

safety, and induced a spirit of caution as to its acceptance. Bromide of ethyl is a colorless liquid possessed of an agreeable odor and pungent taste. It mixes perfectly in all proportions with ether but sparingly with water. The action of the agent, from an anæsthetic stand-point, is even more quickly exerted than is that of chloroform. The manner of its use is the same as for ether, a sponge, napkin, or inhaler being employed. Recovery is more rapid than from the two agents just named. According to experiments by Dr. Laurence Turnbull, to whom the profession stands indebted for a knowledge of the anæsthetic quality of the preparation, the shortest time required to place a patient under its influence is thirty seconds; the longest, five minutes; average, ninety seconds. In the experiments, the smallest quantity used was that taken into the lungs by two inhalations from a sprinkled handkerchief; the largest was two ounces. Out of twenty-one cases, sickness of stomach, with vomiting, occurred in three, hysterical excitement in two, prostration in one.

**Bonwill's Method of Rapid Breathing.**—An anæsthetic effect, as has been shown by Dr. W. G. A. Bonwill, is produced when rapid and full breathing is indulged in for a few minutes. What may prove the result of greater familiarity with the means the writer is not prepared to say. That a condition is produced which allows of puncture being painlessly made he knows from observation. A feature undoubtedly lying in the practice is the diminished quantity of an ordinary anæsthetic required where this process has preceded, and is continued, with the exhibition. A danger connected with the performance seems, to the experiments and experience of the writer, to lie in the direction of venous congestion of the brain; a conclusion to which exception, however, is taken by physiologists whose opinions worthily command wide respect. Greater familiarity, and wider experimentation, with the means, may demonstrate the existence in it of a boon not surpassed by the other great discoveries in Anæsthesia.

**Medicines used by Hypodermatic Injection.**—“*Gemischte narkose*,” mixed narcosis, is a term introduced by Thiersch of Leipsic to express a relation of means by which insensibility to pain is secured without entire abolition of consciousness. The means consists in the hypodermatic employment of morphia by an anticipation of some five minutes of chloroformization. This manner, while most recommendable, is yet not justly to be credited to the German surgeon; the author has been familiar with it assuredly for the last fifteen years, certainly wrote about it in connection with jaw operations quite that long ago. Advantage residing in the practice is that a semi-consciousness may be maintained which insures against the passage of blood into the larynx at the same time that it serves as a prophylactic to shock.

Sulphate of morphia used in conjunction with sulphate of atropia constitutes an admirable injection. The dose will vary from the eighth to a half grain of the first, from the one-hundredth to the seventieth of a grain of the second. To prepare the combination for use it is to be mixed with from seven

to ten drops of pure water. The spoon containing the solution is to be held over a flame for a single moment that a blood-heat of the fluid be secured. The means is not without danger.

Chloroform, subcutaneously used, is an excellent obtunder. In sciatica, ten drops, injected deep among the gluteal muscles, is efficacious in breaking up an attack. The remedy, and manner of employment, are indicated in obscure neuralgia generally.



## CHAPTER LXVI.

### INFLAMMATION.

THE author adds to the volume a chapter on the subject of inflammation, a chapter which is to find apology for its appearance in a work of the present character in consideration of being addressed solely to students, and in further consideration of the importance of the theme.

Understanding of the subject of inflammation is familiarity with surgery. No man has ever yet attained to over-knowledge of the matter. Many practitioners fail in apprehending the importance of it. A study of inflammation involves primarily a comprehension of principles. To appreciate principles is to secure understanding of associate phenomena. The present thesis, written in the most simple words at the author's command, and after a manner aiming to be demonstrative, is commended as designed to present the topic in an aspect which relates it with every-day practice. An analyzer starts on the study of inflammation properly only when he has arrived at recognition of the fact that it is the very corner-stone of that building which is expressive of the full meaning of a physician's life. Without a knowledge of the subject of inflammation no practitioner can be successful. Possessed of such knowledge, obscurity converts itself into simplicity.

By inflammation is meant perversion of the circulation. By perversion of circulation is implied derangement in that harmonious distribution of the blood to the organism at large, through which harmony every individual part has its proper share, and has no more than this share.

When the blood is not harmonious as to a general distribution it follows necessarily that some parts have more than their share, other parts consequently less. A part having more than its share (this being of other than temporary signification) is in a state of inflammation.

Inflammation defines itself as excess of blood in a part; an excess existing by reason of the presence of a something in the part which acts as an irritant. (See Fig. 607.)

The diagram exhibits the two ears of a rabbit, the left one inflamed, the other not.

Inflammation exists never but by reason of the presence of an irritant.

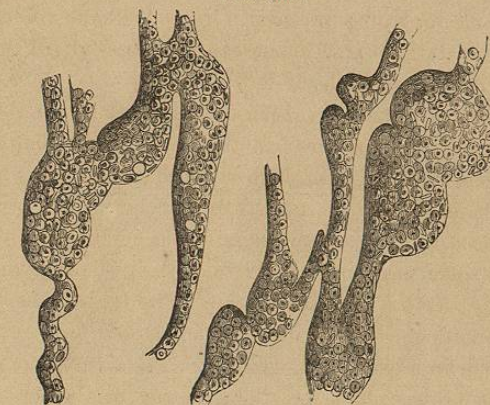
By an irritant is meant anything that worries. Examples of irritants are to be instanced in referring to a splinter pricking the finger, to an exposed tooth-pulp fretted by crumbs or other foreign particles coming in contact with it, to a broken jaw, to a burn, to a ball shot into the flesh, to virus mingled with

the circulation; in short, to anything of whatever nature that after any form or any method interferes with the natural condition of a part or of parts.

FIG. 607.



FIG. 608.



Capillaries enlarged and made varicose from blood engorgement in inflammation.

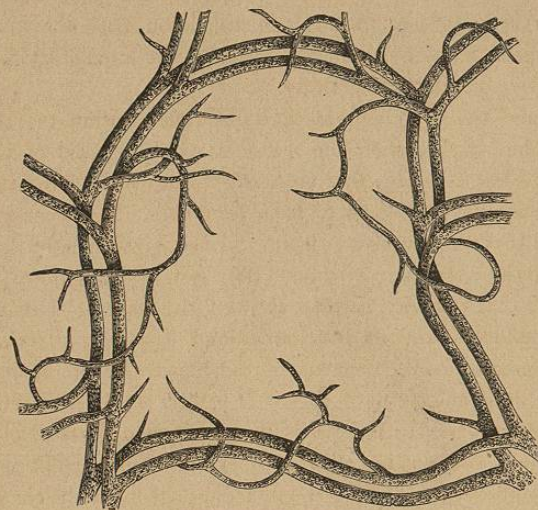
A splinter in the finger is to be seen, not unlikely, by the unassisted eye. A ball in the flesh is commonly to be located by the touch of a probe. Irritants, on the other hand, may be of a meaning, and be involved in an obscurity, that the widest examination to be made, in the light of modern science, fails to get comprehension of them.

An irritant not removed by being picked or lifted away, or by being an-



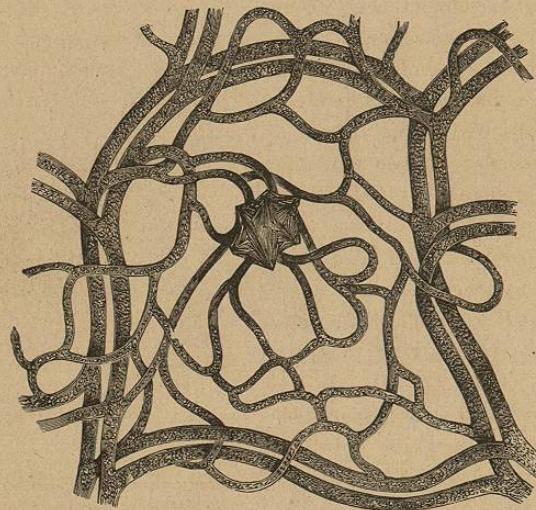
tagonized by means of medicine, or after other required fashion, is always attempted to be combated by nature, and it is the processes of this combat which medical science denominates inflammation.

FIG. 609.



Uninflamed wing of a bat.

FIG. 610.



Inflamed wing of a bat.

An irritant of strictly local signification arouses local phenomena, while one of general import, as, for example, syphilis, is seen to be expressive of disturbance throughout the system at large.

Wherever and whatever the irritant, nature will surely make an effort to rid herself of it. Inflammation is to be understood then as nature's effort to circumvent and to get clear of an offending body, and it is therefore to be looked on as a means of cure and not of hurt.

Local inflammation differs nothing in principle from general inflammation. In both is perversion of harmony in the circulation, both aim to circumvent an offending agent, both show an excitement in the circulatory fluid expressive of aggressive attack on something.

To understand the meaning practically of inflammation the student will consider that he watches with the writer a case possessed of purely local signification. First, it is seen that an agent of offence has fixed itself in the flesh. Let us assume this agent to be a lead ball. No sooner has such an agent intruded than the sensorium, having gained cognizance of the fact, calls for defence on the circulatory system. This system inaugurates an inflammatory attack; that is to say, it takes on itself the office of shutting the part off from surrounding parts by pouring around it a mass of lymph. This lymph is an ingredient, or component, of the blood. It would not be at all amiss to liken it to the white of eggs. It is first a thin fluid, but later coagulates and becomes hard. In its solidification it compresses all blood-vessels which it surrounds, thus cutting off nutrition from the parts infiltrated. These parts dying slough away, and carry the offending agent with them in a stream of pus significant of the death. (Fig. 611.)

The inflammatory act is described commonly as consisting of the stages of simple vascular excitement, active congestion, stagnation, suppuration. These terms have no other signification than that a condition inaugurates where excess of blood begins to run toward a part (simple vascular excitement), that it increases as to amount until the part is engorged (active congestion), that later the part has become so filled that circulation can no longer go on (stagnation), and that still later out of the stagnation has come the death of the part (suppuration).

It is seen that by the term suppuration is meant simply the breaking down of tissue by reason of absence of nutrition, and that such breaking down implies a lake, greater or less in extent, of pus (suppuration and pus being synonymous), which pus is a means to float an offence away; a common boil is illustrative. A boil exists by reason of some particle, that, to be gotten rid of, must be

FIG. 611.

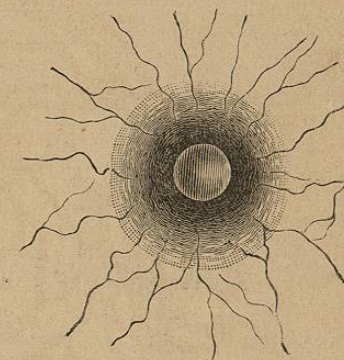


Diagram showing process of circumvallation. The centre shows the foreign body. The lines represent vessels. Circumscribing the irritant, compressing the arteries, and shading dimly away is the lymph.



circumvallated and finally floated off. (See diagram.) Repair is an inflammatory act. The meaning of this is to resupply a part lost in the pus lake. It means simply that such lymph as remains begins to organize, explanation of this existing in the fact that it is beyond that line of compression from which the circulation was cut off. The lymph organizing is vitalized; granulation after granulation springs out, until finally the destroyed part is renewed. The whole performance, as must be appreciated, is expressive of healthy effort, and is not to be interfered with except for reasons. (See diagram, which shows the expression of circumvallation.)

Inflammation of systemic import is illustrated in what is known as "taking cold." An individual exposes the whole or part of the superficies of his body to the action of a cold atmosphere. Cold contracts the capillaries of the skin. As a result of the contraction blood is driven from without inward. There is interference with equilibrium. There is too much blood among the viscera, too little with the integuments. The derangement implies perversion of the circulation. The perversion of the circulation is inflammation. A man who has a cold is in a state of inflammation.

A third and last illustration is found in considering irritants which mingle with the blood at large, proving a source of offence that shows perversion at many points. To express this most simply we are justly to accept that emboli, significant of a vice, are caught at varying localities, and that the perversions seen at these points are expressive of the phenomena of attempted circumvallation and expulsion. Syphilis stands as a prominent representative of the blood vices.

Appreciating the meaning of inflammation, it is understood that whenever the condition is met with in practice a primary question relates with purpose and intention. In the case of a ball, not to be removed otherwise than through natural effort, it is assuredly desirable not to antagonize, but to forward and assist nature's means. It is, however, to be considered that circumstances alter cases, and that while, on principle, the ball should be floated away, yet because of relation of a part with vital organs, it may be a necessity to limit the action of disturbance all that is possible, or even indeed to abort it altogether.

In perversion of the circulation arising out of "taking cold" it is always an indication to remedy the derangement speedily as possible.

In perversions existing by reason of presence of irritating agencies in the blood, treatment is to be as immediate as may be.

**Local Treatment of Inflammation.**—Inflammation meaning disturbance of equilibrium in the circulation, it follows that to restore equilibrium is to resolve inflammation.

Whatever means tend to restore a lost equilibrium in the circulation is the proper and scientific treatment of inflammation.

First, an inflammation being understood to exist never but in the presence of an irritant, attention to the irritant is a primary indication. A splinter

in the flesh is to be lifted away if possible, a ball or a diseased tooth is to be extracted, a broken jaw is to be set and quieted, a virus of specific nature is to be antagonized by specific remedies, influences of cold are to be corrected by repairing broken windows or assuming protective clothing.

An irritant removed, it is commonly the case that inflammation cures itself; that is to say, the cause of disturbance in equilibrium being away equilibrium comes back.

When, upon the removal of an irritant, an inflammation does not resolve itself, or when reason exists for modifying or aborting an inflammation, means are at once to be employed which tend to disgorge over-full parts, restoring the excess to parts under-full.

Over-full parts are in a state of distention. They are so because the office of contractility has been put in abeyance by reason of the unnatural afflux of blood. To relieve this distention implies simply removal of the cause. The cause away, the vessels regain of themselves their normal calibre, accommodating consequently only that amount of blood natural to the circulation of the part. The amount of blood natural to a part circulating in this part, it follows that no inflammation is present; if it existed it has been resolved.

Great variety in means and manner relates as regard is had to getting blood away from a region. If too much blood exist in a part above the lower limbs, a plan is to immerse feet and ankles in warm water; warm water relaxes. Feet placed in warm water are found quickly to grow red, to become engorged, really to assume the inflammatory condition. The excess of blood called to the part as the result of the relaxation invites from the seat of primary congestion such excess as has in it the meaning of the distention. Relieved of the distention the part recovers its contractility, and is thus found cured. The feet, by reason of being in a condition of perfect health, are seen to be able to take care of themselves and to drive the excess of blood from the capillaries, the process of self-relief commencing quickly after the removal of the irritant, *i.e.*, the relaxing water. The blood returning from the feet cannot throw the excess back on the seat of original engorgement, provided time and condition have allowed the part to recover its tone. When tone has not been recovered the inflammation is not found cured, and the foot-baths are to be repeated and other means of relief added, otherwise the other means employed alone.

Dry cups are an admirable agency of derivation. Assuming, for example's sake, that an inflammation is related with the enveloping membrane of a tooth, the placing of a dry cup upon the cheek and a second on the back of the neck, relief to the tooth is apt quickly to follow the abstraction of blood; the change of position in the fluid being witnessed in the red and engorged swellings formed under the cups.\*

\* DRY CUPPING.—To dry cup means simply to take a common wine or other glass and to put in it a wisp of paper saturated with alcohol. When ready to attach, that is, having one edge of the rim resting against the skin, a lighted match is applied and the full circumfer-



Wet cupping is another plan. This relieves by running blood out of a part. In the plethoric the means commends itself, in the anæmic it is oftentimes of doubtful propriety.\*

The use of leeches is another manner. Two kinds are used in practice, the Swedish and American. A Swedish leech sucks half an ounce of blood, the American a less, but an undetermined, quantity; the former is to be preferred. To apply the worms it is usually necessary to hold them against a part by means of a wine-glass or goblet. Where leeches refuse to bite sweetened water may be smeared over the part. Another plan is to prick the skin until a few drops of blood are obtained, this being spread after the same manner as the sweetened water.

Abstraction of water from the blood by use of a fly-blister is a means applicable to underlying inflammation,—of a joint, for example. Take of the fly-plaster, as prepared by druggists, a square or strip of size required and place upon the skin above the diseased part. This is allowed to remain from eight to twelve hours, according to susceptibility of the tissue. On being removed it is to be replaced by a poultice of bread and milk, which poultice is kept on until it is seen that much serum occupies the space between the epiderm and true skin. The object being to drain, the bleb is pricked with a needle and the poultice reapplied, pricking and poultice to be continued so long as water comes or until indications are met.

In inflammations of threatening import involving vital parts, bleeding from a vein is a practice not to be over-commended. A vessel commonly selected for the operation is one at the bend of the arm that does not occupy the centre line; this line being the position of the brachial artery, which, in the region, is separated from the veins by the thickness only of the bicipital aponeurosis. To open a vein the operator commences by placing a constricting band between the proposed seat of performance and the heart. Fig. 612 shows the anatomy of the parts. The crossed vessel is the brachial artery. The bicipital aponeurosis is seen passing between vein and artery; it is not thicker than foreign post writing-paper. The blood being dammed back in the locality through means of the constriction, and the veins swelling to a greatly increased diameter, it remains simply to open the one selected by means of an oblique incision; a curved bistoury of sharp point being employed, otherwise a lancet, thumb or spring, as portrayed by cuts 613 and 614. If an open vein refuse to bleed, the fist of the patient is to be opened and shut many times. If this fail, it is more than likely that the overlying skin inter-

ence instantly pressed to the skin. To remove a cup, the integument is pressed from the outside away from the rim.

\* Wet cupping differs from dry in the use of a fleam, or lancet. A cup being applied after the dry manner, and excess of blood brought to the part, the knife is stuck into the skin and the dry cup reapplied. Here the vacuum made draws the blood from the wound, filling the cup. Surrounding parts are of course relieved of the excess, contractility being thus secured.

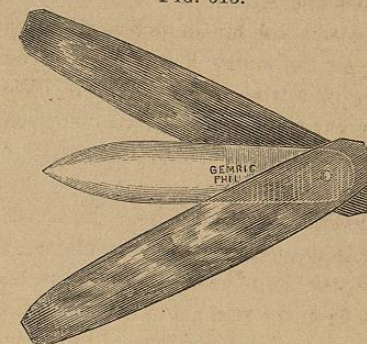
feres with the egress, or that a freer cut is required to be made in the vein. To check bleeding from a vessel the band is to be taken away, and a compressor, retained by a figure-of-8 bandage, is to be bound upon the wound.

FIG. 612.



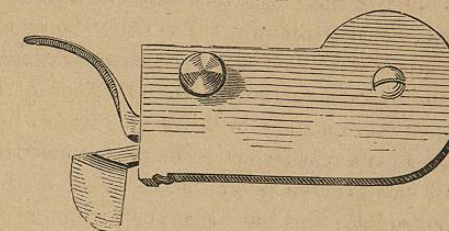
Arrangement of veins, brachial artery, nerves, and bicipital aponeurosis at the bend of the arm.

FIG. 613.



Thumb lancet.

FIG. 614.



Spring lancet.

In parts suffering from inflammation where exposure is immediate and direct, as, for example, a cheek, the neck, or ear, medicines known as antiphlogistics apply. Antiphlogistic remedies act after two manners: 1, constricting the capillaries, thereby driving the blood out of them; 2, sedating the nerve irritability of a locality, thus relieving the vessels of a fret that worries and goads them. In the direction of the first means are alcohol, so applied as to permit of rapid evaporation, cold water, hot water, and medicated water. A prescription known to surgical practice the world over is as follows:

R.—Plumbi acetatis, ℥ij;  
Tincturæ opii, ℥ij;  
Aquæ, Oij. M.

This is applied by means of cloths kept constantly wet, or thin poultices of bread-crumbs may be made with it. Where abscess is inevitable, perhaps desirable, yet where at the same time necessity exists for limiting as much as possible the inflammatory area, it is the practice of the writer to apply flax-seed-poultices, moderately cool, every portion of which, except the part im-



mediately overlying the centre which it is desired to break down, being fully saturated with the lotion; the centre being warm as well as unmedicated.

Another agent of valuable signification in the direction is phénol sodique. To use this cloths are saturated with the pure preparation and kept applied to the part. Phénol is antiphlogistic and antiseptic; it applies particularly in hospital practice where reason exists to fear the influence of septic conditions; it is markedly sedative. The writer always uses phénol in his surgical operations, depending on it wholly for what is called Listerism.

Hydrochlorate of ammonia in proportion of ℥iij to Oiv is a good sorbent antiphlogistic, applicable particularly where, in the inflammatory act, an undesirable quantity of lymph—the circumvallating material—has been thrown out. It is not so good, however, as is lead-water and laudanum preceded by paintings of tincture of iodine.

Goulard's extract is a favorite antiphlogistic. To use it a mixture is made in proportion of ℥ij to water Oj. It is placed by means of saturated cloths.

As applications acting from the stand-point of sedation, reference is to be made to tincture of hamamelis Virginiaca, to be much diluted with water; to laudanum conjoined with an equal proportion of sweet oil; to moist plantain leaves; to decoction of poppies or of hops; to steam. All these are applied with reference to keeping the parts unexposed during an interim of necessary changing.

Rest is to be numbered as among the important features in treatment of an inflamed part; a broken arm is to be splinted; capping of neighboring teeth applies where periodontitis exists; a diseased stomach is to be spared to all possible extent in its functional work; a lung affected, the fewer respirations the better.

**General Treatment.**—Every inflammation implies disturbance alike of the nervous with the circulatory system. In every inflammation it may be necessary to direct remedies to the quieting of both systems. Considering as a type that perversion of the circulation which arises out of "taking cold," few combinations act more curatively than a mixture of tincture of veratrum viride and the bromide of potassium; the first affecting directly the circulation, the second the brain. A formula is as follows:

R.—Tincturæ veratri viridi, gtt. xx;  
Potassii bromidi, ℥ij;  
Aquæ, ℥ij. M.

Dose, a tablespoonful, to be taken on going to bed, and to be repeated twice or thrice the succeeding day, if found necessary.

A second valuable medicine in this same direction is found in Dover's powders:

R.—Pulveris ipecacuanhæ et opii, gr. xl.  
Chart. No. iv. M.

One to be taken at bedtime, and repeated twice or thrice next day, if required.

A free pulse, hot skin, and general febrile disturbance are treated happily by tablespoonful doses of the following mixture, repeated each three or four hours, according to urgency:

R.—Liquoris potassii citratis, ℥iij;  
Spiritus ætheris dulci, ℥ss;  
Antimonii et potassii tartratis, gr. ss;  
Morphiæ acetatis, gr. j. M.

Epsom salts is an admirable anti-inflammatory agent of constitutional expression; it reduces the volume of blood by reason of producing watery stools; the dose is a tablespoonful dissolved in a full goblet of water.

Another agent of this same class is elaterium:

R.—Extracti elateri, gr. j.  
Ft. pil. No. viii.

One to be given each two hours until copious watery evacuations are secured.

Another means, one acting as a diaphoretic, is a favorite with the writer:

R.—Liquoris ammoniæ acetatis, ℥iv.

Put the patient in bed, cover with blankets, and give in tablespoonful doses each fifteen minutes until profuse perspiration is secured.

Still another manner of sweating serum from blood is to place a patient upon a cane-seat chair beneath which a bucket of water kept steaming by means of hot bricks has been put; the patient to be wrapped about with a blanket which extends to the floor, enveloping the bucket, and supplied freely with hot drinks. Care is required in taking a person from such steam bath; he is to be rubbed dry by means of towels carried beneath the blanket, and is to be exposed for the shortest possible time while a change of clothing is being made.

Diet is an element in the treatment of inflammation; articles which never hurt are tea and dry toast. Water-ice, ice-cream, acidulated drinks, are found both refreshing and profitable.

Where much heat of surface exists no means familiar to the author equals sponging with pure alcohol. Generally it is the case that in febrile disturbance the regions of the spine, thorax, and abdomen are burning. A plan that yields commonly inexpressible relief consists in a few minutes of bathing, then drying by means of a soft towel; the bathing and drying to be repeated until the parts are entirely cool and remain so. The writer uses his hand in place of a sponge.

Placing the hands and wrists of a febrile patient in ice-water is an admirable means of refrigeration, the cooled blood being carried from the parts over the general system.