the uterus projects down into the upper part of the vagina. The body is the part between the fundus and cervix.

The fallopian tubes or oviducts, as they are sometimes called, are two in number, each about 4 inches long, and extending from each upper angle of the fundus to the sides of the pelvis. They lie in the free margin of the broad or lateral ligaments.

The canal in each tube is very minute, hardly large enough to admit a fine bristle. Notwithstanding this, it allows the passage of the ova or eggs from the ovaries to the uterine cavity—a phenomena that begins in the female at the age of puberty, and periodically thereafter at intervals of about 4 weeks, until the menopause (change of life).

The Ovaries.—Just posterior and below the outer extremity of each fallopian tube is an oval-shaped organ of a slightly flattened, elongated form. Each ovary is connected by its anterior part to the broad ligaments, and by its inner part to the uterus by means of the ligament of the ovary. A short ligamentous cord attaches the outer end to the fimbriated extremity of the fallopian tube. The ovaries have a whitish color, and are about 1½ inches long, ¾-inch wide, and ⅓-inch thick—weigh from 1 to 2 drachms. Structurally, the ovary has an investing membrane, enclosing the organ, within which are found many Graafian vesicles, all embedded in the meshes of a stroma or framework. This stroma is a peculiar, soft tissue, abundantly supplied with blood vessels. A Graafian vesicle, of which there are many scattered throughout the ovary, measures from 1/100 of an inch to 1/10 of an inch in diameter. The smallest are deeply imbedded within the ovary, while the larger are near the surface. In each follicle or sac is the

Ovum, a small, round body, 1/120 of an inch in diameter, and consisting of four parts: (a) zona pellucida; (b) yelk vitellus; (c) germinal vesicle; (d) germinal spot.

A description of these parts cannot be given here. Sufficient to say that they each form an important part (after union with the spermatozoon) in the formation of the embryo. It may be said that the Graafian vesicles gradually approach the surface of the ovary, burst, and the ovum escapes, passes into the fallopian tube, when, if contact with the male fecundative germ is experienced, impregnation may occur. If not, then the ovum escapes into the uterus, and from there through the vagina externally.

The vagina is a membranous canal extending from vulva or external organs, to the uterus. It is cylindrical, and its walls are usually in contact—is about 4 inches long on its anterior wall, but posteriorly is about 1 or 2 inches longer. It is constricted at its commencement, but at the uterine end is dilated.

Collectively, all of the external organs may be called the vulva or pudendum. The mons veneris is the rounded eminence in front of the pubes, and is formed by a coleletion of fat beneath the skin; at puberty it begins to be covered with hair.

Labia majora are two longitudinal folds of skin extending from the mons veneris to the anterior boundary of the perineum (area between vaginal orifice and rectum). The labia majora encloses an elliptical fissure, the common urino-sexual opening. Each labia is covered externally by integument, internally by mucous membrane. The union anteriorally, is called the anterior commissure—the union posterior, the posterior commissure—a transverse fold just within the latter is called the fourchette.

The labia minora, or nymphæ, are two small folds of mucous membrane just within the labia majora, and extend downward, and outward, obliquely for about 1½ inches on each side of the vaginal orifice, when they become lost.

The clitoris is an erectile structure, more or less prominent and elongated, connected with the rami of the pubes, and situated beneath the anterior commissure between the anterior extremity of the labia minora.

The hymen is a thin, semilunar fold of mucous membrane stretched across the lower part of the vaginal orifice.

Pregnancy.

This, generally speaking, is the period from impregnation to delivery or child-birth, and covers about 280 days—or ten lunar months of 28 days each. Sometimes 9 calendar months, with ten days added, is taken. It is only a matter of choice as to how the time is reckoned. In each case it will be about 280 days. As a pivotal point from which to begin to reckon, the last day of the last menstruation is taken. This day, of course, may not be the exact one, but it, on an average, usually approximates quite closely.

Signs of Pregnancy.

1. Suppression of menstrual flow—not a positive sign within itself.

2. Nausea and vomiting—usually in the morning; of value when used as confirmatory evidence.

3. Mammary changes—as enlargement, sensitiveness, dark colored areola around nipple.

4. Abdominal increase—suggestive, but not positive evidence. Other causes may produce it.

5. Softening of os and cervix—to an experienced examiner it is of great value as a diagnostic point.

6. Quickening—the movement of the fetus within the uterus. A positive sign, of course, and usually occurs about 4½ months after impregnation.

7. Ballottement—proof positive, performed by communicating passive movement to the fetus by the finger, by which the fetus is propelled through the fluid contents of the sac, and giving, on its return, an impulse to the presenting finger.

8. Osculatory signs — (1) Sounds of fetal heart — heard about 18th or 20th week. (2) Uterine bruit—a blowing sound made by the branches of the uterine artery of the mother.

The Mother During Pregnancy.

This is an important event, and its significance should not be misunderstood. Remember, within the maternal organism, a new human body is being constructed and nourished. The supply for all this growth must come directly through the mother. For this reason, from time to time, most overwhelming demands will be made upon her, in a variety of ways. Be not surprised then, nay, even expect, that most unusual expressions of temperament and disposition may exhibit themselves in her character. The stupendous demands on her physical powers must necessarily disturb the normal equilibrium of thought and action. It is a strange tumult of forces that are influencing and establishing a new field of activity. Therefore, she should receive the greatest degree of consideration and kindness. Not only for its effect on herself, but on the growing intra-uterine life as well, should the prospective mother be surrounded with the most pleasant, cheerful and cultured influences possible. Mental, moral, and physical characteristics of the child may be moulded and influenced while it is still in utero.

The Parturient Bed.

As the hour of delivery approaches, the nurse will make readiness for the event. Of course, the doctor has already been summoned and has made the necessary examination to determine that fact. One of your first duties following this is your arrangement of the bed. The airiest, cheeriest, and most quiet room in the house should be selected if possible. A good, solid bedstead with firm springs and mattress should be used. A feather bed is an abomination, invariably loaded with disease germs and vile excretions and odors, and should never be tolerated in any case of sickness, last of all at child-birth. Place over the mattress a thick, heavy, clean blanket or quilt; over this, fasten firmly to the mattress by means of safety pins, a large piece of oil-cloth or rubber. as a protection from discharges on the mattress and blankets. This rubber should be placed under the hips, and of sufficient width to reach from the armpits to the knees—a yard to a yard and a half. It should be of sufficient length to reach across the entire width of the bed. Now spread, in the usual way, a clean sheet over this, lay and pin a folded sheet to cover the area taken by the oil-cloth. This is all that need go beneath the patient. A sheet and a light quilt or two is all that is needed over her. The room should be comfortably warm. After the child is delivered, the bed can be easily changed, removing in order the two sheets beneath the patient, leaving the oil-cloth still fastened. Cleanse and dry it with a cloth. Now place over it, a clean, dry, warm sheet. It might be said that when you have reached the oil-cloth when removing the soiled clothes, then the doctor will direct you to give an antiseptic douche; at any rate, that is the best time to cleanse and make the woman perfectly free from every particle of discharge. At the same time. remove any soiled clothing that she may have on. Finish the entire affair by placing a large, clean, warm napkin over the vaginal outlet to catch any discharges—this napkin should be changed frequently at first. After the first change of clothing, never allow a drop of blood or discharge or discoloration of any nature to be found on the woman, her clothing, or that of her bed. Spotlessly clean at all times. In making a change, always have everything in readiness, and then with the least possible disturbance do the work quietly and quickly. After the first day, the oil-cloth should be removed entirely and used no longer, as it has a tendency to create unnatural heat beneath the patient.

Labor.

The average duration of labor has been estimated at 18 hours from the time of the first uterine contraction, or, as it is called, "pain," to delivery. With some, however, it is but a few hours, occasionally but an hour or two.

As a matter of clinical convenience, labor has been divided into three stages:—

1. Dilation of the cervical canal.
2. Of expulsion—extending from the dilation of the cervix to expulsion of child.
3. Delivery of placenta.

The patient will not go to bed at the first "pain," but will usually continue around on her feet until frequently the second stage of labor is well advanced. During the early hours, it is well to see that an enema and vaginal douche is used, as it will greatly facilitate the passage of the child. If the doctor is present at this time, you will be guided by his instructions in regard to this.

Be cheerful and hopeful in your expression as to the termination of the case. Frequently the patient becomes discouraged and fault-finding, which you will counteract by the most optimistic ideas that you can present.

Care of the Child.

As soon as delivered, the doctor passes over the child to the nurse, who will be in readiness to receive the same. It is best to do this by having a small blanket, either held in your hands, or perhaps by laying it on the bed convenient to the doctor; you will place the child in the same. You will have convenient at that minute, some mild antiseptic solution—boric acid is good; with a soft cloth or absorbent cotton, saturated with the solution, you will wipe from the babe's eyes any discharge that may be present. Now wrap up the babe, place it where it is warm and direct your attention to the mother, as has been indicated. Always have in readiness plenty of hot water, also two large bowls or vessels. Frequently, where the child fails to breathe at birth, its vital forces are stimulated by plunging it first into a bowl of ice cold water, then into very warm water, and so continue. This is an expedient often adopted by the doctor for this purpose. It is a good plan, sometime before washing the babe, to first oil or anoint its entire body. By so doing, certain irritating elements are softened and made more easily removable without irritation to the delicate skin. A large bowl of warm water, delicate toilet soap, a soft cloth or sponge, and a goo drying towel, compose the paraphernalia for giving the babe its hath. A very good plan is to sit the babe directly in the bowl of water, supporting the back part of its head in the palm of the left hand, allowing the fingers to partly encircle the posterior portion of the neck. Use the right to give the bath. Your common sense will guide you aright.

The child need not be fed for several hours; can easily go for 12 or 18 hours. If possible, its first meal, even though it be but little, should come from the maternal breast. Food for the mother should be very light, chiefly fluid like, for the first three or four days—the semi-solids and easily digested solids to the time she arises from the bed to stay. This usually is from 9 to 14 days, always to be determined by the attending physician.

Lecture 22

Insanity.

It is not at all probable that as a nurse you will have much active experience connected with the care of the insane. The subject of insanity is a most interesting one to the medical man, and inasmuch as you may be called as a private nurse to render assistance in some of the milder forms of temporary insanity, it is most advisable that you have such general and special information as will make you an intelligent and useful aid to the doctor, and a valuable and trustworthy attendant to the unfortunate patient. In every case of insanity, the question as to where the patient can best be treated is a most important one. It resolves itself to the selection of one of the following plans:—

(a) Treatment at home.
(b) Treatment at a private sanitarium.
(c) Treatment at an insane asylum.

No grave cases, except puerperal mania, very brief attacks of acute mania, or alcoholism, can be treated at home, and then only among the most convenient surroundings, where good nursing and suitable rooms can be had. In such cases, the attack must be brief, run a definite course, and need but little outdoor exercise and air. Some quiet chronic cases, with no tendency to degenerate habits or mental conditions, may also be treated at home. All other cases must be managed according to the plans of the private sanitarium or the asylum, circumstances to determine which. It is a serious affair to commit as an insane person, any individual. The legal adjudgment to an insane asylum, in a variety of ways, has a most significant and lasting effect, on not only the patient, should he or she recover, but also on the relatives and even generations yet unborn. "Were any of your relatives ever insane?" is a common question among certain insurance and legal interrogations. Hence, the strenuous efforts so frequently and laudably exhibited by relatives, physicians, and courts to delay the final move that legally declares the insanity of an individual. Here and there we do learn of occasional acts of gross injustice and crime committed through systematic conspiracy of persons who anticipate gain by the commitment of a fellow human to an insane asylum.

To manage such cases as may be considered admissible to either of the first two plans, necessitates a liberal expenditure of money. In caring for such, every precaution must be observed that no possible means be overlooked whereby the afflicted one may injure himself or others. For obvious reasons, rooms on the ground floor should be selected. Management by either of the first two plans proposed, always presumes the prospects of recovery, and the patient should receive such medical treatment and care as will best secure the object sought. The nurse in such cases must not have the idea that she is only the patient's "keeper," but should always bear in mind that, in connection with the doctor, she is an important factor in the treatment and recovery.

The forms of insanity that can best be managed in a retreat or private sanitarium are mild melancholie, adolescent insanity, puerperal insanity, some cases of hysterical insanity, mild cases of mania, senile insanity, and some of the cases of alcoholic insanity. In such cases, it usually has a good moral effect on the patient to have medical visitation frequent. Remember, insanity is a mental phenomena and a careful systematic effort must be attempted by every means possible to correct the patient's distorted, abnormal ways of thinking. He should never be told that he is insane, nor by word or look should he be allowed to infer that others think so. Special means to divert the mind to light forms of amusement should be devised. Break up all monotony. Visits from relatives and friends sometimes do much good, sometimes much harm. Intelligent discrimination must ever be exercised in this direction. The insane man, as well as the sane, must have something to do. Activity is a universal law of life. It will dissipate morbidity, and thus keep the current of thought, feeling, and action approximately in physiological channels. Of course, in the hopelessly insane, the principles just expressed will have but little bearing. To "keep" the unfortunate comfortably and in a humane way, is all that can be done. In all cases, the question of food dis one of the first considerations. It should always be tempting, nourishing, and well served. For the more acute cases, it should be liquid, or nearly so, and oftea repeated. Milk or liquid custards, with eggs beaten and a little sherry and nutmeg added, make a good article of food.

If the patient refuses to eat, which quite frequently occurs, then the liquid food can be introduced into the stomach by means of a tube. In mental medicine, fatten and nourish your patient, is a rule with marvellously few exceptions. Emulsions of cod liver oil, extracts of malt, etc., are excellent tonics; and nerve stimulants, such as iron, quinine, dilute mineral acids, etc., constitute the general line of medication.

The general treatment of insanity needs never-ceasing care, endless devising to meet individual symptoms, vigilance to avert serious catastrophes, and the most watchful observation of symptoms, bodily and mental.

The nurse of an insane person should be firm, but not harsh or unfeeling, and should have discretion enough to guard against anything referring to the cause of insanity. The belief of the patient with reference to the imaginary rank in society, should not be encouraged. Do not enter into discussion with the patient in any attempt to convince him by reasoning that he is deluded: it is useless and dangerous. The patient is irresponsible and the nurse, therefore, must always have sufficient self control to endure much bad behavior, and frequently insulting language. Strength, courage, and decision are most valuable adjuncts to the nurse in the management of insane cases. In the violently insane, various mechanical means of restraint have been devised—among which may be mentioned the padded cell or room, straight jackets, muffs, straps, sheets, etc. Such means should, of course, be used only by direction of the medical attendant. With this exception, when in case of sudden delirium there is danger that the patient may injure himself or others, every article that the patient might use with any destructive results should be removed from his reach. Patients inclined to suicide often seek with great cunning to elude observation.

Strict order and absolute cleanliness should predominate. The recovery of patients is promoted by:—

1. Building up the general health.
2. Correcting pernicious habits.
3. Checking morbid impulses.

In the management, remember that punishments should never be employed.

The great question as to what constitutes insanity has puzzled the minds of the greatest alienists. Briefly stated, it may be defined as "a prolonged departure from the individual normal standard of thinking, feeling and acting."

The causes of insanity may be considered under four different standard classes:—

1. Direct physical causes, estimated at 36 per cent.
2. Indirect physical and emotional causes, 14 per cent.
3. Vicious habits, 25 per cent.
4. Constitutional and evolutional causes, 25 per cent.

One of the characteristic symptoms of insanity is the presence of some erroneous or faulty perception, usually manifesting itself as an hallucination or an illusion. An hallucination is a false perception with no objective reality—for illustration, an individual looks upon the bare floor and imagines he sees a snake. There is no objective reality, and the false perception is an hallucination. If, on the other hand, he should look at some of the figures outlined on the carpet and think they were snakes, or birds, or anything else, that would be an illusion, because there was an objective reality as a foundation for such an idea.

For convenience and system in study, insanity may be grouped as follows:—

1. States of Mental Elation—(a) Mania acute; (b) mania chronic; (c) mania recurrent; (d) mania hysteria.
2. States of Mental Depression—(a) Melancholia simple; (b) melancholia with stupor; (c) melancholia with frenzy; (d) melancholia hypochondria; (e) melancholia hysteria.
3. States of Mental Weakness—(a) Dementia chronic; (b) dementia monomania; (c) dementia after melancholia; (d) dementia mania; (e) paranoia; (f) imbecility; (g) idiocy; (h) brain storm or paranoia Americana et Canadensis.

4. Structural Brain Disease—(a) Paretic dementia; (b) paralytic dementia; (c) epileptic dementia.

To enter into an extended and detailed explanation of the classes enumerated would be too great a task for the scope of this course. Neither would it be of any absolutely practical use to you as a nurse. A definite history and termination may be expected with each class. The important preliminary object sought by the physician, then, is to properly diagnose or classify his patient with reference to the form of insanity. When this is done, then he can foretell what peculiar mental phenomena the patient will present, can definitely and precisely inform the nurse or attendants what plans to adopt in his care, and most gratifying of all, is able to state to anxious friends and relatives what may be expected as to the nature of the final outcome.

1. Obey the physician.
2. Be firm yet kind.
3. Keep the patient near you.
4. Be observant and inform the physician as to peculiarities, tendencies, actions, etc.
5. Never allow the patient to hear you discuss the cure with the attending or consulting physician.
6. Never admit the consulting physician to the patient's presence until the attending physician is at hand.
7. "A still tongue makes a wise head" in such cases.
8. Usually good paying cases.

Lecture 23

Accidents and Emergencies.

Circumstances may arise in which the nurse is expected to render necessary aid to the physician, or in his absence to temporarily manage certain accidents and emergencies. In all such unforeseen occurrences, the nurse will ever maintain a calm, unagitated condition of mind, always acting with coolness and discretion. Nothing is more disheartening to the unfortunate victim of an accident than to notice the nurse disconcerted or frightened. While difficulties may arise in which the nurse is absolutely powerless to act, there are, nevertheless, many emergencies calling for prompt action and of such a nature that much valuable aid may be rendered while the physician is being summoned. You will always remember that your first duty is to summon the doctor in the most direct way possible—see that a trustworthy person attends to this while you direct your attention to the patient. Next to that of a physician, the presence of a trained nurse should be most valuable at the time of an emergency. While others are standing shocked and helpless, her presence of mind will not desert her, but coolly, calmly, deliberately and intelligently will she do the right thing in the right way, at the right time. She should be in absolute command of the situation, and this control of herself will go far towards steadying those about her, and making them of some help to her. To maintain and successfully carry out the principles just mentioned, the nurse must become acquainted with certain specific facts which are inseparably associated with each of the specific accidents that may occur.

Poisons.

A delay of a few minutes may lose a life. To the nurse or doctor, it is of no significance whether the poison was taken accidentally or intentionally. To save a life is the only objective point or consideration. So, whiel the nearest physician is being called, you will, after learning that poison has been taken, endeavor to find out what kind. Remember, that acids and alkalies counteract and neutralize one another. Thus, if an acid has been swallowed, then give at once an alkali dissolved in water. Among the common alkalis may be mentioned soda or saleratus—potash, magnesia, lime water. If an alkali has been taken in poisonous doses, then administer acids—such as vinegar, lemon juice, or the mineral acids, If the poison be an irritant, then you will give liberally bland and oily fluids to protect the stomach and mucous membranes of the throat—any oil substance, milk, white of egg, flour and water, etc. In all cases, the very first effort should be to evacuate the stomach, no matter what the nature of the poison. To this end, vomiting must be induced; the quicker the better. Among the various methods are:—

1. Tickling the back of the throat with the finger or a feather.
2. Large drinks of tepid water in which is dissolved plenty of salt or mustard, depending on the remedies at hand.
3. Produce vomiting by giving sulphate of zinc dissolved in plenty of water, or a teaspoonful of syrup of ipecac or wine of ipecac. Repeat the dose every 5 or 10 minutes until free vomiting is induced, no matter what is used as an emetic.

The ordinary remedies of the household can be used in almost any quantities without danger of injury. Of mustard or salt, use about a tablespoonful in a half pint of tepid water. A couple of teaspoonfuls of alum mixed with syrup makes a fair emetic. Cox's Hive Syrup, as per directions on the bottle, is a safe remedy. If you use sulphate of zinc, you will dissolve a teaspoonful in a glass of hot water. Vomiting will usually occur in 2 to 5 minutes. Certain neutralizing remedies are useful at times. The alkalies and acids in this connection have been mentioned.

Nitrate of silver, verdigris, or corrosive sublimate may be quite effectually neutralized with common salt and milk. The white of eggs is also a good domestic remedy, always following in every case at once with an emetic. Carbolic acid may also be effectually offset by giving freely dilute alcohol or whiskey. Paris green, of which the principal ingredient is arsenic, is sometimes taken by mistake. Its best antidote is to mix four tablespoonfuls of aqua aqua ammonia with two tablespoonfuls of tincture of iron. Strain through a cloth. A brownish precipitate will be left. This you will wash with water and give a teaspoonful every 10 minutes. Encourage vomiting.

Poisoning With Gas.

Loosen clothing; plenty of fresh air; dash cold water on face; inhalation of ammonia vapor; artificial respiration.

Opium or Laudanum.

Induce vomiting; give strong coffee; do not allow the person to lie or sit down for a minute. Keep him moving. Fresh air, cold douches, artificial respiration, if needed; electricity.

Artificial Respiration.

In all cases of suffocation or deprivation of air, such as would be brought about by smothering, hanging, choking, or drowning, where breathing has ceased, then artificial respiration must be resorted to, and for that reason, brief directions as to the method of performing same will be here given. There are several different methods:—

1. The Sylvester method.
2. The Michigan method.

3. The Marshall Hall method.
4. The Satterwaite method.
5. The Dr. Howard direct method.

The principles involved in all are essentially the same, hence but one method (Sylvester) will be explained. While the process is being carried out, warmth may be given the body by friction, and in case of drowning, by substituting dry, warm clothing or blankets for the wet garments.

Rule I.—Establish and maintain free entrance of air into the windpipe. This you will do by (a) removing tight clothing from face, neck and chest; (b) emptying mouth, nose and air passages. Do this by having the body put for a minute or two on an inclined plane, head and face downward. Then open the mouth, draw tongue forward, holding it with a handkerchief, and with the fore-finger of the other hand covered with a handkerchief, sweep around the mouth and throat, dislodging water, mucus, etc., that may prevent ingress of air. The tongue should be kept continuously from falling back, until breathing is established. An assistant can do this, or an elastic band placed around under jaw, holding firmly the tongue a little beyond the teeth.

Rule II.—Place body upon the back in best position for full expansion of chest, with head and body a little inclined slightly higher than the feet. Under the back, between the shoulders, must be placed something (a coat or shawls, a pile of sand), anything to throw out the ribs and afford greatest capacity of chest.

Rule III.—Imitate natural movements of respiration, i.e., make chest expand and contract regularly about 15 times a minute (at first 4 or 5 per minute, gradually increasing), with subject in the position mentioned), the operator kneels at the head, and facing the same, grasps both arms near the elbows, draws them steadily back well over the head as far back as they will go, where they are kept for a minute (this allows air to rush into the lungs—generally, air can be heard rushing through the glottis). Now bring arms down against sides with forearms crossed over pit of stomach. Leaning now with your weight upon them, you make forcible pressure upon the sides and abdomen; this will press up the diaphragm, and usually elicits a grunt-like sound from the patient, indicating the expulsion of air. If this sound is not heard, it is doubtful if the air entered the chest cavity when you drew the arms over the head in the first step. Repeat the two steps of filling and emptying the lungs—as a young child naturally breathes faster than an adult, so will you vary the rapidity of the respiration to agree with the age.

After the respiration has been established completely, you will with heat and friction, and hot drinks, further aid the vital processes. The ideas here suggested apply most particularly to drowning, but the same general principles will be carried out whenever artificial respiration is attempted. Never become discouraged in your efforts; breathing has been re-established long after every sign of life had apparently ceased.

Fainting.

1. Immediately place in the dorsal recumbent position. If possible, have the head and shoulders lower than the rest of the body (life may be lost by having person in erect position).

2. Loosen clothing, neck bands, corsets, etc. Dash cold water on face. Give plenty of fresh air. No need of any medicine. The patient usually recovers in a few minutes.

In fainting, you will observe the face becomes deathly pale, almost white, indicating that the blood has left the head. Ordinarily, all that is necessary in a case of fainting is to place the patient flat on the back and wait—soon the color returns to the face, and consciousness returns.

Apoplexy.

Patient falls, usually insensible; not always. Face may be flushed or pale. The pulse is full; the breathing more or less noisy. Paralysis of the face, or some of the limbs. You will maintain rest in recumbent position, loosening the clothing. If the head is hot, apply cold water. Call the doctor.

Burns and Scalds.

Burns are caused by contact of the body with fire, heated substances, or chemical agents. Scalds by contact with steam or boiling liquids. The danger is from shock, and from induced inflammation of internal organs. If you see a person on fire, act promptly. Pick up the nearest rug, carpet, coat, shawl or quilt. Holding it in front of yourself, wrap it quickly around the person, so as to smother out the fire. If nothing is at hand to thus wrap the person, then throw the person quickly to the ground or floor, and roll him over, at the same time have an assistant, if near, to dash a stream of water upon him. When the fire is extinguished, what then? Call the doctor, and proceed at once to:—

Remove, but cutting, all the clothing about the injured parts, being careful not to further disturb the portions burned. What will you do while the doctor is coming? After removing all the clothing as described, then you can do one of several things—first remember that the parts should be protected from the air. This you can do by covering thickly with vaseline, unguentum, or sweet oil, clean pieces of gauze or cotton (not absorbent cotton) and laying same gently over the parts. Another excellent plan is to sprinkle freely over the entire area injured, common soda (baking or saleratus), placing over this clean cotton thoroughly wet with clean water. This is easily applied and has a most useful effect. Sometimes a saturated solution of the soda with water is made and the cloths dipped into the same and then laid on the parts burned, moistening the same from time to time by sprinkling on some of the solution without removing the cloths.

Fractures and Dislocations.

Usually recognized by a change in the shape and function of the part, with pain, etc. Put the patient in as comfortable a position as possible, and let him wait the arriival of the doctor. No extreme urgency is necessary in the treatment, so wait until the family physician has come. He will then, if needed, call others. If the part is difficult to adjust, and gives much pain, he may desire you to aid by giving an anæsthetic. From the instructions already given you, and the further directions from the doctor, you will have no difficulty in doing this satisfactorily.

Hemorrhages.

From the nose.—Usually not dangerous, and ordinarily if one remains quietly in a sitting position, will cease in a short time. If the bleeding continues, several methods are advocated. Note which nostril is bleeding, then raise the arm of the affected side above the hea . as high as possible and hold it there. If both nostrils bleed, then raise both hands. Compress the nostrils, apply cold to the forehead or neck. Throw a syringeful of ice water or solution of salt in the nostril. Sometimes a solution of alum will do it. Plug the nostrils with absorbent cotton. If all this fails, call a surgeon.

From the Stomach or Lungs.—Absolute quietness in the recumbent position. Ice in tiny pieces to melt in the mouth. Cold over the region of the stomach. It need not again be told—call the family physician.

From a Wound.—Many a person has been known to bleed to death from a small incision, where a little intelligent attention would have prevented any untoward results. From your studies in circulation, you will know that blood from any artery must be pumped from the heart outward toward the extremities; it is of a brighter color; it comes in tiny spurts, to correspond to the beating of the heart. Blood from a vein goes from the extremities inward toward the heart. It is a darker color. It trickles in a slow, continuous stream. Your first duty then is to ascertain if the blood comes from an artery or vein. If from an artery, you will at once see that a compress or pressure must be applied between the incision and the heart. If from a vein, then between incision and the extremity. For instance, if a bleeding from an artery occur on the arm, forearm, wrist or hand, you would apply a pressure over the artery or tube through which the blood was being pumped by the heart to the opening. You would further elevate the hand, extending the arm above the head (a fluid does not easily flow uphill).) If it should be a vein that is injured, then you apply the pressure between it and the extremity—of course, in this case, letting the hand hang down. The same method will be followed with any wound in the lower limb. If an artery, the pressure will be just above the wound. If a vein, just below it. To apply a pressure, you ean take a large handkerchief, tie a knot in it, plaee this knot over the vessel whieh is emptying its eontents through the ineision—now tie the handkerchief loosely; slip a short stick through the loosely tied handkerchief and twist it round to make the pressure sufficiently strong to cut off the exit of the blood. If a strong pressure does not do this, then you have not got your knot on the vessel, so ehange its position slightly and tighten it again. This pressure must be kept up until the surgeon arrives.

Free hemorrhages from ordinary euts or bruises ean generally be stopped easily by making a pressure direetly over the part injured. This may be done with a bandage or by pressure with the finger or thumb. The same to be continued until the doctor arrives or clotting or eoagulation has oecurred.

Lecture 24

BACTERIOLOGY AND ANTISEPTICS.

One of the most conspicuous features in the field of medical research that has developed within the past quarter of a century, is the knowledge that has grown out of a study of those low forms of life, commonly known as germs or micro-organisms. As we learn more and more of the remarkable influence that these microscopic lives exert on the human organism, so has the discerning student become impressed with the conviction that such knowledge lies at the very foundation of preventive medicine. With the unaided eye, the demonstration of the existence of the so-called germ or bacterium could never be possible. If the natural eye should suddenly be increased to 1,000 times its present power, what a bewildering scene would meet the gaze. The plants and animals with which we are now familiar would sink into insignificance, as we compared their numbers with the countless millions of diminutive creatures that had suddenly presented themselves to view.

Where would we see them? Everywhere. In the air we breathe, we would see them floating. In the water we drink, we would see them swimming, yes, on every inch of ground upon which we walk are they. With the microscope, that greatest of the scientific instruments of the age, man easily crosses the boundary line that has hitherto shut off communication with this world invisible. As we view with awe for the first time these strange entities, we are struck with the minuteness of their dimensions. They are so much smaller than any object that we have ever measured, that we really can form but little conception of their length and breadth, by comparison with the things we have been acquainted with hitherto. Which of us forms any idea of an object that measures 1/20000 of an inch in length? We speak of this dimension as it is an average one in connection with these organisms. It has been estimated that 400,000,000 of these tiny lives could comfortably stand or rest on a single square inch of surface. Just think of it! A population 100 times greater than London, living on a square inch of ground. And now that you have been told something about the size of these pygmies, let us observe their shape. It is extremely simple. In referring to the shape, we will at the same time give a classification ordinarily adopted, in the main, by different writers, and based largely on the particular form or shape of the micro-organisms, all of which belong to the vegetable kingdom.

I. Bacteria.—(1) Micrococci, spheroidal, granular like. (2) Bacilli, rod like in form. (3) Spiral, or corkscrew in shape, when very short in length this kind is called the "comma."

II. Saccharomycetes.—This is the so-called yeast germ, is large and oval in form.

III. Moulds.—Long threads, appear as hairy patches in foods, jam, bread, and meat which has been exposed to air and moisture.

You will, therefore, from the outline just given, observe that these micro-organisms, or microbes, have three great classes—bacteria, saccharomycetes, moulds. That the first class and the most important one from the physician's standpoint, the bacteria, has three sub-classes, viz.: micrococci, bacilli, spirrila. Now, as we examine more closely under the microscope, we find that each of these sub-classes may be divided on a basis into more minute divisions. Such as is below indicated:—

1. Micrococci—(a) Diplococci, arranged in pairs. (b) Streptococci, arranged in chains or rows. (c) Staphylococci, arranged in grape-like masses.

All of the micro-organisms may be classed in the outline just given. As it is quite well known, some microbes are closely associated with health, others with disease. The latter is usually referred to as pathogenic, or disease producing, bacteria. Pyogenic bacteria are those that produce pus, of which there are several varieties. The most common is the staphylococcus pyogenes aureus or the orange colored pus microbe of the staphylococci variety. There is another quite common pus microbe, the staphylococcus pyogenes albus, or the white pus microbe of the staphylococci variety. Quite frequently, too, is found the staphylococcus pyogenescitreus—the yellow pus germ. This is an important pus microbe belonging to the streptococcus class—known as the streptococcus pyogenes.

All these microscopic lives grow and multiply by that process we call fission or subdividing, each part then assuming an independent existence. It is estimated that a single bacillus will, in 24 hours, increase to 16½ millions.

How to destroy the pathogenic microbe is the vital question in all antiseptic precautions. Certain specific degrees of temperature are conducive to the growth of each class. For a long time it was thought that a freezing temperature would destroy them. It is now thought that it does not kill them at all, but preserves their life instead. Ice must be pure water before frozen, else it will retain all of its original impurities.

Dry heat scarcely affects the vitality of certain kinds of microbe life. Boiling water for half an hour means certain death to all bacteria. Many bactericidal drugs are known—Koch says that corrosive sublimate, 1 to 1,000, will destroy the most powerful organism, in a few minutes. Carbolic acid is considered very good. Boracic acid, also, and many others have recently come into use.

MOTILITY.

One of the most interesting and fascinating microscopic spectacles is to observe the varied motions of the countless swarms of these individuals crossing the field of the microscope.

The bacteriologist must view them more minutely than can possibly be done in the living state, so he accentuates their appearance by staining or coloring their bodies by different dyes. And here a striking peculiarity appears. Some of the bacteria have a decided affinity toward certain dyes, others exhibiting an exactly opposite nature. Some have an envelope which prevents the entrance of certain staining matters, others are easily acted upon with the same. Much of their nature has been discovered along lines of study in this direction.

Reproduction.

A very simple process and, under favorable surroundings, occurs with enormous rapidity.

Micro-organisms in Air.

Aerial micro-organisms (yeast). It is the firm conviction that many infectious diseases are propagated by means of air-carried microbes. A discussion as to how various experiments have been carried on, is out of place here. It suffices to say that much has been learned showing how we may escape from the baneful effects of some of these pathogenic germs; also how to avoid their conveyance and distribution from place to place. The knowledge thus gathered has led to vast improvements in the construction of hospitals, sick rooms and the care of the individual in health and disease. It is the foundation of the antiseptic treatment of wounds, with which the name of Lister is indelibly associated.

Micro-organisms in Water.

Interesting and instructive as is the study of the aerial microbe, it is of no more significance than that of the water. Dr. Koch was the pioneer in this department of bacteriology. Even the so-called pure water serves as a home for some kinds of bacteria. Different kinds of water, however, hold them in different proportions. 1. Filtration through sand lessens their quantity, and forms a protective measure against our infection by water-carried microbes. 2. A filtration through porous strata of chalk is even better. 3. Much less number in sea water than in fresh water.

Useful Micao-oaganisms.

1. Conversion of sugar into alcohol by means of (saccharo-mycescerevisiæ) yeast. A particular kind of germ for each kind of alcoholic liquor (mycodedrma aceti) consumes the alcohol and transforms it into vinegar.

2. Produce decay of animal and vegetable matter.

Malignant Micro-oaganisms.

Pathogenic—Activity of microbes produces cholera, scarlet fever, typhoid, measles, smallpox, diphtheria, hydrophobia.

BACILLI FORMS.

1. Blood from an animal introduced into a person.
2. Outside—an artificial medium.

THEORY.

Specific symptoms due, not to mere presence, but to the fact that they elaborate within the tissues certain highly poisonous substances and that these poisons do the damage. It is the absorption and circulation within the system of these that give the characteristics of the various diseases. Each microbe may be likened unto a laboratory for the manufacture of poison. We call such substances ptomaines.

In an attack of these diseases, it is now believed there is instituted a conflict of warfare between the microbes of a certain element in the body. These are believed to be the colorless corpuscles of the blood, which for a time were called leucocytes. Indeed, this martial spirit of the leucocytes has been observed under the microscope. Metchnikoff and others have observed them muster in large numbers and engage in active combat with invading bands of marauding, pathogenic organisms.

It is supposed by some investigators that every contagious disease has its specific, pathogenic microbe. However, the identity of the germ in every case has not as yet been demonstrated.

The germ of erysipelas is called the streptococcus crysipalitis; that of gonorrhœa, the gonococcus—it belongs, of course, to the diplococcus. Of tetanus, the bacillus tetanus; of tuberculosis, the tubercle bacillus. Of anthrax, the anthrax bacillus. Of diphtheria, the Klebs-Loeffler bacillus. Of typhoid fever, the bacillus typhosus.

Supplementary Chapter on Cleanliness

CLEAN HANDS.

"What, will these hands ne'er be clean?"

It has been said that the modern surgeon "is, or should be, the cleanest man that walks the earth." If we look at the surgeon's hands we shall see that they are the hands of a gentleman; white and clean; kept with care and well acquainted with the use of soap and water. But the surgeon's hands, clean to the eye of the looker-on, are the weakest link in the chain of asepsis and antisepsis. In the crevices and wrinkles, under the nails, down in the depressions, imbedded in the tissue lurk unseen death-breathing particles of infection from which there has not been found an effective method of relief.

In the medical press, in the association meeting, the question: "Can the surgeon's hands be sterilized?" has become a threadbare subject for discussion.

Numberless germ-killing agents have been discovered and no end of methods for hand-cleansing have been tried and abandoned; still the problem remains unsolved.

In the practical suggestions offered it is observable that the mechanical methods seem the more promising in their results, and further, that the intelligent use of such simple material as soap and water is essential under every procedure thus far devised.

It may be, therefore, that the goal of cleanliness for the hands is not far away, and when found will be a process that is not only very simple but which is also effectual.

DISINFECTION OF THE SURFACE OF THE BODY.

Since Eberth, in 1875, demonstrated the presence of various bacteria in normal perspiration, and described the colonies which they form upon hairs, a number of investigators have interested themselves in the germs on the surface of our bodies, and, as a result there have been discovered a great profusion of organisms.

While the tissues in the interior of our bodies are free from bacteria, the outer surface simply swarm with organisms of the most varied species,—moulds, yeast fungi, bacilli, cocci, and color and odor-producing bacteria are present in numberless herds. And this is not surprising, as all the conditions which the lower organisms require for their existence, are found associated upon the surface of our body. A uniform temperature favors their growth, the secretion of the cutaneous and mucous glands provides the necessary moisture, and dead epidermal cells, animal and vegetable substances of the most varied origin afford the necessary culture-medium. It is true we have not as yet been successful in separating out of this conglomeration a special class or a number of special varieties, as particularly epithelial germs; it appears to bo rather a diversity of forms which are present. In a very fluctuating way, first one variety and then another is predominant. The opinion of Bordeni, that the inhabitants of every land and every region have their special and peculiar epidermal bacteria, may be accepted as correct; indeed individuals of every occupation may have their characteristic germs nesting upon them, according as their vocation brings them in contact with different organisms. We encounter bacteria with extreme frequency, and they adhere to the surface of our bodies with such readiness that after only a transitory contact with a material containing germs its distinct traces will be found upon the individual even though apparently perfect cleansing be practised. Nothing in this particular is more instructive than the observations of Furbringer. This scientist engaged in work for short intervals in his garden, and found that, even after washing his hands, various garden bacteria remained about the finger nails. At another time he handled specimens of urine, and later investigations revealed to him the presence upon his hands of numerous germs of the micrococcus ureæ group, which are the cause of the alkaline fermentation so frequently observed in voided urine.

The regions which are covered with hair, also those in which the product of the sweat glands is especially abundant — the axillary space, the interdigital folds, and the furrows about the anus—are the places of predilection for the bacteria upon our cutis. The oral cavity (Miller) and the entire intestinal tract harbor normally myriads of micro-organisms. In the genital tract of the female, as far as the os uteri internum (Winter) also in the upper respiratory passages and in the outer part of the urethra, large masses of schizomycetes are present; and so are the conjunctival secretion and the cerumen of the ear rich in germs of the same nature. These microbes, already vast in numbers, often increase to an almost incredible extent after only slight disturbance in the normal superficial continuity. An augmented secretion, a slight catarrh, or a mild degree of eczema, causes the thousands of germs to multiply to as many millions, and innumerable becomes the host when there is a suppurating wound, a fistulous tract, a superficial ulcer, an ichorous cancer, or similar conditions. We must confess that it is not as yet positively proven whether the germs of pus formation so much feared, and the genitors of the severe pyæmic and septicæmic processes, belong to the regular and customary micro-organisms of the surface of our body. Occasionally, according to all observations, they are present, and the luxuriant development which normally exists implies that as the various non-pathogenic micro-organisms find upon the cutaneous and mucous surfaces the conditions necessary for their growth and proliferation, so also may the pathogenic bacteria colonize upon our bodies as our vocation or incident exposes us to them.

REQUIREMENTS FOR THE STERILIZATION OF SKIN AND HANDS.

Among the requirements which must be carried out, if we wish to attain sterilization of the skin without the use of chemicals, are the following:—

I. The method must work with entirely aseptic and purely mechanical operative material.

II. The preliminary cleansing may be done in clear running water, but the final rinsing must be accomplished in sterile running water.

III. The agents employed must remove the scurf of the skin and rinse it away.

IV. The soap selected for the loosening of skin scales must be a solvent of fat and must contain alkaline principles which emulsifies the fats of the skin.

V. The act of disinfection must not injure the skin, and must insure thorough satisfactory disinfection.

VI. The entire process of disinfection must be brought to completion in one continuous and uniform act.

VII. The aim of the rational asepsis is the washing away of bacteria as well as their extermination.

The necessity to employ materials absolutely free from germs is self-evident.

Brushes are the great if not the greatest source of fault. They can only with great difficulty be kept sterile, or even clean in the ordinary sense. They are absorbers and preservers of dangerous contaminating material which can only be removed by repeated sterilizations. Burning after once being used is the only sure method to avoid transference of infective matter through the brush.

Likewise, alcohol is a liquid of doubtful sterility, never sterile after once being used.

Danger of deficiency in asepsis increases as the operations multiply in number with the use of non-aseptic, or partially aseptic material.

Destruction of bacteria upon the skin has failed in practice and shown to be impossible of attainment, because all measures taken against the life of bacteria endanger also the living material of the cells of the skin.

Skin Scurf.—The necessary point of attack in the asepsis of the skin is the skin scurf and the bacteria clinging upon dead material. In almost every instance they may be found accompanying excretory desquamative, necrotic products of the skin as their life is supported by these portions of the tissue. In the nature of the case, therefore, the less desquamated material and the less scurf our epidermis bears the fewer chances we offer for refuge of bacteria. The deeper we penetrate into the epidermis, the nearer we come to the layer of malpighi and of necessity so much more by nature is the skin made sterile. We cannot, however, in practice, carry this to a logical conclusion. The constant filing away or burnishing the hands with a rough material like sand, sapolio, pumice, etc., would soon render them so tender as to become impracticable: again we are confronted with the problem that the skin does not present a smooth and even surface, that depressed, sweat, sebaceous and hair glands sink deep tubes into the epidermis and cuticle, the inner surface of which contains secretory material with which will be found the bacteria.

Ordinary disinfection or ordinary scrubbing does not reach these depressions. It is desirable to reach this skin scurf and the embedded bacteria and expel them by rinsing them away.

In the region of the nails and other parts of the hands, there are increased layers of hornlike thickening of the ceraline layers of the skin which are with difficulty loosened even by the most vigorous mechanical rubbing. Such layers are most numerous in the hands of those who, through the use of chemicals, alcohol, corrosive sublimate, etc., have brought about a callous process. These horny scurf layers must be softened, loosened, and finally removed.

Alkaline Soaps.—The soaps ordinarily employed for hand disinfection do not loosen the horny cell layers. Such soap should not be neutral but alkaline. An alkaline soap renders the ceraline substance at once soft and pliable.

By means of the alkali, the fats and perspiration acids of the skin, cholerstine and wax acids, are rendered soluble and removable by water.

The natural and unnatural fats of the skin not only harbor bacteria but likewise bear the products of bacterial action, ferments, toxins and other agents that are liable to be productive of imitation.

We may here call to mind, that chemical agents are in themselves liable to aggravate these conditions upon the epidermis.

An exact condition of cleanliness would require that these crystalized and hardened fatty soils should be dissolved and removed.

Whoever wishes to remain clean must always have a healthy skin. for very irritation of the same, each hyperkeratos or hyper-secretion, each secretion anomaly results in a culture (soil) for bacteria growth. Every chemical put upon the skin becomes a scientific fertilizer for the bacterial field. The less chemical disinfection we use upon living material so much better must be the chances for an absolute sterilization. And the further we proceed with purely mechanical sterilization the more we find this does not injure the skin, but even strengthens it. A means of disinfection which attacks the living energy of the bacteria must unconditionally attack also the energy of the skin, and these it can only repel by hyper-functions, increased desquamation, rete-malpighi regeneration. But, therewith, goes hand in hand the heightened hyper-secretion, hardening and scurf-creation, and these form for the swarming bacteria excellent breeding places and homes.

The work of exterminating bacteria from the skin by chemical agents cannot be followed without destroying the skin. The act of removing bacteria from the skin by mechanical operative procedures (driving them away) may be constantly pursued.—Dr C. S. Schleigh in *Neue Methoden der Wundheilung; Ihre Bedingungen and Vereinfachung fur die Praxis.*

BACTERIA OF THE SURFACE OF THE BODY.

The following species of bacteria have been found upon the surface of the body:—

Non-pathogenic.—Diplococcus albicans tardus, Diplococcus citreus liquefaciens, Diplococcus flavus liquefaciens tardus, Staphylococcus viridis flavescens, Bacillus graveolens, Bacillus epidermidis, Ascobacillus citreus, Bacillus fluorescens liquefaciens minutissimus, Bacillus aureus, Bacillus ovatus minutissimus, Bacillus albicans pateriformis, Bacillus spiniferus, Bacillus of Scheurlen, Micrococcus tetragenus versatilis, Bacillus Havaniensis liquefaciens.

Pathogenic.—Staphylococcus pyogenes albus, Staphylococcus pyogenes aureus, Streptococcus pyogenes, Diplococcus of Demme, Bacillus of Demme, Bacillus of Schimmelbusch, Bacillus of Tommasoli, Bacillus saprogenes II, Bacillus parvus ovatus.

BACTERIA OF THE SURFACE OF THE BODY.

The beard as a source of infection.—Huebener (Centralbl. fur Chir., No. 11, 1899) found by holding petri dishes containing agar a short distance under the beard while a sterile instrument stirred the same lightly that 42.3 per cent. of twenty-six beards thus examined contained pus-producing germs.

EXPERIMENTS IN HAND DISINFECTION.

Dr. Leonard Freeman, of Denver, Colorado, at a meeting of the American Surgical Association, detailed the following in using instruments in hand disinfection:—

In the early days of surgical cleanliness the sterilization of the hands was supposed to be easy of accomplishment, but we have gradually learned that it is an exceedingly difficult and complicated problem. The microorganisms, unfortunately, are not strewn upon the surface of the skin like grains of salt upon a plate, but they lie in creases, between and beneath the epithelial scales, and down deep in hair follicles and the openings of sweat glands. The regions about the nails offer particularly favorable hiding places. It is extremely difficult to reach all these microörganisms with antiseptics, not only on account of their impregnable positions, but also because they are protected by grease and by being bunched together. The full significance of this bunching together is not always recognized. An antiseptic will kill the germs on the outside of the bunch, but cannot reach those within. Some time ago I dried portions of a culture of the staphylococcus pyogenes aureus on a platinum wire and immersed the instrument for half an hour in five per cent. carbolic acid. The antiseptic was then washed away in boiled water and the wire plunged into gelatin. A luxuriant growth was obtained.

After operating for some time, the hands, which were apparently sterile at the beginning, are often found to be seriously contaminated.

In discussions on the subject this is usually said to be due to maceration in the fluids of the body and to friction on tissues and instruments. It struck me that this explanation was not sufficient. It might account for the appearance of a number of germs, but it could not account for all of them. The preliminary scrubbing and maceration of the hands would certainly dislodge most of the bacteria capable of being dislodged by these means. It seemed likely that many germs were floated out of the pores by perspiration which is generally excessive, owing to the heat of the operating room and the nervous tension of the operator. This hypothesis would also account for the greater number of bacteria which appear upon the hands when rubber gloves are worn.

In order to test the point I made some experiments, in which I assumed that a single finger, with its palmar and dorsal surfaces, its joint creases, and its nail, fairly represented the entire hand from a surgical and bacteriological standpoint. As a culture medium I employed gelatin contained in morphine bottles, each bottle being about two-thirds filled. A finger inserted into such a bottle snugly fits the opening, thus excluding atmospheric contamination. In each experiment the finger was left in the warm melted gelatin about ten minutes, and continually moved about and rubbed against the bottom and sides of the receptacle, thus stimulating as far as possible, the friction maceration, etc., of a veritable operation. The flesh was frequently pushed away from the nail against the bottom of the bottle, so as to freely admit the gelatin to the subungual space.

Many experiments made to determine the value of methods of cleansing the hands have been rendered valueless by neglecting to remove all traces of the powerful antiseptics employed before immersing the hands in culture media. Very small quantities of an antiseptic such as bichloride of mercury are capable of exhibiting germ-growth to a considerable extent. It is not sufficient to rinse the hands in boiling water: chemical means must be employed. Ammonium sulphide answers the purpose well, and it is astonishing to note, when bichloride has been used, after careful rinsing in plain water, how black the fingers will become upon dipping them into the ammonium compound. (The stain can be removed with chloride of lime).

DISINFECTION OF THE SURFACE OF THE BODY.

Experiment 1. Hands scrubbed in warm water and soap, nails cleansed, hands scrubbed, washed and soaked in alcohol and then in bichloride, rinsed in boiled water, index finger dipped in ammonium sulphide and then brought into gelatin. About thirty cultures were obtained.

Experiment 2. The hand was then wrapped in sterilized towels and thoroughly perspired for some minutes in a Beck's hot-air oven. Another immersion of the same finger in gelatin furnished about sixty cultures, just double the original quantity, although the same finger being used, the number should theoretically have been less.

Experiment 3. The hand was then re-scrubbed and resterilized, and the finger again placed in gelatin. But fifteen cultures were obtained.

Experiment 4. The sweating process was again gone through with, following which but two cultures appeared in the nutrient medium.

It was thus demonstrated that, although sweating the hands in this instance doubled the number of microörganisms, a second sweating failed to bring any more to the surface.

It being quite certain that the finger nails are the most prolific sources of infection, it occurred to me that by using, in addition to the usual cleansing, a small rapidly revolving brush attached to a dental engine, I might clean beneath the nails much more effectively than is usually done. It certainly seemed that I could brush the subungual space with the most minute thoroughness; but much to my surprise I obtained so many colonies in the gelatin that I was practically unable to count them. It seemed that I merely succeeded in loosening up the microörganisms. On another finger of the same hand, upon which the revolving brush was not employed, the germs were found to be much fewer in number.

In order to exclude error, the experiments were repeated with similar results. Wishing to be certain that some of the cultures did not arise from germs contained in the ammonium sulphide I poured a little of that compound into gelatin on two separate occasions with negative results.

I also took occasion to test several processes of sterilizing the hands which are in common use: the chloride of lime method, the mustard method, and the permanganate of potassium and oxalic acid methods. With the two first mentioned I obtained so many colonies throughout the gelatin that I could not count them. This I attributed largely to the fact that I copied fairly accurately, the conditions of a surgical operation by soaking a finger for ten minutes in warm gelatin, rubbing it with force against the sides and bottom of the bottle, and admitting the culture medium freely beneath the nail. Many experimenters, I believe, have contented themselves with simply immersing the hands in nutrient gelatin and perhaps moving them about a bit, which is not sufficient. With the permanganate method between fifty and seventy-five cultures grew; hence this process, according to my experiments, stood next in efficiency to alcohol and bichloride.

Reinicke was unable to render his hands aseptic either by brushing them for fifteen minutes with green soap and hot water or by the use of five per cent. carbolic acid. 1-1000 bichloride of mercury, sublimate soap, chlorine water, one per cent. lysol, tricresol, or sand soap.

Based upon my own experiments and those of others, I feel that the following propositions are approximately correct:—

1. None of the methods of sterilizing the hands can be absolutely depended upon. Many positive results are arrived at by means of

faulty experimental technique, the culture media becoming impregnated with antiseptics, the skin temporarily hardened by alcohol, formalin, etc., or the hands not subjected to sufficient maceration and friction in the culture medium.

2. Under circumstances where it seems desirable to do so, much may be accomplished by sweating the hands in a hot-air oven, by wearing rubber gloves for some time prior to an operation, or by immersing the gloved hands in hot water. In other words, giving the hands a Turkish bath. Mere prolonged soaking in very hot water, although not so effective as dry, hot air, must have some favorable effect. It is difficult to understand, however, how the sweating method can dispose of all the microörganisms beneath the nails. The procedure will hardly be extensively employed, owing to its inconvenience.

3. Excessive brushing beneath the nails, as much even as the sensitive tissues will tolerate, seems merely to stir up the bacteria. We can hope to accomplish little by this means.

4. So far the only really reliable means of rendering the hands aseptic is to incase them in sterilized rubber gloves. But if the gloves become torn, as they often do, the danger of infection is considerable, owing to the bacteria which have accumulated beneath, from perspiration.

5. Coating the hands with various substances has been tried and found ineffectual.

6. Cotton gloves, although they soon become contaminated by exudation from the skin, probably do some good, especially if frequently changed, by filtering out the bacteria, as it were, and preventing their entrance into wounds.

INSTINCTIVE CLEANLINESS.

Schleigh maintains that it is the duty of a surgeon to take care of his hands even more outside of his professional occupation than while employed in it, for the reason that it becomes easier to cleanse ones self for an operation, the cleaner one has kept himself during the period of rest. The centre of gravity of surgical cleanliness is based more upon the skin's instinctive cleanliness and care of the skin than upon it per force in one single surgical operation. The one who is ever watchful about his personal cleanliness will find it easier to present himself aseptic for an operation. Cleanliness for its own sake is the surest way to easily fulfil the object of being useful to others. The germ freedom of the hands made possible by the many daily sterilizations, if properly performed render it difficult for bacteria to exist upon the skin. The skin may be made sterile by means of fractional aseptifying just as liquids are made sterile by fractional heating. This work of driving away bacteria from our bodies must be constantly pursued. In the clinic the requirements are whoever has nothing to do must sterilize himself.

The duty is always necessary and paramount.

This cleansing should be performed even without direct use for it.

even the cleansing for amusement or for instruction is of decided value. To it I attribute in a great measure the success which I enjoy, and it is of especial value where at a moment's notice the call sounds for "All hands on deck."

In the beginning, a newcomer among us often sneers at this mania for cleansing, but his smile disappears when he sees the results of our infection experiments, done for the purpose of controlling or portraying our methods. He sees by the results that we have outstripped him and that he is manifestly unclean.

SCHOOL FOR CLEANLINESS.

Schleigh lays great stress on what he calls a "school of practical asepsis." He states that: "There is absolutely no better means to persuade the learner or teacher of his ability or inability to cleanse himself than by actual inoculation. The physician who from time to time views his own hands in the mirror of the culture tube will attain a well grounded knowledge as to whether he is clean or only thinks himself clean. Everything else is conjecture and often a dangerous form of optimism, the truth is only brought out by a scientific examination. Whoever knows how to remove bacteria from his hands will also know how to remove any other kind of impurities. It is quite certain that the more quickly we succeed in removing the living impurity, the more certain we are to eliminate all other possible infection (ferments, rancid fats, acids, perspiration, particles of dust, tox-albumin, etc.)

"If I were to have the honor and good fortune to be an instructor of surgery, the first innovation which I should feel it my duty to inaugurate would be the institution of courses fitted to instruct my scholars in cleanliness. A school for cleanliness with organized courses of instruction in the art of surgical cleansing. I should require that each of my pupils should have passed through a course which would test his ability to render him aseptic for an operation. Such a course is a present necessity not only for young physicians but for midwives, nurses and assistants of all kinds. This course in practical surgical asepsis would test the ability or non-ability of the scholar to free his skin from bacteria; it would teach him that germlessness is attainable. The inoculation results will teach the pupil that he is unclean and unprepared to handle wounds. It will bring him gradually to a point where he may gain for himself that which is the imperative condition. I would require that one after another of the pupils should frequently walk up to the cleansing bowls, pull off his coat, and disinfect himself. The instructor to stand ready with the inoculation needle and culture tube in hand. After he completes the act, his index finger is taken, the inoculation needle probed into the nails, into the creases and folds, and plunged into the culture tube; the tube bears a label with the name and the date of the person affixed. In one to three days the instructor writes the results of the test. Thus will it be demonstrated who has a talent for cleanliness and who has not. The young collegians will learn how to cut the nails, how to protect and strengthen the skin, the difference between being called clean and being aseptic. This idea may be called 'romantic,' and yet I urge these requirements in earnest. Where else can the embyro physician better learn the method for cleansing his hands from bacteria, than in such a manner? Usually from a high auditorium seat he sees the top of the heads of the assistants and hears the clatter of wash bowls, he copies the rules. 'first wash three minutes with brush and soap, then in alcohol, then in sublimate,' and if he does not have the good fortune to become an assistant he can only learn by his own sad mistakes how to perform the act. On the basis of systematic drill he should convince himself of the attainability of the highest aim. He should be taught that he can make himself aseptic. 'Not one bacteria colony has been picked out in the last ten inoculations.' 'If you hold fast to this method you will fulfil the required conditions of asepsis easily and perfectly in your private practice.' I think that such a course would give to the collegian quite a different feeling under his feet than the ground of timidity on which he now stands. The physician's hands should bring to the invalid health, and should they not learn perfectly at the university how they may fulfil the necessary conditions? It is as if some one were to learn the theory of organ-playing out of a book, and then pose as a master before a church organ. It should not be permitted for any one to attempt to operate aseptically who has never held in his hand the inoculation tube and the inoculation pin. It seems to me a reproach against our colleges that we should have no course of instruction in the practical cleanliness of the hands. In my own practice, the newly entering assistant must first of all learn to sterilize himself, he must pare away his nails down to the epidermis on the inner surface. He must watch closely as to how we perform the act of cleansing the hands and he must imitate us, and after disinfection must follow the inoculation test with the platinum pin. The newcomer will soon convince himself that he must first be a learner in order to become a master, and soon a wholesome strife begins to exercise its power. The goal of perfect cleanliness is attainable, and I know of nobody who having once attained it will give it up. Sterility of the culture tubes in at least 97 per cent. is the requirement that can be attained. What comes above that is mastery, what falls below is negligence. The good student will ever strive until he reaches the highest goal."

STERILE WATER.

An abundance of both hot and cold sterile water from the onset of preparation to the final cleansing up, is essential in every operation. If possible, such water should be free from both organic and inorganic matter. The most desirable water is that which has been distilled or filtered. Whatever may be its source, it should be boiled in a clean vessel for ten minutes. Seemingly trifling, but of vast importance is the suggestion that a portion of the water should be allowed to cool so that when required the temperature of the hot water may be lowered by adding cold water to it. Ice should not be added to water that is to be used for surgical purposes. Water resulting from melted ice is not sterile. Hot water for aseptic purposes may be quickly cooled by surrounding it with ice. The temperature of water should not be taken with the fingers unless they are surely aseptic.

The importance of sterile water for the disinfection of the hands and skin is self-evident. Aseptic practices have taught that the original wash basin even when filled with sterilized water does not fulfil the requirements of surgical cleanliness. Even a large bowl of water if used for the cleansing of both the hands and the face without being renewed becomes a most dangerous practice. The present requirements are that the water for cleansing the hands and the skin must be that which has been boiled and kept ready for use in covered vessels and must be kept flowing through continuous pouring or else changed often during the washing. In the use of basins or simple bowls the matter just washed away immediately attaches itself to the hand as it moves about in the water. This can be avoided to some extent if the act of cleansing is performed with the hands raised quite outside the level of the water and the operator only plunges them into it for a hasty rinsing away of the loosened material. The nearer the hands become clean the longer they may be allowed to remain in the renewed sterile water without the danger of infecting the same. In the hospital or in the houses of patients where warm sterile water flows from the stopcock continuously, no danger of rinsing the infection into the bowl need follow.

Schleigh tells us that one cannot properly wash himself without a continuous exertion of energy to avoid reinfection, even in sterile water. He holds that one cannot properly wash himself and at the same time carry on a lively conversation, he deprecates the practice of using this period for the exchange of opinions, discussion of cases, etc. He says: "I simply consider it impossible to minutely cleanse oneself without concentration upon this act of my entire mental and bodily energy." "This thread upon which hangs a human life confided to us must be unconditionally spun with all the zeal at our command and with a certain enthusiasm which resembles the joyful proud feeling with which one holds the helm of a small boat carrying a valuable cargo fast in his hand, leaving no moment without attention whence and how the winds and sails stand. Timely withdrawal of the hands from the rinsing water, and proper renewal of the same, demand undivided attention and a careful survey of the whole range, scientific self-control and a consciousness which every one should follow."

SOAP AND WATER.

It is related that in connection with the Bureau of Health of a German city, a test was being made intending to show the most effective and economical method of disinfecting the woodwork of an infected premises. The method followed out was to smear the woodwork with a bouillon carrying a known species of bacteria. This being done, the advocates of the various methods would apply solutions or vapors as the case might be, afterwards a portion of the woodwork would be scraped, and if no growth had resulted, the woodwork would be considered disinfected. At this trial all sorts of chemical disinfectants, including formaldehyde, sulphur, etc., in fact, every conceivable method was used and the results and costs tabulated. The item of expense ran from twenty-five cents to two dollars per room. The time varied from a couple of hours to a couple of days. While this trial was going on, an eminent professor challenged the experimenters to smear the premises with their infection, and allow him to apply a simple remedy. This was done, and the results showed all bacteria were destroyed, in less than one hour at the expense of a few pfennigs. The professor's method was exceedingly simple and effectual. He employed a scrub woman, gave her a pail of hot water and some brown soap.

The legion of writers upon the subject of disinfection of the skin agree on one point, namely, the necessity for thorough mechanical cleansing. It has been conclusively proven that the hands and skin cannot be rendered sterile by dipping or immersion in any of the disinfectants now known. On the other hand, an examination of every method which has received any share of approval has included the use of soap, either in the beginning or the end of the process and as an important part of the same. Soap and water may be considered by far the most successful antagonists with which to combat the microörganisms of the skin. This is not to be wondered at when we consider that a soap that is strongly alkaline is capable of dissolving and, by aid of the water, removing the layers of dirt and secretion which lie upon the skin surface. Even thick layers of dirt, scurf, blood, pus, although hardened, can be made to succumb to soap and water when properly and thoroughly applied. But it has been found by experience that the ordinary soaps are by no means destructive to bacteria. Many of the antiseptic soaps (so-called) are useless and thus deceptive. This is especially true of the neutral and finer grades of toilet soaps, as well as the superfatted alkaline soaps; they have little or no action except upon the gross exterior dirt. They do not affect the masses embedded within the horny layers of the skin. Careful washing with a good toilet soap may make the skin clean as the word goes, but this is far short of aseptic cleanliness. Soap, to render the skin thoroughly clean, must be decidedly alkaline. The presence of the alkali is necessary to soften the horny skin scurf, to emulsify the layers of fat, to neutralize the fat acids deeply embedded and dried hard in the depressions of the epidermis.

But herein arises the difficulty, the highly alkaline soaps obtainable—soft soap, green soap, or even the laundry soaps—are caustic in action, and the surgeon sees in the scrub woman's hands the energetic action resulting from their continuous use. The ordinary alkaline soaps are very pulpy and sticky, and this stickiness increases with the alkaline content. It is evident that soap of this character would embarrass the operation by making the skin rough and by binding the infective material under a slimy coat. The requirement is for a soap that is in itself soluble, smooth, and which is sufficiently alkaline to soften, dissolve and emulsify the secretions of the epidermis whatever may be their nature, and by thus rendering them soluble make them removable by water. All this must be accomplished without injuring the texture of the skin.

Given this sort of an agent and thorough and intelligent use, the caustic skin-destroying chemicals may be relegated to the antiseptic junk shop. Under these conditions the hand and skin may be made aseptic by the easiest and most natural method that can be conceived, viz.: washing with soap and water, but the requirement is the right kind of soap, the right kind of water, and the right sort of man to use them.

ANTISEPTIC SOAP.

Experiments with many of the so-called antiseptic soaps have shown that the power of the antiseptics which they contain is destroyed by the soap itself. And further, that in them the antiseptics in many cases retard the activity and destroy the value of the soap as a cleansing agent. In Synol, however, a combination of cresol bases has been made to combine perfectly with the saponaceous compound, in which they are perfectly compatible.

The base of Synol itself is a highly alkaline soap made of perfectly pure fats, and in addition to, and above the germicidal action, the soap is one which aids in destroying or emulsifying the fats of the skin and hardened secretions and softens and loosens the skin scurf, so that the bacteria infesting the depressions of the epidermis and its deeper structure may be destroyed and washed away. In other words, Synol is germicidal, mechanically and chemically, the mechanical and chemical agents assisting each other.

This liquid antiseptic soap has been used in several clinics and by private operators for a number of years and the reports of these observers show that Synol accomplishes the sterilization of the hands without irritation and without destroying or roughening the skin. On the whole, it renders the skin smooth and soft, thereby lessening the chance of its harboring germs subsequently. Indeed, the constant use of this soap keeps the skin soft and pliable and preserves cleanliness in the deeper structures.

Everything connected with the process of manufacture of Synol is absolutely aseptic, from the preparation of the soap base to the container in which it is sent out from the laboratory. It is put up in a sterilized container with a cap which practically seals the contents of the container, and the contents may be distributed over the hands without fear of contamination of the soap itself. Synol has also been shown to be a most excellent lubricant. It is, in fact, adapted to every conceivable use to which soap can be put, and has been found to be an excellent addition to the bath and toilet of the surgical operators, nurses, attendants and patients.

FINGER NAIL DIRT.

The progress of bacteriology has shown that aseptic surgery means scientific cleanliness; the same lines of investigation show how very dirty people can be. Seventy-eight examinations of the impurities under finger nails were recently made in the bacteriological laboratories of Vienna, and the cultivations thus produced showed 36 kinds of micrococci, 18 bacilli, three sarcine, and various varieties; the spores of common mould were very frequently present. The removal of all such impurities is an absolute duty in all who come near a parturient woman or a surgical wound. It is not enough to apply some antiseptic material to the surface of dirt; the impurity must be removed first, the hand antisepticized after. It is sometimes said that the scratch of a nail is poisonous. There is no reason to suspect the nail tissue; it is more likely the germs laid in a wound form a bacterial nest under the nail. Children are very apt to neglect to purify their nails when washing hands; and this matter is not always sufficiently attended to among surgical patients. Personal cleanliness is a part of civic duty, and, as Dr. Abbott well expressed the matter in his address to teachers, should be taught to school children and insisted on in practice. The facts we have recorded might well form the text for a school homily, especially when any epidemic was in the neighborhood."—*British Medical Journal.*

STERILIZATION OF THE HANDS WITH SYNOL.

The hands are first immersed in water as warm as can be comfortably borne to wet them thoroughly, rubbing them together to accomplish this more thoroughly. Then a quantity of the Synol is poured into the palm of one hand and it is rubbed thoroughly into the whole surface by briskly rubbing one hand with the other. Then it is rinsed off under a stream of water from the basin faucet, or by dipping them into a basin of warm water. A quantity of the Synol is then poured on a stiff nail brush previously sterilized and every part of the hands, the fingers, about the nails and under the nails particularly, is scrubbed vigorously for two minutes (actual time).

The lather is now rinsed off and the nails, which should be kept short, are carefully cleaned with a dull nail blade or a flat pointed stick. Then taking a fresh supply of the Synol on the nail brush, the hands, fingers and nails are again scrubbed vigorously for three minutes more, after which the soap is rinsed off with sterile water as warm as can be comfortably borne. If this is done thoroughly, the hands will be sterile.

Afterwards the hands may, if desired, be rinsed off with warm sterile normal salt solution. But this need not be considered absolutely necessary.

When the forearms are to be sterilized with the hands, another five minutes must be consumed for this. The surface of the forearm, including the elbow and a little way above it, is first thoroughly wet with warm water. Then the pure Synol is rubbed into the whole surface with the hand, then with a coarse cloth upon which some of the Synol is poured. This should consume two or three minutes, then the soap is rinsed off under a stream of hot water. After this the surface should be scrubbed, with nail brush and Synol for two minutes and the soap rinsed off with hot sterile water several times.

When the hands are dried, only a sterile towel should be used.

When running water is not used for rinsing, and this is done by dipping the hands into a basin of water, the basin should be emptied and refilled with fresh water after the preliminary washing and again after the first scrubbing. Running water is much better for rinsing.

Where running water is not available, the rinsing may be done by pouring the water over the hands from a pitcher.

Fixed basins with stopper and chain should never be used, because they cannot be sterilized with any degree of certainty. When portable basins are used they should have no cracks and the inner surface must be smooth, and not rough. They should be previously sterilized by repeated boiling or by scrubbing with Synol and a sterile brush.

During an operation two basins of sterile water should be placed conveniently for the surgeon or his assistant to sterilize the hands when it becomes necessary. In one is placed a sterile nail brush and by the side of it a wide-mouth jar containing Synol. This is for scrubbing and washing the hands and the other is for rinsing afterwards. Another basin containing a two per cent. solution of Synol should be placed conveniently to be used for a hand douche when required to remove blood or fragments of loosened tissue adhering to them.

Hot water running through a pipe and coming from the ordinary kitchen boiler cannot be relied upon as positively sterile. It is always doubtful if all of it has been submitted to the necessary degree of heat for a sufficient length of time, and it has not been filtered.

To be satisfactorily sterile, water should first be filtered, then boiled for half an hour at least.

The advantages of Synol for sterilizing the hands are, viz.:

1. It requires so little time, five minutes being sufficient when the process is properly carried out.

2. The hands are left soft and smooth, and are not roughened or cracked by it, and do not become cracked afterwards.

3. It does not leave an unpleasant odor behind.

4. It removes the odor of contamination.

SYNOL IN OBSTETRIC PRACTICE.

Synol is useful in obstetric practice not only for sterilizing the hands and vulva previous to making examinations, but also for lubricating the examining hand and instruments, for irrigation of the genitals after labor, and for washing the infant, since ordinary soap does it very imperfectly.

The physician should thoroughly sterilize his hands before making his first examination by scrubbing them with nail brush and Synol for at least five minutes and rinsing them under a stream of hot water. The nails are to be cleaned, of course, during this process. The patient's vulva should be thoroughly irrigated with a one per cent. solution of Synol, or it should be washed carefully with the Synol on a pad of sterile gauze and irrigated afterwards. Then, if he remains with the patient and subjects his hands to no further contamination, he should rinse them thoroughly in a hot three per cent. solution of Synol, which should be kept standing ready, before he makes subsequent examinations. But if he goes away he should always scrub his hands thoroughly again on his return before making another examination.

If the hand is to be inserted into the uterus for the purpose of turning the child to deliver, or for removing the placenta, the forearm as well as the hand should also be scrubbed with nail brush and Synol.

Subsequent to labor during the lying-in period, and as long as the lochia continues, the external genitals should be irrigated freely twice every day with a one per cent. solution of Synol as warm as can be comfortably borne. If vaginal irrigation is required, the same strength solution should be used for that purpose. At least two or three quarts should be used each time.

If irrigation of the uterus is required, there can be nothing better than a one or two per cent. solution of Synol, since it softens and removes the adherent debris better than any other antiseptic that can be employed.

When Synol is employed during the lying-in period as directed above, the usual objectionable odor about the obstetric convalescent is entirely obviated.

Synol should also be employed by the obstetric nurse for sterilizing her hands, and she should keep them sterile.

CLEANSING THE FIELD OF OPERATION ON THE SKIN SURFACE.

The surface should first be lathered with the Synol, then shaved closely, removing all hairs. A piece of gauze, folded into four or eight thicknesses, large enough to cover the surface for three or four inches on all sides of the proposed incision, is spread thickly with Synol undiluted, so as to saturate it. This is done by placing the folded gauze on a flat, clean surface, and pouring the Synol over it, spreading it over the surface with a clean knife or spoon. This pad of gauze, saturated with Synol, is laid over the surface of the skin covering the site of the proposed incision and over this is placed a layer of sterile cotton which is held in place by strips of Z. O. adhesive plaster and a bandage.

This is permitted to remain from four to six hours, when it is removed and the surface scrubbed with nail-brush and Synol, then rinsed off with warm sterile water and dried with sterile gauze and afterwards covered with a pad of dry sterile gauze, which is not removed until the patient is placed on the operating table. This process is described for the benefit of those who believe a soap poultice necessary before incising the skin. Thorough scrubbing with Synol is sufficient to sterilize the skin.

The method advised, which is absolutely reliable, is to scrub the surface thoroughly with a gauze pad or nail-brush, saturated with Synol and wash off with sterile water as hot as can be comfortably borne. Then the surface should be shaved and again scrubbed. This is done twelve hours before the operation, and a pad of sterile gauze is placed over the surface scrubbed, and held in place by a bandage. If the skin has been irritated by the scrubbing, it should be dusted with Markasol under the gauze pad. This is removed when the patient is placed on the operating table and the surface is again scrubbed and rinsed with hot water as before.

In thin-skinned, sensitive women the nail-brush cannot be used.

When the abdomen is to be prepared for incision, the whole surface from the ensiform cartilage to the pubes and out to the limit on both sides is to be scrubbed and shaved. The depression of the umbilicus must be given careful attention, and in addition to scrubbing with nail-brush, the Synol must be poured into it, and then it should be scrubbed thoroughly with a pledget of gauze grasped in forceps or wrapped around a blunt stick or applicator.

The scrubbing should always be repeated on the table and after the soap has been rinsed off with plain hot sterile water, it may be rinsed again with warm sterile normal salt solution.

SYNOL IN DENTISTRY.

A dentist whose hands or fingers must go into a person's mouth should above all others have clean hands. The mouth, of course, is not the cleanest part of the body, yet everyone regards his own individual mouth the cleanest, and as a rule would not permit contamination from another if he knew it.

It is well known that both the staphylococcus and streptococcus are present on the hands of all persons, and we must believe that these germs at least and many others, no doubt, are present on the hands of every dentist who uses nothing more than the ordinary process of cleansing the hands. Though he may scrub them with nail-brush with the ordinary soaps, the hands are still not clean. He may perfume them to render them more attractive, but it is a delusion. They are still unclean.

With Synol and hot water, a thorough scrubbing with nail-brush, will render the dentist's hands positively sterile. He can certainly afford time between patients for this purpose. Very soon his patients will insist upon it, or leave him for some competitor who is more careful.

STERILIZATION OF INSTRUMENTS.

The sterilization of instruments may be accomplished with Synol by two processes, viz:—

First:—The instruments are first washed thoroughly with Synol, using a nail-brush and having the instrument resting upon a hard surface, such as a marble slab. Then, after rinsing off the soap, they are tied up in clean towels, placed in a boiler with two per cent. Synol solution and boiled for three minutes.

Repeated boiling undoubtedly injures metal instruments by destroying their temper and causing them to lose their polish and eventually to rust.

Second:—The instruments are first placed in a basin or pan, and covered with a warm solution of Synol (two or three per cent.) to soften and loosen the blood, pus, etc., that has dried on them or which adheres to them. Five or ten minutes' soaking in this solution is sufficient. Each instrument is then lifted out separately and the smooth parts are rubbed thoroughly with a pledget of gauze soaked in the Synol pure, and the serrations and locks are scrubbed with a nail-brush saturated with the Synol, the instrument being laid on a hard surface, or the nail-brush may be used on the whole surface.

When the scrubbing of each instrument is finished, it is placed in a clean basin with the soap still adhering to it. When all are finished, the soap is rinsed off by pouring boiling hot water over them repeatedly until no evidence of the soap remains.

The instruments must not be handled after they have been rinsed but must be dried with a sterile towel or a piece of sterile gauze.

Edged instruments (scissors and knives) must be sterilized separately, so as to obviate contact of their cutting edges with the other instruments. Scissors must have their locks and handles well rubbed with a pledget of gauze soaked in Synol, taking care to go over every portion of the edges thoroughly. They are then placed in a shallow pan with their blades separated and some of the Synol poured over them. After five or ten minutes this is rinsed off by pouring boiling water over them.

Knives with metal handles are sterilized in the same manner, but if the handles are smooth and not roughened, the nail-brush need not be used. If the knives have ivory, bone, shell or ebony handles, they can only be satisfactorily sterilized after they have been washed as above, by boiling in three per cent. Synol solution for two minutes, or by passing the whole knife, handle and all, several times through an alcohol flame, holding them with a pair of forceps. The alcohol flame is obtained by pouring a small quantity of alcohol into a saucer and igniting it.

Hollow metal or glass instruments, such as double current irrigators, catheters, aspirating canulæ, drainage tubes, etc., are to be sterilized by boiling in a two per cent. solution of Synol for three or five minutes.

SYNOL AS A LUBRICANT

FOR THE EXAMINING HAND AND FOR INSTRUMENTS.

The hands should always be washed clean or sterilized with nail-brush and Synol before a digital examination is made, for although the vagina frequently harbors germs, no physician should take the chance of carrying infection into it on his hands or the examining finger. The examining finger being clean, it may be dipped into a jar containing Synol and the examination proceeded with. Or a quantity of the Synol may be poured into the palm of the left hand and the examining finger may be coated with it by rolling it in the palm of the other hand containing the soap, which is then rinsed off the free hand by placing it under a stream of running warm water or dipping it into a basin of warm water.

After the examination the soap is easily washed off under a stream of water from the basin faucet or in an ordinary basin of water, more of the Synol being used to wash the hands clean again. A nail-brush will not, however, be required always for this washing unless another examination is to be made in another case afterwards.

For the physician's own protection in most instances the vagina and vulva should be thoroughly irrigated with a one per cent. solution of Synol in warm water before the examination. The distention irrigation method is preferable, for by it only may the secretion be removed from the folds of the vagina by irrigation. This consists in filling the vagina to distention by compressing the vulva orifice, then permitting the solution to escape with a rush. This should be repeated some six or eight times.

This is done preferably after the patient has been placed on the table and after the character of the secretion has been noted or a specimen has been taken for examination under the microscope.

Where inspection before the irrigation is not required, the irrigation may, under some conditions, be entrusted to the patient before she gets on the table.

After the examination, the soap adhering to the vulva should be wiped off, first with a damp cloth, then with a dry one. A towel or a wad of absorbent gauze may be used for this purpose.

SYNOL IN THE BATH AND TOILET.

The importance of producing and maintaining a normal activity of the skin, both of the patient to be operated upon and the surgeon and his assistants, cannot be overestimated. As a fact, it is a point that is often underestimated or actually disregarded. It is well known that the staphylococcus pyogenes albus or staphylococcus epidermis albus is a regular inhabitant of the epidermis and hair follicles. The only way they can be rendered harmless is to keep the skin active by freeing the surface constantly of the gummy coating formed by mixing of the epithelial scales with the secretion from the sweat glands and thus permitting these glands to discharge their secretion freely upon the surface in a condition so it may evaporate readily. These bacteria infest the skin so deeply that chemical disinfection the superficial layers does not destroy them. Therefore, one or even two washings with soap and then with antiseptics will not destroy them.

There is no doubt that persons who consider themselves clean are far from being so in a surgical sense, because they do not bathe frequently enough or they do not bathe properly, or they do not wash with a soap that will clean the skin properly.

Therefore, in the preparation of the patient for an operation, to obviate infection of the wound from the incision of the skin or penetration of the needles employed for inserting the sutures to close the wound, the skin of the whole body should be rendered active by daily cleansing baths for as long a period as possible before the operation. This will also have a marked effect upon the general health of the patient, for by rendering the skin active and thus making it perform its function of elimination properly, it relieves the other overtaxed excretory organs.

It will be admitted that a healthy activity of the skin is essential for the surgeon himself and his assistants also, including nurses, because unavoidably their perspiration comes in contact either with the wound during operation or with articles that are in use. Therefore, a daily cleansing bath is important for them also.

Synol should be used for these baths, applied on a rough cloth or flesh brush, because, besides being antiseptic it possesses the power of cleansing the surface by loosening and dissolving the epithelial scales and oil of the perspiration that adheres to the skin in a manner not possible with any other form of soap.

Let any one who questions this statement take a bath as described with Synol and note the condition of the skin after. It is soft and smooth and not sticky as after the use of other soaps and no "dead skin" can be rubbed off.

The method of using Synol in the bath is as follows, viz.: The body must first be completely immersed in warm or hot water until the skin is thoroughly wet, when necessary rub the surface under the water with the hand or a rough cloth. Then getting out of the water, the whole surface is scrubbed and lathered well with the Synol on a rough cloth or flesh brush. The soap is rinsed off by again immersing in the water or by a shower or spray tempered to suit individual taste. Whenever possible, a shower or spray should always be used after an immersion bath to remove the lather, because it stimulates the skin and washes the surface more thoroughly.

CLEANING INSTRUMENTS.

The difficulty experienced in cleaning surgical instruments has led a young Dutch physician, Dr. Jacques H. Polak, to experiment with the various methods used with a view of finding out which was the most reliable in the shortest time. He claims that, although a two per cent. soda solution in a closed vessel is most efficacious, it is apt to blunt the keen edges of the instruments. Absolute or dilute alcohol, carbolic acid, formalin, and mercuric solutions were all unsatisfactory.

The best results were obtained by using spirit of soap, which killed all staphylococcus pyogenes within fifteen minutes. The spirit has, moreover, a valuable mechanical action, as it causes the pus to swell and thereby becomes more readily detached.

In sterilizing his instruments, Dr. Polak first places them in soap spirit for fifteen minutes and then rubs them for not less than half a minute with a cloth saturated with spirit of soap. Fifteen minutes previous to an operation he places his instruments in the soap bath and either dries them with a sterilized cloth, or removes the soap by means of alcohol (50 per cent.) or a sterilized solution of boracic acid.

DISINFECTION OF THE HANDS.

H. Marx announces that the aim of disinfection of the hands should be to render them a destructive soil for microbes, not necessarily to remove all the germs, but merely to prevent their further development. The standard for these conditions is the presence or absence of the Babes-Ernst corpuscles, and this should be the gauge for disinfection of the hands.

FORMALIN DISINFECTION.

S. Spengler states that tubercle bacilli in sputa are not killed by formalin disinfection as usually performed. Spengler's experience at Davos has shown him that complete destruction of the bacilli is certain if the room is kept at 25C. during the disinfection, and if the infected substances are moistened thoroughly and give off moisture under the influence of the fumes. The formalin must contain .5 to 1 per cent. formic acid.

DANGERS OF CARBOLIC DRESSINGS.

Dr. F. B. Harrington sounds a note of warning against the indiscriminate use of dilute solutions of carbolic acid as a dressing for wounded surfaces. He states that an aqueous solution of carbolic acid (one to five per cent.), if applied to an extremity, as the fingers or toes, for a number of hours, may produce gangrene and total destruction of the part. This result is directly due to the action of the carbolic acid, which slowly penetrates into the deeper tissues, where it acts directly upon the red and white blood-corpuscles, producing thrombosis, and so destroying the nutritive processes of the tissues. Nearly two hundred cases of this kind are to be found reported in recent medical literature, and Dr. Harrington urges the profession to teach the public some safer treatment.

BANDAGING

FIG. 3.

Fig. 1 Fig. 2

Fig. 3.---Roller Bandages. A, eye; F, finger, wrist and forearm; G, groin; H, knee-cap; J, foot and ankle. Trangular Bandages. B and C, shoulder D, upper arm; E, Hand; I, Leg.

Fig. 1.---Method of applying Roller Bandage spirally.

Fig. 2.---Method of reversing or folding back turns of the spiral Roller Bandage.

Nurses Charges

List of prices to be charged for nursing patients able to pay for the same. This scale of prices applies to Canada and the United States of America.

One Visit Daily of One Hour or Less, 50c to $1.

Two Visits Daily of Two Hours or Less, $1 to 1.50.

Preparing Patient for Operation and Assisting at Same, $3 to 5.

One Night with Patient after Operation, $2 to 3.

Assisting at Obstetrical Cases - $3 to 5.

Care of Patient and Baby, Two Visits Daily, $10 per week.

One or More Weeks - $18 to 30 per week.

In communities away from the large centres of population a modification of the above may be necessary. Circumstances also will govern the making of charges. When the nurse is not busy a modification of these charges might be made. The above is merely a guide to charges generally.

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($........ ......) as first payment and agree to pay the balance due in ....regular monthly installments of $............each, at the College Office, until I have paid the total sum of $...................., the full price of said course.

It is understood and agreed that the fulfillment of the above promises entitles the applicant to the complete ***Series of Lessons*** included in the above course, and all supplementary explanations.

It is also agreed that there is to be no further charge of any kind.

Date................................ *191*....

Name..
Write name as you wish it to appear on your diploma.

City or Town..

Street and No................................*Prov. or State*.....................

Give age .... *Height*..................... *Weight*.......................

What previous education?..

Have you ever studied this subject? If so to what extent?.........................

What books, if any, have you?...

If Possible, Send Us a Photograph of Yourself, to Place in Our Album of Students.

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