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Contributors

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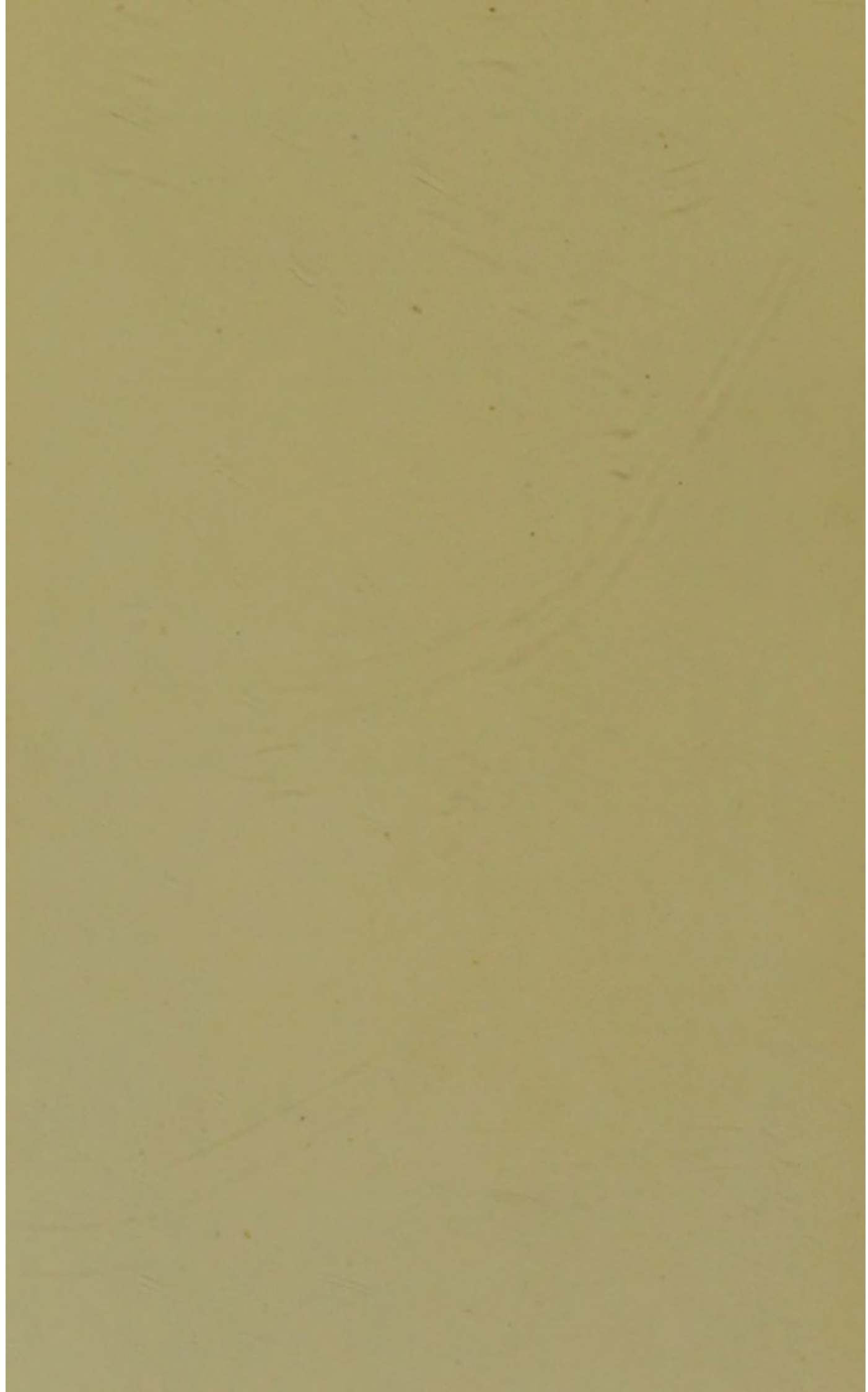
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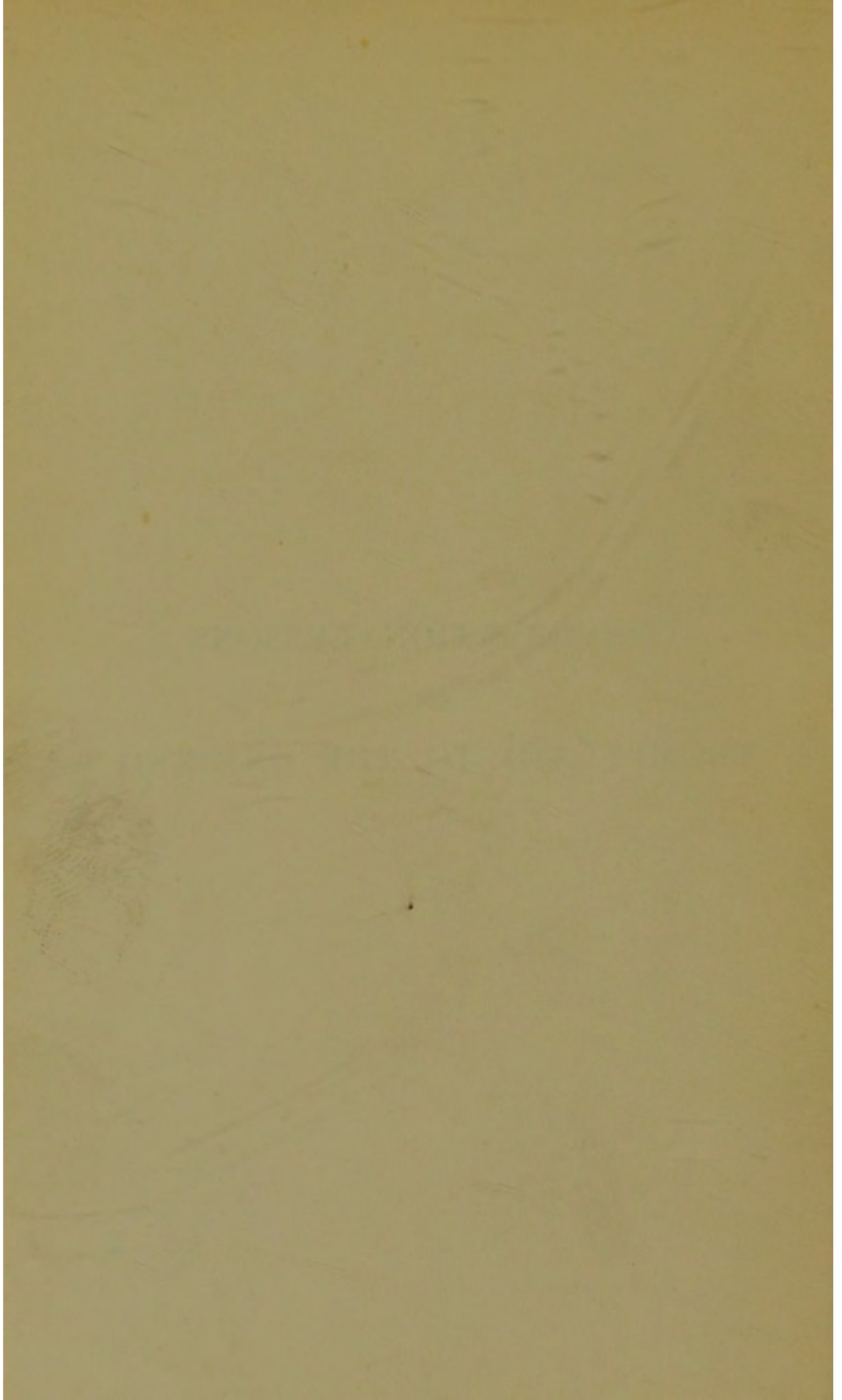


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CONVERSATION - LESSONS
ON
PROMPT AID TO THE INJURED.



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CONVERSATION-LESSONS

ON

PROMPT AID TO THE
INJURED.

BY

HENRY WEBB.

WITH FORTY-SEVEN ILLUSTRATIONS.

BURY :

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I will praise Thee ; for I am fearfully and wonderfully made : marvellous are Thy works ; and that my soul knoweth right well.—*Psalm cxxxix—v. 14.*

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PREFACE.

My life has been spent amidst the manufactories of Lancashire, where many accidents occur; this, and my connection with the Bury Dispensary Hospital, as Honorary Secretary, for several years, have shown me the value of rendering "Prompt Aid to the Injured," whereby much suffering, and even life itself, has been saved. Having established several classes under the auspices of the St. John Ambulance Association, in which clerks, volunteers, policemen, firemen, foremen, mechanics, ironworkers, carpenters, miners, quarrymen, porters, and operatives of all sorts have received instruction how to render "Prompt Aid," the men attending these classes have often said, "the lectures given and the text books used are very good, but we should understand and remember them better if the books were arranged in the form of question and answer, especially in view of the examinations." The present work is intended to supply this felt want.

It has been impossible to avoid treading over the ground already occupied by former writers on this subject, and it is not my intention to try

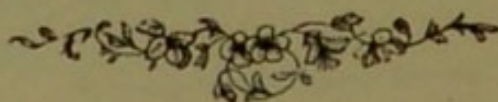
to supersede the excellent guides that have been written, but only to present the matter in the form asked for.

My sincere thanks are due to ADAM FLETCHER, Esq., M.D., for kindly certifying that the medical and surgical facts are correctly stated; to JOHN FURLEY, Esq., for loan of the three engravings, "The Ashford Litter" and "Ambulance Carriage;" also to others who have generously rendered me valuable help.

I hope this work may prove useful not only to many who are engaged in the large manufacturing establishments, but to all who are wishful to do everything in their power to alleviate the sufferings and save the lives of their fellow-men.

HENRY WEBB.

BURY, OCTOBER, 1887.



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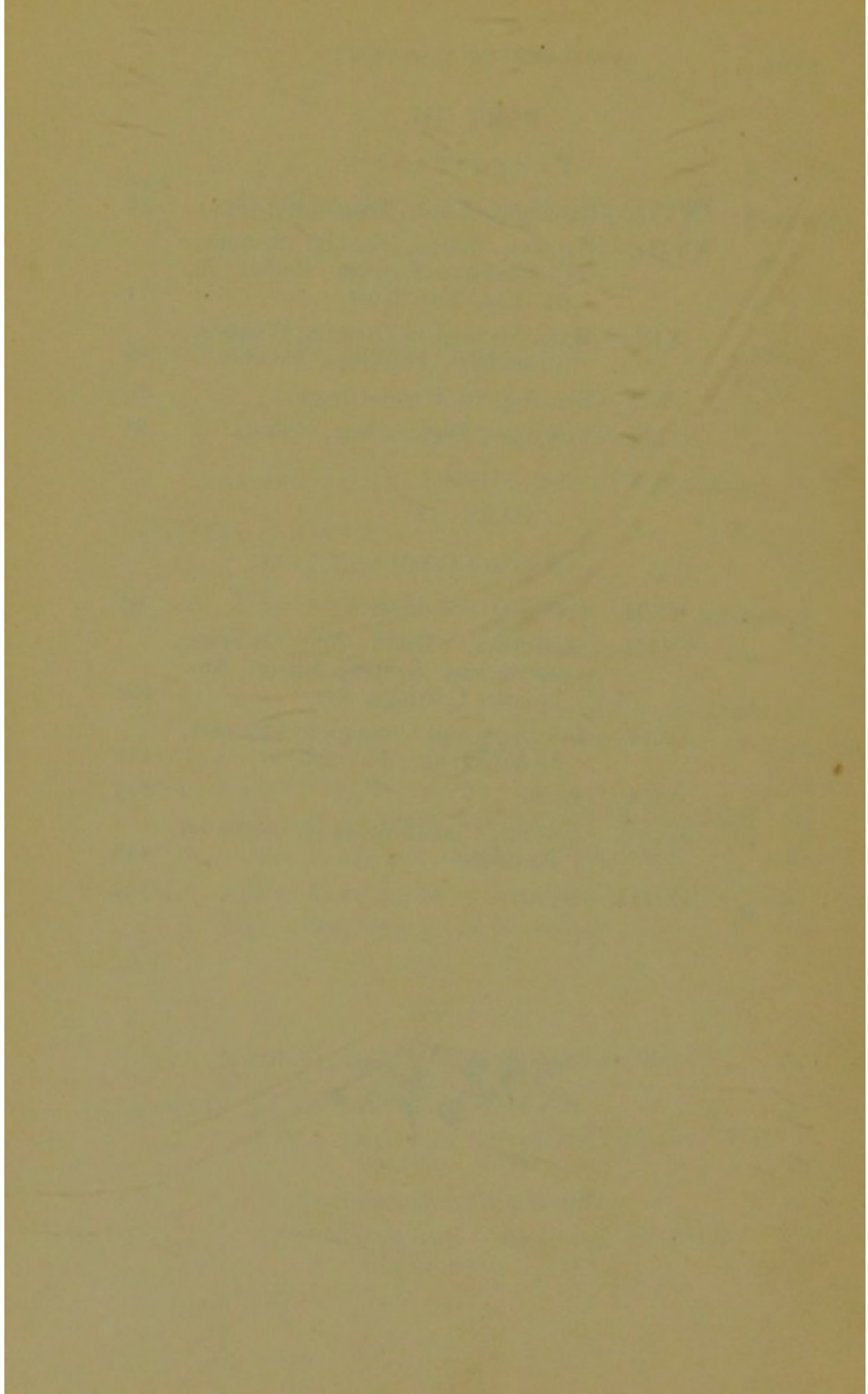
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PART I.

ANATOMICAL AND PHYSIOLOGICAL OUTLINES.

Skeleton : BONES—JOINTS—CARTILAGE. *Muscular System* : MUSCLES—TENDONS. *Nervous System* : BRAIN—SPINAL CORD—NERVES—CEREBRAL SYSTEM—SYMPATHETIC SYSTEM. *Organs of Special Sense* : EYE—EAR—NOSE—TONGUE—SKIN. *The Blood and Organs of Circulation* : BLOOD—HEART—CIRCULATION OF THE BLOOD—ARTERIES—CAPILLARIES—VEINS. *Principal Arteries. Principal Veins.* *Organs of Voice and Respiration* : LARYNX—TRACHEA—BRONCHI—LUNGS. *Food and Organs of Digestion* : ALIMENTARY CANAL—MOUTH—PHARYNX—ŒSOPHAGUS—INTESTINES—DIGESTION. *Organs of Secretion* : LIVER—PANCREAS—SALIVARY GLANDS. *The Organs of Excretion* : LUNGS—SKIN—KIDNEYS.

CHAPTER I.

BONES.

Into how many principal parts is the body divided?

(1) Trunk, comprising the thorax or chest, and the abdomen or belly. (2) The head, comprising the brain case, and face. (3) The upper limbs—

the arms. (4) The lower limbs—the legs.

What is the framework called?

Skeleton.

How many bones in the skeleton?

Over 200.

Name the principal bones of the skeleton?

Skull:—one frontal, two parietal, two temporal, one occipital, 1 ethmoid, one sphenoid.

Face:—two superior maxillary, (or upper jaw bones), two malar, two lachrymal, two palate, two nasal, one inferior maxillary (or lower jaw bone), one vomer, one hyoid, and four small bones.

Trunk:—seven cervical, twelve dorsal, and five lumbar vertebræ; pelvis = sacrum, coccyx, innominate; seven pair true ribs, five pair false ribs, sternum.

Lower limb:—femur, patella, tibia, fibula, seven tarsus, five metatarsus, and fourteen phalanges.

Upper limb:—clavicle, scapula, humerus, ulna, radius, eight carpus, five metacarpus, and fourteen phalanges.

Into how many classes may bones be divided?

(1) Long and short, (2) round and flat, (3) irregular shaped.

Of what use are bones?

A framework for the attachment of muscles; they form cases for the protection of the various organs, and support the weight of the body.

What shape are the bones forming the top of the brain case?

Thick, flat, and curved; forming an arch, so that the force of any blow on the head may be broken.

What does the skull rest on?

The vertebral column.

Where does the vertebral column extend from and to?

From the head to the innominate or haunch bones.

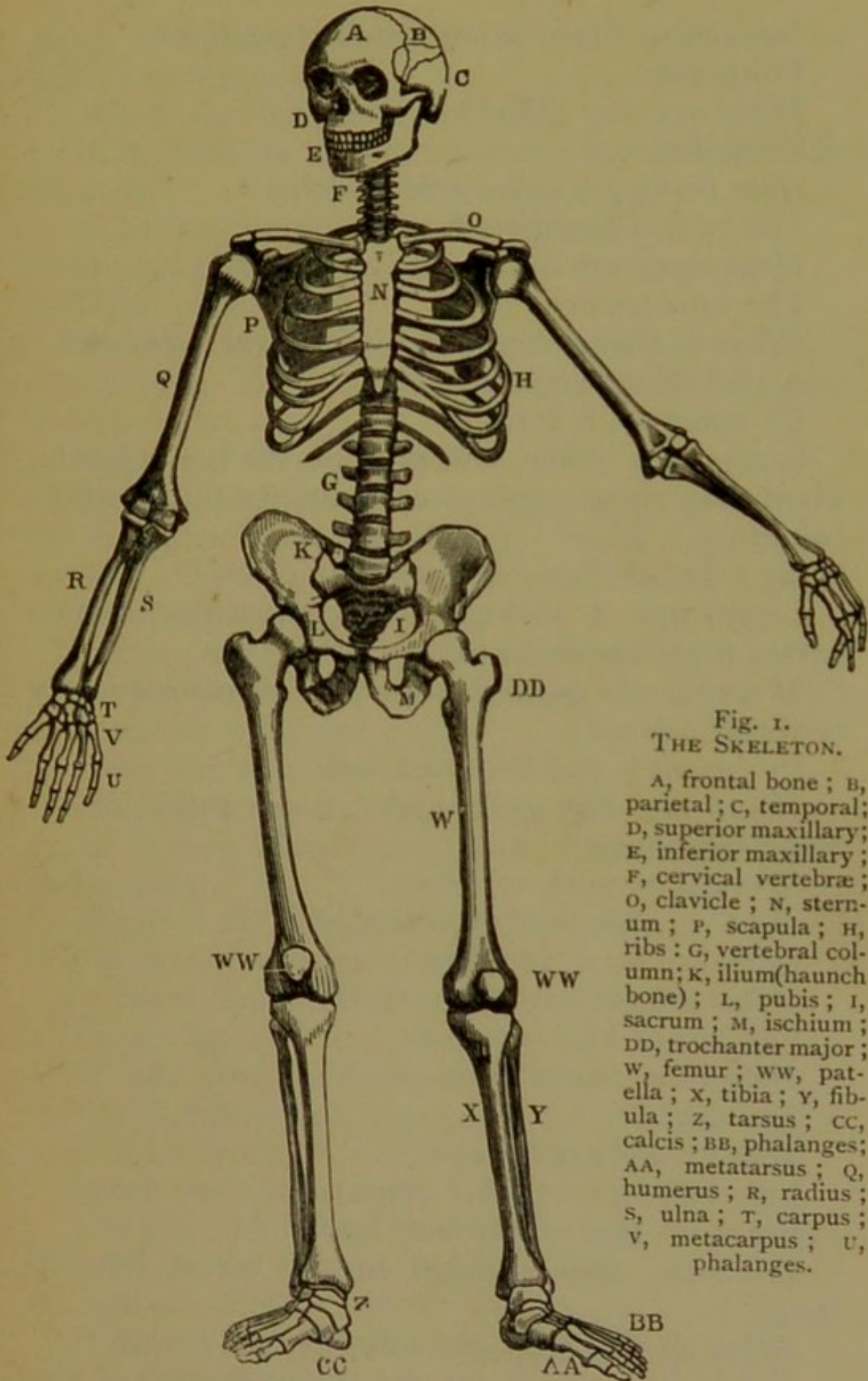


Fig. 1.
THE SKELETON.

A, frontal bone ; B, parietal ; C, temporal ; D, superior maxillary ; E, inferior maxillary ; F, cervical vertebræ ; O, clavicle ; N, sternum ; P, scapula ; H, ribs ; G, vertebral column ; K, ilium (haunch bone) ; L, pubis ; I, sacrum ; M, ischium ; DD, trochanter major ; W, femur ; WW, patella ; X, tibia ; Y, fibula ; Z, tarsus ; CC, calcis ; BB, phalanges ; AA, metatarsus ; Q, humerus ; R, radius ; S, ulna ; T, carpus ; V, metacarpus ; U, phalanges.

How many bones in the vertebral column?

Thirty-three.

What are they called?

Vertebræ.

How many are called true vertebræ?

The twenty-four upper.

How many are called false vertebræ?

The nine lower.

What is there between each of the true vertebræ?

A pad of cartilage or gristle.

Of what use is this?

It acts as a buffer, and prevents the bones jarring when they move ; and gives elasticity to the whole column.

By what are bones kept in their places?

Ligaments, a strong, tough substance, which passes from one bone to another.

Where is the greatest amount of movement in the vertebral column?

In the neck and loin portions.

What are the seven upper bones called in the vertebral column?

Cervical or neck vertebræ.

What are the next twelve called?

Dorsal or back vertebræ.

What are the next five called?

Lumbar or loin vertebræ.

Which are joined to the ribs?

The dorsal.

What shape are the ribs?

Like half-hoops (sickle shape)

Where do they extend from and to?

From the spine behind to the breast bone in front.

What do they form and what do they protect?

They form the thorax, for the protection of the

heart and lungs, large blood vessels, gullet, and some important nerves.

Where does the spinal cord lie?

In a canal in the centre of the spinal (vertebral) column.

What are the false vertebræ called?

The sacrum or rump bone.

What is the pelvis?

A strong bone case, formed by the sacrum, coccyx behind, and two haunch bones form the sides and the front.

What does the pelvis contain?

Bladder, internal organs of generation, and part of the intestines, several large blood vessels and nerves.

What is the abdomen?

A large cavity, between the thorax and the pelvis, supported behind by the lumbar vertebræ, and enclosed by muscular walls.

What does it contain?

Liver, stomach and intestines, pancreas or sweetbread, spleen, kidneys, and many large blood vessels and nerves.

Which is the largest bone in the body?

The femur or thigh bone.

Of what does the lower limb consist?

Thigh, leg, and foot.

Of what does the thigh consist?

The femur which extends from the hip to the knee joint, both of which joints it helps to form.

What bones are there in the legs?

The tibia, the inner one very strong and thick: the fibula or broach bone, a thin one, which strengthens the leg without adding much weight.

What bone is in front of the knee?

The patella or knee cap.

How many bones in the foot?

Twenty-six, arranged in a double arch.

Why are they so arranged?

To give strength and elasticity to the foot.

Name the bones of the foot?

Tarsus, seven irregular-shaped bones; five metatarsus, and fourteen phalanges—two for the great toe and three for each of the others.

Why are the bones in the lower limbs strong and thick?

Because they have to support the whole weight of the body.

Of what do the upper limbs consist?

Shoulder, arm, forearm, and hand.

How is the shoulder formed?

It is formed by the upper extremity of the humerus, or arm bone, to which are affixed the clavicle, or collar bone, and the scapula or blade bone.

Which bones serve to keep the shoulders apart?

The clavicles.

What shape is the scapula, and where does it lie?

It is large, flat, and triangular-shaped, and lies on the back of the thorax, covering the seven upper ribs.

Of what use is the scapula?

It gives additional strength to the thorax, and serves for the attachment of muscles which move the upper limbs, and enters into the formation of the shoulder joint.

What shape are the bones in the upper limb?

Long, thin, and light.

Why so?

They have to support no weight, are required merely to enable us to reach a long distance, and in the case of the hand to cover a large space.

What is the bone in the arm called?

Humerus; it extends from the shoulder to the

elbow ; above, it is joined to the scapula, and below to the bones of the fore arm.

Name the bones in the fore arm ?

Ulna and radius, they extend from the elbow to the wrist.

Which is the ulna ?

The larger and inner bone.

Which is the radius ?

The lighter and outer bone (side of the thumb).

What bones form the wrist ?

Eight small bones, called carpal bones, firmly joined together, and forming a very flexible joint, called carpus, or wrist.

What bones form the hand ?

Carpal bones ; five metacarpal bones, and fourteen phalanges, three in each finger and two in the thumb.

CHAPTER II.

JOINTS.

What is the name given to the parts where bones come together ?

Joint.

Which are the most common kind of joints ?

Modifications of the "ball and socket," and the "hinge."

What shape are the bones at the joints ?

The ends of the bones forming the joints are larger than their middles or shafts.

Where bones move on each other at the joints, how are they covered ?

The surfaces in contact are covered with smooth, elastic gristle called *articular cartilage*, this acts as a buffer, and prevents pain being caused when the

bones move on each other.

What is there over this cartilage ?

A smooth membrane, secreting a lubricating fluid called synovia.

How are bones kept in position ?

By a number of short bands of fibrous tissue, called ligaments, which completely surround their ends ; these are, also, lined with a smooth membrane.

CHAPTER III.

THE MUSCULAR SYSTEM.

How are bones moved ?

By muscles (about 220 pairs in the human body).

What are muscles ?

Lean flesh, formed of bundles of reddish fibres, like bundles of threads, enclosed in a tough sheath.

What particular power have they ?

The power of contraction and expansion under stimulation, by which property all movements are accomplished.

Do muscles vary in their form ?

Yes ; some are broad and thin, others are more or less elongated straps, and others are cylindrical or fusiform masses of various thicknesses.

How may they be divided ?

Into long and short, square, round, rhomboid, &c.

Do muscles ever run into each other ?

Not infrequently two or more muscular parts run into one, as in the bicipital, tricipital, and quadricipital forms.

Have they other forms ?

In other instances muscles, beginning as single

masses, become divided at their remote ends into two or more muscular tendinous slips, and there are others in which a greater number of parts are thus separated.

Where are they thickest, and why?

In the thigh and arm, because they have to move and lift heavy weights.

Where are they thin and flat, and why?

In the abdomen and cheeks, because they have only to cover in cavities.

What is the diaphragm?

The diaphragm or midriff is a powerful muscular partition, arched upwards, which divides the thorax (or chest) from the abdomen (or belly).

Into what two varieties may muscular tissue be divided?

Voluntary and involuntary.

Where are the voluntary muscles mainly found?

In the limbs, head, neck, and walls of the cavities of the trunk.

What weight are the muscles in the body?

For a man of 150 lbs. weight the muscles would be about 63 lbs.

Are the muscles visible?

The actions of a few are visible more or less, according to their powerful developement or otherwise, but it is at all times difficult to detect their exact forms and directions.*

N.B.—The diagrams of the muscles on pp. 10, 11, (see figs. 2 and 3) are not for any instruction in "Prompt Aid," but to give a general idea of the marvellous construction of the superficial muscles, and in some measure to impress upon the student that such conversation lessons as these can only give the merest outlines, the subject affording study for a lifetime.

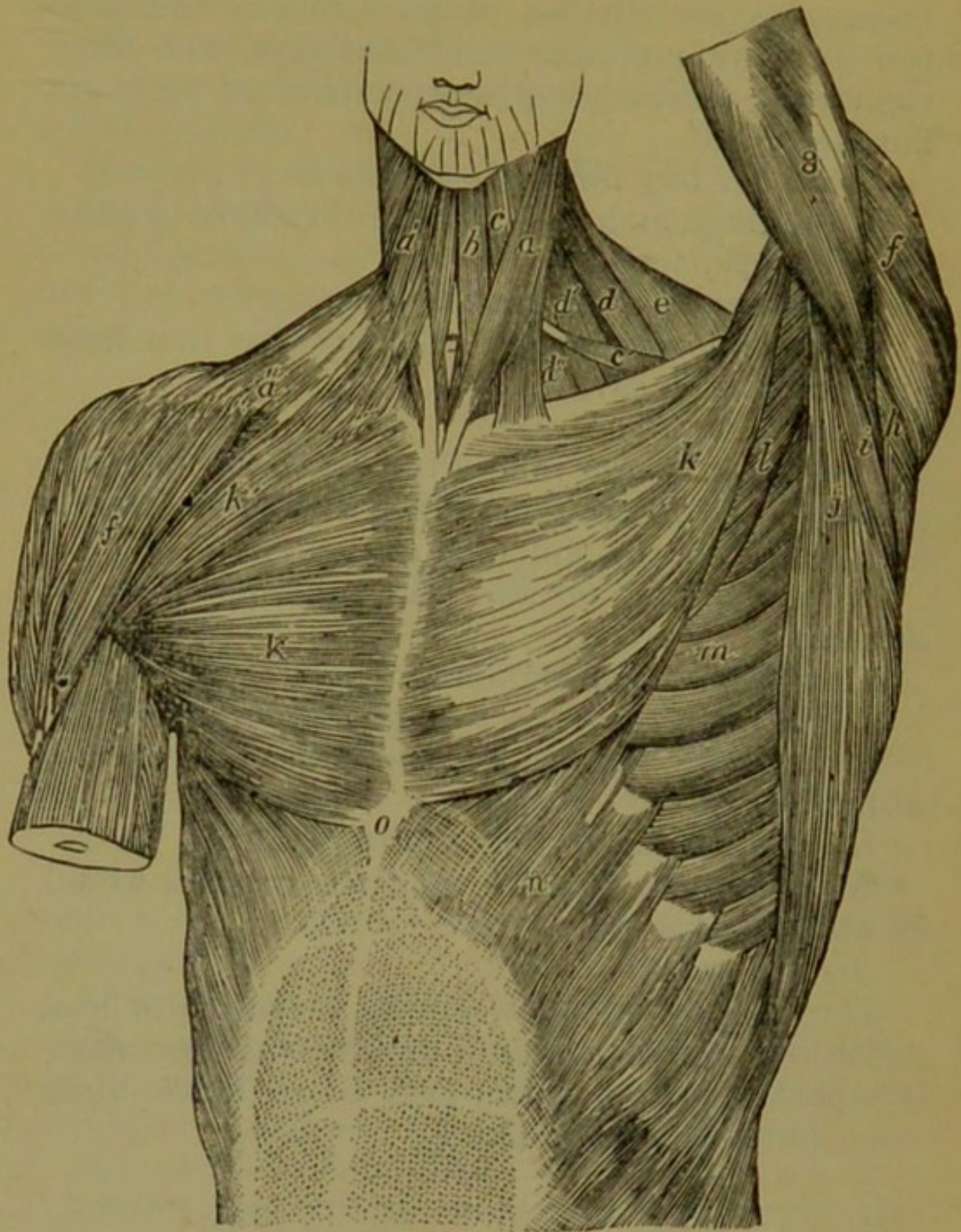


Fig. 2. SUPERFICIAL VIEW OF THE TRUNK, FROM BEFORE.

a is the sterno-mastoid muscle of the left side ; *a'* platysma myoides of the right side ; *b*, sterno-hyoid ; *c* upper, *c'* lower belly of the omo-hyoid ; *d*, levator anguli scapulæ ; *d'* *d''* scalene muscles ; *e*, hapezius anterior ; *f*, deltoid ; *g*, triceps branchii ; *h*, teres minor ; *i*, teres major ; *j* latissimus dorsi ; *k*, pectoralis major ; *k'* on the right side its clavicular portion ; *l*, pectoralis minor ; *m*, serratus magnus ; *n*, external oblique muscles of the abdomen ; *o*, xipoid cartilage.

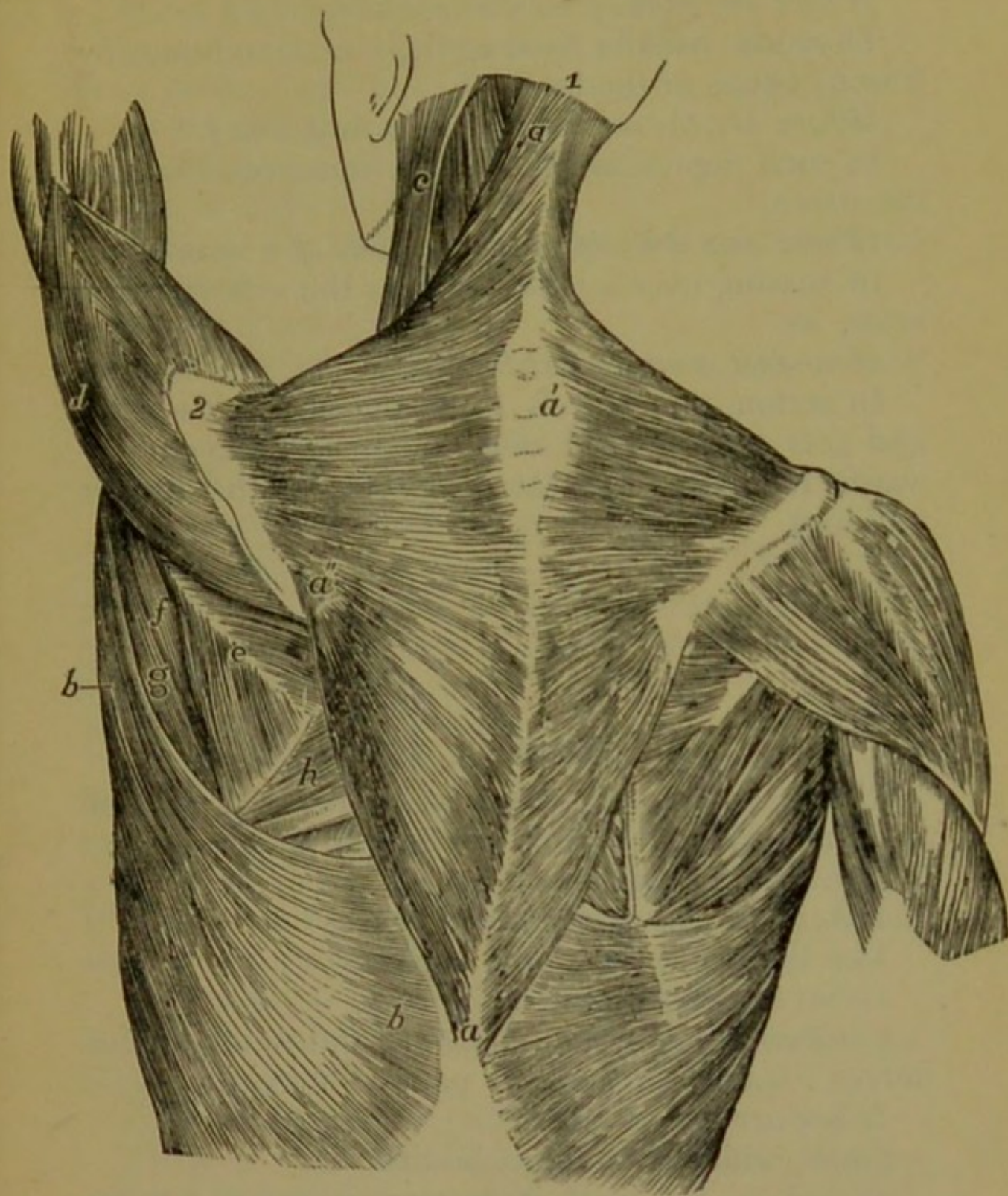


Fig. 3. SUPERFICIAL VIEW OF THE TRUNK, FROM BEHIND.

1 is external occipital protuberance; 2, acromion of the scapula; *a*, trapezius; *a'* oval tendon of the two muscles in the upper dorsal and lower cervical region; *a''* triangular tendon of insertion; *b*, latissimus dorsi; *c*, sterno mastoid; *d*, deltoid; *e*, infraspinatus; *f*, teres minor; *g*, teres major; *h*, rhomboideus major.

Where are ends of muscles usually fixed?

They are usually fixed at their ends to bones by fibrous tissue or tendons.

Where are the involuntary muscles found?

In such organs as the heart, blood-vessels, and intestines.

Where does a tendon take the place of a muscle?

In passing over a joint, such as the elbow, wrist, knee, &c.

How does a muscle act?

In action, one end is fixed, the middle shortens and gets thicker, and thus draws its free end towards its fixed one (*ex.*: muscles of the leg in walking).

CHAPTER IV.

THE NERVOUS SYSTEM.

What regulates the whole of the processes carried on by the different parts of the body?

The nervous system.

What does this system comprise?

The brain and the spinal cord.

What are they called?

Cerebro-spinal system:—Brain and nine pairs of nerves; spinal cord and 31 pairs of nerves.

What are nerves like?

Small, white, thread-like bodies.

Which is the most important mass of nervous matter?

The brain.

How is it subdivided?

Into *cerebrum*, *cerebellum*, and *medulla oblongata*.

What does the cerebrum consist of?

Two similar ovoid masses, divided above by a deep groove, and united below.

Of what is it the seat?

The intellect, emotions, and will.

Where is the cerebellum?

It lies at the back of the head, and is called the little brain.

Of what use is it?

Its function is to regulate the movements of the body.

Where is the medulla oblongata?

It is the enlarged upper part of the spinal cord.

Mention another feature of this part?

Here, some crossing of the nerve fibres takes place, so that injury or disease, on one side of the head, produces paralysis of the muscles on the opposite side of the body.

What is the spinal cord?

A cylindrical column of soft, nervous tissue, occupying the vertebral canal. It extends from the brain to the loins, and is about 18 inches in length; it gives off thirty-one pairs of nerves from its sides. If the cord be cut, all parts of the body below would be paralysed.

How may the nerves be further divided?

Into the cerebro-spinal nerves, and the sympathetic system.

Describe the cerebro-spinal nerves?

They consist of nine pairs; they are *motory*, *sensory*, or *compound* in their functions.

What use is a motor nerve?

It conveys an impulse from the brain to some muscle.

What use is a sensory nerve?

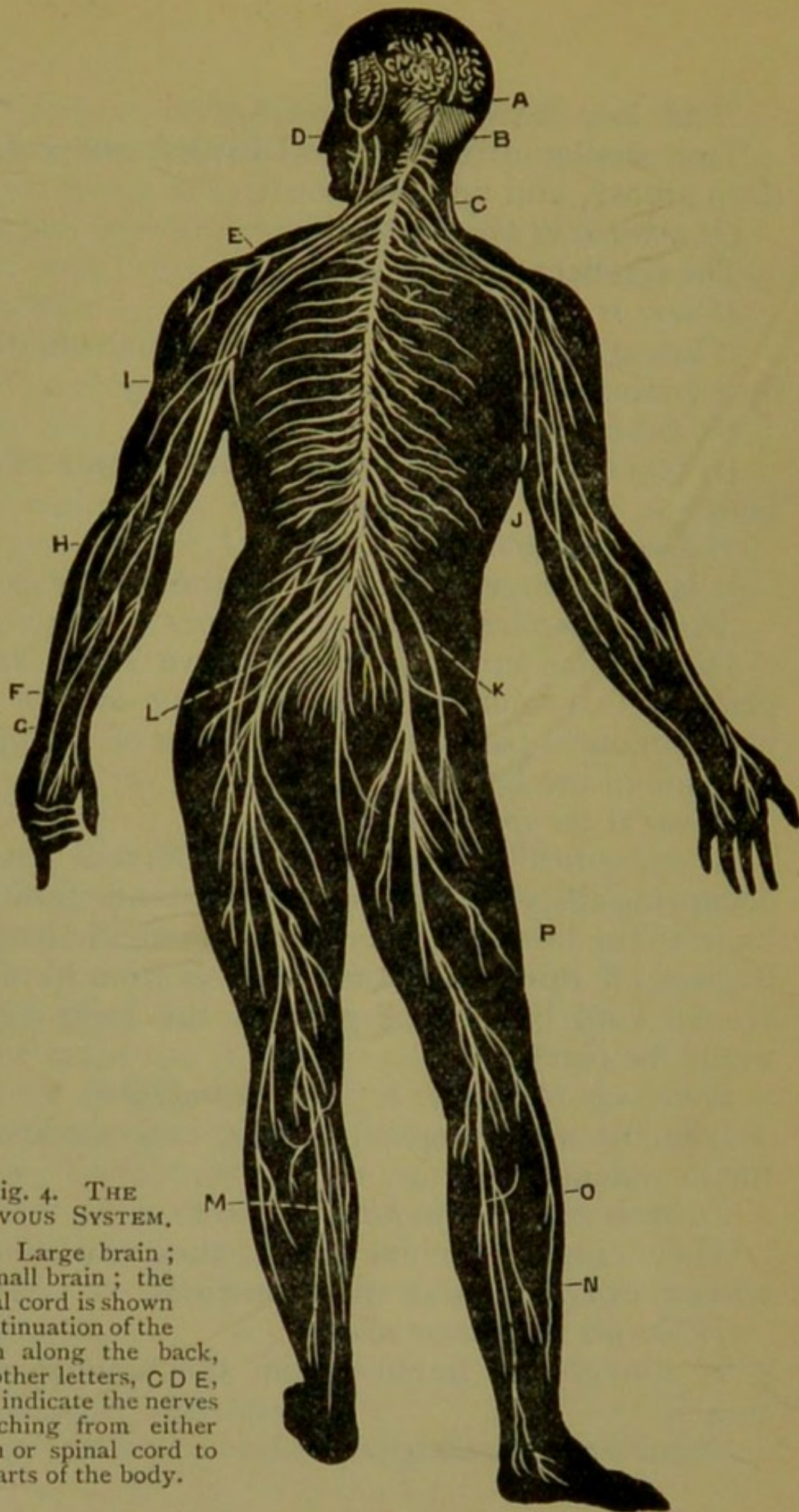


Fig. 4. THE NERVOUS SYSTEM.

A, Large brain ;
 B, small brain ; the
 spinal cord is shown
 a continuation of the
 brain along the back,
 the other letters, C D E,
 &c., indicate the nerves
 branching from either
 brain or spinal cord to
 all parts of the body.

It receives and conveys an impression or sensation to the brain.

What is a compound nerve?

It contains both motor and sensory fibres, and is consequently possessed of a double function.

What does the sympathetic system consist of?

A double chain of nervous centres or ganglia, which lie along the sides of the spinal column; their branches communicate freely with the cerebro-spinal system.

What functions does the sympathetic system perform?

It governs the blood supply, and nutrition of the body; it supplies and controls the involuntary muscles, and the secreting and excreting organs.

What does the paralysis of these nerves produce?

Enlargement of the blood vessels of the parts to which they are distributed.

CHAPTER V.

THE ORGANS OF SPECIAL SENSE.

Name the organs of special sense?

The eye, ear, nose, tongue, and skin.

To what are they often compared?

Five gateways of knowledge, from the fact that through them are received and transmitted to the brain impressions regarding surrounding objects, by means of the nerves.

CHAPTER VI.

THE BLOOD, AND ORGANS OF CIRCULATION.

How are all the organs of the body kept supplied with nourishment?

By the blood.

What other use is the blood?

Besides supplying all organs and tissues with nourishment, it removes their waste products, and thus acts as a scavenger.

What is the estimated total quantity of blood in the body?

About one-twelfth to one-eighth of the weight of the body.

What does great loss of blood produce?

Death: so, also, does any considerable change in its composition.

What colour is blood?

In the arteries it is a bright red; in the veins, a dark purple.

What does blood consist of?

It contains water, minute cells, called *corpuscles*, (red and white,) albumen, fibrine, fatty matter, and gases, all of which, with the exception of the corpuscles, enter into the formation of the tissues of the body.

What are the organs of circulation?

(1) Heart; (2) Blood-vessels—arteries, capillaries, veins.

Describe the heart?

The heart is a hollow, conical, muscular organ, about the size of a closed fist; say, 5 inches long, and $3\frac{1}{2}$ inches broad.

Where is it placed?

Between the two lungs, behind the breast bone, chiefly on the left side; the base looks upwards, and

the point extends to just below the left nipple, where it can be felt beating.

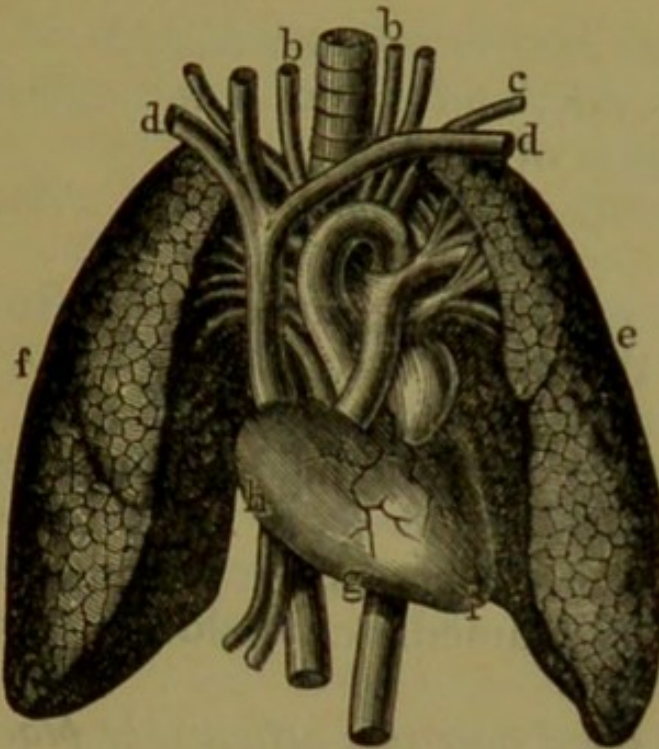


Fig. 5. THE HEART, LUNGS, AND LARGE BLOOD VESSELS.

h g i, Heart ; e f, lungs ; b b c are branches from the aorta ; the aorta is the curved artery which goes behind the heart at g ; d d are veins from the upper portion of the body ; below h are the veins from the lower portion of the body ; the windpipe is shown in the centre ; the pulmonary artery is seen running upwards from the right side of the heart, and branching off to both lungs.

How is it divided ?

Into two halves, a right and left, and each half into two chambers.

What are these cavities or chambers called ?

The upper cavities are called *auricles*, and the lower, *ventricles*.

What is there between the cavities ?

Openings guarded by valves, to prevent the blood flowing in the wrong direction.

Where are other valves placed ?

At the mouths of the large vessels, leading into and out of the heart.

Which side of the heart receives the impure blood?

The right side, and drives it to the lungs to be purified.

Which side receives the pure blood?

The left side, and forces it through the arteries to every region of the body.

Which cavity of the heart has the strongest walls, and why?

The left ventricle, because it has to drive the blood over the whole body.

How does the heart act?

By alternately contracting and dilating.

Does each cavity contract or dilate separately?

No. The two auricles act simultaneously, and their action is immediately followed by that of the ventricles.

At what speed does this action take place?

Seventy to eighty times a minute.

What does the blood circulate through?

A system of closed *tubes*, called blood-vessels.

How are they divided?

Into arteries, capillaries, and veins.

What do arteries convey?

Pure blood from the heart to every part of the body, continually branching and dividing.

What are capillaries?

Minute *tubules*, into which the smallest arteries break up.

What are they like?

Close network; pervading nearly every tissue of the body; their walls are extremely thin, and allow the fluids in the blood to escape for the purpose of nourishing the parts in which the capillaries are situated.

What are the veins?

The vessels which begin by the union of the

capillaries, and serve to return the impure blood from the capillaries throughout the different parts of the body to the heart.

Describe the circulation of the blood?

The impure blood returns from the body, through the veins, and enters the *right auricle*, by two openings; by the upper one, called *superior vena cava*, from the veins of the head and upper extremities; and by the lower one, called *inferior vena cava*, from the veins of the lower parts of the body: the *right auricle* contracts and forces the blood into the *right ventricle*, the right ventricle then contracts and forces the blood through the *pulmonary artery* to the *lungs*, where it becomes purified: it then returns by the *pulmonary veins* to the *left auricle*, which contracts and drives it into the *left ventricle*; the *left ventricle* now contracts and drives the blood through the *aorta* into the arteries, capillaries, and then, back through the veins to the heart.

Which artery conveys impure blood?

The pulmonary artery.

Which vein conveys pure blood?

The pulmonary vein.

What is the lesser or pulmonic circulation?

The flow of blood from the right side of the heart, through the lungs, to the left side of the heart.

What is the greater or systemic circulation?

The current of blood which passes from the left side of the heart, through all the structures of the body to the right side of the heart.

Name the differences between arteries and veins?

- (1) Arteries carry pure blood away from the heart, veins carry impure blood towards the heart.
- (2) Arteries, (except the pulmonary,) carry bright red blood; veins, (except the pulmonary,) carry dark

purple blood. (3) The walls of the arteries are stronger and more elastic than veins, and have no valves, except where they leave the heart. The walls of the veins are thin, and have valves on their inner walls to prevent the blood flowing backwards. (4) Some veins are quite superficial; the arteries lie more deeply. (5) The current is remittent in the arteries, slower and continuous in the veins. (6) The arteries do not sink when empty; the walls of the veins, being thin, collapse when empty.

CHAPTER VII.

PRINCIPAL ARTERIES.

Where is the aorta?

It arises from the left ventricle of the heart, ascends for a short distance behind the sternum, arches backwards, and descends along the left side of the spine, through the chest and abdomen, until it is opposite the fourth lumbar vertebra, where it divides into the two *iliacs*.

Where is the innominate artery?

It is a short trunk arising from the arch of the aorta; it extends upwards for about $1\frac{1}{2}$ inches, and divides into the *right carotid* and *right subclavian*.

Where is the right common-carotid?

As just stated, it is a branch of the innominate artery.

Where is the left common-carotid?

It is a branch of the aorta; this and the right common-carotid ascend the neck, one on each side of the windpipe, to about an inch below the angle

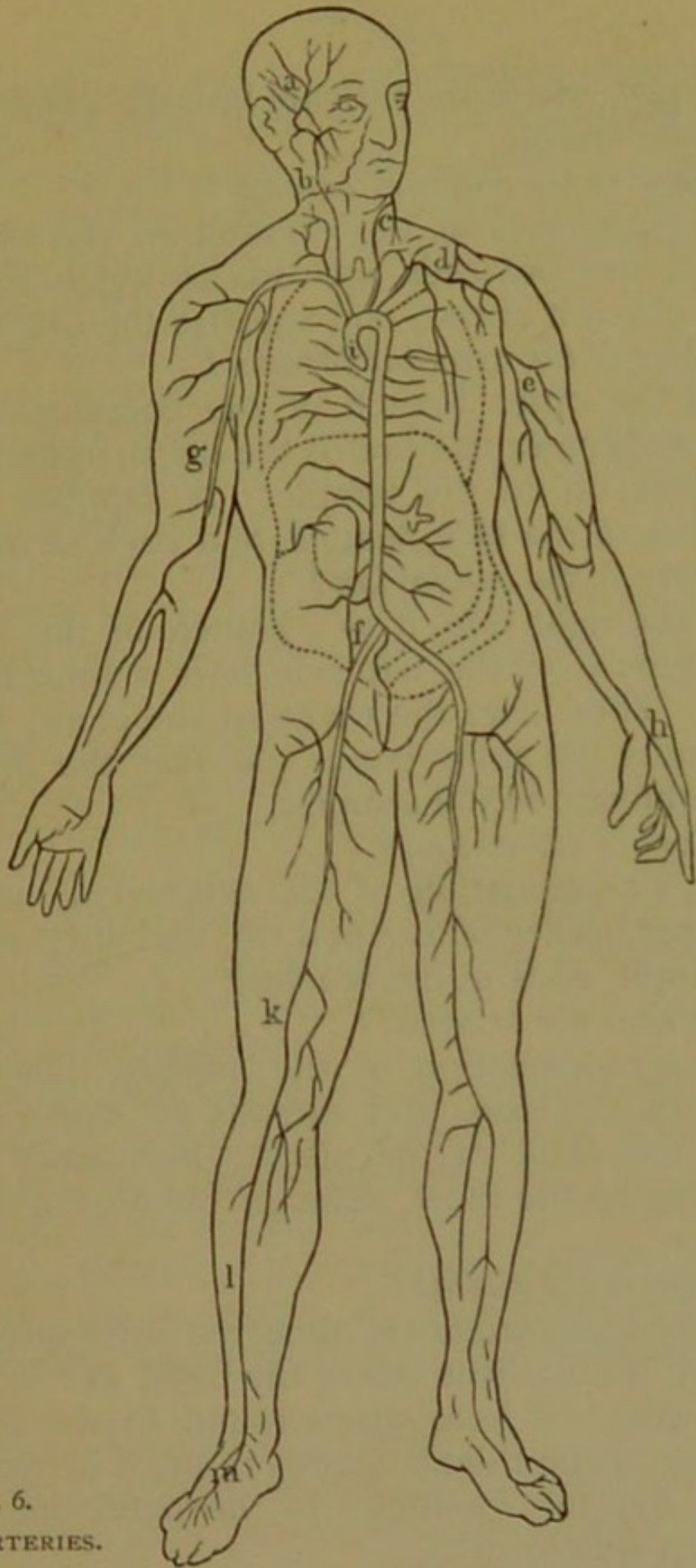


Fig. 6.
THE ARTERIES.

This diagram gives a general idea of the position of the main Arteries. *i* is the aorta; *b c*, carotid; *a*, temporal; *d* subclavian; *e*, axillary; *g*, brachial; *h*, radial; *f* femoral; *k l*, anterior tibial; *m*, metatarsal.

of the jaw, where they divide into the external and internal carotid.

Where is the internal carotid ?

It commences at the division of the common-carotid, and proceeds upwards to the base of the skull, which it enters, and supplies the brain.

Where is the external carotid ?

It is the outer branch of the common-carotid ; it proceeds upwards towards the ear, in front of which it passes on to the temple. It supplies various branches to the face, temple, and back of the head.

Where is the subclavian ?

On the right side it is a branch of the innominate artery ; on the left side it is a branch of the aorta. They leave the cavity of the chest, by passing under the collar bones and over the first ribs, and terminate in the armpits.

Where is the axillary ?

It is a continuation of the subclavian, begins at the lower border of the first rib, and after crossing the armpit, ends in the brachial.

Where is the brachial ?

It is a continuation of the axillary, lies on the inside of the arm, and extends to about an inch below the front of the elbow ; its course is well indicated by the inner seam of the arm of a man's coat.

Where is the radial ?

It extends downwards, along the outer side of the forearm, from a little below the bend of the elbow to the wrist ; it here winds round to the back of the bone of the thumb, passes through between the thumb and the forefinger to the palm, and forms the deep palmar arch.

Where is the ulnar ?

It is the larger of the two divisions of the brachial ;

it descends along the inner side to the wrist and then, entering the palm, forms the superficial palmar arch.

Where are the common iliac arteries?

They are the division of the aorta into two branches; they pass downwards and outwards to the brim of the pelvis.

Where is the external iliac?

It commences at the division into two parts of the common iliac, it passes along the brim of the pelvis, and makes its exit from the abdomen at the middle of the fold of the groin.

Where is the internal iliac?

It is the inner division of the common iliac; it descends into the pelvis, and supplies the organs there.

Where is the femoral?

It is a continuation of the external iliac, descends along the inside of the thigh, for about two-thirds of its length, and then passes to the back of the thigh. A line drawn from the middle of the fold of the groin to the inside of the knee-joint, indicates the course of this artery.

Where is the popliteal?

It is a continuation of the femoral artery, and extends along the *back* of the lower third of the thigh to a little below the knee-joint.

Where is the anterior tibial?

It is a branch of the popliteal, passes to the front between the two bones of the leg, and descends to the instep, where it divides into branches for the toes.

Where is the posterior tibial?

It is the other branch of the popliteal: it runs down the back of the leg, and passing along the depression behind the inner ankle bone, supplies branches to the sole of the foot.

Where is the peroneal?

It branches from the posterior tibial, passes down on the outside of the back of the leg, and divides into branches around the heel and outer ankle.

CHAPTER VIII.

PRINCIPAL VEINS.

How many pulmonary veins are there?

Four : two to each lung. They carry pure blood from the lungs to the heart.

Which are the systemic veins?

Those which return the dark impure blood from the body generally to the right side of the heart.

Can veins be seen?

Yes. Many can easily be seen under the skin, they are very superficial ; others lie deeply.

What are the veins of the head and neck called?

The jugulars ; formed by numerous branches from the head, face, and neck, they pass down from about the angle of the jaw to the inside of the chest, and unite with the subclavian.

How are the veins of the upper extremities divided?

Into those which are superficial and those which are deep set. The deep set correspond to and lie alongside the arteries, the superficial are the radial, ulnar, median, basilic, and cephalic.

Where is the subclavian?

It lies behind the collar bone, crosses from the outer edge of the first rib to behind the sternoclavicular joint, and joins the jugular.

Where are the innominate veins ?

They are two large trunks placed one on each side of the neck ; they are formed by the union of the jugular and subclavian veins.

What is the superior vena cava ?

It is formed by the union of the innominate veins, and empties itself into the heart.

How are the veins of the lower extremities divided ?

Into two sets, the superficial and deep.

What are the superficial ?

The internal and external saphenous.

Where is the internal saphenous ?

It begins about the instep, and ascends on the inner aspect of the leg and thigh, is joined by numerous branches on its way, and joins the femoral just below the fold of the groin.

Where is the external saphenous ?

It ascends the back of the leg, and joins the popliteal in the ham.

Where is the popliteal ?

The popliteal passes through the ham and then through the substance of the thigh to become the femoral.

Where is the femoral ?

Alongside the artery on the inner side of the thigh in its upper two-thirds.

Where is the external iliac ?

It is a continuation of the femoral and terminates by uniting with the internal iliac to form the common iliac.

What does the internal iliac do ?

It collects the blood from the organs in the pelvis.

What becomes of the common iliacs ?

They are formed by the junction of the external and internal iliacs, and terminate by uniting to form the *inferior vena cava*.

What is the inferior vena cava?

It is formed by the union of the two common iliacs, passes through the liver, and is joined by branches from the liver, kidneys, and other viscera: it returns the blood to the right auricle of the heart from all parts below the midriff.

CHAPTER IX.

THE ORGANS OF VOICE AND RESPIRATION.

Name the organs of voice and respiration?

Larynx, trachea, bronchi, lungs.

Where is the larynx?

It is the enlarged upper part of the trachea or windpipe: it is situated between the trachea and the base of the tongue, in the upper and fore part of the neck, where it is felt as Adam's apple.

What is the larynx?

A cartilaginous tube.

What is inside the larynx?

Two narrow fibrous bands, called *vocal cords*, which are attached before and behind; the vibration of these bands during expiration produces the voice.

What is the trachea?

A cartilaginous and membranous tube extending downwards from the lower part of the larynx.

Is the larynx and trachea before or behind the gullet?

Before.

Where are the bronchi?

The lower end of the trachea divides into two smaller tubes called bronchi, one of which enters each lung.

Are they further divided?

Yes, each tube splits up into smaller and smaller branches, like the twigs of a tree, until finally all the little minute tubes end in a multitude of very small pouches, sacs, bags, or air cells.

What are the lungs?

The lungs are two in number, one in each side of the chest: they are enclosed in double sacs or coverings, termed *pleura*, and are of a light spongy texture, for the ramifications of the bronchial tubes, the pulmonary arteries, and the pulmonary veins.

What lies between the two lungs?

Heart, blood-vessels, bronchi, and gullet.

Where does purification of the blood take place?

In the minute blood-vessels which spread like a network over the minute air cells (before mentioned) "venous" is converted into "arterial" blood.

How does purification take place?

The carbonic acid and watery vapour, &c., pass from the blood into the air cells, and oxygen passes from the air cells into the blood.

What becomes of the carbonic acid, &c.?

When we breathe out or "expire," it is driven out of the air cells along the bronchial tubes, wind-pipe, and so through the mouth and nostrils.

What is essential to purification of the blood?

Wholesome, fresh air.

Describe the mechanism of respiration?

During an *inspiration* the chest is enlarged by elevating the ribs and depressing the diaphragm, and the air rushes down the windpipe into the lungs to supply the vacuum. During an *expiration* the chest is diminished by depressing the ribs and elevating the diaphragm, together with a contraction of the lungs, forcibly expelling the air from the chest.

How often does respiration take place?

In a healthy person 15 to 18 times a minute.

What is the difference between expired and inspired air?

Inspired air consists of 79 per cent. of nitrogen, 21 per cent. of oxygen, watery vapour, and traces of ammonia. Expired air consists of 79 per cent. of nitrogen, 16 per cent. of oxygen, 4 or 5 per cent. of carbonic acid, much watery vapour, and decaying animal matter.

Is there any difference in heat in expired and inspired air?

Inspired air, 55 deg. Fahr.

Expired air, 98 deg. Fahr.

What is the capacity of the lungs?

Average 250 cubic inches.

What amount of air is taken in and passed out with each respiration?

About 30 cubic inches.

What is vital capacity?

The greatest volume of air that can be expired after the deepest possible inspiration.

CHAPTER X.

FOOD AND THE ORGANS OF DIGESTION.

What may food be compared to?

Fuel for the human machine.

What conveys food to all parts of the body?

After it has been suitably prepared, the *blood* conveys the nutriment to all the tissues and organs for their growth and repair.

What are the organs of digestion?

The alimentary canal, and certain accessory organs.

What is the alimentary canal?

A musculo-membranous tube, about 26 to 30 feet in length, and comprises the following parts:—Mouth, Pharynx (back of throat), Œsophagus (gullet), Stomach, Small Intestines, and Large Intestines.

Describe the mouth?

An oval shaped cavity, containing the teeth, tongue, palate, and ducts of the salivary glands.

Where is the pharynx?

At the back of the mouth and top of the gullet, behind the root of the tongue and larynx.

Where is the œsophagus or gullet?

It extends from the pharynx to the stomach, and is about nine inches long; it lies behind the wind-pipe and in front of the spine and aorta.

Where is the stomach?

It is a pouch-like enlargement of the alimentary canal; it lies chiefly on the left side of the body, under the diaphragm, with the liver on its right and the spleen on its left. The stomach is the chief organ of digestion.

Where is the small intestine?

It is a continuation of the tube beyond the stomach; it is a very tortuous canal, and is joined below to the large intestine.

Where is the large intestine?

It is a continuation of the small intestine; it ascends the right groin, crosses the abdomen under the liver and stomach, and then descends on the left side, and opens on the surface at the anus.

Of what use is the saliva?

It moistens the food, keeps the mouth moist, prevents the particles of food continually sticking

to the teeth, renders the movements of the tongue easy, dissolves portions of the food (so that we are enabled to taste them) and also exerts a chemical action on certain parts of the diet.

Describe how food is treated?

First the food is cut up, broken, crushed, and ground down by the teeth, and at the same time, being mixed up with saliva, is formed into a pulp which is suitable for swallowing.

What is swallowing?

The food by the act of swallowing is forced by muscular action down the back of the throat, along the gullet into the stomach.

What is done with the food in the stomach?

The food is there subjected to the action of a fluid called *gastric juice*, which pours forth into the cavity of the stomach from a multitude of little glands, and it is so churned up by the movements of the involuntary muscles contained in the walls of the stomach, that every portion of it becomes thoroughly mixed up with, and subjected to the action of, the gastric juice. A portion of the food is straightway dissolved, and absorbed by the minute blood-vessels (capillaries) in the walls of the stomach, the remainder, converted into a thickish liquid, called *chyme*, is forced on by muscular action into the *intestines*.

What becomes of it then?

The food, *chyme*, is gradually forced on by the muscular action of the intestine, and during its progress it meets with, and is acted upon by, different juices or secretions, such as *bile*, which is poured into the bowel from the *liver*, and *pancreatic juice*, which in the same way streams into the bowel from the *pancreas* or *sweetbread*, and as it passes onwards it mixes with the secretions of a large

number of minute glands that line the intestine itself.

Why is all this?

In this way the remainder of the nutritious portion of the food is dissolved or digested, and is taken up by the minute capillaries, or by other special delicate tubes which exist in the walls of the intestine, for conveyance to the blood.

What is done with the remainder?

The unnutritious, indigestible remnant of the food is passed on and got rid of through the bowels.

CHAPTER XI.

THE ORGANS OF SECRETION.

What is secretion?

The process of elaborating special products, such as bile, pancreatine, saliva, &c., used in connection with the digestion of food, &c.

Name the organs of secretion?

Liver, pancreas, salivary glands, mucous crypts and glands, and others which need not be specified. (Liver also assists in excretion of effete material).

Where are the salivary glands?

They are situated about the sides of the face, neck, and tongue, and their ducts enter the cavity of the mouth.

What do they secrete?

Saliva, which keeps the mouth moist, and assists in the process of swallowing and digestion.

What and where is the liver?

It is a large reddish-brown organ, made up of lobes, lobules, and cells; it has a duct for conveying

its secretion, *bile*, to its reservoir, the gall bladder ; it is situated chiefly under the false ribs, on the right side of the body.

What weight is it ?

About three to four pounds.

What are the functions of the liver ?

(1) Secretes bile, which aids digestion and acts as a purgative. (2) Purifies the blood. (3) Elaborates albumen, fat, and sugar.

What and where is the gall bladder ?

It is a reservoir for the bile ; it lies under the right lobe, and empties itself into the intestinal canal below.

What is the pancreas ?

It is made up of a number of small lobes, is about seven inches long, and weighs about four ounces, and is called *sweetbread*.

Where is it ?

It is situated behind the stomach, in front of the spine ; its duct leads into the intestinal canal, and conveys the pancreatic juice to aid digestion.

What and where is the spleen ?

It lies on the left side under the false ribs ; it is a ductless gland, and its function is connected with the blood in some way which has not yet been determined.

CHAPTER XII.

THE ORGANS OF EXCRETION.

What is excretion ?

The process by which special products are taken out of the blood, and thrown out of the system as useless, being the various impurities which result

from the waste, decay, wearing out or habitual work of all the different tissues and organs.

Which are the organs of excretion?

Lungs, skin, kidneys.

What do the lungs throw off?

Carbonic acid, watery vapour, &c. as explained.

(See Chapter IX.)

What is the skin?

It is the general covering of the body; it is also the organ of touch, a protection for the structures underneath, and retains the heat of the body; it is composed of two layers, epidermis, cuticle, or outer layer; and derma, or true skin.

What does the skin contain?

A great number (millions) of little sweat glands, fatty glands, and a free supply of nerves and blood vessels.

What do you mean by sweat?

A continual evaporation of water is going on from the surface of the body during life; and at different times, from great exertion, intense heat, &c., more water is poured out from the skin than can at once evaporate, so that it forms in drops or beads: this is sweat or perspiration.

What amount does the skin throw off in 24 hours?

By constant evaporation, sweating, &c., about $2\frac{1}{2}$ pounds of water, at the same time carbonic acid and a noxious substance, called urea.

What is the danger if the skin be injured?

If a large surface of the skin be injured (scorched, &c.) so as to arrest the usual evaporation, the system cannot clear itself of the impurities constantly accumulating in the blood, and most serious illness, often death, is the result.

What is the temperature of the skin?

In health 98 degrees.

What are the kidneys?

Bundles of minute tubes: externally they have a fibrous layer or covering; internally, a cavity communicating with a duct which terminates in the *bladder*.

What is the function of the kidneys?

They excrete about 40 to 50 ounces of water in the 24 hours, together with impurities, such as urea and uric acid.

Where are the kidneys?

There are two, a right and left, situated in the cavity of the belly, and placed one in each loin (small of back).

What and where is the bladder?

It is the reservoir for the urine, situated in the pelvis, and connected with the kidneys by the ducts previously named.





PART II.

MEDICAL AND SURGICAL SUGGESTIONS.

Insensibility, Causes of : EXAMINATION OF PERSONS FOUND
INSENSIBLE. *Important Symptoms* : STAGGERING GAIT.
—CONVULSIONS.—GIDDINESS.—SHIVERING FITS.—VIO-
LENT FITS.—COUGH.—WEAK, IRREGULAR AND SLOW
PULSE.—DILATED AND CONTRACTED EYES.—PARALYSIS.
Important Diseases : APOPLEXY.—EPILEPSY.—HYSTERIA.
—FAINTING.—INTOXICATION.—SHOCK OR COLLAPSE.—
CONCUSSION AND COMPRESSION OF THE BRAIN.—KIDNEY
DISEASE.—OPIUM POISONING. *Treatment of Important
Cases* : DROWNING. — SUFFOCATION. — HANGING. —
CHOKING.—SUNSTROKE.—FROSTBITE. *Artificial Res-
piration* : DR. SYLVESTER'S METHOD, &C.

CHAPTER XIII.

INSENSIBILITY.

Of what is insensibility a symptom ?

Sudden illness or accident.

How is insensibility produced ?

By the action of the brain (or heart) being inter-
fered with, which causes a suspension of the
functions of animal life, except those of circulation
and respiration.

Should you try, first, to restore a patient, or to find out the cause of insensibility?

Try to find out the cause *before* trying to restore.

What are the chief causes of insensibility?

1. Injuries to the brain: compression from fracture.
2. Diseases of the brain: apoplexy, epilepsy, &c.
3. Poisoning by narcotics: chloroform, morphia, opium, &c.
4. Blood poisoning, from kidney disease, &c.

Can any of the above forms of insensibility be mistaken for drunkenness?

Yes, they are very liable to be so mistaken. Policemen especially, and others who have attended the St. John Ambulance Association Classes, should remember that these conditions may be complicated with each other, and with the effects of drink, (the drink often administered in mistaken kindness) and should be most careful in forming a conclusion on the condition of the patient. In many cases it is extremely difficult to ascertain the cause of insensibility.

What should you do in case of doubt as to the cause of insensibility?

Place the patient in a comfortable position upon a bed or sofa, with the head rather low; keep him very quiet until the arrival of a medical man.

In examining a person found insensible how should you proceed?

1. Note the position of the body and its surroundings.
2. Obtain all information possible as to the cause.
3. Place the body in a comfortable position, on the back, with the head inclined to one side, and only slightly raised, the arms by the side, and extend the legs.

4. Examine the head, pass the fingers gently over the surface, and search for wounds, bruises, swellings, or depressions.
5. Notice whether the pupils of the eyes are large or small, or of the same size, whether the surface of the eyeballs is sensitive to the touch. If the eyes are closed, open them, and note if the pupils become small when exposed to the light.
6. Compare the two sides of the body.
7. Observe the state of respiration, whether easy or difficult; the presence or absence of snoring; and the odour of the breath.
8. Notice the general appearance of the limbs and their position; and mobility, crepitus, shortening or lengthening of the *bones* of the limbs.
9. Observe the state of the ribs and collar bones.

Why be so particular?

To arrive at a just conclusion as to the cause of insensibility, as the case may end in a law court, and you may have to give evidence as to marks of blood—torn clothing—bruises—knives or other weapons—the state of the ground, whether much trampled on, &c.—the posture in which you found the body, and other similar matters.

If the patient be lying at the foot of a ladder or high scaffolding, what would you suspect?

Concussion, compression, or other injury resulting from a fall.

If an empty bottle labelled "Laudanum" be near, what would you suspect?

That the person had taken poison.

If near the patient an empty flask, smelling of whisky?

Intoxication.

If a patient should show an inclination to vomit what would you do ?

If he were on his back, immediately turn the head to one side, or he might be choked by the matter rejected from the stomach getting into the windpipe.

If a person should fall very comfortably, without hurting himself, (and near the door of a rich man) and commence to jerk his limbs about, and moan, and perhaps froth a little at the mouth what would you suspect ?

That he was an imposter ; the foaming probably produced by a little soap in the mouth ; a good cure being a policeman with a pair of handcuffs.

CHAPTER XIV.

IMPORTANT SYMPTOMS AND THEIR INDICATIONS.

Of what is a staggering gait a sign ?

Intoxication.

May it be from some other cause ?

Yes, from disease or injury of the brain or spinal cord.

Of what are convulsions a sign ?

In children, often of teething ; in others, apoplexy, epilepsy, kidney diseases, and digestive disorders.

Of what is giddiness a sign ?

Disorders in the brain, stomach, liver, or kidneys.

Of what are shivering fits a sign ?

They usher in fevers, and indicate danger during illness.

Of what is a cough a sign ?

Irritation of the air passages ; pressure on the

lungs or on their nerves ; lung and heart disease.

Of what is difficulty of breathing a sign ?

Obstruction in the air passages, or injury to the nervous supply of these organs ; of lung and heart disease, and broken ribs.

What is stertorous breathing ?

Loud snoring.

Of what is it a sign ?

Compression of the brain and apoplexy.

Of what is a weak pulse a sign ?

Fainting, shock, collapse, and hemorrhage.

Of what is an irregular pulse a sign ?

Heart disease.

Of what is a slow and labouring pulse a sign ?

Diseases causing pressure on the brain, such as apoplexy.

Of what are violent fits a sign ?

Insanity, drunkenness, hysteria, epilepsy.

When hemorrhage from the ear, mouth, nose or eyes occurs, of what is it a sign ?

Fracture of the base of the skull.

When are the pupils of the eyes fixed and dilated ?

In paralysis and apoplexy.

When unequal in size ?

In serious disease or injury affecting one side of the brain.

When contracted ?

In congestion or inflammation of the brain, opium poisoning, &c.

What are evidences of paralysis ?

Drawing of the face to one side, squinting, fixed condition of the pupils (dilated), irregularity in the size of the pupils, twitching of the muscles on one side of the body.

Of what is a flushed face a sign ?

Intoxication, apoplexy, epilepsy.

CHAPTER XV.

IMPORTANT DISEASES, &C.

What is the cause of apoplexy?

Effusion of blood producing pressure on the brain.

What are the signs of, and what is the treatment for, apoplexy?

SIGNS :

Patient becomes suddenly helpless.

Face flushed (or very pale).

Mouth drawn a little to one side.

Difficulty in speaking, you cannot well understand what he says.

Pulse full.

Breathing stertorous, one cheek puffed out with each expiration.

If the arm be raised, one will give some evidence of feeling, while the other will fall helplessly to the side.

Patient cannot be roused.

Convulsions.

Paralysis.

TREATMENT :

Place patient quietly in a lying down position, with the head slightly raised.

Loosen all tight clothing, such as collar, neck-tie, waistcoat, braces, &c.

Apply iced or cold water to the head.

Apply hot bottles, or flannels to the feet and legs.

See that the patient has plenty of fresh air and keep him still and quiet.

DO NOT GIVE THE PATIENT ANYTHING TO DRINK ; STIMULANTS ARE ESPECIALLY TO BE AVOIDED.

What is the cause of epilepsy?

Disease or disorder of the brain.

What are the signs of, and what is the treatment for, epilepsy?

SIGNS :

Patient is *suddenly* seized with the fit, and is in consequence often badly hurt, the attack is sudden and the insensibility complete.

Before becoming unconscious he frequently utters a piercing scream.

The hands are tightly clenched, the legs and arms jerked violently towards the body.

Face livid, the pupils dilated, the eyes roll and the features are twitched and drawn all ways.

Foams at the mouth, sometimes streaked with blood (because he has bitten his tongue).

Breathing laboured ; pulse normal.

TREATMENT :

Place in a comfortable position, and remove all tight clothing, as in apoplexy.

Place a piece of wood or pad between the patient's teeth to prevent him biting his tongue.

Prevent patient from injuring himself, but use only sufficient force to do this ; never hold him firmly to the ground. If he wishes to go to sleep, or shows signs of being stupid and heavy after the fit, let him rest quietly for some hours.

What is the cause of hysteria?

Excitement, weakness, and nervousness.

What are the signs of, and what is the treatment for, hysteria?

SIGNS :

Usually occurs in females.

Falls suddenly but carefully, clenches her

hands, grinds her teeth.

Partial insensibility, apparent but not real.

Eyelids partially closed and quivering.

Patient alternately cries and laughs: great tendency to cry.

TREATMENT :

Be firm, and give cold douche to face; if necessary, tell her you will drench her with cold water.

What is the cause of syncope, or fainting?

Bleeding, excessive heat, fright, exhaustion, over fatigue, general debility or mental shock, causing failure of the heart's action.

What are the signs of, and what is the treatment for, fainting?

SIGNS :

If standing, patient staggers; if sitting down, becomes restless and uneasy; respiration hurried and shallow, then insensible.

Face and lips pallid.

Pulse almost imperceptible.

Cold sweat over forehead and under the eyes.

TREATMENT :

Place the patient down flat, with his head on or below the level of his body, and keep him in that position until he is better.

Loosen all tight clothing, as in apoplexy.

Cold douche to head and face.

Give weak stimulant.

Plenty of fresh air.

(If patient is in such a place that he cannot be laid down and have fresh air, &c., get his head as low as possible by pressing it well down between his knees.)

What is the cause of intoxication?

Excess in alcoholic drink.

What are the signs of, and what is the treatment for, intoxication?

SIGNS :

Insensibility not complete, if roused will answer in an incoherent manner.

Strong odour of alcohol about the breath.

Pupils of eyes equal in size, dilated, and fixed, the eyes themselves reddened.

Face flushed and bloated, lips livid, and breathing slow.

Temperature of the body 2° to 3° lower than it should be.

Pulse soft and quick.

No squinting, no frothing at the mouth, no biting of the tongue.

All the limbs equally helpless.

TREATMENT :

Place in a comfortable position.

Rouse him by dashing cold water on the head and face.

Apply warmth to the surface of the body and the extremities.

Apply friction by rubbing the limbs and trunk well with warm, dry cloths.

If you are certain that the patient is intoxicated, give him, as an emetic, a tablespoonful of salt in a tumbler of hot water, or one tablespoonful of mustard in the same quantity of warm water.

Keep him quiet and warm, giving him a cup of hot coffee or tea after vomiting.

Policemen should never put a man really intoxicated into a cold, damp cell.

What is the cause of shock or collapse?

Injuries to the nervous system by severe accident, operations, grief, fright, lightning, &c.

Is shock or collapse dangerous?

Yes, death may be almost instantaneous ; or recovery may be slow or rapid.

What are the signs of, and what is the treatment for shock?

SIGNS :

Face pale, pinched, and haggard, and bears a vacant, yet anxious and alarmed, expression.

Patient frightened, faint, depressed, and complains of cold.

He trembles and staggers, his skin feels cold and clammy.

His breathing is feeble and laboured, his pulse almost imperceptible.

TREATMENT :

Place patient in lying down position.

Remove all tight clothing.

Apply warmth to surface of the body, and hot water bottles, &c., to his feet.

Give coffee, tea, broth, or a little spirit or wine mixed with hot water (if there is no risk of bleeding).

Restore circulation and respiration.

What causes concussion of the brain?

Blows on the head, or falling on the feet from a great height. It is either severe or slight.

What are the signs of, and what is the treatment for, slight concussion?

SIGNS :

Patient lies motionless and insensible, with his eyes shut.

Face pale, skin cold, pulse weak, breathing slowly. If roused, answers peevishly, and then falls back again into insensibility.

After a little time he gets uneasy, vomits, and recovers.

TREATMENT :

Place the patient on his back with the head slightly raised.

Remove all tight clothing, keep him in a dark, quiet room.

Wrap him up in blankets, and put hot water bottles to his feet.

Cold applications to the head.

Allow the patient to go to sleep.

What are the signs of, and what is the treatment for, severe concussion ?

SIGNS :

Patient perfectly insensible, and cannot be roused at all.

Skin cold and clammy, pulse very feeble.

Breathing slow and sighing.

TREATMENT :

The symptoms being like those of apoplexy, the case must be treated as such.

What causes compression of the brain ?

The skull may be broken, and a fragment of the bone driven against the brain ; or a blood vessel may be ruptured, and the blood pressing upon the brain.

What are the signs of, and what is the treatment for, compression of the brain ?

SIGNS :

Like those of apoplexy. (*See page 40.*)

TREATMENT :

Same as apoplexy. (*See page 40.*)

What is blood poisoning from kidney disease ?

It is when the kidneys fail to perform their proper function of excreting hurtful materials (*see page 34.*) These wasteful products accumulate in the blood and act as poisons.

What are the signs of, and what is the treatment

| | | |
|--|---|--|
| Diseases of the Brain | { | Apoplexy, Epilepsy, Hysteria. |
| Injuries of any kind in any part of the body. | } | Shock or Collapse. |
| Fatigue, fright, bleeding, debility, &c., causing failure of the heart's action. | } | Fainting. |
| Poisoning. | { | Intoxication ; Opium Poisoning ; Poisoning of the blood due to Kidney Disease. |

CHAPTER XVI.

DROWNING, SUFFOCATION, HANGING, SUNSTROKE.

Where can you find the best directions for restoring persons apparently drowned ?

In the instructions issued by the Royal Humane Society.

What should you do to render prompt aid ?

Send for medical assistance, blankets and dry clothing, and proceed to treat the patient *instantly*.

How would you proceed ?

Secure as much fresh air as possible, by exposing the neck, face, and chest to the wind (except in extremes of weather).

What points are to be aimed at ?

First and immediately, the restoration of breathing ; secondly, after breathing is restored, the *promotion of warmth and circulation*.

Why not promote warmth, &c. first ?

If circulation of the blood be induced before breathing has recommenced, the restoration to life

will be endangered.

How long should you persevere in efforts to restore breathing?

Until medical assistance arrives, for two hours, or until the pulse and breathing have ceased for at least one hour.

How would you restore breathing?

First place the patient flat on his face, supported by folded articles of clothing, with one of the arms under the forehead, and the head rather lower than the body, so that any water, &c., in the mouth and air passages may drain off; the tongue itself will fall forward, leaving the entrance to the windpipe free.

Should you do anything with the tongue?

Yes, cleanse the mouth and nostrils; open the mouth; draw forward the tongue, and keep it forward by fixing an elastic band over it and under the chin.

How would you get rid of the water which has entered the stomach?

When the patient is lying on his face, apply firm pressure to the small of his back.

How would you excite breathing?

Quickly place the patient on his back on a flat surface, the head and shoulders on a firm cushion, or folded articles of dress placed under the shoulder blades; remove all tight clothing from the neck and chest; place yourself at the head of the patient, grasp the arms just below the elbows, and draw the arms gently and steadily upwards until they meet above the head, and keep the arms in that position for two seconds. This is for the purpose of drawing air into the lungs. (*See fig. 7.—Inspiration.*)

How do you imitate expiration?

You force air out of the lungs by turning down

the patient's arms and pressing them gently and firmly for two seconds against the sides of the chest. (*See fig. 8.—“Expiration.”*)

How often should you do this?

Repeat these measures, alternately, deliberately, and perseveringly fifteen times in a minute, until a spontaneous effort to respire is perceived.

Could anything else be done to excite inspiration?

Whilst employing the above method, another person might excite the nostrils with snuff, or smelling salts, or tickle the throat with a feather, and rub the chest and face briskly, and dash cold and hot water alternately on them, and rub the body and lower limbs with dry flannel or cloths.

When you perceive respiration, what then?

Proceed to induce circulation and warmth.

How?

Wrap the patient in dry blankets and commence rubbing the limbs upwards, firmly and energetically, to press the blood along the veins towards the heart, the friction must be continued under the blankets or dry clothing; also promote warmth by the application of hot flannels, bottles, or bladders of hot water, heated bricks, &c., to the pit of the stomach, the arm-pits, between the thighs, and soles of the feet.

What then?

When the power of swallowing has returned give a *teaspoonful* of warm water, small quantities of wine, warm brandy and water, or coffee. The patient should be kept in bed and a disposition to sleep encouraged. During reaction large mustard plasters to the chest and below the shoulders will greatly relieve the distressed breathing, but this should be under the direction of a medical man.

By what name is the method known which has

been described?

Dr. Sylvester's method.

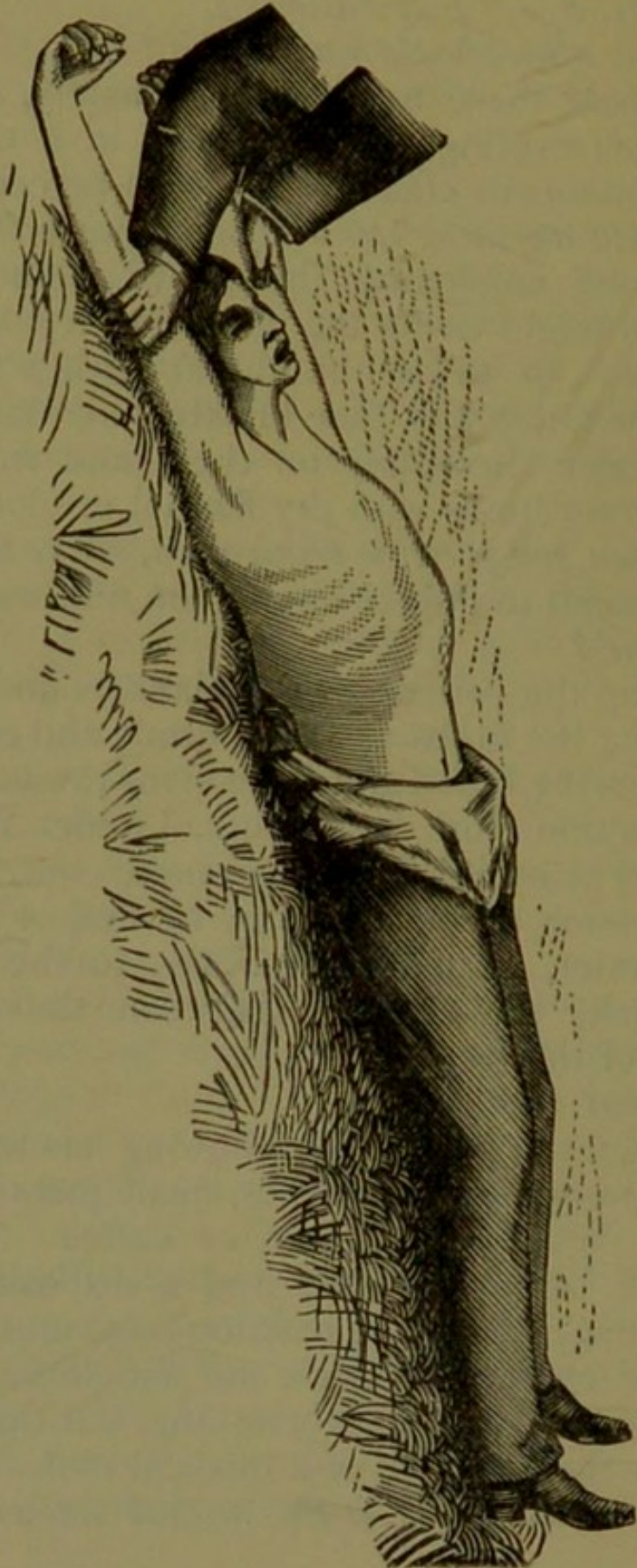


FIG. 7. DR. SYLVESTER'S METHOD OF PERFORMING ARTIFICIAL RESPIRATION :
INSPIRATION.



FIG. 8. DR. SYLVESTER'S METHOD OF PERFORMING ARTIFICIAL RESPIRATION :
EXPIRATION.

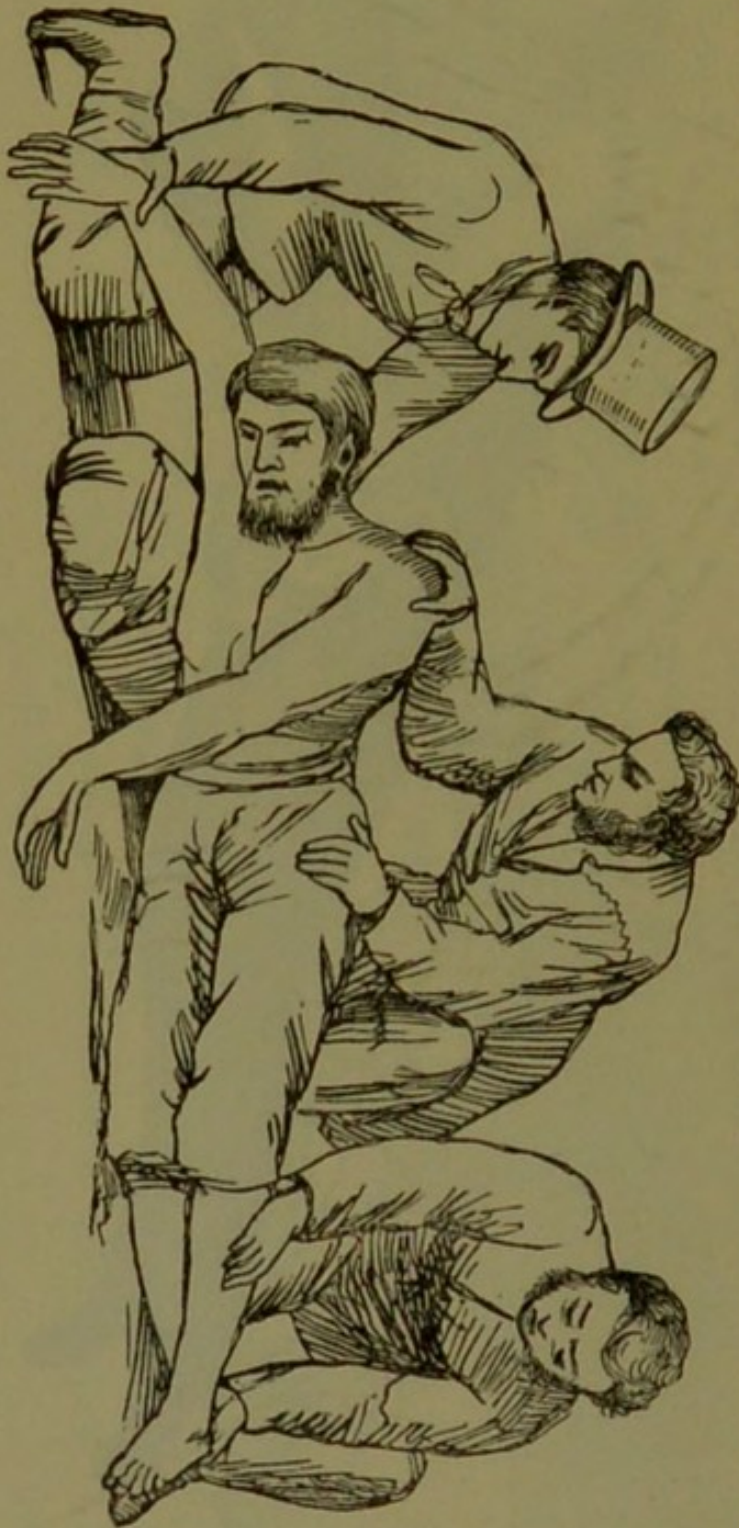
Are there any others ?
Dr. Marshall Hall's, and others.

Describe another method?

Clear the throat and remove tight clothing; excite nostrils and rub the chest, dash hot and cold water,

&c., as previously described. To imitate breathing, place the patient with the face downwards, fold one of the arms so that the forehead may rest on the forearm, supporting his chest on a folded coat or other article of dress, (see fig. 9) then turn the body gently on the side and a little beyond, and then briskly back again on the face, occasionally

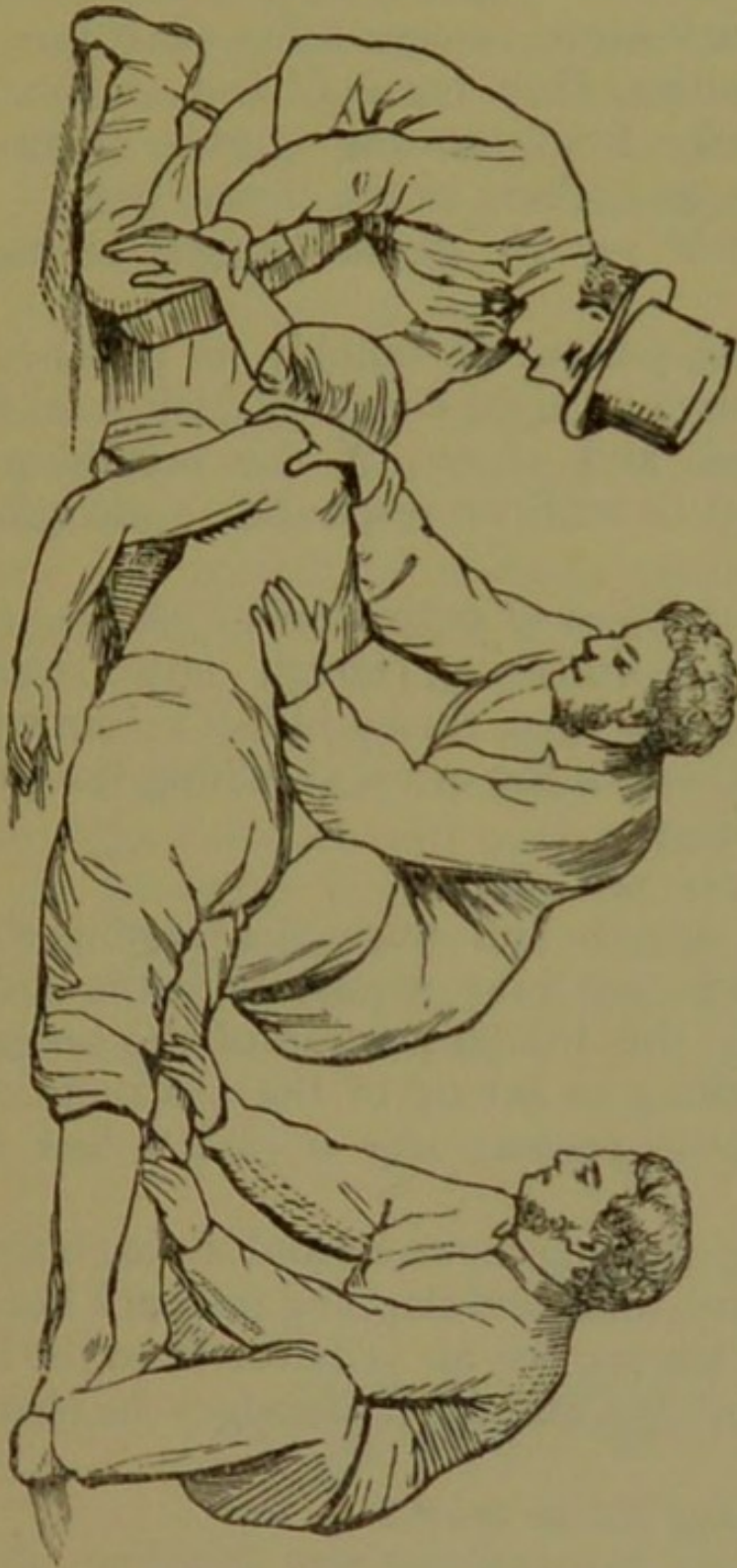
FIG. 9. DR. MARSHALL HALL'S METHOD OF PERFORMING ARTIFICIAL RESPIRATION: INSPIRATION.



varying the side; on each occasion that the body is replaced on the face make uniform but efficient

pressure with brisk movement on the back, between and below the shoulder blades ; (see fig. 10) remove

FIG. 10. DR. MARSHALL HALL'S METHOD OF PERFORMING ARTIFICIAL RESPIRATION :
EXPIRATION.



the pressure immediately before turning the body on the side again ; repeat the measures about fifteen times in a minute. Two persons are required ; one must attend solely to the movements of the head and of the arm placed under it.

Should the head of the patient be placed below level of the the body, or be slightly raised ?

The opinions of eminent medical men vary ;

some advocate the head slightly lower, others, slightly raised, hence the diagrams show both methods.

How may persons be suffocated ?

Many ways : by "choke damp" in mines, by charcoal vapour, sewer gas, coal gas, vapours from lime kilns, brick kilns, cement kilns, blast furnaces, foul air in cellars, deep cuttings and excavations, in wells, smoke from burning houses, by food or other substances sticking in the throat, &c.

What should you do in case of gas or vapour suffocation ?

Remove the patient as quickly as possible into fresh air, remove all tight clothing, dash cold water on face, head, and chest ; if the breathing has stopped, resort to artificial respiration ; use galvanic battery.

What are the signs of suffocation by choking ?

Difficulty of breathing, cough and retching, prominence of the eyes, dusky bluish colour of the face, tossing about of the arms, clutching the throat, then insensibility.

What should you do ?

Open the mouth and push the forefinger right back, and try to pull away or push aside the obstruction, or press the hinder portion of the tongue to bring on vomiting to get rid of the obstruction.

Why do some persons slap a child's back when choking ?

Because by pressing the chest and stomach against something hard, and then slapping the back between the shoulder blades, the air is driven from the lungs along the windpipe, and often dislodges the obstruction.

Can anything else be tried ?

If the patient can swallow any liquid an emetic may be given, (and in very young children you may lift the little patient up by the heels, and give a slap on the back at the same time).

What is the treatment for hanging?

Cut the body down immediately, (many persons run away to tell someone else to do this); remove all tight clothing, have as much fresh air as possible, dash hot and cold water alternately on the face and chest, use vigorous friction to the limbs and body, excite the nostrils, &c., and use artificial respiration as in drowning.

What are the signs of sunstroke?

Giddiness and sickness, great heat and thirst, skin hot and dry, eyes reddened and pupils contracted, pulse quick, breathing noisy and hurried.

What is the treatment?

Place the patient in a shady place, in a lying down position, head slightly raised, remove all tight clothing, dash cold water freely over face, neck, and chest. On no account give stimulants.

What should be done in case of frostbite?

The main object should be to restore the numbed parts as *gradually as possible*. Keep the patient away from any fire or even warm room, rub the part affected with snow, or bathe with cold water; after a time, wrap them in flannel.





PART III.

PRACTICAL.

Bandages, Use of: TRIANGULAR BANDAGE AND ITS APPLICATION—REEF KNOT—"GRANNY"—SURGEON'S KNOT—CLOVE HITCH.—ROLLER BANDAGES—REVERSE SPIRAL—CAPELINE BANDAGE—BANDAGING WHOLE ARM—BANDAGING WHOLE LEG *Wounds:* INCISED—LACERATED—CONTUSED—PUNCTURED—GUNSHOT—BURNS—SCALDS—SPRAINS—BITE OF ANIMALS—STING OF BEE,—MATERIALS USED IN DRESSING—STIMULANTS—BEEF TEA—POULTICES—MUSTARD POULTICE—LEECHES, &c. *Foreign Bodies in the Eye:* NOSE—EAR—DRESSINGS—PLASTERS. *Hæmorrhage:* ARTERIAL, VENOUS—CAPILLARY—INTERNAL—DIGITAL PRESSURE—COMPRESSION OF THE PRINCIPAL ARTERIES AND VEINS. *Fractures:* CLASSIFICATION OF—CAUSES OF—SIGNS OF—SPLINTS—DISLOCATIONS—TREATMENT OF VARIOUS FRACTURES.

CHAPTER XVII.

BANDAGES, KNOTS, BANDAGING, &c.

Of what are bandages made?

Unbleached calico, linen, flannel, webbing, &c.

How many kinds are there?

Two principal kinds: Esmarch's triangular bandage, and roller bandage.

Of what use are bandages ?

For covering and protecting wounds, as supports to the different parts of the body, for applying pressure to arrest bleeding, for binding on and maintaining dressings to wounds and splints to fractured limbs, for checking undue muscular action.

What size is the triangular bandage ?

The lower border should measure 4 feet, and the two side borders 2 feet 10 inches each.

Is it very useful ?

Esmarch's bandage can be applied in 32 different ways: it answers every purpose for temporary dressings, and the manner of applying it can be learnt with the greatest facility. A bandage with figures illustrating its use can be obtained from the Order of St. John.

What would serve the purpose of a triangular bandage ?

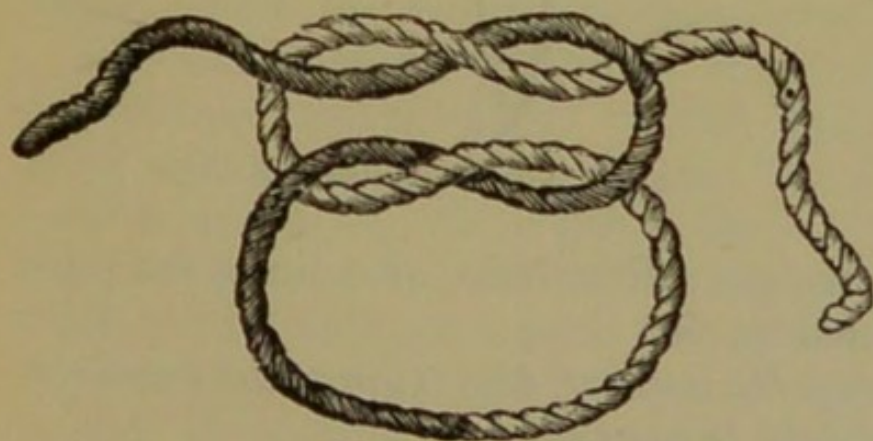
A good sized pocket handkerchief.

How would you fold it broad ?

By spreading it out, then bringing the point down to the lower border, and folding in two.

How fold it narrow ?

By drawing the point down to the border, and folding into three.

*How should it be tied ?*

By a reef knot (*see figs. 11 and 12*) because it is very secure.

FIG. 11. THE REEF KNOT.

How do you tie a reef knot?

By passing the right hand end *over* the left, and tying, then the left hand *over* the right; or *vice versa*.

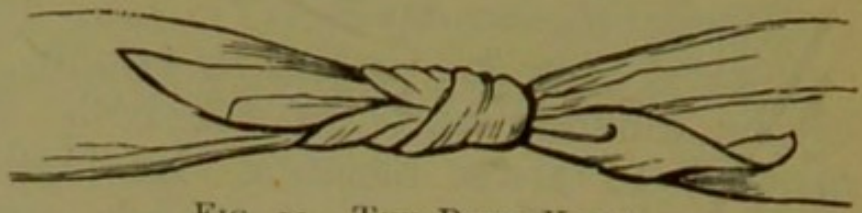


FIG. 12. THE REEF KNOT.

What is an insecure knot often called?

A 'Granny.'
(See figs. 13 and 14.)

Name other useful knots?

The Surgeon's knot and clove hitch (see figs. 15 and 16.) It is not very likely that you will be called upon to use the Surgeon's knot.

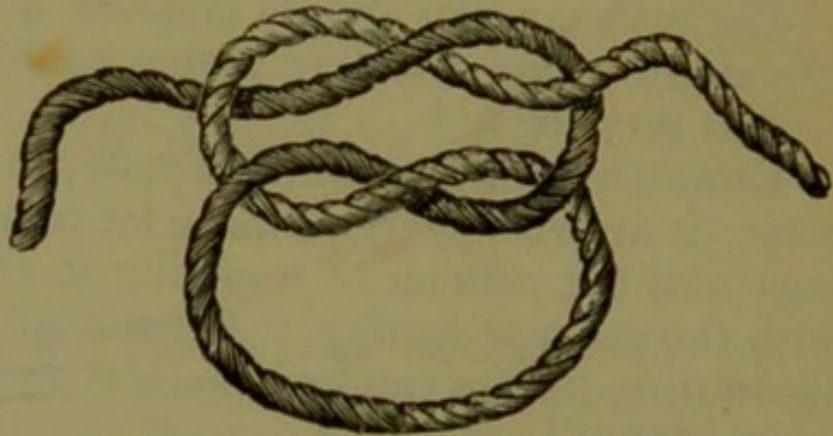


FIG. 13. THE "GRANNY" KNOT.

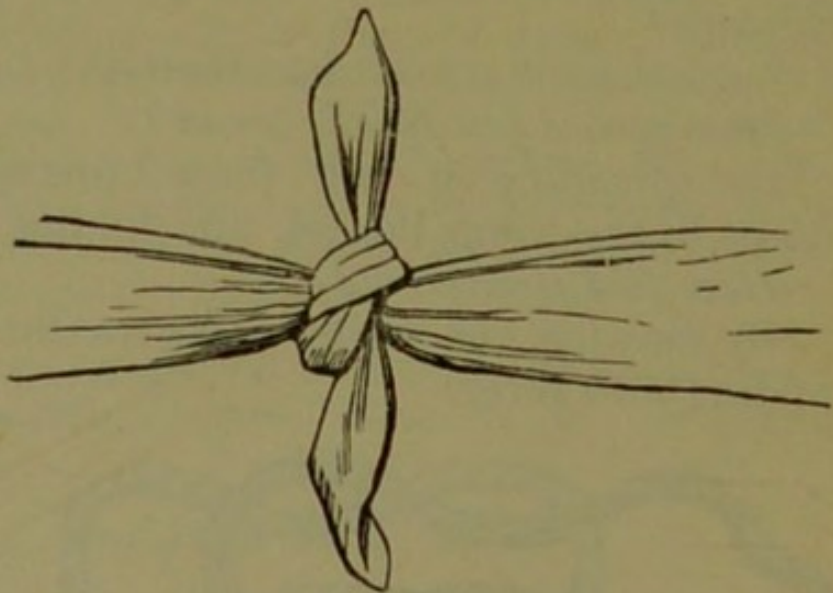


FIG. 14. THE "GRANNY" KNOT.

Of what use is the clove hitch?

It is used to get a firm hold of a limb, for purposes of extension, &c.

Name some of the uses of the triangular bandage you are most likely to meet with?

Large, broad, and narrow arm sling; tourniquet;

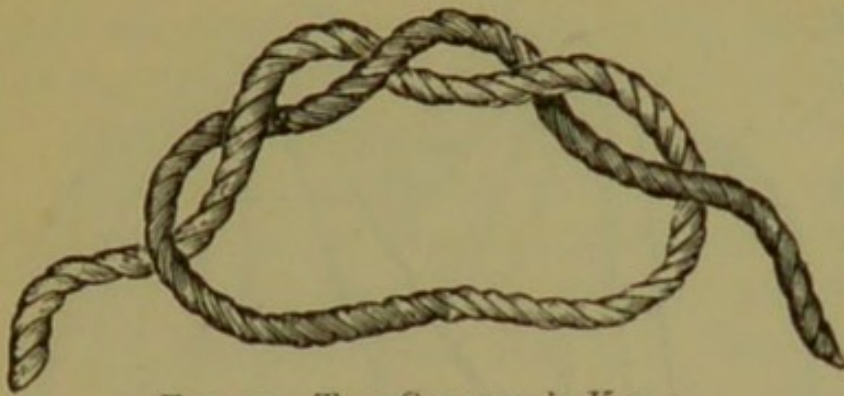
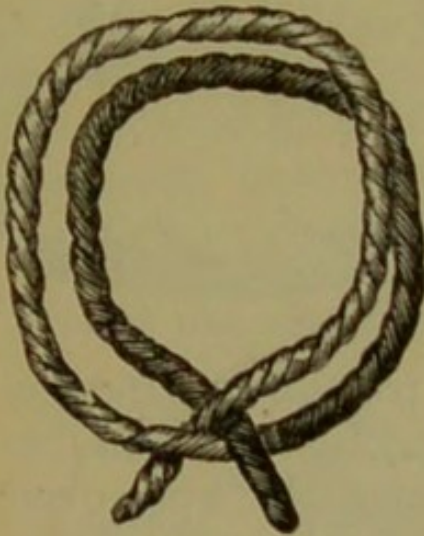


FIG. 15. THE SURGEON'S KNOT.

bandages for
the head, eye,
nose, jaw,
shoulder,
elbow, hand,
chest, ribs,
hips, knee,
foot, halter
bandage and chin sling.

FIG. 16.
THE CLOVE HITCH.

How should you make the large arm sling?

Take an unfolded bandage, put one *end* over the *sound shoulder*, let the other *end* hang down in front of the patient. Place the *point* well behind the elbow of the injured arm, gently bend the forearm forward and hold it over the middle of the bandage, then take hold with the other hand of the lower

end of the bandage and place it over the shoulder of the injured side, tie the ends together behind the neck, then bring the point neatly over the elbow, and pin in front with a safety pin. (*See fig. 17.*)

How should you put on the broad arm sling?

The bandage being folded in *two*, one end is placed over the shoulder of the *injured side*, the other end hanging down; bend the fore-arm and hold it as above, then place the other end over the *sound* shoulder, and tie the ends together at the back of the neck, or a little to one side.

How should you put on the small arm sling?

Fold the bandage in *three*, and put on as in the broad arm sling. (*See fig. 21.*)

What is a tourniquet?

An appliance for checking bleeding by pressure on the blood vessels.

Are they specially made?

Yes. Esmarch's elastic tourniquet is one of the best.

How may they be improvised?

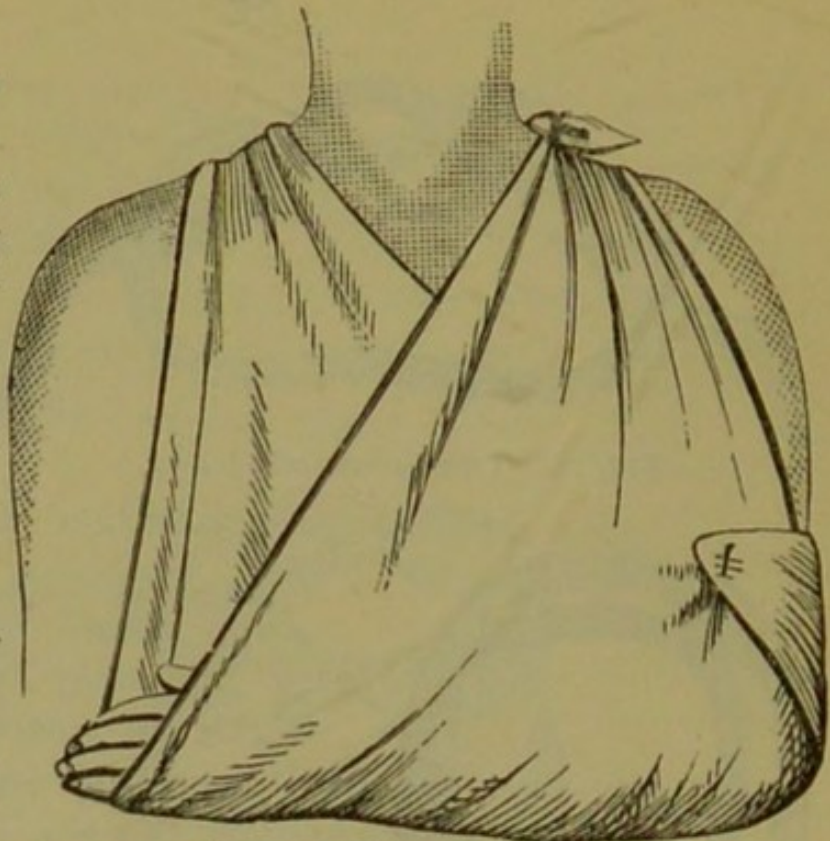


FIG. 17. THE LARGE ARM SLING.

Fold a triangular bandage narrow, and tie a knot in the middle, place the knot over the artery, tie the ends of the bandage, and then twist it tighter with a stick. (*See fig. 18.*)

A pad, piece of wood, cork, stone, ball, &c., will do better than a knot.

Elastic bandage, elastic braces, a piece of india rubber tubing, may be twisted tightly round the limb. "Völker's stick tourniquet" consists of two sticks each about 8 inches long; one is placed under

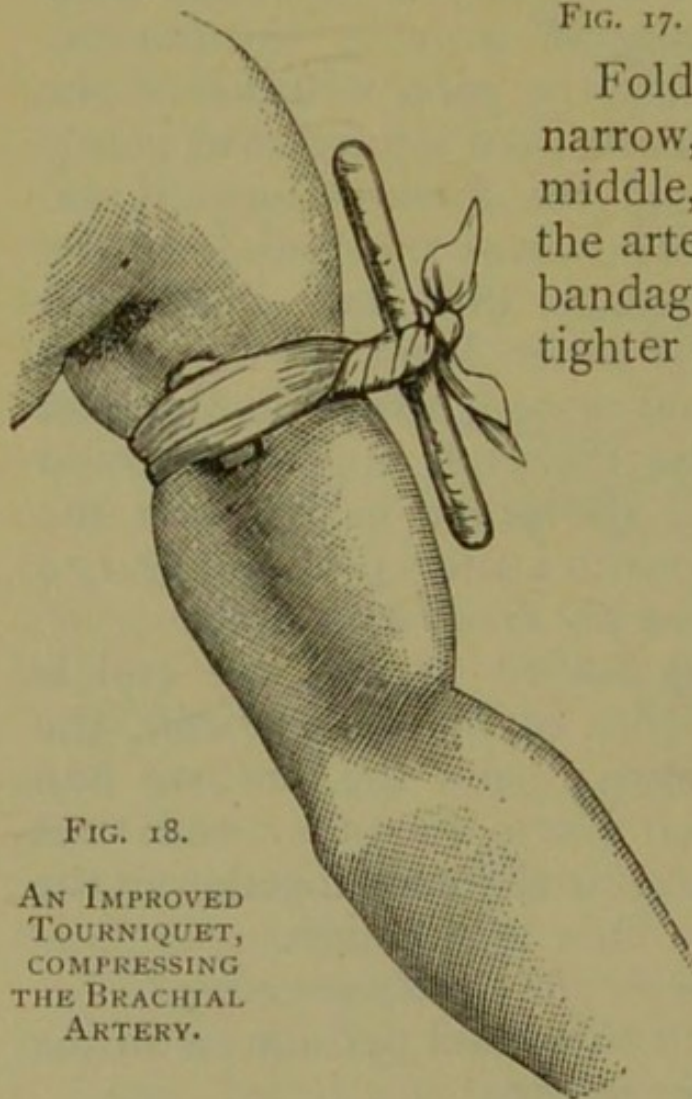


FIG. 18.

AN IMPROVED
TOURNIQUET,
COMPRESSING
THE BRACHIAL
ARTERY.

and the other over the arm or leg, and then each end of the sticks tied tightly together by bandages, &c.

How should you bandage the head?

Fold a hem, about two inches deep, along the lower border of the bandage, standing behind the patient (who should be sitting), place the bandage on the head so that the hem lies on the forehead just above the eyebrows, and the point hangs down over the nape of the neck; then carry the two ends round the head, *above* (not over) the ears, cross them below the occipital protuberance, and bring them forward and tie on the forehead; then draw the point downwards and turn it up, and pin it on the top of the head. (*See figs. 19 and 20.*)



FIG. 19. (Side and back view.)

BANDAGE
FOR THE
HEAD.



FIG. 20. (Front view.)

How should you bandage the jaw?

Fold a narrow bandage, place the centre under the chin, take the ends to the top of the head, and tie; *or, see Chapter XX, "Fractured Jaw."*

How should you bandage the shoulder?

Place the *point* of an unfolded bandage on the shoulder against the neck, so that the base will be about the middle of the arm, take the two ends round the arm, and tie on the outer side. Put on a broad arm sling with a second bandage. Then

bring the *point* of the first bandage under the arm sling, double it over, and fasten with a safety pin. (See fig. 21.)

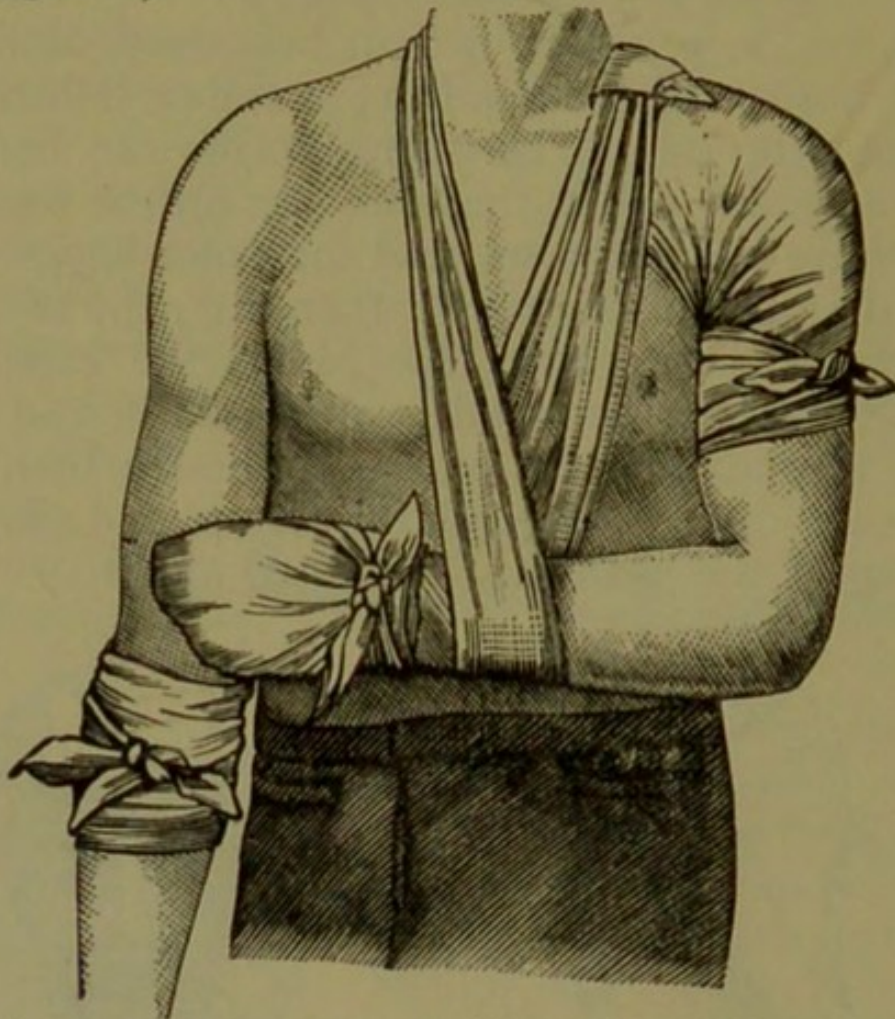


FIG. 21. BANDAGE FOR THE ELBOW, HAND, SHOULDER, AND SMALL ARM SLING.

How should you bandage the collar bone?

By a pad in the arm pit, a narrow bandage binding the arm to the side, and broad arm sling. (See Chapter XXI, "Fractures, &c.")

How should you bandage the elbow and knee?

By figure-of-eight-bandage; and in case of the elbow, putting on the large arm sling; or in each case fold a bandage, place the centre over the seat of the injury, take the ends around, cross them, and tie on the opposite side. (See figs. 21 and 22.)

How should you bandage the ribs?

Take two bandages folded broad, place the broad

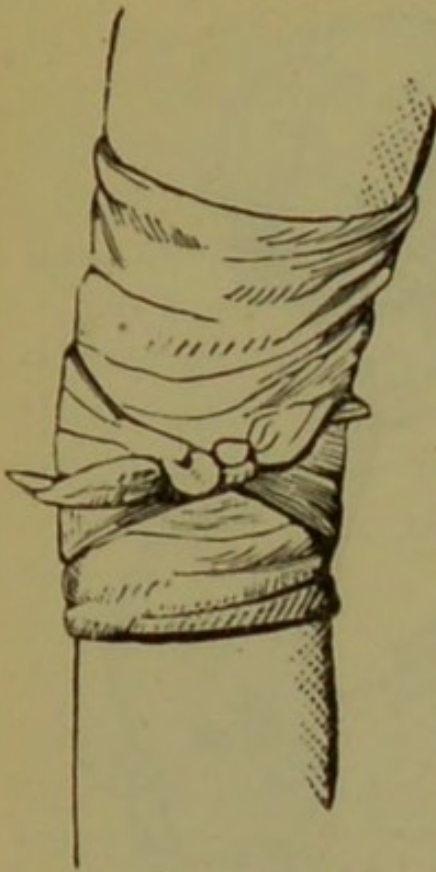


FIG. 22.
BANDAGE FOR THE KNEE.

part over the seat of the injury, put one bandage well up in the armpits, the other below it, carry the ends around the chest and tie. (See "Fractured Ribs.")

How should you bandage the chest?

Place an unfolded bandage on the chest with the *point* over the shoulder of the injured side, carry the ends of the base round to the back and tie, then pull the point well over the shoulder, and tie to one of the ends of the knot already tied behind. This bandage can be put on the back in the same way. (See *figs. 23 and 24.*)

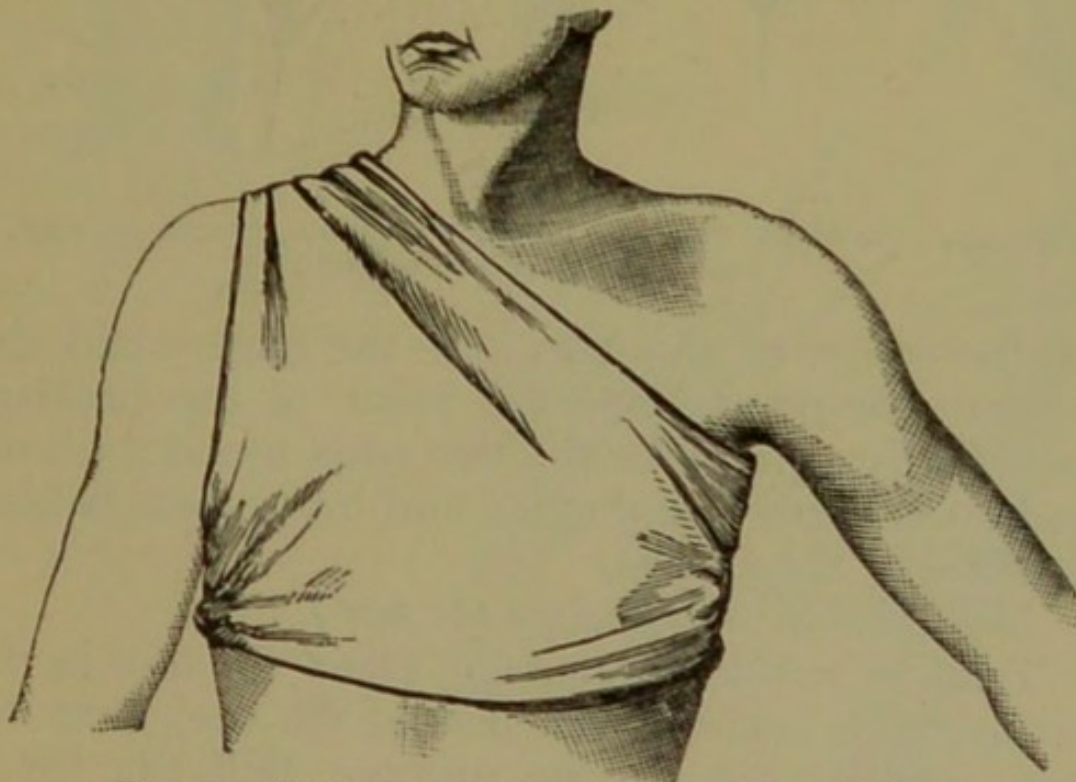


FIG. 23. BANDAGE FOR THE CHEST. (From before.)

How should you bandage the hand?

Put the hand on an unfolded bandage, the wrist

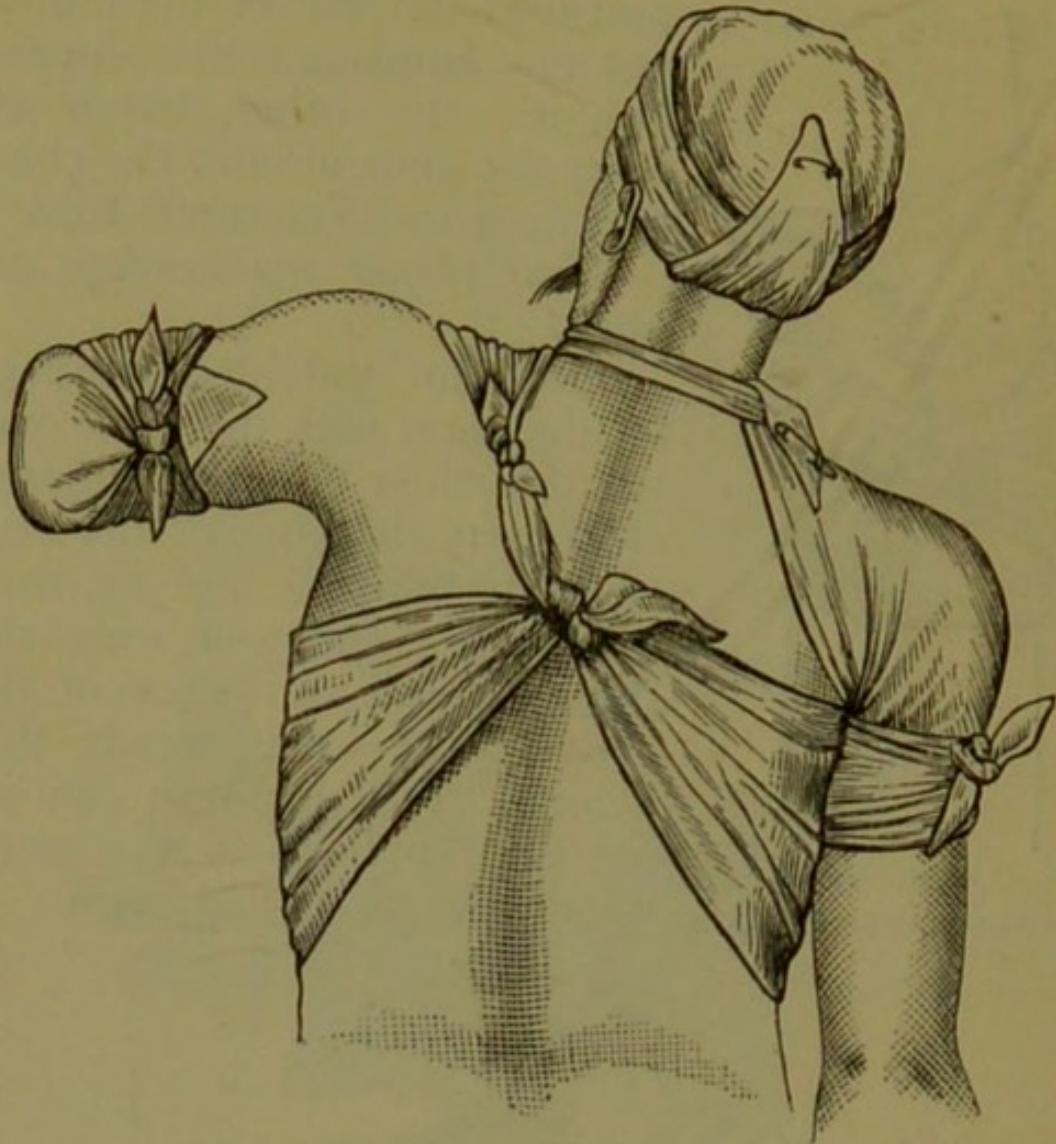


FIG. 24. BANDAGE FOR THE HEAD, SHOULDER, STUMP OF ARM, AND CHEST. (From behind.)

on the centre of the *base*, and the fingers laid flat towards the point, bring the point of the bandage to the wrist, then take the two ends round the wrist and cross them in doing so, and bring them behind and tie. (*See fig. 21.*)

How should you bandage the foot?

Take an unfolded bandage, place the foot in the centre, with lower border behind the heel, turn the *point* over the toes to the instep. Pull the lower border behind the heel, take the ends around the ankle, cross them in front, pass under the foot and tie on the top, then double the point over and pin

in, (*see fig. 25*); or it may be tied around the ankle.

How should you bandage the hip?

Tie a narrow bandage around the waist (across the loins). Take the point of another bandage and pass it under the first one and pin it, then fold the lower border to the required length, and pass the ends around the thigh, and tie or pin on the outer side; adjust the bandage until it is straight and comfortable.

(*See fig. 26.*)

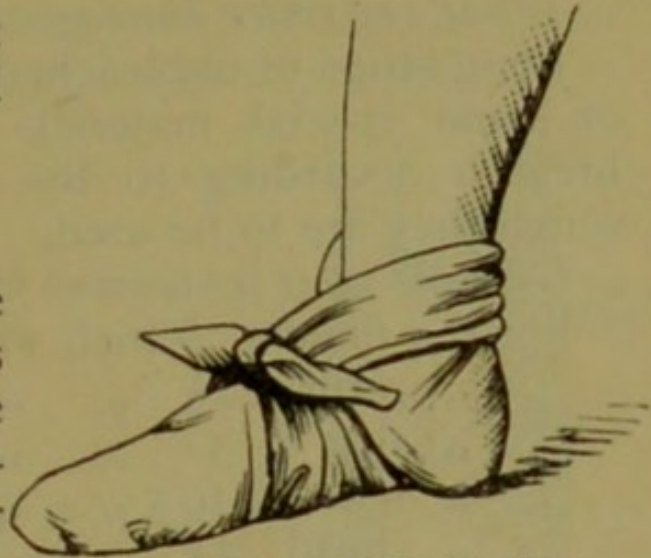


FIG. 25. BANDAGE FOR THE FOOT.

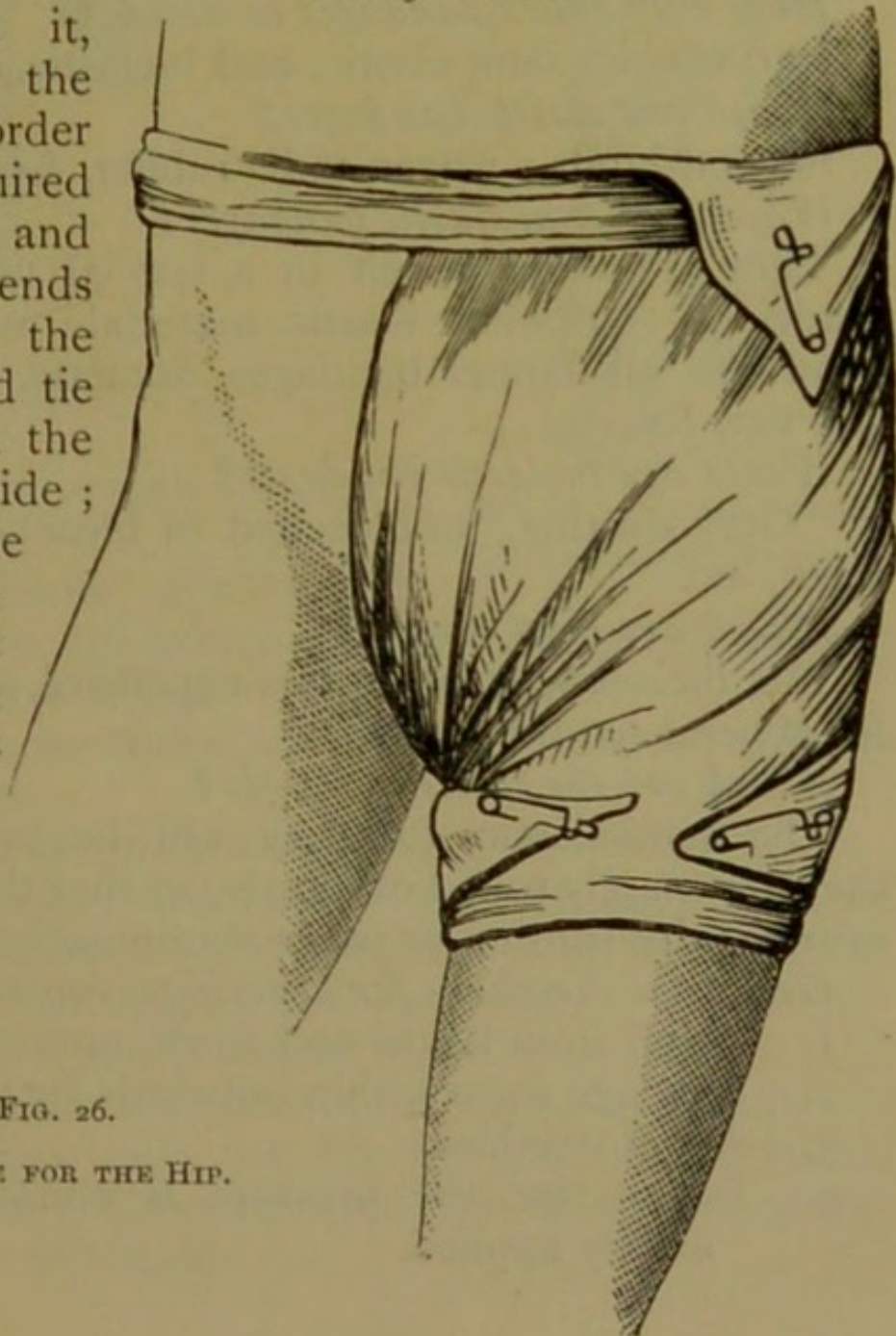


FIG. 26.

BANDAGE FOR THE HIP.

What are roller bandages ?

Long strips of unbleached calico, linen, flannel, or some special material, varying in length and breadth according to the part of the body for which they are to be used.

Give the most convenient sizes ?

For the fingers $\frac{3}{4}$ inch wide, 1 yard long.

„ „ arm $2\frac{1}{2}$ „ „ 3 to 6 yards long.

„ „ leg 3 „ „ 6 to 8 „ „

„ „ chest 4 to 5 „ „ 8 to 12 „ „

„ „ head $2\frac{1}{2}$ „ „ 4 to 6 „ „

How may roller bandages be divided ?

Into elastic, semi-elastic, and inelastic.

Which are elastic bandages ?

Several kinds ; woven india-rubber, &c.

Which are semi-elastic bandages ?

They are either woven in a special manner, or made of somewhat elastic material ; under this head are all flannel bandages, domette, cotton or silk net, &c.

Which are inelastic bandages ?

“Grey shirting,” unbleached or bleached calico, linen, &c.

Which are most used ?

The inelastic, as being less expensive, and firmer for general requirements.

Which are the easiest to apply ?

The semi-elastic, for they will lie smoothly if they are merely rolled on firmly, so that they hardly ever require turning or other manipulation.

Give some directions for applying a roller bandage ?

1. Begin from below and work upwards.
2. Bandage from within outwards by the front.
3. Avoid wrinkles.
4. Insure that the pressure is uniformly and evenly applied.

5. Reverse on the fleshy side of the limb and not over the sharp edges of a bone.

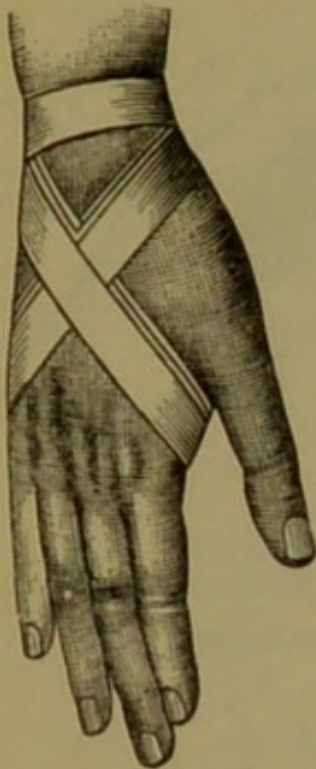


FIG. 27.
FIGURE-OF-EIGHT
BANDAGE.



FIG. 28. FIGURE-OF-EIGHT
HANDKERCHIEF BANDAGE.

Where do you use the figure-of-eight?

At the joints. *Ex.*: thumb, hand, elbow, hip, knee, ankle, &c. (See figs. 27 and 28.)

What is a circular roller bandage?

One whose turns are applied on one and the same level.

What is meant by bandaging by reverses?

It must be used where the circumference of the limb increases or diminishes, so as to avoid the gaping of the turns. (See fig. 29.)

What is a double headed roller?

A bandage which is rolled up from both ends. It is used especially for the head, and amputation stumps: it is also employed for drawing together the edges of wounds.

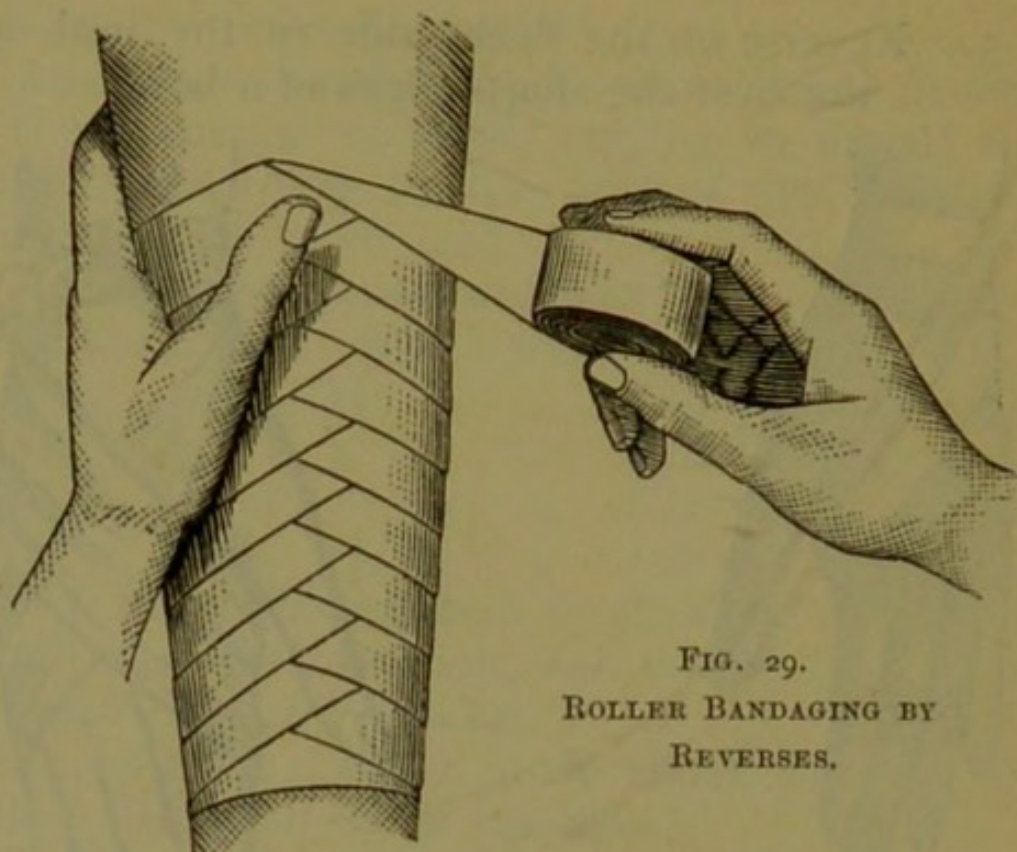


FIG. 29.
ROLLER BANDAGING BY
REVERSES.

What is a starch bandage?

Starch laid on a roller bandage; gutta percha and plaster of Paris is often used instead.

What is a capelline bandage?

A double headed bandage, one end of which passes round the head from forehead to occiput, and fixes the turn of the other end, which is carried alternately over the right and left parietal bone, each turn overlapping the preceding one.

(See fig. 30.)

How would you bandage the whole of the arm?

Commence by bandaging every finger and the entire hand with a narrow roller, the wrist by figure-of-eight: forearm is then bandaged by an ascending spiral with reverses, the elbow by a figure-of-eight, the arm by a simple spiral, and the shoulder by the spica. (See fig. 31.)

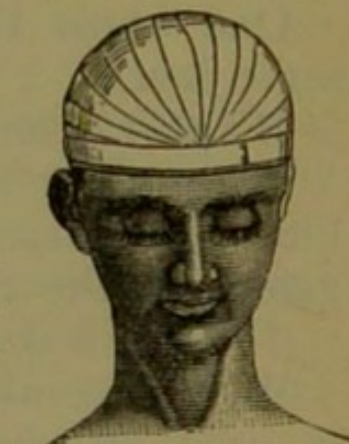


FIG. 30.
CAPELLINE ROLLER
BANDAGE.

Where do you use the simple spiral?

Where the limb is of uniform thickness. (See fig. 31.)

Where do you use the reverse spiral?

Where the limb thickens. *Ex.* : wrist to elbow, ankle to knee. (See figs. 31 and 32.)

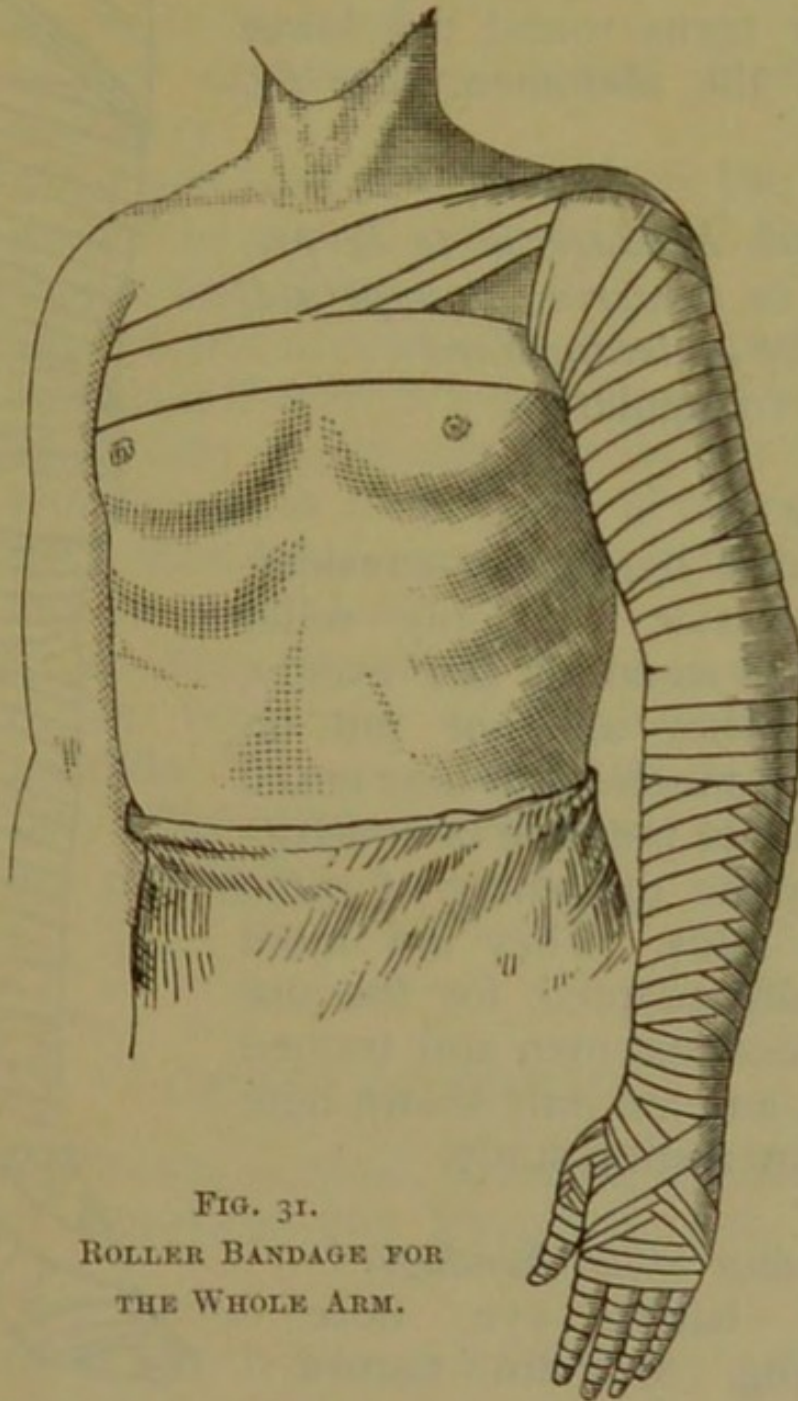


FIG. 31.
ROLLER BANDAGE FOR
THE WHOLE ARM.

How would you bandage a whole leg?

Commence by bandaging the foot with a narrow figure-of-eight bandage: the leg is then bandaged

by a broader ascending spiral with reverses, the knee by a figure-of-eight, the thigh with an ascending spiral with reverses, the hip by a figure-of-eight, which is finished off by a few circular turns round the lower part of the abdomen. (See fig. 32.)

Which bandage is to be preferred in rendering prompt aid, the roller or triangular?

The triangular.

Why?

Because it requires considerable practice to apply roller bandages smoothly and evenly, and if they are not put on properly much harm may ensue from undue pressure or constriction, by the tightening of some of the folds. They are more especially adapted for the use of professional men and trained nurses, and are only shewn here as an interesting study.

Mention minor bandages?

The halter, eye, nose, chin-sling, &c., are narrow bandages, the centres of which pass over the seat of injury, the ends being tied on the opposite side.

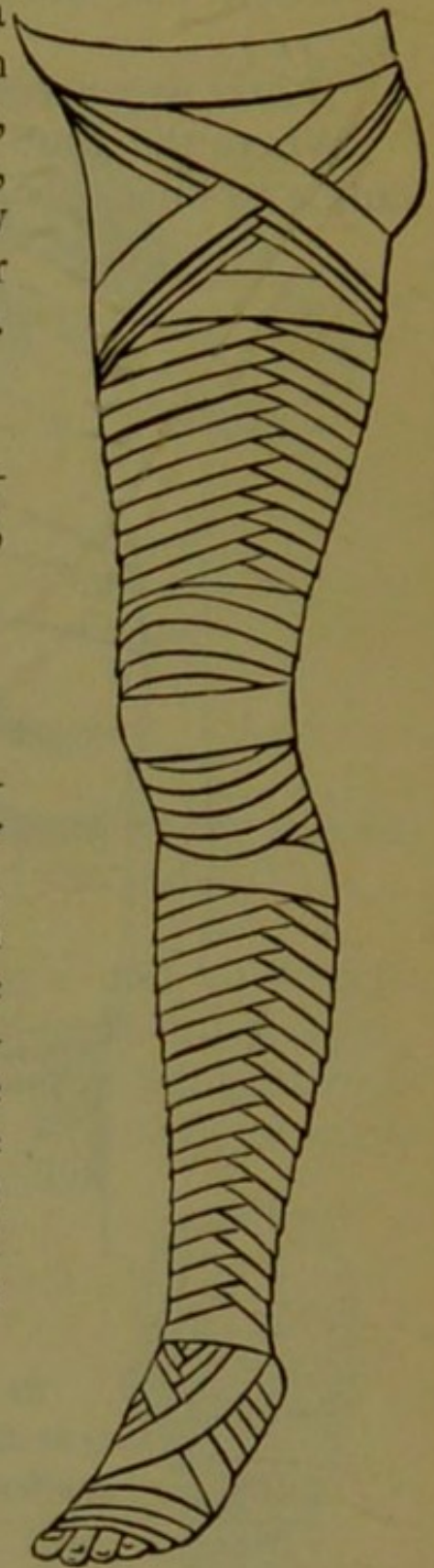


FIG. 32.

ROLLER BANDAGE FOR
THE WHOLE LEG.

What should you remember in rendering prompt aid to the injured?

1. That you are only giving temporary help until the arrival of medical assistance.
2. That the patient is liable to turn sick, &c., therefore let him sit or lie down whilst you attend to his needs.
3. Not to expose any wound more than necessary.
4. That if you have to undress him, the clothes should be *gently* removed, and from the sound side first.
5. That it is not necessary to give a quantity of stimulant if there is any danger of bleeding, as it only aggravates the danger; *better without any in the majority of cases*: water, tea, coffee, broth, are far better than stimulants in most cases.
6. Not to allow crowding round a patient, but to let him have as much fresh air as possible. To consider calmly: decide carefully what is best to be done: and then to act promptly.

CHAPTER XVIII.

WOUNDS, BURNS, SCALDS, SPRAINS, CONTUSIONS,
FOREIGN BODIES IN THE EYE, EAR, AND NOSE.

What are wounds?

Injuries in which the skin, flesh or other soft tissues are laid open.

How may they be arranged?

As incised, lacerated, contused, punctured, and gunshot wounds.

What are incised wounds?

Clean cuts, as gashes made by razors, knives, swords, &c.

What are lacerated wounds?

They are torn, the edges of the wound being jagged and irregular.

What are contused?

Wounds which are accompanied by much crushing or bruising.

What are punctured?

They are deep out of all proportion to their breadth, and are caused by stabs or blows from some sharp instrument, such as a pick, dagger, bayonet, &c.

What are gunshot?

Such as are caused by explosive weapons, guns, pistols, &c.

What should be done with wounds?

1. Cleanse the parts carefully from all dirt and impurities, with water.
2. Arrest bleeding.
3. Place the edges of the wounds as nearly as possible in a natural position.
4. Apply cold water dressing and triangular bandages.
5. Place the patient in an easy position so as to avoid straining the parts, and protect the wound from cold winds, or hot rays of the sun.

How should wounds be cleaned?

Be careful to work with clean fingers, and see that all articles used in washing are perfectly clean, such as sponges, towels, handkerchiefs, linen, lint, tow, &c. Pick out any pieces of glass, coal, stone, splinters of wood or iron, &c., remove dirt, soil, mud, sand, &c., and use clean cold water for the purpose of checking the bleeding.

Is washing always needful?

Not if the wound is clean; and where a clot of blood has formed in a wound on no account disturb it.

Should the hair be removed?

Yes: clip all the hair off immediately around the wound.

Should bleeding be arrested?

Yes. (*See next chapter.*) In the majority of cases this may be done by cold water, and the pressure of the dressing and bandage, and raised position of the injured limb.

What causes burns?

A burn is caused by excessive heat, such as fire directly applied to the surface, or by strong chemical agents, such as oil of vitriol, carbolic acid, caustic potash, &c., which destroy the skin and tissues underneath.

What causes scalds?

Hot or boiling liquids touching the skin; the cuticle is raised and the true skin reddened and inflamed.

What should be done with a burn?

Remove the clothing very carefully, cut it with scissors or knife, do not pull it off if it firmly adhere; leave it there and pour oil on it.

What then?

Exclude the air as quickly as possible.

How?

1. Apply one part of eucalyptus oil to ten parts of olive oil, by soaking a piece of rag in it and covering the wound.
2. Apply linseed oil and lime water mixed in equal parts. (This mixture is called "carron oil.")
3. Apply any oil, such as salad, olive, linseed, castor, almond, or fresh lard.

4. Cover with flour, whiting, or prepared chalk.
5. Cover with cotton or wool.
6. If the pain is extremely severe apply a strong solution of carbonate of soda, lime, or magnesia, by means of lint, linen, &c., steeped in it.
7. Cover all the above with wadding, cotton wool, or flannel, and bandage.

Should a burn be held in front of the fire ?

No : it increases the injury.

Should cold water be put on a burn ?

No : it might produce shock, if the burn is extensive.

Should the blisters be pricked ?

No : the dressing should be put over them.

What should be done if you meet a girl or woman with her dress on fire ?

Immediately put her in a horizontal position ; if necessary, throw her down ; flames ascend, and if the person is in a horizontal position the flames have very little to feed on, and do not encircle the victim. Roll the person on the floor, or with your coat, rug, shawl, &c., stifle the flames.

What should be done with scalds ?

Apply a solution of carbonate of soda, lime, or magnesia, or any of the dressings given for burns.

Should anything else be remembered ?

Troublesome contracting scars, causing deformity, often follow burns and scalds, it is therefore important to make the patient lie in a natural position and avoid twisting the neck or doubling up the limbs.

What causes a sprain ?

A twist, wrench, or over-extension of a muscle, or tendon, or ligament about a joint, usually with rupture of some of its fibres and small blood vessels.

Is it very painful?

Yes: especially in rheumatic people.

What should be done?

1. Soak the injured part in hot water, for about quarter of an hour, then apply a good, large, hot bran poultice.
2. If hot cannot be obtained, apply cold water, spirit and water, or vinegar and water; keep the applications constantly cold and wet.
3. Give the injured joint absolute rest, and keep it continually in a raised position.
4. When the pain is relieved and swelling subsided, apply friction and stimulating liniments.

Where do sprains mostly occur?

In the wrists and ankles, sometimes the muscles of the back, loins, hips and shoulders.

What causes a contusion or bruise?

Falls, blows, squeeze, &c.

What effect has it?

The soft tissues underneath the skin are more or less lacerated, which causes swelling and discoloration, the color varying from a purplish red at first to a greenish brown or yellowish tint later on.

What should be done?

In trivial contusions, cold applications; in severe cases, hot fomentations, followed by a thick bran poultice over which vinegar has been sprinkled.

What should be done in case of a bite from a rabid animal?

1. Tie a ligature tightly around the limb, above the wound; that is, on the side nearest the heart.
2. Bathe the wound with warm water, so as to encourage bleeding.

3. If you have no cracks or abrasions on the lips or in the mouth, suck the poison out of the wound, rinse the mouth well out, first with brandy, if available ; or
4. Burn the wound with red hot wire, knitting kneedle, cinder, lighted fusee, gunpowder, &c.
5. Use caustics, such as nitrate of silver, nitric acid, or carbolic acid.

What is the treatment when a person is stung by an insect, such as a bee or a wasp ?

Remove the sting by pressing a watch key firmly down over the sting, which is thereby forced up into the hollow of the key, then apply ammonia, as sal volatile, to the painful part.

What should be done with foreign bodies in the eye ?

1. Close the eye, tears will accumulate and perhaps wash it out ; or
2. Hold the eye over sliced onion, and cause it to water ; or
3. Pull the upper eyelid down over the lower one two or three times, the lower eyelashes will brush the innerside of the upper lid.
4. Seat the patient in a chair, and, standing behind, place a pencil over the lid, lay hold of the eyelashes, turn the lid over the pencil, brush off the substance with a moistened corner of handkerchief, &c.
5. If under the lower lid, depress the lid and brush the particle away.

What should be done if any mortar, lime, or other alkali gets into the eye ?

Wash it out with an acid, such as weak vinegar and water, (about two teaspoonful of vinegar, to three or four teaspoonful of water), then drop a little oil into the eye.

How would you get foreign bodies out of the ear?

1. Syringe with tepid water, if the substance be something that will not swell by such application; or
2. Shake it out by leaning the head over on the side, and sharply tapping the opposite side; or
3. Insects can be removed by pouring warm oil into the ear.

Where is the drum of the ear?

At the end of the canal leading into the ear, about $1\frac{1}{4}$ inches from the surface. It is a very thin, delicate membrane, and easily ruptured and destroyed.

Should you try to get things out of the ear?

No; only a surgeon should attempt this. The use of pins, hair-pins, pieces of wire, knitting needles, &c., is to be deprecated, for fear you should injure the delicate membrane.

How would you remove foreign bodies from the nose?

1. Press the side of the nose in which the passage is clear, and get the patient to blow his nose hard.
2. Make him sneeze by means of snuff &c.

What is meant by stitching a wound?

This should only be done by a surgeon. It is where there is much gaping and difficulty in keeping the edges of the wound together.

What should be done in case of an incised wound, with protrusion of the internal organs?

If practicable the protruded parts (perhaps intestines) should be washed with warm water and carefully pressed back in their places; and the patient placed in a thorough state of rest. If in the face, it is very important to replace the wounded portions with as little delay as possible.

What is a dressing?

A piece of lint, linen, muslin, shirting, gauze, or any fragment of rag or handkerchief, clean and soft, folded into a pad, wetted in cold water, applied smoothly to the wound, and fastened with a triangular bandage.

Is it advisable to add anything to the water?

If carbolic acid is available add a few drops to the water (about 1 to 40) before wetting the pad.

Should a dry dressing be used?

If clean water cannot be obtained it would be better rubbed with a little pure oil, vaseline, &c., to prevent it sticking to the wound.

How should plaister be cut?

Into strips; the edges of the wound should be drawn *well together*, and then the strips of plaister placed across.

Should slight wounds be neglected?

No; they are often poisoned by the entry of dirt, and inflammation and abscess occur; this leads to serious consequences. The precautions enumerated should be taken with all wounds.

CHAPTER XIX.

MATERIALS USED IN DRESSING WOUNDS, STIMULANTS, POULTICES, LEECHES.

What are the principal materials used in dressing wounds?

Adhesive plaisters, lint, tow, charpie, oakum, cotton wool, oiled silk, gutta-percha tissue, &c.

Of what use is adhesive plaister?

To keep the edges of the wound in position, and for fixing dressings in lieu of bandages.

Of what use is lint, &c.

To protect from the atmosphere, and to absorb all discharges.

Of what use is oiled skin and gutta-percha tissue?

They are used over other dressings to retain moisture, to prevent the escape of liquid applications, and to protect the parts from any external impurities.

What stimulants are ordinarily used?

Internally: tea, coffee, beef-tea, brandy; *Externally*: friction, smelling salts to nostrils, mustard to extremities, cold effusions, and slapping the face with a wet towel.

How should beef-tea be made?

Get one pound of lean beef and mince it. Having removed all skin and fat, put it into a jar with a pint of cold water and a little salt, tie a bladder or other impervious material over the mouth of the jar, let it stand one hour: then place the jar in a pan with cold water, place the pan not *over* but near to the fire, and let it heat very slowly, say from two to three hours, and avoid boiling.

Of what use are poultices?

To apply and retain heat and moisture; they clean foul wounds, allay pain, draw the circulation of the blood towards the surface from internal organs, and encourage suppuration in abscesses.

Of what should they be made?

Bread, ground linseed or other meals, charcoal, mustard, carrots, &c.

Describe how to make a poultice?

Have all the materials you are going to use previously heated, such as basin, linen, spoon, or knife, &c. Begin by pouring water into the basin sufficient for the size of the poultice, then quickly sprinkle in the linseed meal, stirring the while till

the whole is of proper consistency. With the knife (which should be dipped in hot water) spread it on a piece of linen rather larger than the size of the poultice wanted; turn the margin of the linen left over the poultice, apply it to the skin, and place over it a piece of mackintosh to prevent evaporation.

Describe a mustard poultice?

Mix with tepid or cold water (never boiling water.) Make into a paste, spread it on a piece of linen, or brown paper, the size required, and lay a piece of muslin over it before applying to the skin, fold over the margin of linen as in ordinary poultices, keep it on fifteen minutes; on removing, sponge the skin gently with tepid water, and apply a layer of cotton-wool. It can also be made with linseed meal; when enough meal has been added to boiling water, add one to two parts of mustard, or half and half, according to the pungency required; this can be borne a longer time, and in many cases is preferred.

Of what use are leeches?

For bleeding a patient; but should only be applied by direction of a medical man.

CHAPTER XX.

BLEEDING OR HÆMORRHAGE.

What causes hæmorrhage?

Opening of a blood vessel by a wound or otherwise. It may be external or internal

How is hæmorrhage divided?

1. *Arterial*, where the blood flows in jets in great force, and is of a bright red colour.

2. *Venous*, where it flows slowly—wells out—and is of a dark purple hue.
3. *Capillary*, where there is a general oozing of red blood from the whole raw surface of the wound.

What is the pressure of blood in the arteries?

It is said to be four pounds to the square inch.

What in the veins?

Quarter of a pound to the square inch.

What is the best help to give in cases of bleeding?

Firm pressure applied to the injured tube (for external bleeding).

On which side should the pressure be applied?

On the side of the wound from which the blood flows, and should be directed against some bone as a point of resistance.

In bleeding from an artery, on which side of the wound would you apply pressure?

On the side *nearest the heart*, i.e., in the limbs above the wound.

In bleeding from a vein, which side?

On the side of the wound *farthest from the heart*, i.e., in the limbs below the wound.

In capillary bleeding, which side?

Apply pressure to the whole of the raw and bleeding surface.

What other help can be given besides pressure?

Elevate or raise up the wounded part above the level of the trunk ; apply cold water or ice.

Any other?

Use styptics, such as alum, steel drops, or powdered gall, which have the effect of clotting the blood, and causing a shrinking of the blood vessels.

Which is the most dangerous form of bleeding?

Arterial. Note position of arteries. (See fig. 6.)

What should be done in arterial bleeding?

1. Expose and examine the wound.
2. Wash with cold water.
3. Place the patient in a lying down position, and elevate the bleeding part.
4. Apply pressure to the mouths of the bleeding vessels until you can get further help.
5. Apply pressure to the main artery on the heart side with the fingers, or with a tourniquet.
6. Apply a pad and bandage over the wound, as an additional safeguard.

In arterial bleeding from wounds in the head, what should be done?

The artery should be pressed against the skull by means of a compress pad and bandage over the wound.

How would you bandage a wound on the temporal artery?

Fold the triangular bandage narrow, lay the centre on the opposite side to the wound, bring it round, and cross over a pad placed on the wound, bringing one end over the head, and the other under the chin, and tie at the sound side; or the reverse way.

In arterial bleeding from a wound in the neck, what should you do?

Compress the carotid artery, (*see fig. 33*) press it firmly against the spine until the arrival of medical assistance.

What in bleeding from the armpit?

Press the subclavian artery (*see fig. 34*) with the thumb: it is behind the collar bone, about the middle. Squeeze the artery against the first rib; or, push your fingers into the wound and jam the injured artery tightly against the upper part of the arm-bone.

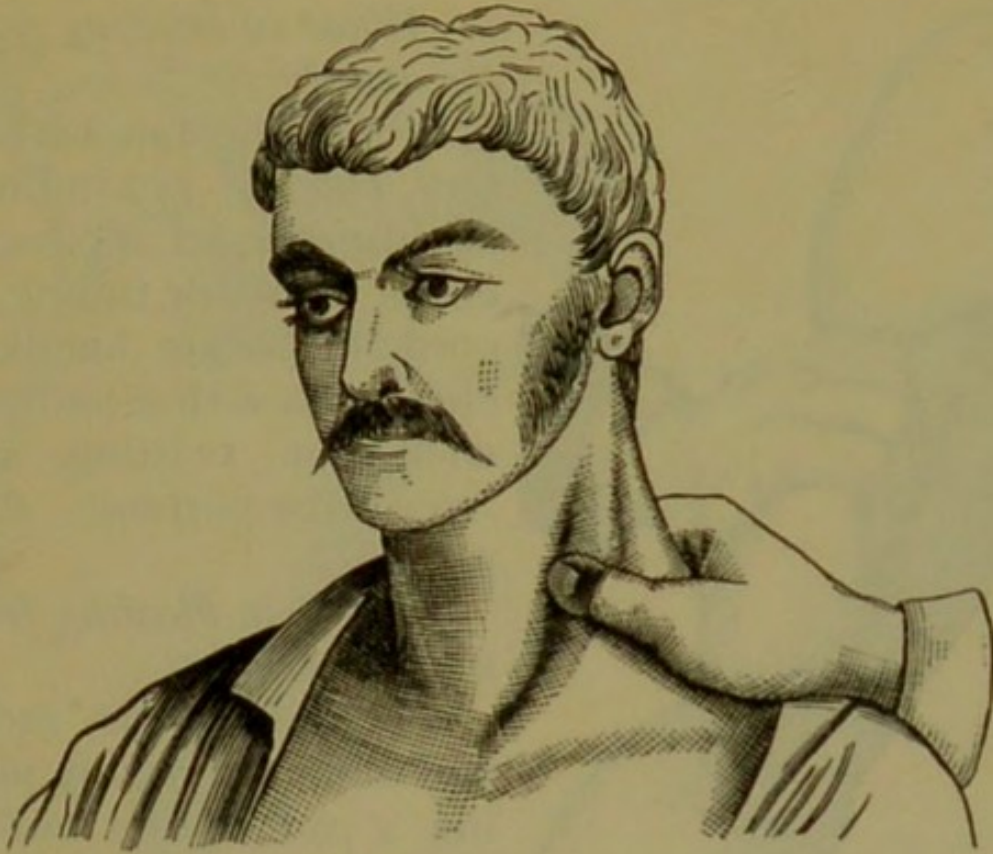


FIG. 33. DIGITAL COMPRESSION OF THE CAROTID ARTERY.

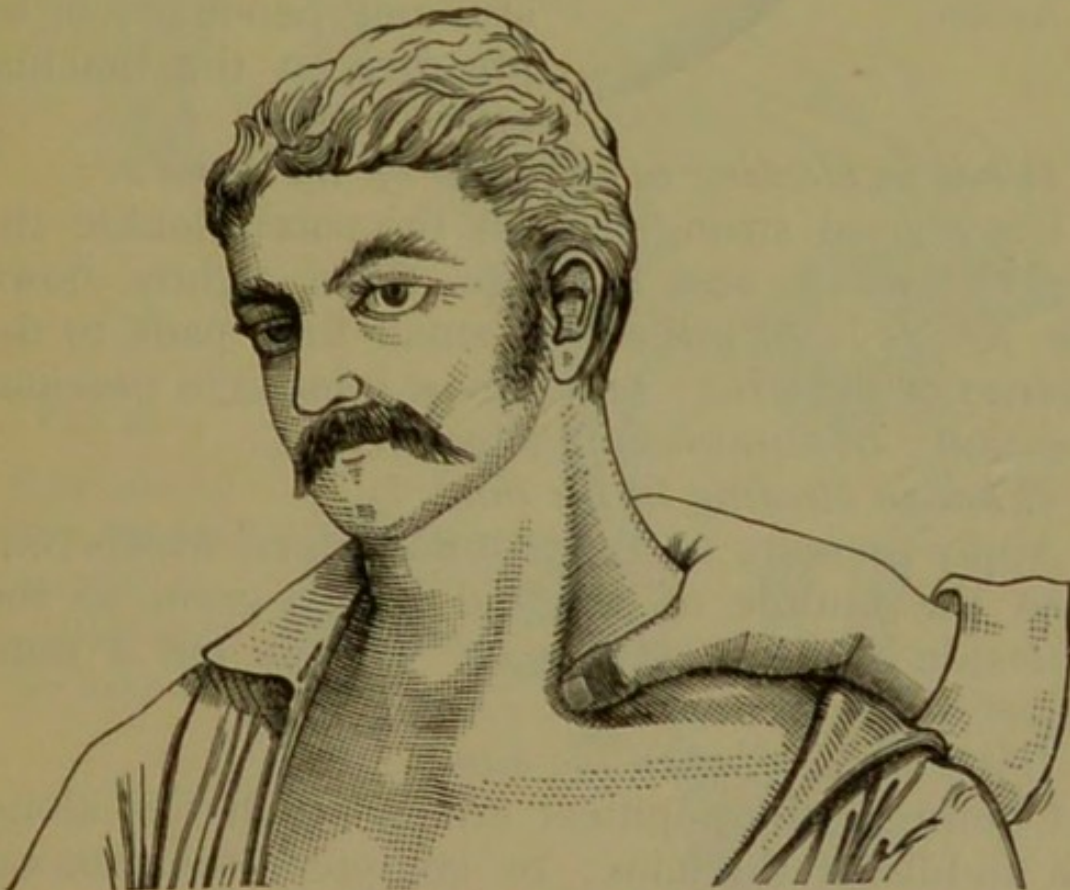


FIG. 34. DIGITAL COMPRESSION OF THE SUBCLAVIAN ARTERY.

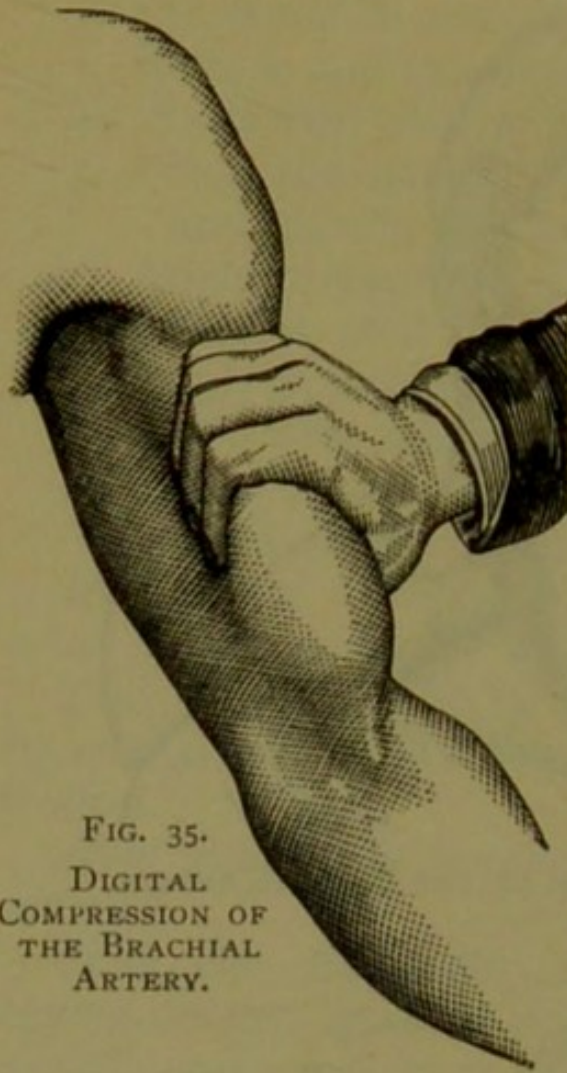


FIG. 35.
DIGITAL
COMPRESSION OF
THE BRACHIAL
ARTERY.

What in bleeding from the arm?

Press the brachial artery, (*see fig. 35*) improvise a tourniquet, a piece of elastic band, or tubing, or cord, or pocket handkerchief; this with a pad and stick for twisting, will answer the purpose. (*See fig. 18.*)

What in bleeding from the forearm?

Compress the radial and ulnar arteries by placing a pad in the hollow of the elbow, and bend the forearm against the arm and bandage; or by pressure on the brachial artery.

What in bleeding in the palm of the hand?

Put a good strong pad on the palm, double the fingers over it, and bandage them tightly down (*see fig. 21*); or place two small firm pads to the arteries at the wrist; or at elbow joint as in previous question; or compress brachial artery.

What in bleeding in the thigh?

Apply pressure on the femoral artery, which runs from the middle of the fold of the groin to the innerside of the knee, (*see fig. 36*); or put a tourniquet above the wound. (*See fig. 37.*)

What in bleeding in the ham?

Compress the popliteal artery, which lies along the middle of the ham; or compress the femoral artery in front of the thigh, by tourniquet.

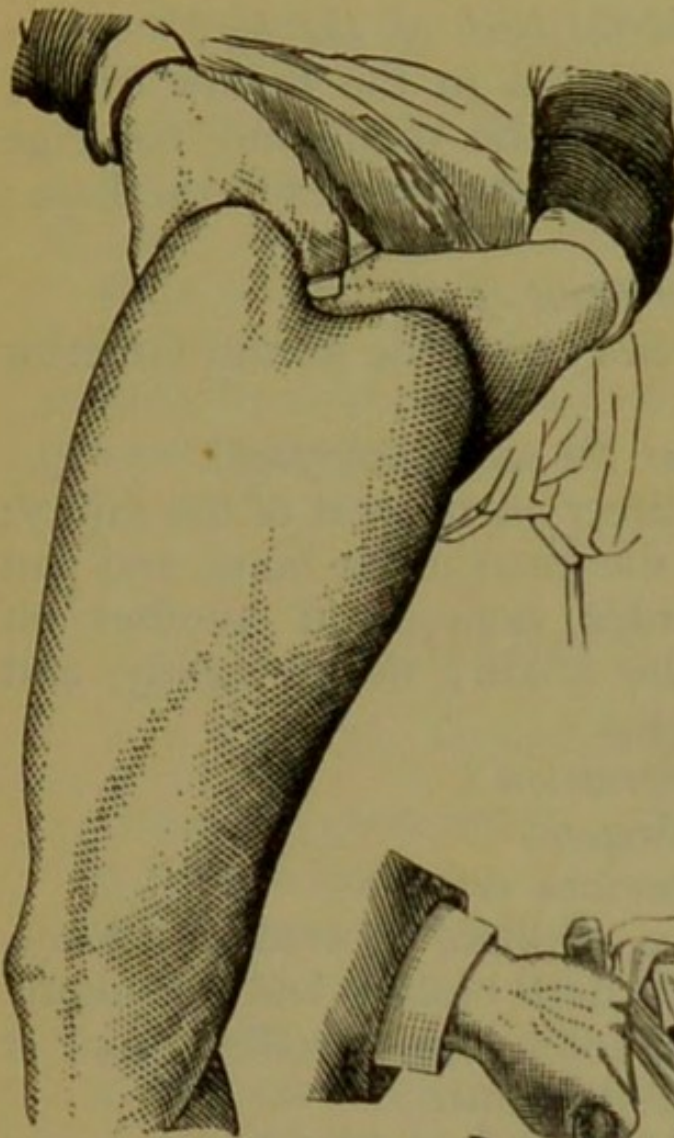


FIG. 36.
DIGITAL COMPRESSION OF
THE FEMORAL ARTERY.

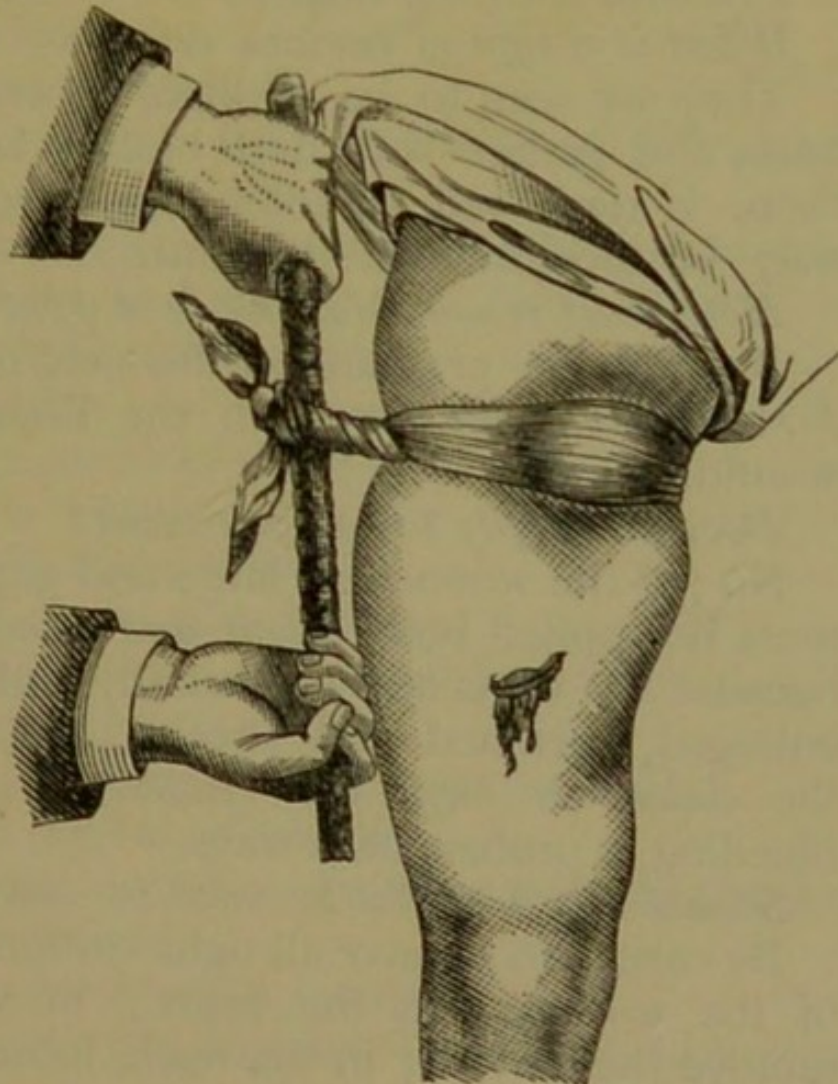


FIG. 37.
COMPRESSION
OF THE FEMORAL
ARTERY BY
AN IMPROVED
TOURNIQUET.

What in bleeding in the back of the leg?

Compress by pad placed in the hollow of the knee, double the leg on the thigh and bandage tightly; or by compress on the arteries in the ham; or the femoral artery.

What in bleeding in front of the leg?

Compress the arteries above the wound (anterior tibial.)

What in bleeding at the sole of the foot?

Compress by pad direct on the seat of the injury; or by a pad behind the inner ankle bone, and pad behind the outer ankle bone, and another on middle of front of the ankle; tie all tightly, and bandage. (See fig. 25.)

What is digital compression?

Pressure with the fingers.

What is a sign of varicose veins?

They are seen to be swollen, knotted in appearance, and gorged with dark blood; and frequently there is dark red discoloration, swelling, and it may be ulceration of the limb.

How must venous bleeding be stopped?

By applying pressure on the side of the wound *farthest from the heart* (in the limbs below the wound.)

Does this apply to varicose veins?

No; if the wound be large and gaping, pressure must be applied both *below and above the wound*, because the veins are unnaturally and permanently enlarged, stretched and swollen, and consequently the *valves in them are rendered useless*, so that bleeding is profuse both ways.

Should anything else be noted in venous bleeding?

Be careful to remove all tight clothing on the side of the wound next the heart; in varicose veins remove the garters; in the neck, loosen the collar

and necktie; in other cases loosen braces, belt, waistband of trousers, &c.,

What causes capillary bleeding?

It is found in all wounds; but the term refers particularly to scratches, abrasions, and trivial cuts, &c.

How is it stopped?

By pressure applied to the whole of the bleeding surface, by cold applications, by ordinary sticking plaster, by styptics.

CHAPTER XXI.

FRACTURES, DISLOCATIONS, SPLINTS, &c.

What is a fracture?

A broken bone.

What causes fracture?

1. Direct violence, such as a blow at the seat of injury, &c.
2. Indirect violence, as when a man jumps from a height and breaks his legs; or falls on the out-stretched hand; breaking the collar bone, &c.
3. Violent action of the muscles, such as fracture of the knee-cap, in the effort to recover oneself when slipping.

Into what classes may fractures be divided?

Simple, compound, complicated, comminuted.

What is a simple fracture?

A simple break, with no injury to the flesh.

What is a compound fracture?

A flesh wound communicating with the broken ends of the bones.

What is a complicated fracture?

Where there are injuries to the blood-vessels,

nerves, joints, or internal organs ; as when the ribs are driven into the lungs or liver, or the femoral artery or vein pierced by the broken thigh bone.

What is a comminuted fracture ?

The smashing of the bone into pieces.

Can a simple fracture be made into a compound fracture ?

Very easily ; either by the struggling and efforts of the patient himself, or by the rough and careless handling of the injured part by bystanders. Very much injury has often been done by the unskilful, careless, and rough handling of well-meaning but ignorant friends.

What are the signs of fracture ?

1. Inability to use the limb ; or loss of power at the part.
2. Pain and swelling at the seat of injury.
3. If the injured limb be compared with the sound one, some distortion will be noticed, it being either longer or shorter ; or lying in an unnatural position.
4. If the limb be gently moved, it will be found to move somewhere in the *shaft of the bone*, instead of the joint only : at the same time, a grating sound (crepitation) may perhaps be heard and felt.
5. If the limb be gently pulled, it will regain its natural shape ; but will return to the distorted position as soon as the traction ceases.
6. Some inequality will be felt on running the fingers along the surface of the injured bone.

What is a dislocation ?

A displacement of the bones forming a joint.

How can you tell a dislocation from a fracture ?

1. A dislocation always occurs at a joint.

2. The limb is more or less fixed, instead of being unnaturally moveable.
3. Gently pulling will not bring the limb into its natural position.
4. No crepitus.

What should you do in case of a dislocation?

Send for a doctor as quickly as possible, and never interfere with it beyond placing the patient in the most comfortable position; or if he have to be conveyed, supporting the injured limb by splints. Dislocations, for their proper treatment, require a great amount of technical knowledge.

What help can be given in cases of fractured bones?

Supporting the injured parts, so as to prevent them from moving about and tearing the surrounding tissues.

What are the best means of support?

Splints and bandages; and these should be applied, if possible, *before the patient is moved.*

What are splints?

Appliances for supporting the bones in their natural position till a cure is effected.

Of what are they made?

Wood, iron, pasteboard, leather, gutta percha, felt, wire, tin, and bark.

Of what could you extemporise splints?

Policemen's truncheons, soldiers' weapons, such as rifles, swords, bayonets, and lances; umbrellas, walking sticks, rulers, broomsticks, cigar boxes, folded newspapers, backs of books, trellis flower pot covers, laths, wickets, palings, mats, baskets, rolls of straw, heather, brushwood, rushes, bags filled with sand; stockings ditto; straw bottle casings, coat, &c.

Should splints be covered?

They should, if possible, be padded with wool, cotton-wool, tow, flannel, or lint; or in emergency

by hay, moss, horse hair, dried sea weed, handkerchiefs, parts of clothing, &c.

How are splints to be fastened to the fractured limb?

By triangular bandages, pocket or neckerchiefs, napkins, scarves, garters, braces, tape, cord, belts and straps of all kinds.

What should be your first care in treating a fracture?

To put the fractured ends, or portions, to their natural position, and then to retain them immovably in their proper places.

Is there any urgency in treating a broken limb?

No, unless an unskilful attempt be made to move the person.

Which is the only safe means of conveyance?

A stretcher; as unskilful handling and moving often cause serious mischief.

How should you handle a fractured limb?

1. Hold it firmly and fixedly in as natural a position as possible.
2. Take care there is no bending at the point where the bone is broken.
3. Place one hand underneath the limb, above the fracture, the other underneath, below the fracture, and grasp the limb with sufficient firmness to prevent it slipping or rolling.

What causes fracture of the skull?

Blows or falls.

What are the signs?

If fracture of the roof, the patient will be unconscious; probably you can see the broken bone. If the base be fractured, there will be bleeding from the mouth, nose, or ears; probably a discharge of a sticky bloody fluid from the ears; red patches of blood under the eyes; accompanying these there may be symptoms of concussion and compression.

What is the treatment?

Place the patient on a sofa or bed, in a dark and quiet room, slightly raise the head, and keep him perfectly quiet until the doctor arrives; if he be hot and feverish, apply cold water or ice to the head.

What causes fracture of the lower jaw?

Direct violence; such as a kick, blow, or heavy fall.

What are the signs?

The line of the teeth and the under margin of the jaw are irregular; inability to move the jaw; gums torn and bleeding; you can feel the broken fragments of the bone; patient frequently tries to support it with his hand.

What is the treatment?

Fix a triangular bandage on the front of the chin, and, carrying the ends backwards, tie them behind the neck: fix another underneath the jaw, carrying the ends and tying them at the top of the head.

What causes fracture of the collar bone?

Blows on the shoulder; falls on the elbow or hand.

What are the signs?

The shoulder drops, the arm is helpless, irregularity is felt on drawing the finger along the surface of the bone, the patient inclines his head to the injured side, and supports the elbow with the sound hand.

What is the treatment?

Raise the shoulder by pressing up the elbow, and push a good pad right up into the armpit; bind the arm to the side just above the elbow and, sling the forearm. (*See fig. 38.*) The pad should

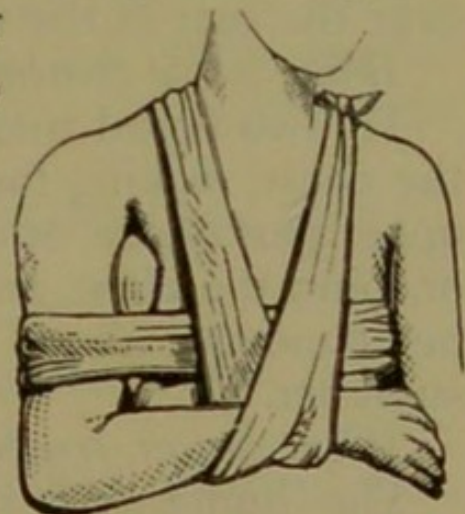


FIG. 38. PAD AND BANDAGE FOR FRACTURED COLLAR BONE.

be three inches thick at its upper part, and taper downwards.

What causes fractured spine?

Accidents on the railway, in coal mines, quarries, &c.

What are the signs?

Paralysis of the parts below the seat of the fracture.

What causes fractured pelvis?

Accidents ; such as a squeeze between two railway trucks, &c.

What is the treatment in the last two mentioned cases?

Convey the sufferer to the nearest doctor, hospital, or home, as steadily and as gently as possible, remembering the lying down position ; and head slightly raised : seek medical aid at once.

What causes fracture of the ribs?

Blows, falls, weights passing over the chest or back (such as the wheels of a cart.)

What are the signs?

A catching pain and difficulty of breathing, which is jerky and shallow ; when the patient coughs you may feel crepitus, by placing your hand over the seat of the injury.

What is the treatment?

Tie two broad triangular bandages firmly round the chest, making the lower part of one and the upper part of the other cover the seat of the injury ; or, bind the chest around tightly with a good flannel bandage, about six inches wide ; remove on a stretcher.

What causes fracture of the arm?

The humerus is often fractured by direct blows, or by falling on the elbow.

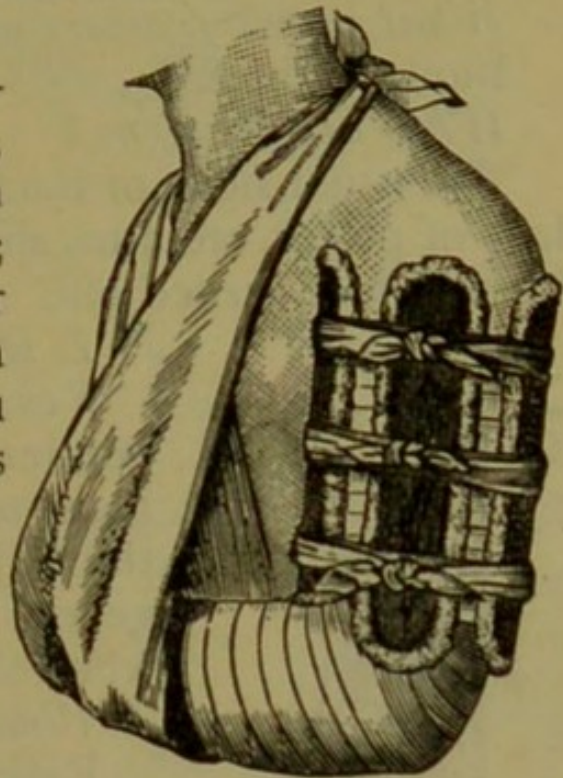
What are the signs?

Arm helpless, crepitus can be felt, deformity,

often shortening when the fracture is oblique, mobility at the seat of the fracture.

What is the treatment?

Apply three or four padded splints to the arm, (*see fig. 39*) reaching from the shoulders to the elbow; bind them by triangular bandages, put on small arm sling. In the diagram you notice a roller bandage is applied: this is the work of a surgeon.



What causes fracture of the forearm?

Direct blows or falls.

What are the signs?

Crepitus, mobility, alteration in shape, &c., as in the arm.

What is the treatment?

Bend the elbow at a right angle, with the thumb *pointing upwards*, and apply two splints, one inside, from the bend of the elbow to the tips of the fingers, and one outside, from the elbow to the wrist; support by putting on the large arm sling.

What causes fracture about the wrist and hand?

Blows and other injuries.

What are the signs?

Pain, swelling, crepitus, irregularity, &c.

What is the treatment?

Bandage to a flat board, or splint, padded with some soft material; keep it in position with a triangular bandage, and sling the arm in a large arm sling; if the small arm sling is put on, be sure

FIG. 39.

SPLINTS AND BANDAGE
FOR A BROKEN ARM.

the end which passes in *front* of the hand is carried over the *opposite* shoulder.

What causes fracture of the thigh?

Blows, falls, &c.

What are the signs?

The usual signs of fracture; pain and swelling, loss of power, crepitus, shortening, broken ends may be felt, foot turned out.

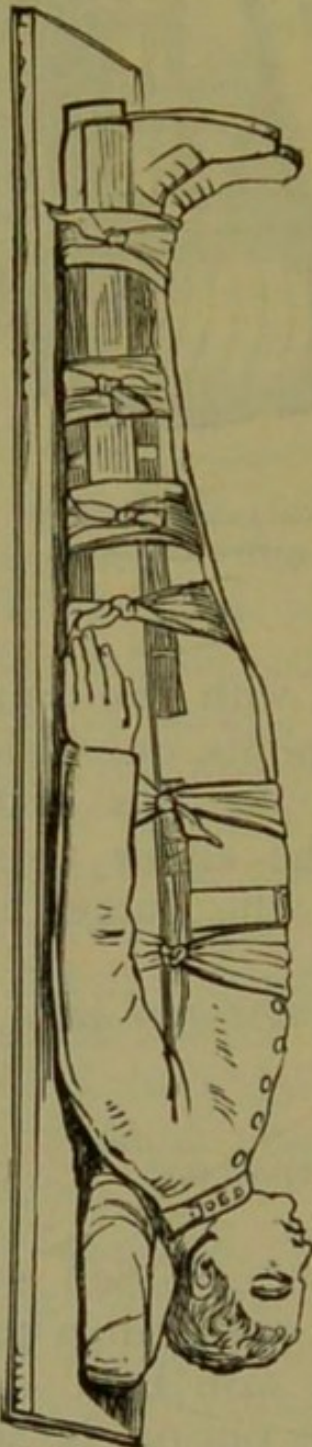
Is it a serious fracture?

Yes; and the utmost care, gentleness, coolness, and judgment must be used, so as to give the injured man into the surgeon's hands *not worse* than when the accident occurred.

What is the treatment?

Extend the limb, apply a long splint on the outside, from the armpit to the outside of the heel; and another shorter one on the inside, from the top of the thigh to the knee; a friend should keep the injured limb extended to its natural length, by drawing the foot steadily down, until the feet are level, taking care the foot of the injured side is in its natural position, with the heel next the ground. Pad the splints well with hay, straw, portions of clothing, &c. Tie a bandage round the abdomen, one or two around the thigh, one round the leg; at the ankle *tie both legs firmly together*, and carry carefully on a stretcher. (*See fig. 40.*) With this fracture

FIG. 40. IMPROVISED SPLINT, PADDING, AND BANDAGES FOR A BROKEN THIGH.



there is ample scope to improvise splints, padding, &c.

What causes fractured fore-leg?

Kicks, whether of horses or at football, &c.; accidents, falls, jumping, and other kinds of violence.

What are the signs?

Usual signs of fracture.

What is the treatment?

Bind by two splints, one on the outside, and the other on the inside, properly padded and tied, as shown in the diagram. (See fig. 41.) Tie the legs together at the knee and ankle for additional support.

What causes fractured knee-cap?

Blows and falls, and often by violent efforts to recover oneself after slipping.

What are the signs?

Fragments can be felt, patient unable to stand upon, or raise, his leg.

What is the treatment?

Apply a splint to the back of the limb, and apply a figure-of-eight bandage around the knee, including the fragments.

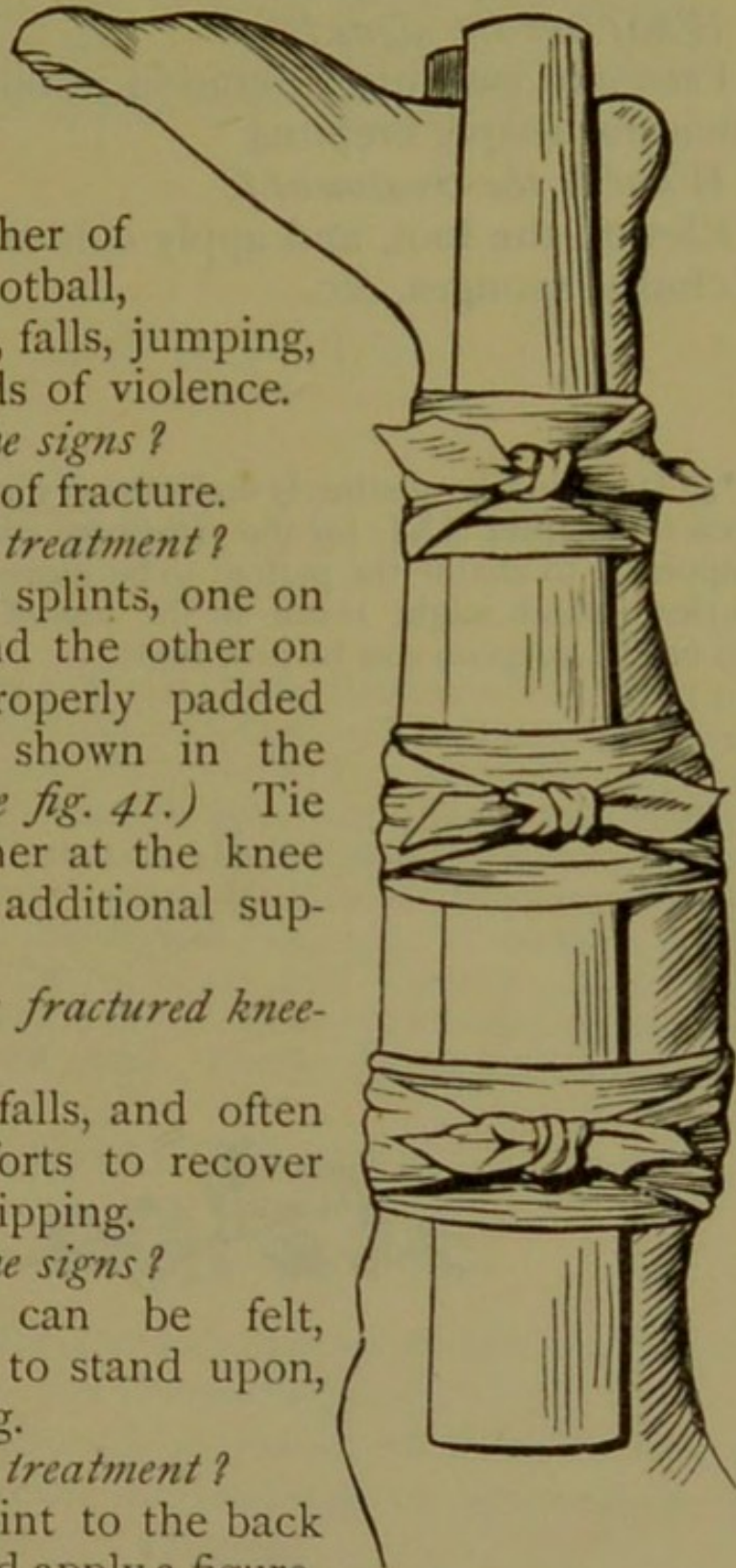


FIG. 41. SPLINTS FOR A BROKEN LEG.

What causes fractures about the foot and ankle?

Violence, kicks, blows, &c.

What are the signs?

Pain and swelling, alteration in outline of bones, unnatural shape, crepitus.

What is the treatment?

Elevate the foot, and apply cold water by means of cloths, sponges, &c.

. It should be distinctly understood that the information given in Chapter XXI, for the treatment of fractures, is only temporary, to enable the patient to be moved without further injuries, (which might result in the loss of a limb, or even life) until a surgeon can be procured.





PART IV.

MISCELLANEOUS.

Carrying Patients : WITH ONE PERSON—TWO-HANDED SEATS—THREE-HANDED SEATS—FOUR-HANDED SEATS.
Stretchers : USE OF IMPROVED STRETCHER—REGULATION STRETCHER—FURLEY STRETCHER—ASHFORD LITTER—AMBULANCE CARRIAGE—RULES FOR USING A STRETCHER IN CONFINED PLACES—IN MINES—IN OPEN PLACES.
Infectious and Contagious Diseases : DISINFECTANTS.
Baths : COLD, TEPID, HOT, AND VAPOUR—WET COMPRESS—FOMENTATIONS. *Poisons* : CLASSIFICATION OF—SIGNS OF—ANTIDOTES. *Death* : CAUSES OF—SIGNS OF.

CHAPTER XXII.

CARRYING THE INJURED.

When you have given assistance on the spot, in case of accident, have you completed your duty?

The patient should be conveyed to his home, or the nearest doctor, the hospital, or somewhere to await the arrival of a surgeon.

How should you carry a patient?

In cases of severe injury, or illness, always in a lying down position, and for this purpose a stretcher is the best means of conveyance.

In slight cases, how may a patient be helped?

He can be carried by his comrades providing they have only to go a moderate distance.

Suppose there be only one helper, how must he act?

He must place his hip behind the near hip of the injured man, put one arm around the patient's loins, at the same time the patient puts an arm around the helper's neck, the patient's hand resting on the helper's opposite shoulder, and grasped firmly by the helper's disengaged hand; he can thus bear him and carry him along.

Any other way?

In his arms, like a child, if sufficiently strong.

Any other?

On his back, if the thighs are uninjured, holding and supporting his thighs with his arms.

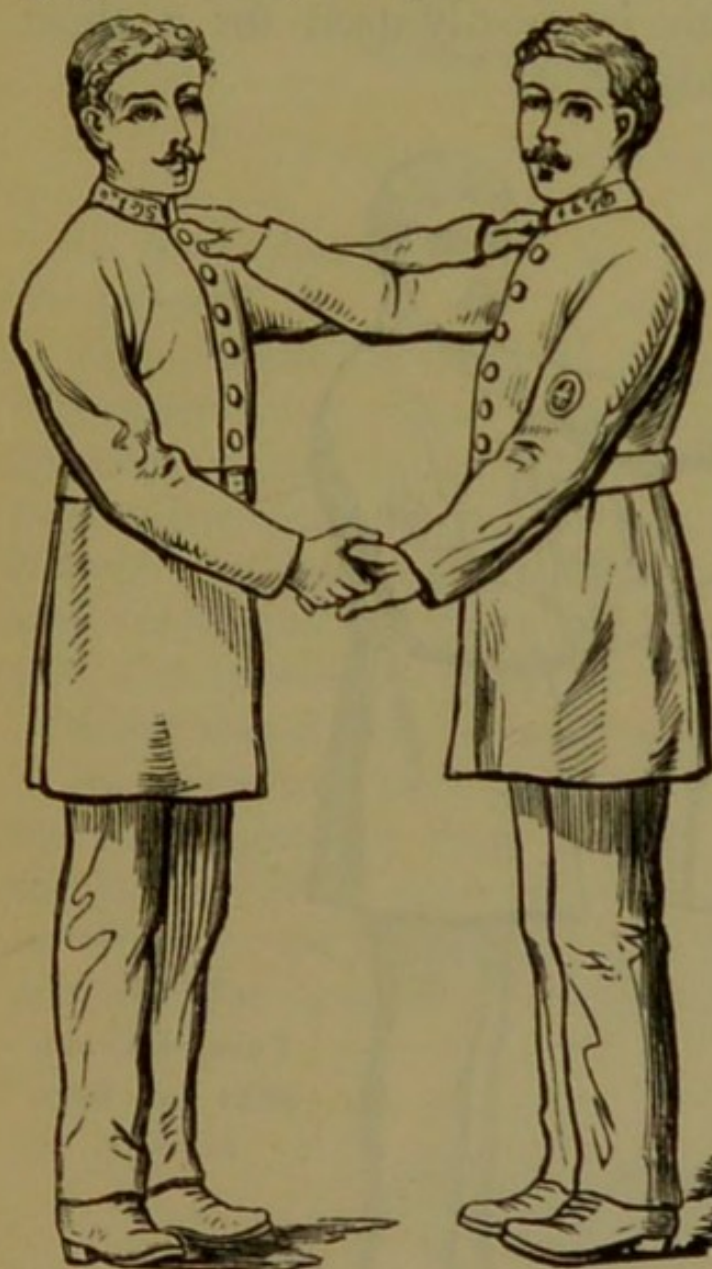
Suppose he be unconscious, what then?

Turn the face downwards, (standing in a line with the patient, and facing his head) and take hold close up under each armpit; then raise the body as high as it can be lifted in that position, and allow it to rest on one of the knees; then shift the arms round the waist, and, after interlocking the hands, lift the person in an upright position. After this, take hold of one of the wrists with one hand, and drop into a stooping position; at the same time pass the arm that is free between, or around the legs, and the patient will then fall across the shoulders; then rise in an upright position, and balance the body on both shoulders; (see "*Fire Protection*," Cap. E.M. Shaw.) Or, turn the person on his face, with the arms extended in a line with his body; raise the trunk until he is in a kneeling position. Place yourself under him, so that his stomach rests on your right shoulder; pass your right arm between the thighs, and behind his right

thigh ; with your left arm draw his left hand forwards under your left, and grasp the wrist with your right hand ; then raise yourself to an erect position ; one arm is thus disengaged. Or, by reversing the operation, he may be carried on the reverse shoulder. (*See "Lancet," March 28th, 1885.*)

Supposing there be two helpers ?

Join two of their hands under the patient's thighs, and clasp him around the loins with their disengaged hands, the patient, if able, further supporting



himself by putting one or both his arms around the neck of his helpers.

Any other way ?

Two may join their hands under the patient's thighs, and place their other hands on each other's shoulders. He can thus be carried in a lying-back position, and if the patient is injured in the arms, or faint, &c. this is an excellent way. (*See fig. 42.*)

FIG. 42. TWO-HANDED SEAT & BACK SUPPORT. An insensible person can be conveyed by two bearers, one can walk in front, carrying a leg under

each arm, the other walking behind, supporting the other part of the body by passing his arms under the shoulders, and around the chest of the person.

How do you make a three-handed seat?

One bearer holds up one arm (say his right), the second grasps this just above the wrist, with the left hand; he then grasps *his own arm*, just above the wrist, with his right hand; the first man then grasps the right arm of the second, just above the wrist, with his right hand, and places his left arm on the other's shoulder; this is mostly used for a short person or child. (*See fig. 43.*)

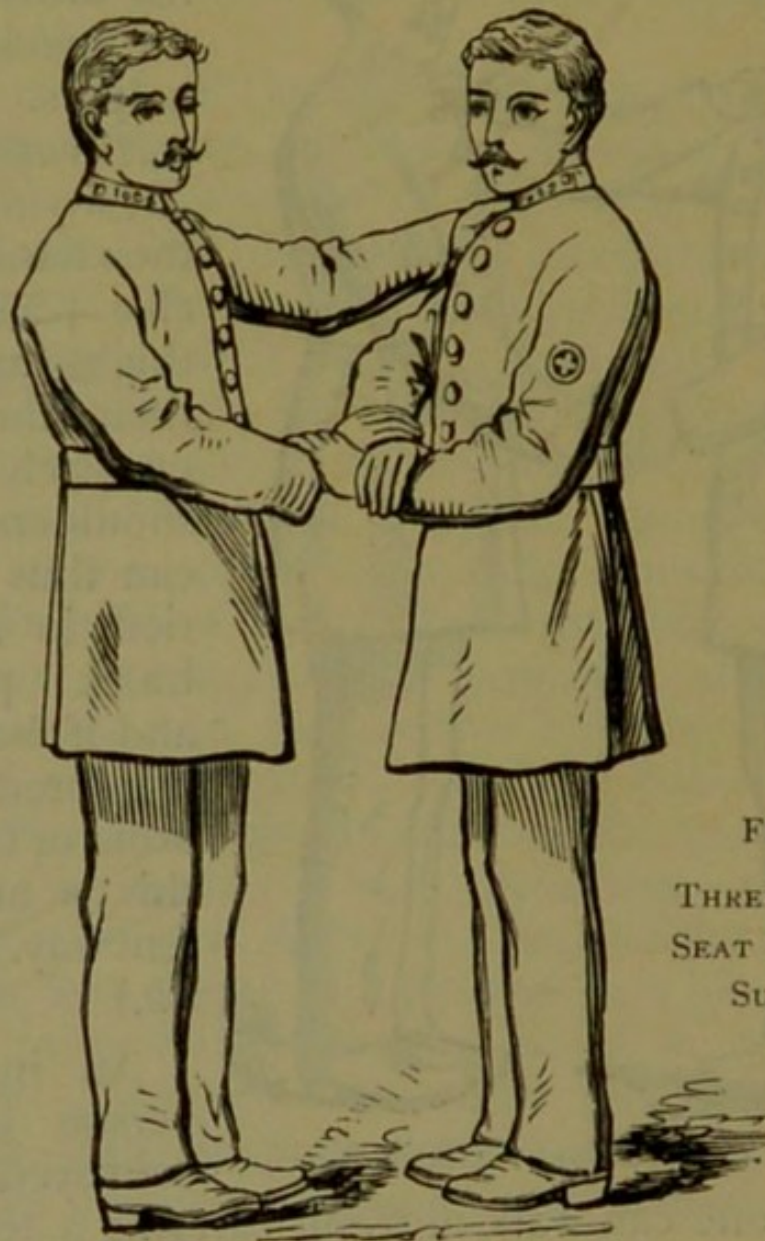


FIG. 43.
THREE-HANDED
SEAT AND BACK
SUPPORT.

How do you make a four-handed seat?

By two persons clasping each other's wrists. (See *fig. 44.*) This seat is used in cases where the patient is unable to walk, but able to give some assistance.

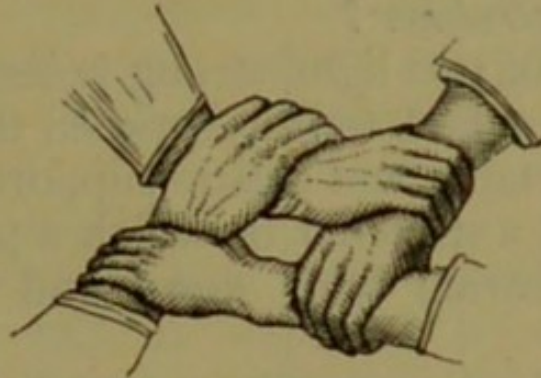


FIG. 44. FOUR-HANDED SEAT.

Is there any difficulty in placing a patient on these seats?

Yes, if there be no third person to help; but the two bearers can place themselves one on each side of the patient, kneeling on one knee, and then, raising the patient on *their* knees, he can support himself by putting his arms around their necks, while they quickly join their hands underneath him, and slowly rise up together.

How would you improvise a seat?

By using any flat piece of timber, such as the bar of a gate, or even a pole, rifle, &c., covering the same with a coat, rug, &c.; the patient sitting on this can further secure himself, by placing his arms on the shoulders of his bearers.



CHAPTER XXIII.

STRETCHERS ; RULES FOR CARRYING STRETCHERS ;
ASHFORD LITTER ; AMBULANCE CARRIAGE, &c.*What is a stretcher ?*

It is made of two light, strong poles, with a piece of canvas stretched tightly between them, so as to form a comfortable and elastic support. Anything may be called a stretcher on which a patient can be comfortably carried lying down, and with ease to the bearers.

How would you improvise a stretcher ?

1. Turn the sleeves of a coat inside out, pass two poles (one up each sleeve) and button the coat. Two coats will form a longer bed.

2. One or two sacks may be used, by making a hole in each corner of the bottom, and passing two poles through the sacks, and out of the holes.

3. Pieces of blankets, rugs, table cloths, carpeting, tarpauling, canvas, overcoats, &c., may be spread out, and two poles rolled up and fastened, one in each side.

4. You may stretch *across* two poles netting of any kind, ropes, straps, bands of hay, or straw, telegraph, or other wire, and cover it with your coat, &c. Or, nail or tie pieces of wood across, and cover with some soft material.

5. You may use a broad piece of wood, plank, hurdle, gate, shutter, door, ladder, &c. ; first covering it with straw, hay, clothing, or something soft.

What should you particularly notice in using an improvised stretcher ?

That it is *strong enough to bear the patient, and comfortable* ; its strength should be tested by placing a good sized healthy man upon it first.

Are there any stretchers specially made for the purpose?

Yes; one called "Regulation Stretcher" is made of a piece of canvas 6 ft. 6 in. long, 23 in. wide, nailed to two side poles 7ft. 9½ in. long, with two hinged steel crosspieces; it has also four foot pieces, to which small rollers are attached; it is provided with shoulder straps, &c., and weighs thirty-two lbs.

Are there any others?

Many; one of the best is that designed by John Furley, Esq., and is supplied by the St. John Ambulance Association; it is provided with shoulder straps, four foot pieces, and has *no independent parts*; the canvas can be raised up at one end so as to give a support to the head; the joints are so arranged that the bearers can reduce the width of the stretcher without disturbing the patient; it can be readily folded up so as to occupy little room; it can be procured with *fixed or telescopic handles*, and weighs 26½ to 28 lbs.

What do you mean by telescopic handles?

Handles, parts of which slide under the other parts so as to shorten them, which allows the stretcher (without disturbing the patient who may be upon it) to be placed in railway carriages, or other vehicles, not otherwise sufficiently large to receive it; it can also thus be used much more easily in mines, where space is often very limited.

What is the Ashford litter?

It is simply the application of a stretcher to wheels, a great advantage when a patient has to be taken any distance over a half a mile. (*See fig. 45.*) It is designed by John Furley, Esq., and consists of a folding stretcher, with automatic pillow, and moveable cover, with an under carriage of two

wheels, on elliptical springs. Any number of stretchers may be used with the same under-carriage; one great advantage of this vehicle, is that the bearers can pass with the stretcher between the wheels, and over the crank axle; (*see fig. 46*) and thus lifting over the wheels is avoided. When a disabled person is on

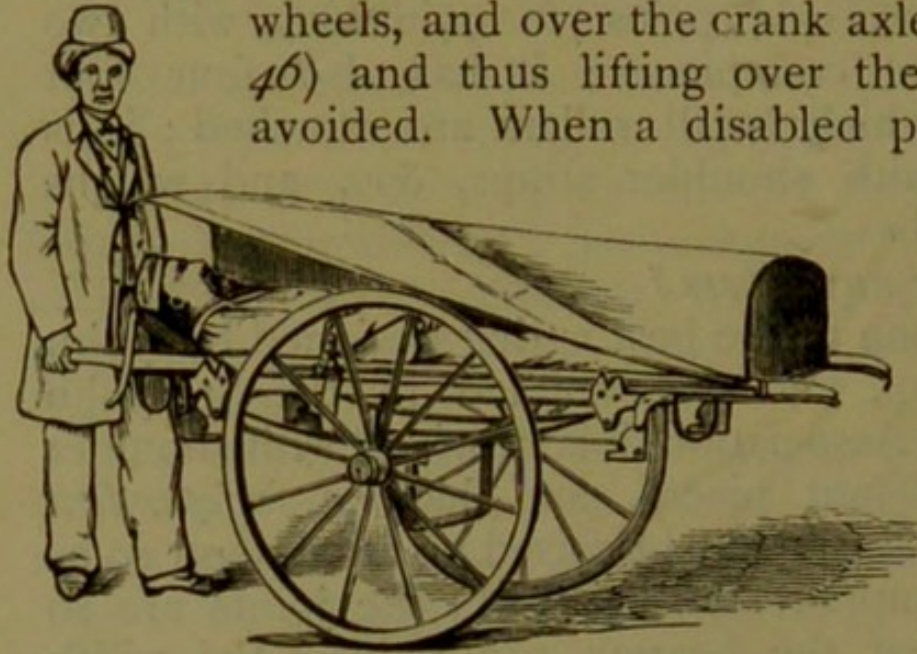


FIG. 45. THE ASHFORD LITTER.

the litter, it is necessary that it should be kept in a horizontal position, and not wheeled like a barrow; when

it is moved over a curb stone, or other obstruction, or even up and down two or three steps, two men can lift the whole vehicle with a patient in it.

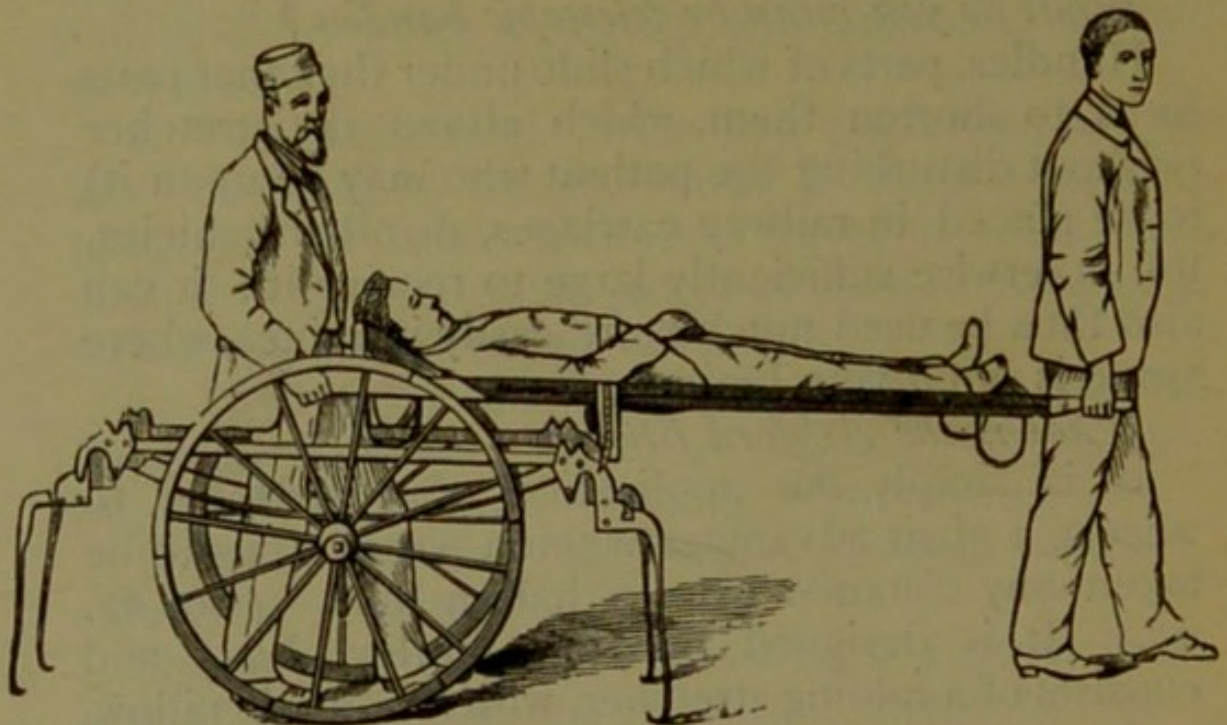


FIG. 46. THE ASHFORD LITTER; WITH STRETCHER ATTACHED.

What other means of conveyance can be recommended.

Every town should be provided with at least one horse ambulance carriage. (*See fig. 47.*) Several

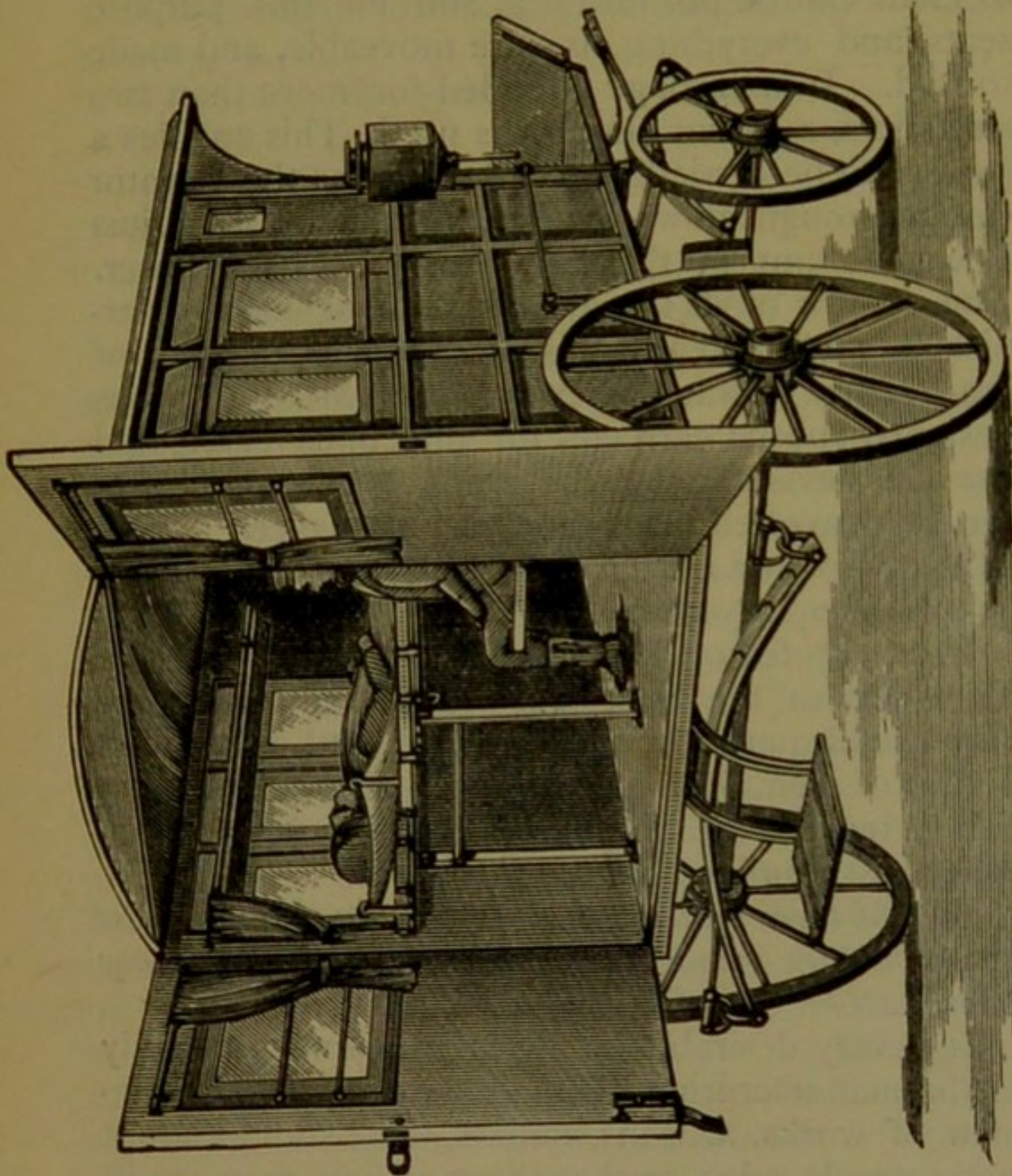


FIG. 47. FURLEY'S HORSE AMBULANCE CARRIAGE.

have been designed by John Furley, Esq. It is seldom that two are built exactly alike, experience leading him to constant improvements, and each

being built to suit the requirements of the locality for which it is intended. Mr. Furley, in every carriage, endeavours to obtain as much unbroken floor space as possible, so that a stretcher, couch, mattress, or chair can be put into it; and for this purpose seats, and everything else are moveable, and made to fold. In a carriage intended for more than two stretchers, a patent elevator is used. This enables a patient to be carried over another; as the elevator can be brought down level with the floor, it is just as easy to put in the upper patient as the lower. The interior of all these carriages is of smooth, varnished wood and galvanised iron; this permits of the free use of water in every part. Mr. Furley has designed special carriages for infectious cases, and has also devised means by which small omnibuses can be converted into ambulance carriages.

Are there any rules for the removal of the injured by stretchers, or otherwise?

Yes; Professor Longmore's "Treatise on the Transport of the Sick and Wounded"; these are very useful, particularly for drilled and disciplined bodies of men. Also, "Stretcher Exercises," published by the St. John Ambulance Association, which are simpler than the former.

Should there be a common understanding amongst those who are removing a patient, as to how they should act?

It is very desirable in all large towns, especially in the manufacturing districts, that policemen, foremen of works, artizans, miners, &c., should adopt some simple rules, so that three or four men could act in unison to lift and carry a patient with ease to themselves, and comfort to the sufferer; and when so many cannot be found, even one man could tell others how to act.

Supposing an injured man had to be removed on a stretcher from a place where there was not much room, how would you act, to do it orderly and with precision?

If four men could be procured, number them 1, 2, 3, 4.

What must No. 1 do?

Give all orders.

What do you mean by orders?

Such as, "fall in," "ready," "lift," "march," "halt," "lower," "unload stretcher," &c.*

What should be done when "fall in" is ordered?

No. 1 (who gives the order) should put the stretcher *close to the sound side* of the patient, and remain standing near its centre. Nos. 2, 3, and 4 must take up a position on the opposite *or injured side* (facing No. 1.) No. 2 places himself at the patient's shoulder; No. 3 near the middle of the body; and No. 4 near the patient's feet.

When "ready" is ordered?

Nos. 2, 3, and 4 kneel on the left knee, if they are on the left side of the patient; and on the right knee, if they are on the right side of the patient. They then take hold of the patient, No. 2 passing one of his arms under the patient's neck, and the other beneath his shoulder blades; No. 3 passing both arms under the middle of his body, one above, and the other below the buttocks; No. 4 passing both arms under the legs, excepting in case of fracture, when he must place one hand on each side of broken bone, so as to steady it; No. 1 grasps the stretcher near the centre.

* See Professor Longmore's book; also "Stretcher Exercises," by the St. John Ambulance Association.

When "lift" is ordered?

Nos. 2, 3, and 4 raise the patient up carefully, each at the same time placing on the knee, which is not touching the ground, his elbow of the same side, to act as a lever. Whilst Nos. 2, 3, and 4 are thus lifting the patient, No. 1 moves the stretcher into position under him, and kneels down on one knee by its side.

When "lower" is ordered?

Nos. 2, 3, and 4 steadily lower the patient down to the stretcher, while No. 1 assists in supporting and placing him on it.

When "stand to stretcher" is ordered?

All stand up; No. 2 goes to the head of the stretcher, with his face towards the patient; No. 3 to the foot, with his back to the patient; while Nos. 1 and 4 remain, one on each side of the stretcher.

When "ready" is ordered?

Nos. 2 and 3 take firm hold of the handles of the stretcher.

When "lift" is ordered?

Nos. 2 and 3 raise the stretcher steadily together (No. 2 slightly before No. 3) and stand up.

When "march" is ordered?

After looking to see that all is right, Nos. 2 and 3 move off; No. 2 marching off with his left foot, and No. 3 with his right foot, this avoids any irregular motion; the stride, or step, should be a short one, of twenty inches, and taken with bent knees, just from the hips. Nos. 1 and 4 march on each side of the stretcher,

When "halt" is ordered?

All remain steady, and wait for the next order.

When "lower" is ordered?

They place the stretcher on the floor, and stand up.

When "fall in" is ordered?

Nos. 2, 3, and 4 take up the first position, and No. 1 on the opposite side.

When "ready" is ordered?

Nos. 2, 3, and 4 prepare to take the sufferer off the stretcher.

When "lift" is ordered?

The patient is gently and steadily lifted up by Nos. 2, 3, 4, placing their arms as before stated, whilst No. 1 removes the stretcher.

When "lower" is ordered?

The patient is carefully lowered upon the vehicle, bed, sofa, mattress, or other place to which it has been designed to carry him.

Supposing there be only a limited space, and only three men available, are the same instructions to be carried out?

Yes; with the exception that all three must stand on the *same side* of the patient (the stretcher having been placed as near to him as possible), and must place themselves as close to the patient as possible, and, after lifting, lean *forward*, so as to carry the patient over the stretcher, and then carefully lower him down upon it; the same applies to removing the patient from the stretcher, except that they lean or slide themselves back. No. 1, as before, gives all orders.

Could such rules be carried out in narrow cuttings, such as in mines, and only two men available?

No; in such cases a fertile mind will devise means; but the following will be helpful. The stretcher must be placed *in a line* with the injured man's body, as close to his head as possible; one man then places his feet one on each side of the patient, between his body and arms, the toe of each foot as near to the armpits as possible, standing over the

man. He then stoops down, and passes his hands around the sides of the chest, and the arms underneath the shoulders, and locks the fingers. The patient, if able, will put his arms round the neck of this man. The other man places his right foot between the calves of the patient's legs, as close to the knees as possible; and his left foot at the patient's right side, close to the top of the hip; he then kneels down, and passes his arms round the outside of the patient's thighs, at the lowest part, and locks his fingers behind, just at the bend of the knees. Both being ready the patient must be slowly lifted, just sufficient to clear the stretcher; both bearers will slowly and gradually move forward, the first by very short steps, and the second by bending his body forward over his left thigh, by which means he exercises a pushing movement, which greatly assists the bearer who has hold of the shoulders. When the second man has bent his body forward as much as he can without moving his feet, he advances his right foot to his left, then again advances his left foot, and bends his body forward. This movement is repeated until the patient is laid on the stretcher.

If there be ample space, and three bearers, how would you act?

Number them 1, 2, 3; No. 1 to give all orders.

When "place the stretcher" is ordered, what is done?

No. 2 takes the head of the stretcher; and No. 3 the foot, and place it *in a line* with the injured man's body, the foot of the stretcher being close to his head.

When "fall in" is ordered?

No. 2 places himself at the patient's right side, No. 3 at his left side, both facing each other; No. 1

takes his position on the injured side, near the patient's knee, and it is his duty, besides giving orders, to look after the injured part, to see that no bandages, splints, &c., become displaced, or that no further injury is possible.

When "ready" is ordered?

Nos. 2 and 3 kneel each on one knee, and grasp each other's hands under the shoulders and thighs of the patient, whilst No. 1 places his hands underneath the legs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury.

When "lift" is ordered?

All rise together, keeping the patient in a horizontal position.

When "march" is ordered?

All take *very short* side steps until the patient's head is over the pillow of the stretcher.

When "halt" is ordered?

All three stop and wait for the next order.

When "lower" is ordered?

The patient is placed gently on the stretcher, and they then stand up.

When "fall in" is ordered?

No 2 places himself at the head of the stretcher, with his face towards the patient; No. 3 at the foot, with his back to the patient; No 1 at the side, to attend to the injured limb, &c.

When "ready" is ordered?

Nos. 2 and 3 stoop down, and take firm hold of the handles of the stretcher.

When "lift" is ordered?

They lift the stretcher, ready for moving off.

When "march" is ordered?

No. 2 steps off with his left foot, and No. 3 with the right; this avoids any irregular motion.

What then ?

The various words of command previously mentioned, such as "halt," "lower," "fall in," "lift," "lower," should be given and acted on until the patient is laid comfortably upon a bed, &c.

What should be remembered in carrying a stretcher ?

That everything depends on proper behaviour and steadiness ; that the utmost care, caution, gentleness, and patience must be used in lifting, lowering, marching, &c. ; that there must be no rough handling, or want of attention, otherwise the patient's sufferings will be aggravated.

Should a stretcher be carried on the shoulders ?

No, never ; it must always be carried with the hands, or by means of shoulder straps ; if on the shoulders the patient might faint, bleed, or even die without being noticed ; or he might fall off, &c.

CHAPTER XXIV.

INFECTIOUS AND CONTAGIOUS DISEASES, DISINFECTANTS, FUMIGATION.

What is meant by the terms "infectious" and "contagious" ?

"Catching." It is applied to any disease that is communicable from the sick to the healthy.

Name the principal infectious diseases.

Eruptive fevers ; such as measles, small pox, and scarlet fever. Continued fevers ; typhus, typhoid, relapsing, and yellow fevers ; diphtheria, erysipelas, whooping cough, and cholera.

What are disinfectants ?

Materials used for the purpose of purifying the air, water, soil, &c., by removing or rendering harmless certain noxious substances.

Which are the most common disinfectants?

Condy's fluid, Burnett's fluid, Ledoyen's fluid, Dougall's powders, Sirel's compounds.

How would you disinfect an unoccupied room?

Close every door and window, make up the fire place, and stop up every opening, or crevice, with old rags, tow, &c., and then fumigate.

What do you mean by fumigate?

Use any of the following methods:—

1. By sulphurous acid. Break some sulphur into pieces of equal size, and burn it in saucers, or dishes, placed in different parts of the room, by putting hot cinders on the sulphur.

2. By chlorine. Place saucers (as above) containing a mixture of one part of common salt, one part of black oxide of manganese, and two parts of oil of vitriol.

By iodine. Place two drachms of iodine in a metal cup, or vessel, and place a lamp, or burning candle underneath it, until it evaporates.

4. By nitrous acid fumes. Place several cups into saucers, or basins containing hot water, and inside the cups put two ounces of nitrate of potash, and one ounce of sulphuric acid.

5. By carbolic acid. Place some pure carbolic acid in shallow vessels around the room.

What should be done after fumigating?

The furniture and floors should be well washed or scrubbed with a solution of chloride of lime, the floor may be sprinkled with powdered chloride of lime. The papers should be stripped from the walls, and the walls and ceilings lime-washed.

How would you disinfect clothing?

If a disinfecting establishment is not available, by washing, boiling, baking in an oven, or exposure to the sun, or before a fire.

How would you disinfect carpets and curtains, &c.?

By sending them to a disinfecting establishment, where they would be subjected to a heat of 400 degrees.

What is best to be done in an extreme case?

Destroy by fire all clothing, bedding, carpets, &c.

How would you disinfect an unoccupied room?

Fumigate cautiously with carbolic acid, placed in saucers as before stated; maintain a proper state of ventilation, by doors, windows, &c.; keep a good fire in the room; use Condy's fluid for utensils in the room, closets, &c.; disinfect all clothing (as stated above) before it leaves the room.

How should you prevent the spread of infectious diseases?

In the majority of cases by sending the patients to the hospital specially built for the treatment of infectious diseases.

How should they be conveyed?

In a special conveyance (all corporations are provided with such) and not under any circumstances in a public carriage, such as a cab, &c.

What then?

After removal, fumigate as described.

If the case is to be treated at home, what precautions should be taken?

Set a room apart for the patient; clear the house, as far as possible, of all the inmates; remove all carpets, curtains, pictures, and all superfluous furniture; only let the attendants on the sick be in the room, and if possible this should be a trained nurse. Allow as much fresh air as possible, but no draughts, and keep a good fire burning night and day in the room. Use disinfectant solutions in all utensils and slop pails; place soiled

clothes and linen in a disinfecting solution before they are taken from the room; open doors and windows should be curtained with sheets kept moist with carbolic acid and water; drains, sinks, and closets should be flushed at least once a day with disinfectants.

If the case is small-pox, what other precaution would you suggest?

That every one, in any way exposed to infection, be vaccinated.

CHAPTER XXV.

BATHS.

When the patient is convalescent, what should he have?

Tepid or warm baths for several days, medicated with some suitable disinfectants, before he is allowed to join his family. This is very useful in cases of scarlet fever.

What is a medicated bath?

Add about eight ounces of Condy's fluid, to 16 to 30 gallons of tepid or warm water.

Name the principal kinds of baths, and the temperature of the water.

Cold, 33 to 65 deg.

Cool, 65 to 75 deg.

Temperate, 75 to 85 deg.

Tepid, 85 to 92 deg.

Warm, 92 to 98 deg.

Hot, 98 to 112 deg.

N.B.—A healthy person, stepping into a bath, reduces the temperature three to four degrees.

Give the heat of vapour baths.

Tepid, 90 to 100 deg.

Warm, 100 to 115 deg.

Hot, 115 to 140 deg.

Give the heat of air baths (Turkish.)

Tepid, 96 to 106 deg.

Warm, 106 to 120 deg.

Hot, 120 to 180 deg.

What effect has a cold bath?

It chills the surface, contracts the superficial blood vessels, forces the circulation from the surface to the internal parts, and checks perspiration.

Is it beneficial?

Its general effect is bracing and tonic, and if a person is in robust health, after the bath there is a very pleasant feeling of warmth.

What are its dangers?

Congestion of the internal organs.

What effect has a shower bath?

Same as a cold bath, probably somewhat more bracing.

What is a cold effusion?

The application of a stream of cold water from a height; it produces a sudden and violent stimulating effect.

When is it used?

To rouse persons from a state of insensibility, suffocation, drunkenness, hysteria, and poisoning. It is sometimes useful for producing sleep in delirium tremens, (or drunken mania).

What is a wet compress?

It is prepared and applied on the same principles as hot fomentations, (*see page 117.*) Cold water is used as the medium, and in place of flannel, a folded soft towel is used. It is just as essential in this case that the mackintosh thoroughly overlaps.

How does it act?

As a local bath, and gives a combination of effects; it first acts as a cold bath, and secondly as a prolonged warm bath; its effects are very soothing.

When are ice and iced water used?

They are applied locally when contraction of any blood vessel is required, they drive the blood away from the part. They are useful for reducing swelling and inflammation, and arresting hæmorrhage.

Of what use are tepid, warm, and hot baths?

They act as stimulants; they increase the circulation in the surface of the body, relieve congested internal organs, and promote secretion and excretion.

Is it wise to have many hot baths?

No, they have a weakening effect; they relax the tissues and weaken the nervous system.

What are hot fomentations?

A local application of hot water by means of flannel in such a form that warmth and moisture are combined and sustained; it is simply a local hot bath and acts in a similar way.

Of what use are they?

They are useful for relieving pain, they lessen inflammation, relieve spasms, &c.

How do you make a hot fomentation?

Spread out a towel in an empty basin, and on that lay the flannel folded eight times or so. Pour boiling water on it, and wring it in the towel as dry as you possibly can before applying it to the patient; shake it for a second or two to allow the admission of a little air between the folds of the flannel. Having applied it, place a piece of mackintosh so that it will completely overlap the flannel by at least an inch on all sides; keep it in position by a bandage.

What is an acid bath?

You use a wooden tub, and add three ounces of nitro-hydrochloric acid to 30 gallons of water.

What use is it?

It is useful in liver case and malarious diseases.

What is an alkaline bath?

Add a pound of carbonate of soda to 30 gallons of water.

When is it used?

In cases of gout and rheumatism.

CHAPTER XXVI.

POISONS, CLASSIFICATION OF. SIGNS OF. ANTIDOTES.

What are poisons?

Substances capable of destroying life.

How may they be classified?

As irritants, narcotics, and narcotico-irritants.

Which are irritants?

Those which destroy the tissues and produce nervous shock.

Which are narcotics?

Those which produce insensibility by their action on the brain.

Which are narcotico-irritants?

Those which have a combined action.

What are the general symptoms of poisoning?

Vomiting, purging, cramps, pain in the stomach, delirium or unconsciousness soon after partaking of food and drink.

What should be kept in view in treatment of poisoning?

1. To get rid of the poison by encouraging vomiting.

2. To counteract the effects of the poison by antidotes.
3. To remedy the effects produced, and obviate the tendency to death.

What are emetics?

Remedies used for the purpose of causing vomiting.

Name the safest?

1. Irritating back of the throat with the finger or a feather.
2. Large draughts of tepid water, or water mixed with a tablespoonful of salt or mustard.
3. One or two tablespoonfuls of ipecacuanha wine in water.
4. Twenty grains of sulphate of zinc, in water.

Name some common acids useful as antidotes for poisons?

Vinegar, lime juice, lemon and orange juice, mixed with water.

Name some common alkalies?

Soda, potash, lime, magnesia, diluted with water.

How do acids and alkalies act?

As antidotes to each other.

Is oil ever used?

Yes, in case of irritant poisons it protects the walls of the stomach. White of egg, milk, flour and water, salad oil, and castor oil may be used.

Name the principal poisons, their signs, and antidotes?

ANTIMONY. SIGNS: Vomiting, great depression, giddiness, cramps, purging. ANTIDOTES: Encourage vomiting, mucilaginous drinks, syrup and water, strong black tea, tannic acid in solution.

ARSENIC. Pain in the stomach, vomiting, constipation, burning heat of throat, mouth and fauces. **ANTIDOTES :** Emetics, magnesia and water, charcoal and water, mustard and water, limewater and milk, castor oil, salad oil, raw eggs ; vomiting to be produced.

ALCOHOL. (*See page 43.*)

BELLADONNA. Dilated pupils, dimness of sight, dryness of throat and mouth, pain in the head, giddiness, stupor. **ANTIDOTES :** Astringents, as bark, logwood, or oak, decoction of bark ; an emetic, limewater or magnesia and water to drink ; vomiting to be continued.

CALOMEL. Same as Mercury.

CARBOLIC ACID. Burning heat of mouth, throat, and stomach, great pain over abdomen. **ANTIDOTES :** Lime water ; castor oil or olive oil to be given as a drink ; milk and water, mucilage.

CAUSTIC POTASH. Intense pain in alimentary canal, stricture of œsophagus, vomiting, an abrasion of the skin of the mouth and fauces. **ANTIDOTES :** Acids, vinegar and water, lemon or orange juice, lime juice in large quantities, an emetic of ipecacuanha, salad oils, butter-milk.

CHLORAL. Drowsiness, stupor, coma, failure of the heart's action, cold extremities. **ANTIDOTES :** Strong doses of carbonate of ammonia and water, or sal volatile ; hot, strong coffee ; cold water dashed over head and chest ; brandy and water ; camphor administered.

HYDROCYANIC ACID, OR PRUSSIC ACID. Drowsiness, giddiness, stupor, extreme prostration, cold extremities, breath a distinct odour of bitter almonds, rapid failure of the heart's

action. ANTIDOTES : Carbonate of potash, a cupful of strong carbonate of ammonia and water, sal volatile and water frequently ; cold water dashed over head and chest, galvanism.

IODINE. Symptoms similar to influenza, vomiting, great depression. ANTIDOTES : Solutions of starch, arrowroot, tapioca, flour and water, or boiled potatoes. Cause vomiting to expel the poison.

LEAD. (PAINT.) Redness of the gums, sores round the teeth, great pain in the abdomen. ANTIDOTE : Sulphur water.

MERCURY. Sponginess of the gums, undue flow of saliva, teeth loosened, green stools, corrosion of the stomach, mouth and anus become excoriated (abraded), cramps. ANTIDOTES : Encourage vomiting ; white of eggs, flour and water, milk.

NITRATE OF SILVER. Burning heat of mouth and throat, pain in the stomach, vomiting, purging, cramps. ANTIDOTES : Common salt and water, castor oil.

OXALIC ACID. Same as carbolic acid. Give lime water.

OPIUM. (*See page 46.*)

PRUSSIC ACID. See hydrocyanic acid.

STRYCHNINE. Involuntary twitching of the limbs, arching of the back, spasms of the throat, cramps. ANTIDOTES : Emetics, mustard and water ; large draughts of warm milk, and effective doses of castor oil.

VITRIOL. Corrosion of the lips, tongue, throat, and alimentary canal, bloody stools, &c. ANTIDOTES : Carbonate of soda, chalk or whiting, in water ; gruel or olive oil ; all in large quantities.

CHAPTER XXVII.

DEATH.

How does death occur?

Three ways, according as it begins in the head, heart, or lungs. In the head by coma. In the lungs by asphyxia. In the heart by syncope.

Name the chief causes of sudden death?

Apoplexy, aneurism, heart disease, injuries to the nervous system, lightning, suffocation, sun-stroke, poisoning.

What are the signs of death?

No breathing; cessation of the heart's action, no pulsation: eyelids half closed; eyes dim and glassy, and pupils dilated; jaws clenched; tongue appearing between the teeth; frothy mucus about the nose and mouth; fingers half closed; body rigid and the surface cold.

