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### ON LOCAL ANÆSTHESIA.\*

by

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In its various stages of development the science and art of rendering more or less extensive parts of the body insensitive to pain represent an interesting phase of medical history.

It is surprising to see through what a long and thorny path a method had to struggle although it was based on an excellent idea and from the beginning was bound to have a promising future; many difficulties and adversities had to be overcome before the present high standard of efficiency in modern surgery had been attained.

Formerly when the scientific exchange between the various countries was established to a much lesser degree than now-a-days, medical men with great tenacity stuck to the methods in which they had been trained and which they were used to practice. New methods, particularly on surgical lines travelled rather slowly and were not readily accepted everywhere with the same enthusiasm, even after they had long passed their experimental stage and successfully proved their usefulness.

Having had my surgical training in Germany & Switzerland, where some 30 years ago I saw among others, Kocher in Bern using local anæsthesia (L. A.) almost exclusively in all his many goitre and hernia cases, I was surprised to find this easy and harmless method so rarely applied in England and America, even ten years later at a time when the application of a general anæsthetic, especially in goitre cases, still involved greater risks than in the present time with its much improved technique. Still now the progress in the use of excellent drugs and methods is strikingly slow in the advance from the place of origin to other parts of the world. Thus, f.i. Avertin, a tri-bromethyl alcohol, which, given as a rectal enema produces a

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\* Delivered before the Hong Kong University Medical Society.

deep sleep with complete general anæsthesia, has only recently found its way abroad, whereas this method of rectal anæsthesia has been widely used in Germany already for about four years. Similarly, very little is known outside of Germany of the intravenous narcosis with pernocton, a 10% aqueous solution of a sodium barbituric compound.

As I said before L. A. was established on the continent as a generally and frequently practised method long before it gradually gained ground in England and America, and it is only since the great war and largely owing to the teachings of Crile that it has become more popular in English speaking countries.

From what I have seen in *China* L. A. deserves to be recommended for a much wider use. The only surgeons who have quickly become familiar with the use of L. A. are the dental surgeons, and they use the injections, in my opinion, rather too frequently in cases which they could easily treat without them, and in others in which the infiltration does more harm than good; I shall refer to this matter later.

The history of L. A. is well worth reading in extenso; here only a few remarks on its earlier stages may be mentioned.

The *first attempts* to render the skin anæsthetic date back to the ether *spray* of *Richardson* in 1866, but it was not until cocain was introduced in 1884 by Koller in Vienna into ophthalmological practice that the value of a local anæsthesia was realised. In the same way cocain was administered in manipulations in the throat and nose and further it was used for anæsthetising the male urethra. Quickly thus cocain made its entry into surgical practice and already two years after its introduction Halsted published a report on 1,000 operations performed under L. A.

In those days the injections were made with solutions of rather high concentrations—from 2 to 20% of cocain!—and consequently many fatal accidents occurred which soon damped the initial enthusiasm for the new method. Then *Reclus* in France recommended weak solutions and by drawing up distinct directions and limitations within which cocain could be used without danger, he restored the confidence in the drug to a certain extent.

In Germany it was *Schleich* who carefully worked out the technique of infiltration anæsthesia and who by his persistent advocacy revived the use of L. A. to a steadily increasing popularity. For a long time therefore the method was known in Germany as *Schleich's anæsthesia*. His first paper in 1891, in which he reported on 224 operations successfully performed under L.A., was delivered before a large surgical conference in a very eloquent and candid way, full of temperament; but as a simple medical practitioner without connection

with an university institution from which alone in the eyes of most leading medical professors at that time in Germany new methods worthy of consideration could emanate, Schleich did not impress his audience, and his suggestion for a thorough trial of L.A. and advocacy for a much wider use were not regarded worthy of further discussion. But, Schleich was a great enthusiast and eagerly fought for what he had recognised as an essential and valuable factor in lessening the dangers of operations. It is amusing to read Schleich's poetical satires and various literary attacks on the prejudice and conceit of his colleagues in academic positions.

Schleich has shown that an efficient anaesthesia could be obtained already with weak solutions. In most of his cases a 0.1 and 0.2% cocain saline solution was used with 0.02 morphia which, as he thought at that time, had also a local effect.

Various means had further been devised to *increase the anaesthetising effect* of the drug like the *application of cold* to the field of operation and the *blocking of the blood stream*, from the part operated upon by means of a tourniquet put around the limb before cocainisation. The latter method involves the danger of gangrene which on several occasions had been observed especially when too strong solutions (2%) had been used as for instance in circular injections at the fingers.

Yet the great toxicity of cocain was a hindrance to the wider development of L.A. and it was not until continuous efforts in chemical research work had succeeded in the synthesis of new substances which by their low toxicity, eliminated the danger factor practically completely without weakening the efficiency, that a new era of L.A. began. B. eucain (Marlin 1896) and tropococain (Liebermann 1892) had already been used for some time as substitutes for cocain, then followed stovain (Forneau 1904) and alypin (Impens 1905).

*In 1905 novocain was introduced by Einhorn* and since then has established itself as the best substitute of cocain. Novocain is the monochlorhydrate of the p-amido-benzoyl-diethyl-amido-ethylester and in America known under the name of procain. Owing to its low toxicity, its excellent anaesthetic properties and the easy way of administration, the indications for the use of L.A. soon became considerably enlarged and new technical procedures in more elaborate methods developed in quick succession.

In the same concentration novocain is three times less powerful in producing anaesthesia than cocain, but on the other hand, it is also seven to ten times less poisonous, whereas the toxic index of eucain, alypin, tropococain and stovain is about three times higher than in novocain. Single doses up to the total of 3 and even 4

grams have been injected without causing any harm although unpleasant after effects like pallor, nausea, vomiting, dizziness, headache and profuse sweating may follow much smaller doses; but these disturbances are seldom observed with the adequate doses given and readily respond to proper treatment. Fatal accidents following infiltration anæsthesia with novocain which have been reported, particularly from the dental practice have mostly been due to carelessness, faulty technique and disregard of the contra indications. Delirious and comatous conditions, respiratory paralysis and collapse have been observed, probably effects of a direct injection of the solution into the blood stream, which of course has to be avoided.

Occasionally an hysterical fit may be released through the injection, which to the inexperienced may look rather disquietening but will soon reveal itself as a perfectly harmless reaction. Keeping further in mind that novocain may provoke a status of sexual excitation, it is advisable to administer the drug only in the presence of a third person.

Novocain is easily soluble in water and the solution can be heated up to 120 degrees Centigrade without disadvantage to its anæsthetising qualities; it does not irritate the tissues. Concentration and amount of fluid to be injected naturally vary according to the nature of the operation and the method applied for anæsthesia.  $\frac{1}{2}$ , 1 or 2% solutions are most commonly used;  $\frac{1}{2}$ % is quite sufficient for an ordinary field block with the infiltration method, (f.i. in a simple inguinal hernia with 70—80 c.c.) but even with only a  $\frac{1}{4}$ % solution we get satisfactory results in cases which require a large amount of fluid, as for instance in an amputation of the mamma, when 300 c.c. or more are needed. To the dosages which are used in the various methods I shall refer later. Indiscriminate injections into the tissues should be avoided, they mean waste of time and unnecessarily blur the anatomical picture. A certain plan must be followed according to the methods which have been worked out for each operation.

There is no fixed maximum dose of novocain, but from experience it is stated that the following quantities and concentrations can be given in adults for peripheral injections without danger;

250 c.c. of a  $\frac{1}{2}$ % solution.

150 c.c. of a 1% solution.

50 c.c. of a 2% solution.

30—35 c.c. of a 3% solution.

25 c.c. of a 4% solution.

In children and weak patients respective reductions have to be made.

In its physiological action on the circulatory system novocain increases the pulse rate and decreases the blood pressure after an initial slight rise of the latter. As it lacks the important vasoconstrictor property of cocain, novocain would not have been able to replace cocain definitely if another substance had not been found which combined with novocain fills this gap of deficiency. This substance is the *product of the suprarenal glands* and the addition of it to the anæsthetising fluid is an *essential point in increasing the efficiency*. Two preparations are commonly used, *adrenalin and suprarenin*, the latter also in synthetic form. They probably help in the way of sensibilising the nerve endings for the action of the anæsthetic and are specific stimulants of the sympathetic nervous system; their effect, contraction of the arteries, is still noticeable in a dilution of 1 : 10,000, the toxicity therefore is high and more than  $\frac{1}{2}$  mgr. should never be injected at a time. In patients with arteriosclerosis great care must be taken in the use of these drugs and a thorough examination of the patient must precede the administration of the L.A. in the same way as it is done before starting an inhalation narcosis. The pallor often noticed in patients after an operation under L.A. is mainly due to the effect of the suprarenal component.

Special attention must further be paid to the accurate ligature of the blood vessels, smaller vessels do not bleed for some time as they are contracted, thus they are easily overlooked. Some surgeons do not use adrenalin in a field block as it prevents the quick spread of the fluid.

In sterilising the needles and syringes no soda, but only distilled water should be used as novocain as well as the suprarenal products become impaired by alkaline solutions. When an exact amount of fluid is required for a certain injection it is wise to make sure that the graduation of our syringes is accurate, which is not always the case.

*Much depends on the proper quality of the solution.* This should be "body warm" when injected and always freshly prepared and sterilised; before use 5—10 drops of adrenalin should be added from a 1 : 1,000 solution in ampoules to every 100 c.c. of novocain solution. Standard solutions containing adrenalin quickly become yellowish and then are less effective and more toxic and therefore should not be used. Very handy are the novocain suprarenin tablets from Hoechst, they contain suprarenin in synthetic form, (for instance 0.25 novocain with 0.00012 suprarenin) and are dissolved in 0.9% NaCl solution. The tablets are supposed to be sterile, but as occasionally they have been found to contain bacteria it will be safer to sterilise them before use. By adding 3 drops of diluted Hydrochloric Acid to 1,000 c.c. of the fluid before sterilising, the disintegration of the suprarenin is prevented. The composition of the tablets has

recently been improved by the addition of potassium sulfuricum (4 : 1,000) and sodium chloride (7 : 1,000), which increases the anæsthetic effect and lessens the after pains.

Various other combinations with novocain have been recommended for special methods, which I shall mention when discussing these methods. With regard to other substitutes of cocain, among them also derivatives of quinine, many have been devised and introduced in the various countries. One of these already mentioned is stovain, still much used in England, especially for spinal anæsthesia; it is more dangerous than novocain and has been found to produce degeneration of the nervous elements. Others, like albromin, allocain, apocain, atoxydin, borocain, butyn, eccain, eufin, optocain, paranæsin, sinecain, to mention only a few, have not survived very long and do not offer any advantages over novocain.

But there are a few of more recent date which deserve some attention as they represent a distinct advance with regard to anæsthetic qualities, and which to some extent have already successfully replaced the novocain. This holds good in the first place for *tutocain* (para-amino - benzoyl - dimethyl - amino - methyl-butanol-hydrochloride), which was produced in 1922 by Schulemann of the Bayer works. Tutocain is about twice as toxic as novocain, much stronger in its effect and therefore requires less concentrated solutions. Whereas the minimum concentration in which novocain produces anæsthesia in the intradermal wheal experiment is 1 : 100, tutocain has the same effect already in a much weaker concentration. Anæsthesia appears much quicker with tutocain and remains much longer; combined with adrenalin and eucupin, a quinine alkaloid, anæsthesia has been found to last up to 24 hours. *Tutocain is especially to be recommended in the treatment of eye diseases* since it lacks the irritating qualities of cocain. As tutocain dilates the blood-vessels a slight increase in the addition of adrenalin or suprarenin is required. On account of its only weak action in dilating the pupils it is preferably used in cases in which dilatation is not desired.

For infiltration tutocain is injected in 0.2% solutions; it is sold in tablets of various strengths also combined with suprarenin and as solution in ampoules.

The length of experience with tutocain is still too short for a definite decision with regard to its superiority over novocain; many surgeons prefer to use tutocain, others claim that it does not offer sufficient advantages to relinquish a local anæsthetic which for over twenty years has proved its great value and efficiency. Kochmann expressed the value of a local anæsthetic (V) by the comparison of the concentration limit (C) with which anæsthesia is locally obtained with the minimum fatal doses (F). The value is then in

direct proportion to the fatal dose and indirectly proportional to the concentration,  $V = \frac{F}{C}$ . The formula applied to tutocain would give the value of 65, whereas for novocain the much higher rate of 127. But in this estimation, properties like the irritability of the tissues, reaction on the blood-vessels and others are not considered, which render the practical value of the formula somewhat doubtful. In my personal experience, tutocain has given very satisfactory results: I prefer it to novocain on account of its quicker action and the longer duration of the anæsthesia.

Another substance, psicain (Merck) an isomer of cocain, has proved twice as strong in action and quick in effect, but only half as toxic as cocain. Even in a 20% concentration it does not produce disagreeable symptoms like those often accompanying the administration of cocain in the same concentration. *Psicain* has therefore already earned the reputation of an *excellent substance for superficial anæsthesia* and there is no future need to take the greater risks connected with the use of cocain. In urological cases  $\frac{1}{4}$  to  $\frac{1}{5}$ % solutions for the bladder and  $\frac{1}{2}$ % solution for the urethra are to be used. The experiences with psicain in the injection methods do not yet suffice for decisive conclusions.

Of still stronger anæsthetic power is a product called *supracain* or S.E. 147, belonging to the novocain group, which was first tried in the clinics of Quervain in Zuerich. In the wheal experiment supracain proves effective even in a concentration of 1: 100,000, in its toxicity it stands midway between cocain and novocain; with regard to the duration of the anæsthesia it surpasses tutocain. Skin infiltrated with a 0.3% solution remains painless for up to 8 hours, corneal anæsthesia can be obtained with a solution eight times less concentrated than an efficient novocain solution. But as sufficiently large series of cases in which this new drug was used are not yet published nothing can definitely be said about its practical usefulness.

The latest drug, percain (Ciba) a butyl-oxy-cinchonin-diethyl-amino-ethylamid-hydrochloride, a derivative of the chinolin series, to which also other valuable drugs such as atophan and yatren belong, is said to *surpass in its desensibilising effect all other substances* hitherto known, and to fulfill all postulations of an ideal anæsthetic:

1. In concentrations required for anæsthesia it is less toxic than cocain.

2. It is not irritant.

3. Readily soluble in water. The solution can be sterilised by boiling without losing its efficiency; it keeps well without deteriorating, but to avoid alkalisation from the glass vessel it is advisable to add 3 drops of diluted hydrochloric acid to 100 c.c. of the solution.

4. The solution mixes with adrenalin or suprarenin.

Percain is slightly bactericidal, causes moderate constriction of the blood-vessels, but is not injurious to the tissues. According to Uhlmann total loss of the corneal reflex in a rabbit is obtained with percain 1 : 75,000, with cocain 1 : 5,000, tutocain 1 : 1,500, and novocain 1 : 1,000. 1% percain solution one second after application has the same effect in the frog experiment as 1% cocain solution after 30 seconds. 1 : 4,000 quickly renders extensive burns insensitive. Although 2 to 8 times more toxic than cocain a poisoning effect need not be feared as the therapeutic doses of percain are 10 to 100 times weaker than those of cocain. Thus for surface anæsthesia a 1—2% solution is sufficiently strong. In laparotomies the infusion of 250 c.c. of a solution 0.5 : 1,000 into the abdominal cavity allows painless handling of the abdominal organs. The approximate maximum dose is 0.2 in substance and 400 c.c. of a solution 1 : 2,000, 150 c.c. of 1 : 1,000, and 50 c.c. of 1 : 500 can be injected without danger, but a 0.3% solution gives a perfect anæsthesia with the ordinary infiltration method. The solution is best made with  $\frac{1}{2}$ % phenol solution which about doubles the effect of the percain. Owing to the long duration of the anæsthesia which according to the concentration lasts from two to six hours and to the low specific gravity of effective solutions, percain is *particularly useful in spinal anæsthesia*.

Let us now consider the various methods in which the drugs mentioned above are used to produce anæsthesia of a certain region of the body.

#### 1. *Surface Anæsthesia.*

Small areas of skin are rendered insensitive by spraying them with ether or chlorethyl. In the *ophthalmological practice* anæsthesia of the cornea is still most commonly effected by the instillation of a few drops of a 2% cocain solution into the conjunctival sac, but as we have already pointed out, we have in tutocain and psicain 2 substances which are at least as effective and moreover less dangerous, therefore cocain need not be used any longer. For minor operations on the eye, removal of foreign bodies, etc., a 2—5% solution of tutocain or a 1—2% solution of psicain with the addition of suprarenin (5 drops (1 : 1,000) to 10) renders the field sufficiently anæsthetic.

In *operations on the ear, nose and throat* the anæsthetising fluid is administered by the spray or by the sweeping of the mucous membranes or plugging the cavities with cotton soaked in the solution. For *endonasal manipulations* a five (5%) solution of tutocain or psicain is needed, and for those in the larynx a 10% tutocain or 10-20% psicain solution, while operations in the pharynx need a 5 to 10% solution of tutocain or psicain. The addition of suprarenin in all these instances reduces the concentration to half the former strength. Nose and throat specialists generally use for superficial anæsthesia



rather large doses of suprarenin, 1 gtt, to 1 c.c. of solution and even more. Suprarenin as we have seen, is not a harmless substance and this quite unnecessary usage of high doses, even if only applied to the surface, can not be recommended.

In *endovesical operations* the bladder is filled with 200 c.c. of a 2% novocain solution or 50-100 c.c. of a  $\frac{1}{2}$ % alypin or a  $\frac{1}{4}$ % psicain solution. In the very painful treatment of cystitis with strong (3%)  $\text{AgNO}_3$  solution, 100 c.c. of a 2% solution of *novocain nitrate* is used, as ordinary novocain impairs the effect of the silver nitrate.

For anæsthesia of the joints for the purpose of reposition in cases of dislocation, the joint cavities are injected with a  $\frac{1}{2}$ % novocain suprarenin solution.

### 2. Infiltration Anæsthesia.

To render deeper situated tissues anæsthetic the fluid has to be injected, hereby the endings of the peripheral nerves are anæsthetised. The original method of Schleich was by the way of infiltrating the field of operation step by step, thus in cutting deeper one gradually had to extend the infiltration to the deeper tissues. In an amputation of the mamma for instance, one would begin with the infiltration of the skin along the line of incision reaching down to the depth of the aponeurosis, then after having cut the skin and subcutaneous tissues the M. pectoralis has to be infiltrated and later the axillary tissue and intercostal spaces. The preparations until the desired anæsthesia is attained are thus rather lengthy and troublesome, especially when the operation covers a large area. Further by the infiltration of the tissues the anatomical landmarks become less distinct and this may render the operation somewhat difficult, particularly for the beginner; it is therefore more advisable by introducing the needle deeply in a rectangular or slightly oblique direction to inject the deeper tissues first and then to work up gradually to the upper layers. By this way the orientation is made easier. The concentrations and the amount of solutions used for this method have already been mentioned.

### 3. Conductional or Regional Anæsthesia.

In 1888 a method was described by Krogius, Oberst and Corning as *conduction anæsthesia* by which the injection was made into the neighbourhood of the nerve trunks, whereby the conduction in the latter is inhibited. In America this method was named *Regional Anæsthesia*. To perform it successfully an exact knowledge of the topography of the nerves is essential. Although in certain cases the conduction anæsthesia had been practised before the infiltration method was known—the first conduction anæsthesia was performed in 1885 by Halstedt who injected cocain solution on the trunk of the inferior alveolar nerve—infiltration was the method most frequently used in the early days of L.A. Only since a substance was found in

the combination of novocain and adrenalin which allowed the surgeon to apply a comparatively small amount of a non-toxic but never-the-less effective drug, did conduction anæsthesia eventually begin to replace the infiltration method.

Conduction anæsthesia can be performed in two ways. The injections are made either into the substance of the nerve trunk itself, the *endoneural injection*, or into the tissue closely surrounding the nerve, the *perineural injection*. The first by which complete anæsthesia is obtained within a very short time, is of course feasible only with nerves in superficial positions like the ulnar nerve at the elbow, the peroneal behind the capitulum fibulæ or at certain localities where the nerve passes through a narrow bony opening or canal; deeply situated nerves like the sciatic, femoral or others may be laid open for the purpose of injection, a method practised by Crile, but as the dissecting of a nerve is itself an operation on its own, this method has not found many adherents. But in selecting certain landmarks on the bony and fleshy parts of the body from which to direct the needle we have learned to reach the deeper nerve trunks very closely and thus to obtain practically the same effect with a perineural injection as if the nerve substance itself had been injected. There is scarcely any nerve left which has not been reached by the needle, and methods were described to anæsthetise the trigeminal nerves and their Gasserian ganglion (Hærtel 1911), the brachial plexus (Kulenkampf) and the nerves of the leg. Thus we are able to produce complete anæsthesia which allows any operation on the lower extremities by three separate injections from given landmarks on the trunks of the sciatic, femoral, and obturator nerves. For regional anæsthesia 5—10 c.c. of a 1% concentration are needed and 10—20 c.c. of a 2% solution of novocain for thick trunks like the femoral and sciatic nerves or the brachial plexus.

Special forms of regional anæsthesia are the *venous* (Bier 1908) and *arterial anæsthesia* (Goyanes 1909). As these methods never enjoyed great popularity, and with the development of more useful methods have become obsolete, they need no further description.

#### 4. *Paravertebral Anæsthesia.*

In 1905 Sellheim, a gynæcologist, had tried to perform laparotomies after having blocked the intercostal, ileo-hypogastric and ileo-inguinal nerves by injecting them at a point close to their exit from the vertebral canal. By this method which was later modified and improved, especially by Læven 1911, who inaugurated the name under which the procedure is known now, not only anæsthesia of the abdominal wall is obtained, but the organs within the latter also become insensitive, the pain conduction through the rami communicantes of the sympathetic system being inhibited. For most of the abdominal operations bilateral injections have to be made which unduly prolong

the procedure; besides the large amount of anæsthetising fluid needed for abdominal operations (up to 4 to 500 c.c. which means 2 and more grams of substance) may lead to disagreeable after effects. Therefore the method is not suitable for laparotomies but quite useful in renal and ureteral operations which require only about 150 to 200 c.c. of a 1% novocain adrenalin solution, paravertebrally injected into the last 5 intercostal and the first lumbar nerves.

*Paravertebral anæsthesia* can further be used for *operations on the lower extremities*. In these cases the injection is made into the region of the plexus lumbo-sacralis. The patient is put into ventral position with extreme lordosis and the needle inserted at the crossing point of a horizontal line connecting both iliac crests, and a vertical line through the posterior superior iliac spine. With the direction towards the vertebral column the needle reaches the space below the transverse process of L.4. Paræsthesia in the region supplied by the femoral and obturator nerves indicate the proper position of the needle. 25-30 c.c. of a 1% novocain adrenalin solution are injected into each trunk. The sciatic nerve has to be anæsthetised separately. (Keppler's method).

The paravertebral method is not without danger. By exercising it the needle may pierce the epidural space, or the venous plexuses which are rather abundant in the vertebral region, or penetrate the pleural and mediastinal spaces, in all instances serious, even fatal accidents may follow, especially if a somewhat large amount of fluid has been injected. Since we have other less dangerous and less complicated methods of serving the same purpose there is no need to use paravertebral anæsthesia for major operations.

#### 5. *Splanchnic anæsthesia.*

In 1911 Neumann and in the following year Kappis independently from each other found that the visceral sensibility of the abdomen was conducted by the two splanchnic nerves and the first three lumbar rami communicantes. On this fact Kappis based his method of splanchnic anæsthesia. In 1914 he first demonstrated the feasibility of blocking the conduction in these nerves at a place where they are all lying closely together, by a paravertebral injection from a point just below the 12th rib into the region *in front of L.1. where the solar ganglion is situated*, into which the two splanchnic nerves and the first lumbar ramus communicans enter. By this injection an anæsthesia of the organs in the upper abdomen (stomach, duodenum, liver, gall bladder, upper jejunum and transverse colon) can be obtained. To avoid the possible danger in Kappis method of injuring vital internal organs, *Braun* in 1920 has tackled the same problem by *injecting the plexus from the front* after the abdomen has been opened with the help of a simple field block. According to the constitution of the patient, 50-60 c.c. of a  $\frac{1}{2}$ % novocain adrenalin solution are then injected at the

level of L.I. into the tissue at the medial side of the aorta. This small amount of fluid is sufficient to allow an operation in the upper abdomen of  $1\frac{1}{2}$  hours duration. Braun's method, if carefully executed is without danger and free from unpleasant after effects which often hinder a quick recovery, therefore it is especially suitable in patients who are considered not likely to stand the strain of inhalation narcosis and its sequelæ. The excellent results obtained with this simple form of splanchnic anæsthesia should enjoy a greater popularity than the method hitherto enjoyed.

#### 6. *Parasacral Anæsthesia.*

Analogous to the paravertebral anæsthesia a method was described in 1913 by Braun, which he called parasacral anæsthesia, by which the sacral nerves are blocked at their lateral exit from the foramina; but instead of reaching the foramina from behind which is a complicated and not very reliable procedure, the injection is made in the following way: the patient is put in the Trendelenburg position and a long fine needle is inserted at a place about  $1\frac{1}{2}$  cm. lateral to the tip of the coccyx and pushed along the inner surface of the sacrum parallel to its median line. At about 12 cm. distance the uppermost foramen is reached and 25—30 c.c. of a  $\frac{1}{2}\%$  novocain—suprarenin solution are deposited there. In retracting the needle similar but somewhat smaller deposits are made at the other foramina within the curvature of the sacrum. For each side about 100 c.c. of the solution are required. The coccygeal plexus has to be anæsthetised separately by an injection of 5—10 c.c. between the rectum and coccyx as well as in the tissue on the posterior side of the latter. This anæsthesia, which is also known by the name of *transacral anæsthesia* permits operations on the bladder, prostate, penis, rectum and those of the uterus by the vaginal route.

#### 7. *Sacral Anæsthesia.*

Experiments with the purpose of anæsthetising a large complex of nerves at a point where they are still closely situated together in the extradural space of the vertebral canal were made by Cathelin on dogs in 1903, but although the experiments were continued by a number of other French scientists, no satisfactory results were obtained until the introduction of less toxic substances serious after-effects could be avoided. Then the method quickly became popular especially among the obstetrical, gynæcological and urological profession. Stoeckel recommended the method which he named sacral anæsthesia for relieving the pains during the expulsion period of labour. Læwen improved the technique and showed that in order to obtain complete anæsthesia it was essential to use the right quantity as well as the right concentration of the fluid; according to his statement, 20 c.c. of a  $1\frac{1}{2}\%$  and a 2% solution of novocain give the optimal effect. As the sacral nerves in the epidural space are covered with rather thick

dural sheaths, these somewhat strong solutions are needed, but if the doses are injected slowly and not exceeded, the procedure is regarded as harmless; Læwen recommends a mixture of bicarbonate of soda, sodium chloride and novocain which is said to facilitate quick penetration through the sheaths. Of tutocain, 30 c.c. of a 1% solution is recommended.

The *technique* is very simple. The injection is made through the sacral hiatus into the extradural space within the sacral canal, the needle penetrating 3 cm. in an upward direction. About 10 to 20 minutes after the injection a block takes place of S 2—5 including the coccygeal plexus, the pudendal, inferior hæmorrhoidal and perineal nerves, resulting in an anæsthesia of the perineal region including the lower rectum, prostate and vagina. The effect, by this method, on S 2—5 is not always satisfactory; in this case parasacral anæsthesia gives more reliable results. The duration of sacral anæsthesia is from 1½ to 2 hours. With the so-called *high method* the fluid is deposited at a somewhat higher level, the needle reaching a depth of 4—5 cm. then anæsthesia of the lower half of the body and of the whole of the uterus takes place within a few minutes. In obstetrical manipulations the complete relaxation of the uterus obtained by this method may prove very useful, but on the other hand involves the danger of profuse hæmorrhage. The sacral method is also called *epidural anæsthesia* or *caudal block*, by English writers.

#### 8. Spinal Anæsthesia.

The last stage in the development of L.A. is represented in the idea of conveying the anæsthetic as near as possible towards the spinal nerve centres. Experiments in this direction originated in the observation of Corning in 1885 that an injection of a 2—3% solution of cocain made between the dorsal processes of the lower thoracic vertebræ produced complete anæsthesia in the lower extremities of a dog.

But not until much later—in 1899—practical use of this method was made by Bier. The spinal anæsthesia, or as it was called by Bier, *lumbar anæsthesia*, in its early days was rather a risky operation, not rarely followed by serious and even fatal accidents, so that Bier himself had to publish a warning against his own method.

The danger of introducing an anæsthetic into the spinal canal lies in the possibility of the drug reaching the respiratory and circulatory centres too quickly and in too high a concentration thus causing disturbance and paralysis of their function, with the symptoms of sudden fall of the blood pressure, pallor and collapse in extreme cases. Quantitative examinations of the behaviour of novocain in the liquor have shown that the novocain solution in a concentration used for spinal anæsthesia, having a slightly greater specific gravity than the

liquor, does not diffuse to any extent in an upward direction in a sitting individual, but that within a few minutes the anæsthetic becomes anchored and thus fixed to the nerve tissue at the place of injection; the concentration then soon reaches such low grades that it is no more injurious to the upper vital centres.

Of further importance is the amount of fluid prevailing in the spinal canal. If little liquor is present the novocain acts stronger on the nerve tissue, being more quickly absorbed by the latter; thus the concentration decreases quickly, whereas with much spinal fluid the absorption is less and the spinal fluid remains longer in a somewhat high concentration which increases the danger of effecting the vital centres.

If therefore the patient remains sitting until a few minutes after the injection, when he will feel a tingling sensation in his feet and then gradually assumes a horizontal position which then in the further progress of the operation may be extended to a position with raised pelvis, the danger of serious respiratory and circulatory complications is practically eliminated. In the administration of adrenalin, ephedrin, caffein, strychnin and similar substances which are either added to the anæsthetising solution or given subcutaneously before, and if necessary, during and after the operation, we have further safeguards which reduce the danger to a minimum. The method nowadays has become entirely rehabilitated and in the hands of a careful surgeon renders most satisfactory services.

In order to obtain control with regard to the level of the anæsthesia, besides prolonging its duration, Pitkin of New Jersey has devised a special composition of a strychnin novocain alcohol solution with a starchy product (amyloprolamin). By varying the proportions he prepares two solutions of a higher and lower specific gravity, which as Pitkin claims, guarantee an absolute control of the analgesia. The product is called *spinocain*, and recently has also been tested in England and on the Continent, but the reports are not by far so enthusiastic as those from certain parts of the United States. Howard Jones, senior anæsthetist to Charing Cross Hospital in criticising Pitkin's theory points out that the addition of alcohol does not reduce the specific gravity as was supposed, since the heavier constituents of the mixture will always react to gravity, thus the addition of alcohol is useless. The viscous starch solution delays the rate of absorption which as we have seen before, increases the danger of effecting the vital centres. Also, Charles Donald finds spinocain no more controllable than novocain and considers the major claims of Pitkin not justified.

In France the following preparations are much in use for spinal anæsthesia :—

Sod. bicarb.	0.15	Scurocain.	0.6.
Sod. chlorat.	0.1	Adrenalin (1 : 1,000)	gtt. 6.
Aq.	20.0	Aq.	10.0
Solutio 1.		Solutio 2.	

The contents of the two ampoules are mixed just before the operation and 15 to 20 c.c. of the mixture injected.

The *injections for spinal anæsthesia* can be made at *various levels* and accordingly a *high anæsthesia* (injection at *L1.*) has been distinguished from the *low anæsthesia* at *L4.* In the latter form which does not require the solution to be mixed with spinal fluid the anæsthesia extends only to the perinæum, rectum, vagina, cervix (not fundus) and a saddle shaped area at the inside of the thigh. *With injections at the high level all operations below the costal margin can be performed.*

With regard to the dosages of novocain, according to Braun 6—8 c.c. of a 1% solution, of tutocain 3 c.c. of a 1.5% solution are used, with less solution of the latter substance the anæsthesia is not satisfactory; of percain 4 c.c. of a solution 1 : 1,000 give excellent results. An equal amount of spinal fluid to that of injected fluid should always be withdrawn.

Spinal anæsthesia gives a perfect relaxation of the abdominal wall, an existing meteorism is decreased and the viscera do not so easily protrude whereas peristalsis becomes even more active, all factors of great value at the operation in cases of peritonitis and paralytic ileus. Occasionally trophoneurotic disturbances have been observed which show a marked tendency to sloughing. To prolong the duration of the anæsthesia the spinal injection can be combined with splanchnic anæsthesia.

Having discussed the various drugs and methods serving the purpose of L.A. we see that there is *practically no operation which could not be performed under L.A.* but there are a few conditions in which the use of a *local anæsthetic* is *not advisable or contra indicated.*

Thus very excitable and nervous patients are better excluded from the benefit of L.A. to their own disadvantage but sometimes after having given a sedative before and by promising to administer general anæsthesia in case any serious pain should be felt we might succeed to finish the operation under L.A. Naturally, much depends on the length and character of such an operation and the psychical nature of the patient. Certainly the surgeon should feel quite at ease and must not be handicapped in his doings by an unreasonable patient; for the same reason it is *not advisable to use L.A. in young children.* I might add that in each case about one hour before starting to anæsthetise, an hypnotic should be given.

With regard to the advisability of *injecting inflamed tissue* the views still differ. Although some surgeons were lucky enough not to have met with any serious consequences after the infiltration of tissue in the state of inflammation and therefore see no objection to using the method in cases of whitlow, furuncles, abscesses, infected glands, tonsillitis and similar infective processes, others have reported very serious and also fatal accidents in connection with the infiltration of such tissues, especially in operations in the mouth, pharynx, and neck, so that in my opinion these dangers should not be risked. They should discourage any further use of the infiltration method in infective cases. Just lately I have seen a case of brain abscess which rapidly developed after the removal of an inflamed tonsil with local infiltration.

By the injection the pressure in the tissue becomes increased and the infective agent may get mechanically forced into the surrounding healthy tissue or even into the bloodvessels, thus causing a spreading of the inflammation or a metastasis at some distant place; the needle by piercing infectious tissue might also directly convey infectious material to some other previously healthy part of the body including the bloodstream and thus cause septicæmia.

The infiltrated area also becomes ischæmic by the injection, the powers of defense are paralysed and thus an *excellent ground is created for the growth and extension of the inflammatory process*. "Le microbe n'est rien, c'est le terrain qui est tout" says Pasteur. A great part of the serious and fatal accidents which occurred in the dental practice mainly in the earlier days of L.A. were not due to the drug, but to sepsis following the infiltration.

Fortunately most of those conditions which nowadays are so freely diagnosed as "focal infections" and "pyorrhœa" are of a rather harmless nature, otherwise septic cases in oral surgery would be observed much more frequently in the use of L.A. Still more or less serious local inflammations are not rarely met with in this connection. The imbibition of the tissue further retards cicatrisation, the cavities remain open longer after the extraction of the tooth and thus the danger of secondary infection with following acute osteomyelitis is increased.

Whereas in all branches of surgery the more frequent use of L.A. is strongly to be recommended the latter should rather be restricted in oral surgery and confined to non inflammatory conditions. In my opinion many extractions now done under L.A. would better be performed without such to the advantage of the patient. During my military services I have performed thousands of extractions without L.A. and have never experienced any inflammatory swelling afterwards, but I have seen a good many other cases in which L.A.



was used and the following inflammation had caused much suffering to the patient not to speak of the disagreeable effects of conduction anæsthesia resulting in sensations of paræsthesia, and anæsthesia of more or less long duration (in some cases for years) in the mandibular, especially mental region.

The after-effects and postoperative complications due to the administration of the local anæsthetic can practically be neglected in comparison with those seen after a general anæsthetic has been given. Postoperative pneumonia may also occur when only L.A. has been used, but then the latter cannot be made responsible for its development whereas a large number of these complications occurring after general anæsthesia are due directly to aspiration during the inhalation. If we speak of shock in an operation, all those who have a large experience in both forms of anæsthesia agree that *general anæsthesia produces the greater shock. L.A. is a blood saving method and by these means reduces the chances of producing shock.*

*Vomiting* is occasionally met with and headache more frequently especially after spinal anæsthesia but certainly less than with General Anæsthesia. Both symptoms are usually promptly relieved by an injection of caffein or ephedrin, also an enema of 50% magnesium sulphate solution is recommended.

*Necrosis* of the tissue following the injection is probably due in most cases to the action of the suprarenal compound and is especially liable to occur at the penis and finger. Therefore in operations distally from the base of these parts of the body, adrenalin or similarly acting substances should never be added to the anæsthetising solution. On two occasions I have seen extensive skin necrosis in cases in which sacral anæsthesia had been performed.

In administering the local anæsthetic care has to be taken *not to inject the fluid directly into a blood-vessel* as this certainly would cause serious consequences; one always has to make sure that the point of the needle does not lie within a blood-vessel, therefore in operations in regions like the head, neck or rectum, where on account of the large venous plexus in the neighbourhood great caution is needed, the injection must be made slowly, steadily progressing and strong solutions should be avoided.

Although novocain in doses used for L.A. has no toxic effects, it is well worth knowing that we have an effective antidote to novocain poisoning in barbital, 0.6 of which given  $\frac{1}{2}$  an hour before operation would safeguard against possible adversities in connection with the anæsthetic. In case of collapse through novocain besides injections of strychnin or caffein preferably into the cisterna medullaris, intravenous injections of a 10% calcium chlorate solution are recommended.

The deaths which are reported to have followed the administrations of L.A. may at the first glance damp the enthusiasm in advocating the use of L.A. but on closer examination we will find that often faulty technique can be blamed for the accidents and that with our experience of to-day these deaths could have been avoided. Thus for instance in 26 of 40 fatal cases on which an American investigatory commission has reported as sequelæ of the administration of L.A., cocain solutions had been used, which as I have pointed out before should never be used any longer as they can be completely replaced by much safer drugs.

If the details of the technique are carefully observed and the limits in dosage given for each case are not superceded *L.A. can be regarded as a perfectly safe procedure which offers so many advantages over general anæsthesia that one has to wonder why many hospitals still stick to inhalation narcosis for practically all operations.*

The dangers of general anæsthesia certainly have become reduced to a minimum, especially in the hands of an expert anæsthetist, but still *chloroform* remains a dangerous substance, a strong poison for heart, blood and the parenchymatous organs, and cases of sudden death still occur even when the utmost care in administering the narcotic has been taken. According to Finsterer during the decade from 1910 to 1920, 130 deaths during the administration of chloroform had officially been reported from Vienna.

In recent statistics from the Mayo clinics several deaths are reported with occurred soon after the operation with chloroform, whereas among the same number of similar operations under L.A. there was no mortality.

Individuals of the so-called lymphatic type, those with goitre or fatty degeneration of the heart, kidneys or liver, and those suffering from diabetes are especially endangered by the toxic effects of chloroform. In all these conditions L.A. can be used without doing any harm and therefore should be chosen as the method to be applied.

Ether, although a less dangerous narcotic than chloroform, besides having also a general toxic effect, is very irritating to the respiratory tract and therefore contra-indicated in all patients with respiratory troubles, another field on which L.A. is much superior to inhalation narcosis. Also ether narcosis has its mortality. L.A. has the further advantage not to weaken the power of resistance, thus a patient can often be operated upon with a local anæsthetic who under general anæsthetic would very likely succumb; moreover the patient is able to take food immediately after the operation, a factor of great importance in a decrepit or weak patient.

That the mortality rate is much lower with L.A. is clearly demonstrated by the figures of Burgess (Manchester) who had 37.9%

fatal cases with inhalation narcosis, but only 13.6% mortality with block and spinal anæsthesia in similar material of grave abdominal cases. Hughs experienced a 50% decrease in mortality in his abdominal operations since using L.A. *Similar results from other clinics categorically indicate the superiority of the local methods.* Especially in laparotomies of long duration, in all forms of ileus there is no doubt that the patients stand the operation better when L.A. is used. The dangers and the high rate of mortality with general anæsthesia are still not fully realised. In England alone, in a country where general anæsthesia is administered to the greatest extent by specially trained anæsthetists, in a single year (1928) 656 deaths were reported from various forms of inhalation narcosis. *Why therefore expose our patients further to the extra risk involved in the administration of a general anæsthetic when the operation can be performed equally well under L.A.?* At least, for operations which can easily be done with *infiltration or regional anæsthesia*, methods which involve no danger at all, general anæsthesia should have no further place.

What method of L.A. should be used cannot be decided principally, it has to be chosen according to circumstances, to the individuality of the patient and the nature and locality of the operation. In some cases we find it necessary to combine L.A. with the administration of a general anæsthetic, in which case very little of the latter is needed.

The proper use of L.A. is an art which has to be learned and unless one has become quite familiar with the technique one probably will not realise its great advantages so readily. In clinics in which L.A. is handled adequately and with proper attention and care, the results will necessarily be good, and in hospitals where specialists are employed for L.A., in a similar way as are general anæsthetists, the advantages of L.A. can be brought out to the highest possible degree.

Statistical figures certainly prove the rapid progress L.A. has made especially on the European continent. In 1906, at the time I was assistant at the University Hospital in Heidelberg, L.A. was applied in only 11.4% of all operations. Five years later already 42% of all the cases had been operated under L.A. and at other clinics at that time these figures reached 50 to 68%. Since then further improvements of the various methods of L.A. especially the development of sacral and spinal anæsthesia have replaced inhalation narcosis to a still greater extent so that the latter has become entirely eliminated in some clinics, mainly in those with gynæcological patients. In recent years also in England, the use of local anæsthetic methods has gained in popularity. In the United States the extensive use of L.A. has lately been adopted in certain parts with a sudden great enthusiasm on account of the good results obtained with spinal anæsthesia, on which subject, not long ago 14 articles had appeared in one single

issue of the American Journal of Surgery. On the other hand the statistics show a rapid fall in the use of general anæsthesia. *It appears that often only a favourable atmosphere and adequate advocacy is necessary to crown a method which long since should have earned full recognition with its final complete success*, and it seems to me that the time is not very far off when general anæsthesia, at least such with chloroform or ether, with its inevitable mortality will have entirely disappeared out of the armentarium of modern surgery and be replaced by the safer methods of L.A.

To be complete in relating all the possibilities of the usage of L.A. I have at last to mention its *administration for non-surgical purposes*.

Peri and also endo-neural injections of cocain solution have been practised with varying success against *neuralgias of the trigeminal branches and sciatic nerve* from the early days of L.A. Now-a-days we attack the trigeminal neuralgia right at its root by an injection of 1—2 c.c. of 85% alcohol into the Gasserian ganglion, a method which in most cases proves very successful without involving the great risks of the operation.

A similar injection, recommended by Leichsenring, into the neighbourhood of the nervus recurrens is used for the temporary, curative immobilisation of *the larynx* in tuberculous conditions of the latter.

*Neuralgias* in the area of the *lumbo-sacral plexus* can be stopped by an injection of 50 c.c. of a ½% novocain-suprarenin solution into the sacral hiatus. L.A. is further useful in painful *dermatoses* like *herpes zoster* and also in burns.

Muscular rigidity in *tetanus* can be relieved by injections of a local anæsthetic, thus for instance the tonic contraction of the masseter and pterygoid muscles will disappear after an intra-muscular injection; those of the diaphragm after a perineural injection of the phrenic nerve, whereas the rigidity of the lower extremities can greatly be benefited by a sacral injection. Although these injections do not act in any specific way in tetanus, the disappearance of the contractions, even if only temporary, is likely to have a favourable influence on the course and issue of the diseases. Similar good effects have been observed with spinal anæsthesia in cases of *eclampsia*.

Injections into the contracted muscles in *dislocations* release the tension of these muscles and thus facilitate the reposition. If the *bones* are *fractured* an injection into the neighbourhood of the fractured ends will allow a painless setting.

Based on the view that post-traumatic muscular atrophy develops in connection with reflectory contraction of the muscles, Mandl injected 20—30 c.c. of a ½% novocain solution repeatedly in 80 cases

of fractures and similar injuries and claims to have observed much less atrophic changes than in those cases in which no injections had been made.

*Very striking are the effects of L.A. in neuralgic conditions in the areas supplied by the vegetative nervous system.* Colicky attacks in cases of *stones in the gall bladder and kidney* have promptly been checked by a single injection into the respective rami communicantes, for a time lasting from 4 months to 2 years. The passage of an ureteral calculus can be effected by a paravertebral injection of 10 c.c. of a 0.5% solution of novocain at D.12 below the last rib and another at L1. By the relaxation of the contracted ureter, the stone is released, and with the flow of urine, is pressed down into the bladder.

In cases of *reflectory anuria* the secretion is reported to have started soon after the administration of splanchnic anæsthesia. Also to patients suffering from *angina pectoris* paravertebral injections have given great relief. In these cases it is recommended to inject not only 2 segments but at least 4, preferably D.1.—D.4. from 2 points. Fifteen c.c. of  $\frac{1}{2}$ % novocain have proved sufficient.

According to observations of A. Mayer *splanchnic and spinal anæsthesia* are a great help in the *treatment of ileus* regardless of its spastic or paralytic nature.

At last I have to refer to the *diagnostic value of anæsthetising injections*. Thus it has been found that paravertebral injections at D.6—7. on both sides will relieve *gastric pains*, those at D.8 on the left side, pains due to *pancreatic troubles*, whilst gall bladder colics disappear after injections at D.9.—11 on the right side, and those of the kidneys can be checked with great certainty by injections at D.12—L.2. on the corresponding side.

*The paravertebral injections therefore represent a very useful help in the often extremely difficult differential diagnosis of the various forms of abdominal pain.* As a further effect the anæsthesia relaxes the reflectory rigidity of the abdominal wall and thus allows a better palpation of the inner organs.



A Preliminary Communication  
on  
AUTO—HÆMO—THERAPY.  
by  
Alexander Cannon.

Late Teacher of Morbid Anatomy, University of Hong Kong.

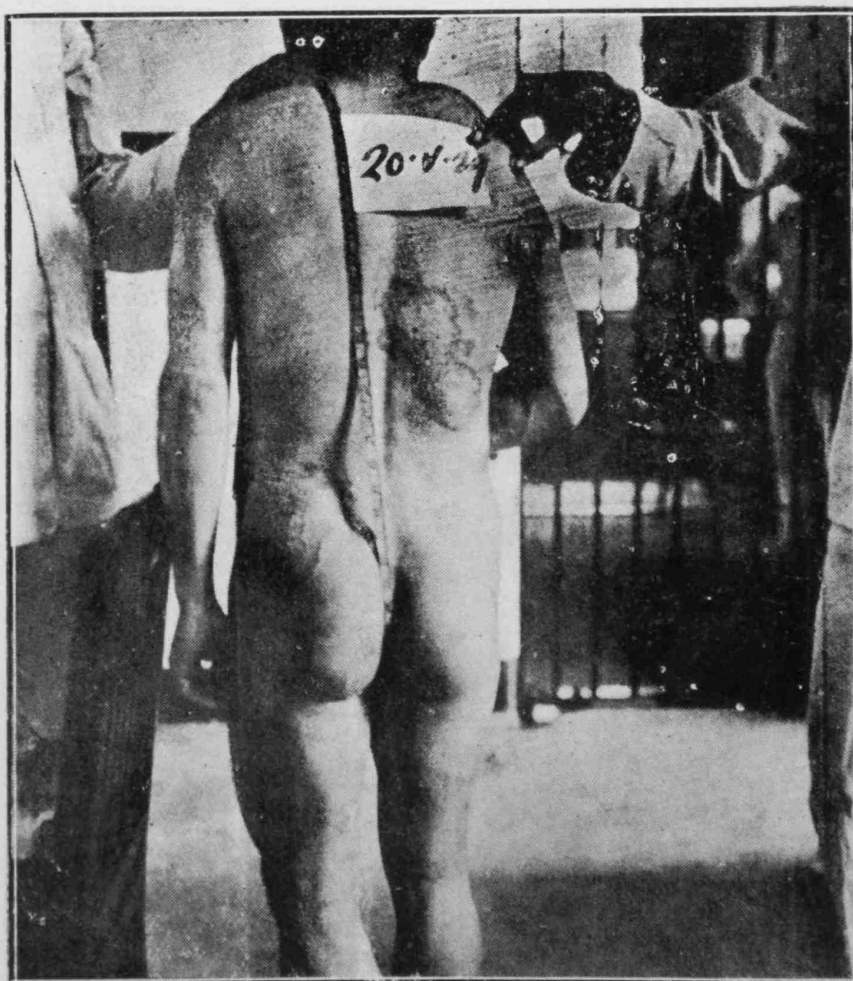
Late Medical Officer, Colonial Medical Service.

Knowledge grows with the years, but our use of such knowledge moves in cycles with periodic waves. Certain forms of treatment are tried, perhaps half tried, and sometimes with success, but life is one great sphere of change, and we are always looking out for something new, and frequently in our search for the new, we come round in our cycle to some old knowledge, but with new light, more experience, and renewed vigor. In ancient days we read of people cutting themselves and sucking their own blood, and put it down to the ignorance of heathendom. But heathendom is by no means so ignorant as we are apt to surmise. The heathen was centuries ahead of us in this form of auto-hæmo-therapy, and to-day we are using the same treatment, only in the light of our knowledge of to-day, giving it by intramuscular injection, instead of by the mouth. It may well repay us to pause for a while and consider this treatment, provided by Nature, without the artificial apothecary store. When all is said and done, how much do we really know about the blood, which is the most important thing in the body, without which no organ can live? To say the most . . . very little. We have only reached the fringe of the as yet unknown story to be told by the blood. In vain we search for a cure for cancer, certain blood diseases, and nervous complaints, and yet we search not in our own house, in which we live, for the remedy that is at hand, if only we knew how to recognise it, and then how to use it. E. G. Mayer has shewn us that X-rays appear to be more effective on cancer, when preceded by an intravenous injection of 10 c.c. of a 30% solution of glucose. Is it not possible that X-rays act mainly through their influence on the blood itself? The claims made by Blair Bell and others of cures for cancer by lead salts, may be due to the action, visible or invisible, directly or indirectly on the blood. For every locked door there is a master key: for every disease there is a cure. Have we not, in the past, tried to open locks with bunches of keys, instead of seeking and using the master key? Nature always provides a dock-leaf, to take away the sting of the nettle, which grows close at hand. Is this not so in the human body? Is not the so-called vaccine therapy which is often so effective, but an artificial method of doing this? The body produces its toxins, but also its anti-toxins, and it is only when Nature's machinery falters that we must come to its aid (but not substitute

Case I.



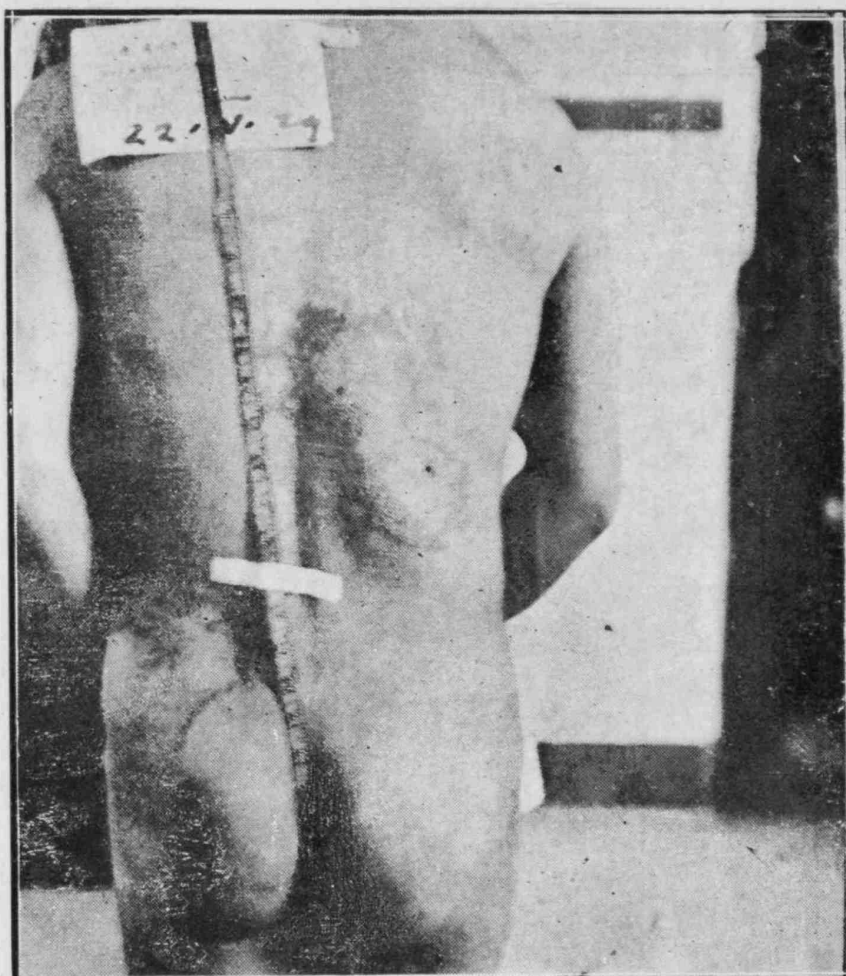
18th May, 1929.



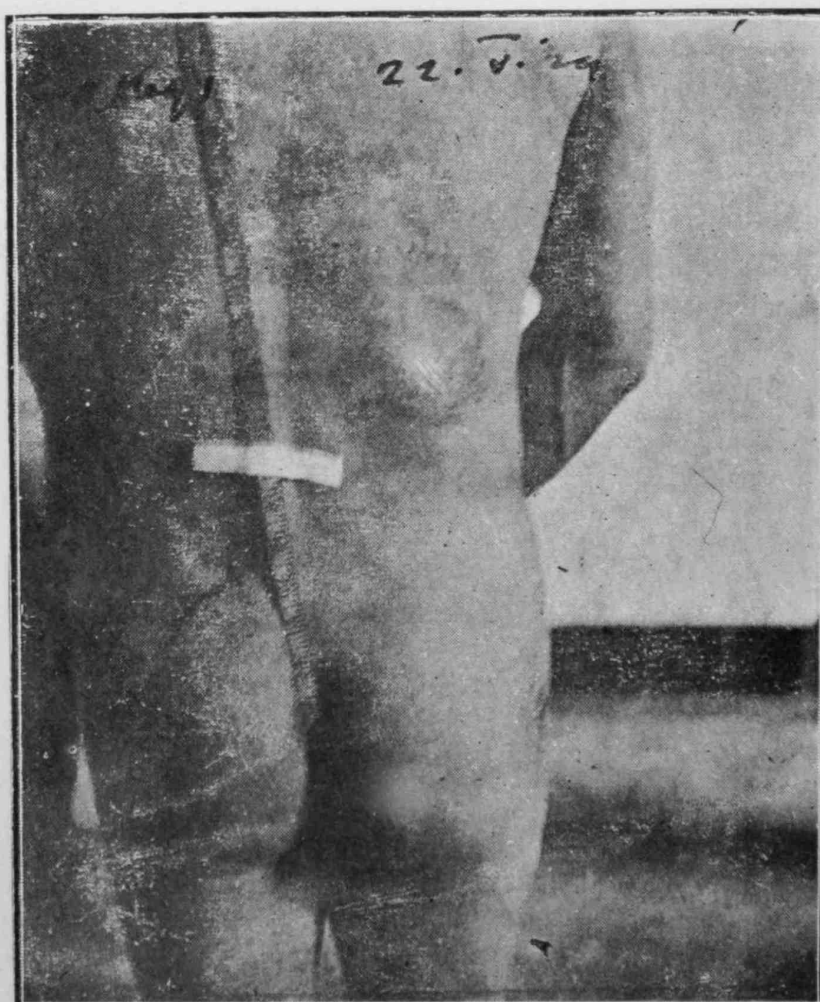
20th May, 1929.



Case I.



22nd May, 1929.



22nd May, 1929.



it). The blood carries the anti-toxins, so to speak, to deal with the toxins, but the vessels through which it is conveyed are sometimes diseased in one way or another, and it may be that the anti-toxin is thus forbidden to come to the rescue: this can be remedied by removing it from the vein, and injecting it into the muscle tissue (whether the muscle acids, etc. have any action on this auto-blood is a research which is of the utmost importance), and so an action takes place without reaction, so differing clinically from protein shock and so forth.

For many months now, my hospital supervisor, Mr. V. H. Freeman, has conscientiously carried out the routine work for me on over eighty cases of diverse diseases, including typhoid fever, influenza, skin diseases of all kinds, leprosy, syphilis, tuberculosis, malaria, portal cirrhosis, and one keloid of three years duration. Hundreds of photographs have been taken personally by me, and a few are reproduced to show results. In scabies, the twenty-four hour Danish Ointment treatment remains supreme. Generally speaking, the impression on my own mind, is that A.H.T. (autohæmotherapy) is *slow but sure*. One great advantage is that nothing more is required than one 10 c.c. syringe, water and some form of heat for sterilization. One outstanding feature in the cases under treatment during this time, is that in practically every case the systolic blood pressure is lowered from 10 to 40, according to its height, and the diastolic is modified also, except when glucose is given by the mouth: in no case, has this yet proved detrimental, but frequently it has been beneficial.

*Method:*

Take a 10 c.c. syringe, and suck up 1 c.c. of sterile water, then 9 c.c. of blood from the median-basilic (or cephalic) vein is sucked up through the water already in the syringe, and the 10 c.c. of mixed water and blood are *immediately* injected slowly into one of the patient's buttocks. (At first I experimented with blood only, varying from 4 to 10 c.c., but found the action much slower than the mixture . . . the syringe wall itself may also be a factor of importance.) That is all.

Following the injection there is no reaction, no pain, and the treatment is ambulatory in nature. In skin cases improvement frequently can be noticed after the first injection, the next day fine white scales, much finer than those of psoriasis, appear, and often the whole condition rapidly subsides. The average number of injections, which are given every other day (there is no reason why they should not be given every day, or every third day, but one has to start somewhere, and I followed the Continental method of every other day), is 30 for severe resistant skin diseases, and for other diseases from 2 to 40 injections according to the nature of the invasion.

Although at first very sceptical of this treatment, we are now becoming hopeful, and believe that it has a great future.

*Review of a few cases:*

Case 1.—*Syphilis*. The rash was considered by some colleagues as one of leprosy, whilst another suggested erythema multiformi. The rash was leproid in character. I mention this to show all the varied aspects simulated by syphilis: it can simulate anything and everything. The Wassermann reaction was positive; the history was specific. The pictures shewn were two taken on successive days to show the slight improvement evident in such a short time. Six injections were given in all. Age 44 years, weight 112 lbs., and height 5' 1".

Case 2.—*Syphilis*. One photograph shows the secondary rash, and the other two photographs the improvement in the gland condition of such severity in so short a time. The discharge from the gland was bacteriologically confirmed as syphilitic and not as T.B. The rash disappeared within a few days, either due to treatment or of its own accord. Within a fortnight the Wassermann reaction was negative. Note the reduced size of the gland. Age 24 years, weight 103 lbs., height 5' 3¼" on May 3rd, 1929.

Case 3.—*Tinea imbricata*. 3 injections cured this patient. The photographs are taken within three days of each other, and show wonderful progress. Age 30 years, weight 124 lbs., height 5' 2½".

Case 4.—*Tinea circinata*. (Some of the nine photographs submitted will clearly grade the improvement, which required 24 days: the photograph are too poor to make blocks on). Twelve injections were given. The pulse, respirations, temperature, etc., were strictly normal all the time. The B.P. within five hours of commencing treatment came down from 140/75 to 120/80, without any apparent disadvantage. Irritation ceased after the first injection.

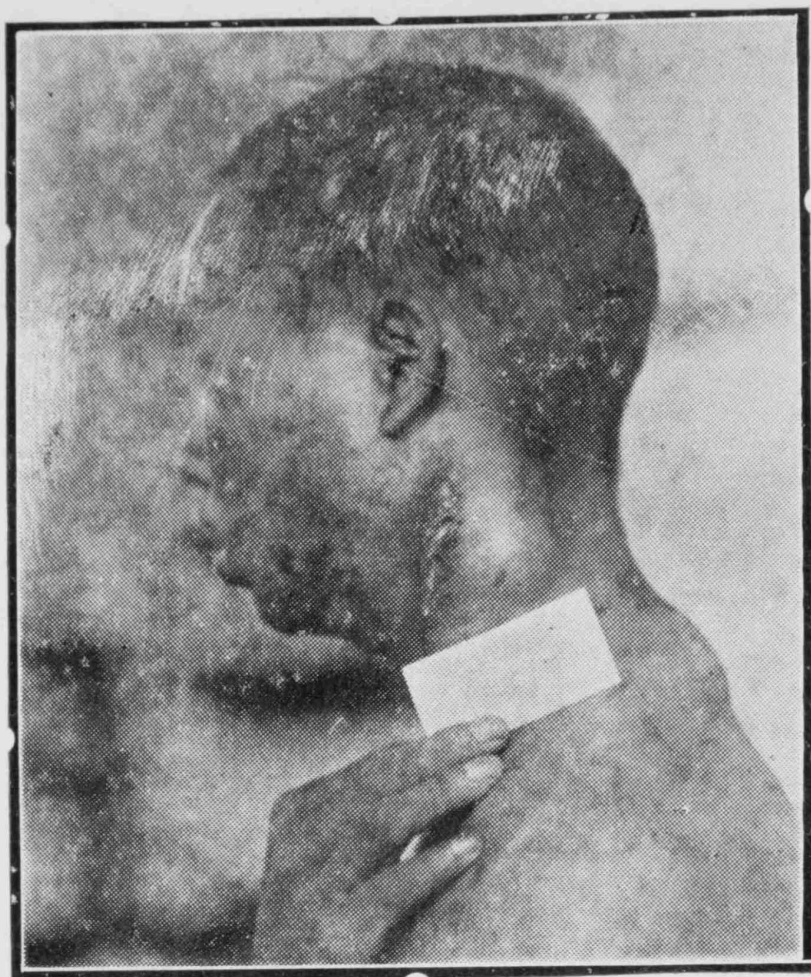
Case 5.—*Leprosy*. (Diagnosis confirmed). Photographs taken on the 22nd, and 27th of June and 5th of July show the remarkably quick road to recovery. On the 10th, there was nothing to see, and the patient was discharged. Was he cured? Age 23 years, weight 131 lbs., height 5' 5½".

Case 6.—*Leprosy*. (Diagnosis confirmed). Photographs taken on the 26th June, and the 5th and 7th of July, show that progress is very slow. Age 25 years, weight 121 lbs., height 5' 6".

Case 7.—*Keloid*. This is stated to have followed chemical trauma (nature unknown) over three years ago. The patient complained of severe pain, which prevented him from sleeping. A.H.T. was commenced on the 8th of May, 1929, and after the second injection, the pain vanished. Twenty days later the first photograph was taken, the only superficial difference at that time being the scaling of an area about ¾ inch. marked X in the first photograph of this lesion, taken on the 28th of May, 1929. Bear in mind that in this case, we were still experimenting with dosage, and therefore started with 4 c.c. of blood only, and worked gradually up to 10 c.c., fearing a reaction which never came to pass. The second photograph of this case was taken on 15th June and the white area had now reduced to ½". Also the length of the lesion incidentally was ½" less. Other white areas also made their appearance now, followed by scaling, and then complete disappearance. Owing to errors in light and shade, my photography does not do justice to the improvement, so comparison by contour rather than density must be made. Further photographs were taken on 22nd June, 10th and 21st July, 1929. In about six months, at the present rate of progress, the whole lesion should disappear. Age 32 years, weight 127 lbs., height 5' 6¼".

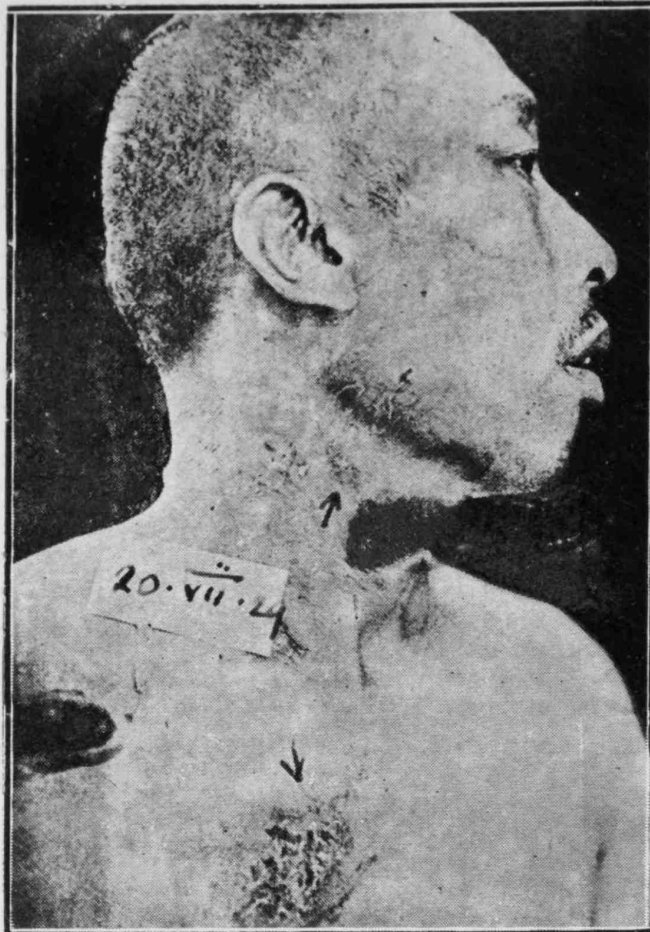
Case 8.—*Guinea-worm*. This is rare in China, but the pt. was a water carrier in days gone by in India. The condition on admission was very active, and tracings were taken daily. Length 38". The inflammation about the head, where most movement was observed, was noted daily, and subsided within seven days, two blisters appearing and the typical *dracunculus medinensis* embryos being observed under the microscope, after douching with cold water a few times. The patient was apparently cured in two and a half weeks. (See photographs).

Case II.



20th June, 1929.

Case III.



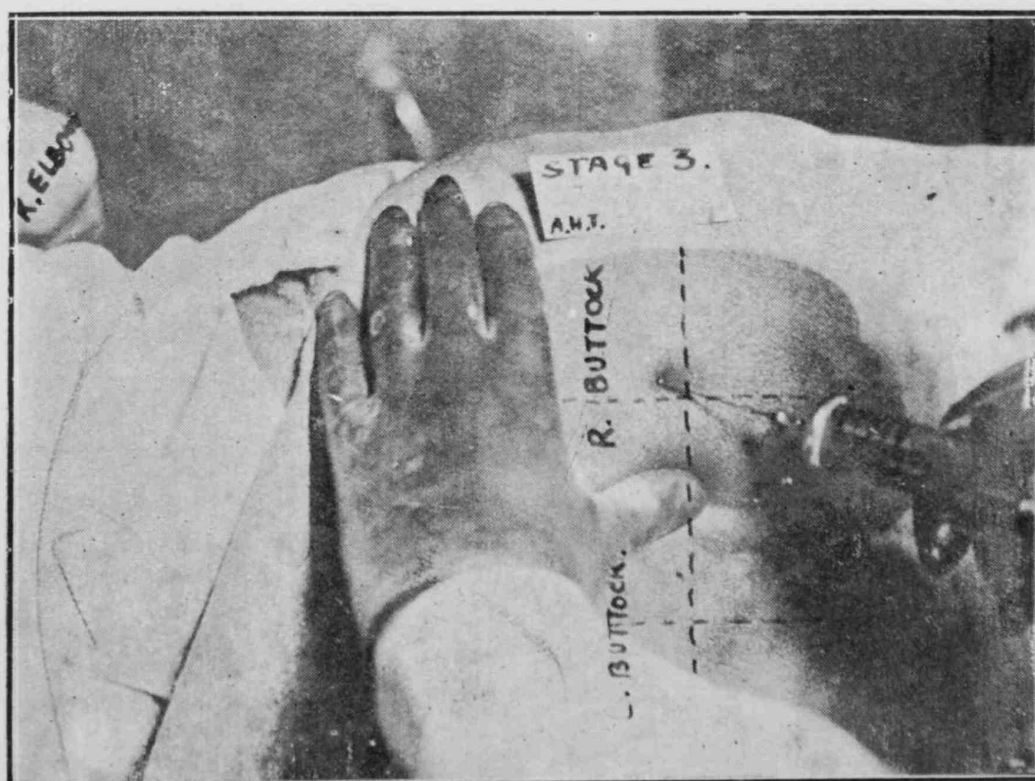
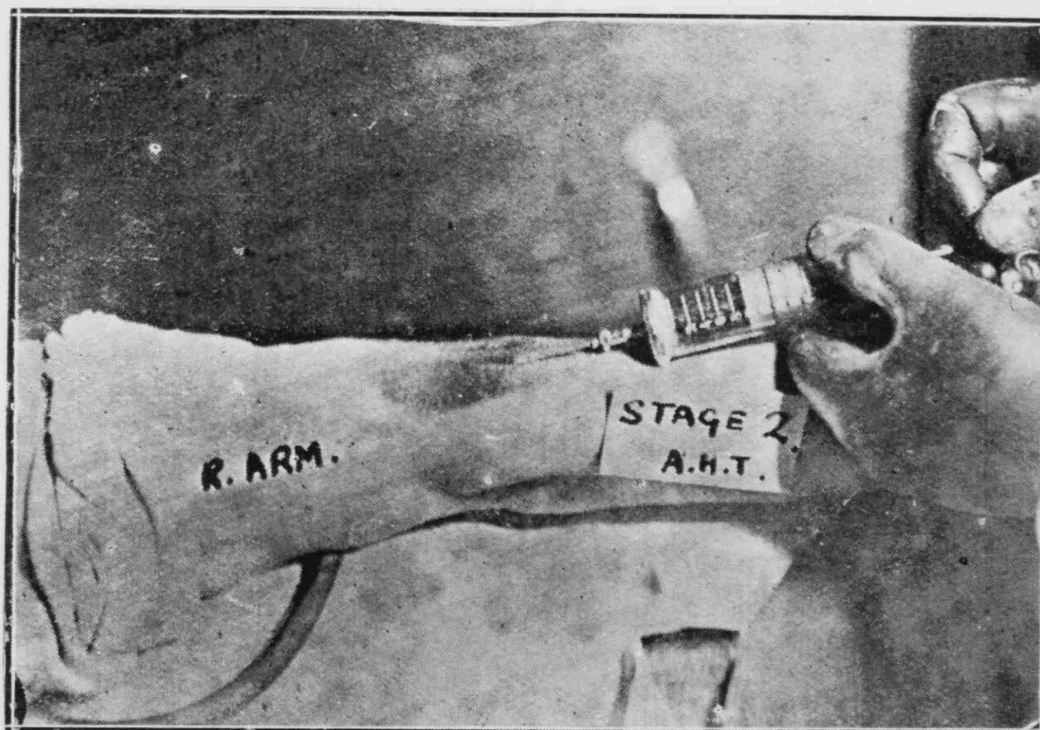
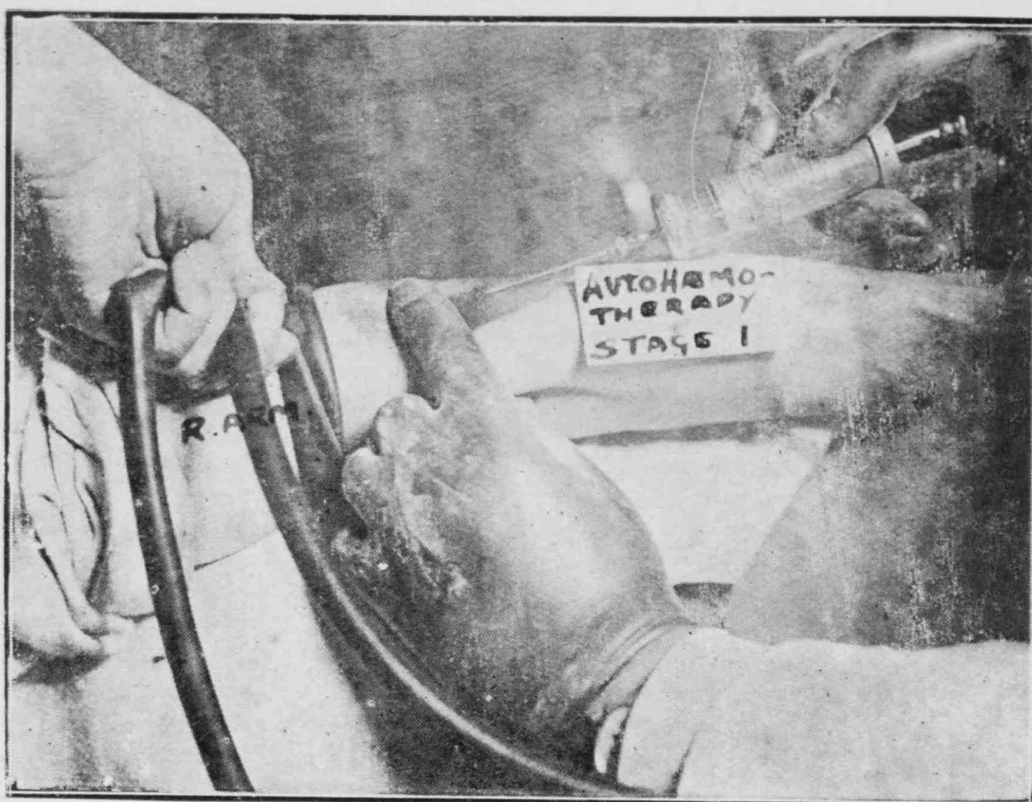
*Ulceration due to scratching and profuse perspiration during heat—Humidity 93°, Temp. 96° F.*



*Size of visiting card. 3" x 1½".*



The Technique of Auto-Hæmo Therapy.



Case 9.—*Banti's disease*: The spleen stated to have been enlarged for "a long time," and on admission, the liver was palpable to the extent of two fingers breadth below the costal margin, by "dipping" as there was marked ascites. Total reds 4,800,000 cmm., Hb. 70%. C.I.  $70/85=0.8$ . Poikilocytosis and normablasts present.

Differential count..... polymorphs ..... 56.0%.  
                                   small lymphs ..... 22.6%.  
                                   large lymphs ..... 10.4%.  
                                   large monos ..... 3.7%.  
                                   eosinophils ..... 6.6%.  
                                   Basophils ..... 0.7%. ..... I.v. 29.

Faeces: no ova detected. Nine injections of A.H.T. given in eighteen days, and H. I. Digitalis for the marked myocardial degeneration (1/100 gr., 100 gr.) (this may not be necessary, but I did not like to risk it with such a serious case). Second reading . . . total reds 4,880,000 cmm., Hb. 80% i.e., C.I. nearly one (normal). Poikilocytosis and normablasts noted after prolonged search. D.C.=polymorphs ..... 62.0%.

                                  small lympho ..... 22.5%.  
                                   large lympho ..... 6.0%.  
                                   large monos ..... 5.0%.  
                                   eosinophils ..... 4.0%.  
                                   basophils ..... 0.5%.

From now onwards the results were vitiated, as the Bolshevich-Prisoner refused (he had of course the right to do so) any more injections, unless given salt eggs (a favourite with Chinese) and Liver, of which 8 oz., were given with two eggs. Hence from now I do not know how much is due to liver, and eggs, and how much is to the credit of A.H.T. The outstanding facts remains that on the 20th May his ascites was gone and his liver not pulphable. D.C. .... 25th May = polymorphs ..... 68.0%.

                                  small lympho ..... 23.0%.  
                                   large lympho ..... 5.0%.  
                                   eosinophils ..... 3.2%.  
                                   basophils ..... 0.8%.

He was discharged with a just palpable spleen which the Asiatic would feel strange without. Age 34 years, weight 100 lb., height 5' 2".

Case 10.—*Carbuncle of face*. Its danger need hardly be mentioned. There were three large cores, and its size was 2" by 2½", situated just below the left malar prominence. I was to take the photograph the next morning but the condition had so improved that it was not worth while. Four injections of A.H.T. without any local application cleared up the condition like magic, and after the second injection the temperature which had ranged from 102 to 103 was 99, and soon ranged normal. Age 20 years, weight 106 lbs., height 5' 1¼".

Case 11.—*Bronchiectasis*. Examinations as follows:—

22. x. 28.—Sputum, "No T.B. seen. Gram + staphylo-strepto-cocci and bacilli present, and Gram—ve cocci."

22. x. 28.—Faeces, "No T.B. detected."

24. x. 28.—Faeces, "No ova seen."

25. x. 28.—Sputum, "No T.B. detected."

13. x. 28.—Sputum, "No T.B. seen. Gram + strepto & staphylo-cocci & a few Gm + bacilli & also some Gm—ve cocci."

19. xi. 29.—Sputum, "No T.B. detected."  
                                   Faeces, "No T.B. detected."

4. i. 29.—Sputum, "No T.B. detected, stanphylo & strepto & pneumonococci pre-present, no gram—ve diplococci."

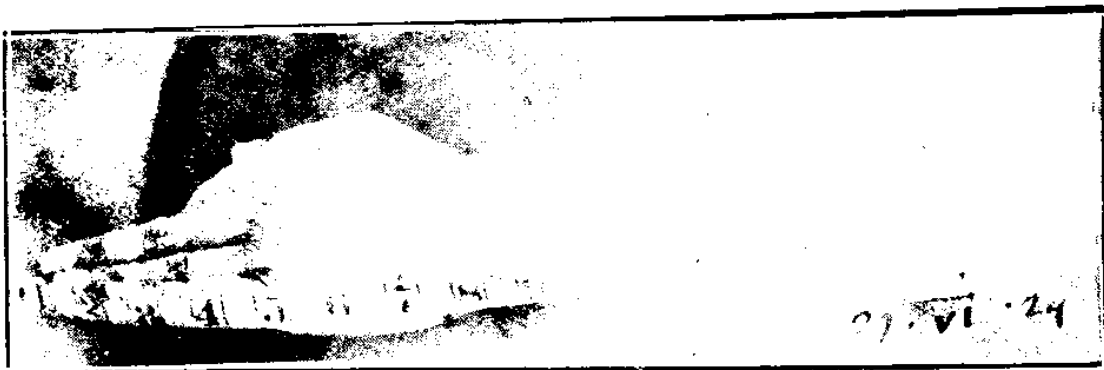
20. vi. 29.—Sputum, "No T.B. detected; no abnormal organisms."



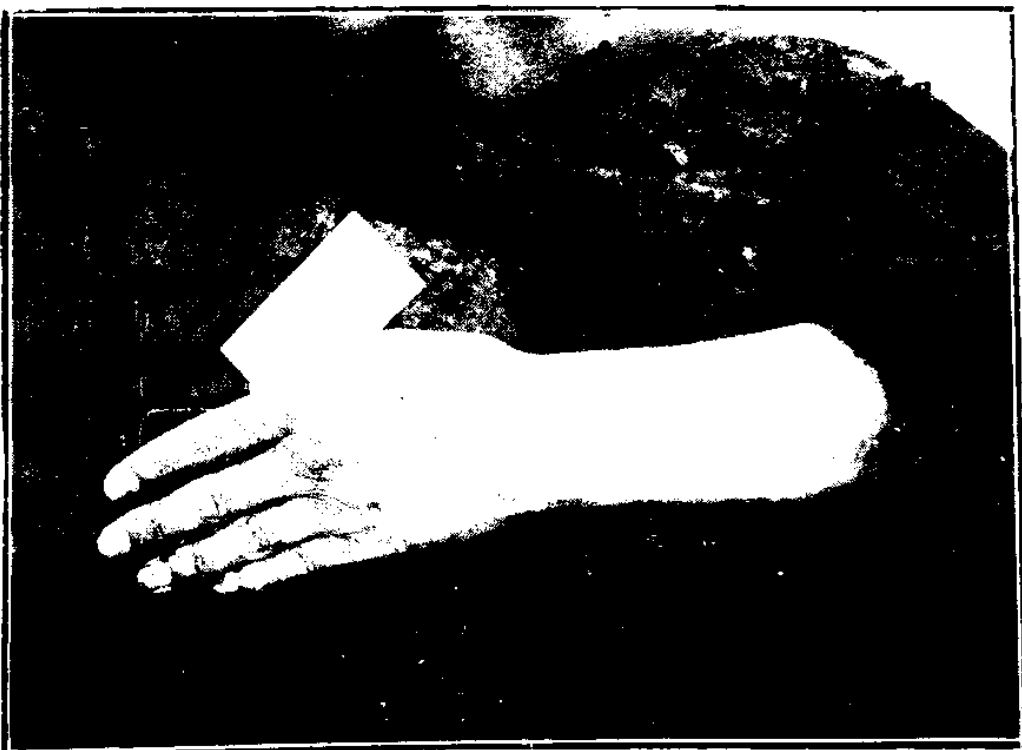
Case V.



22nd June, 1930.



27th June, 1930.

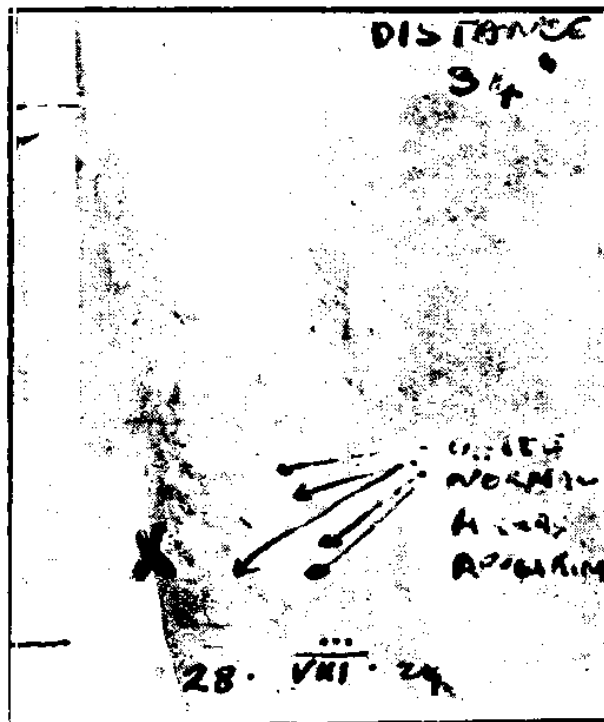


5th July, 1930.

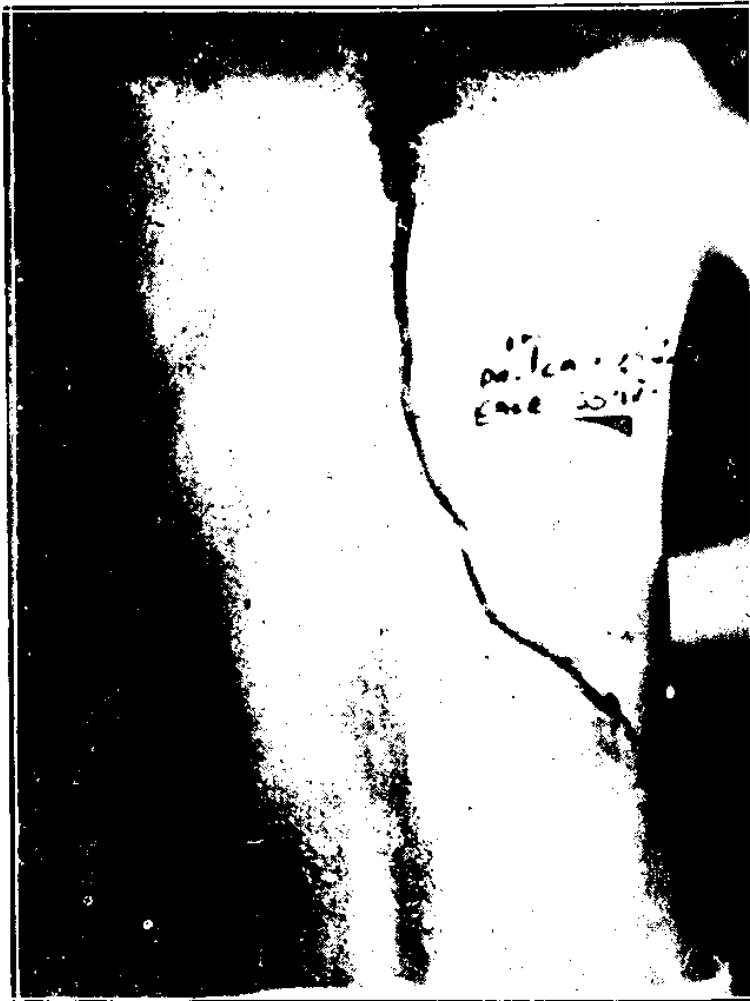
Size of visiting card,  $5'' \times 1\frac{1}{2}''$ .



Case VII.



Distance measured in each case = 34".  
Size of visiting card. 3" x 1 1/2".



15th April, 1929.

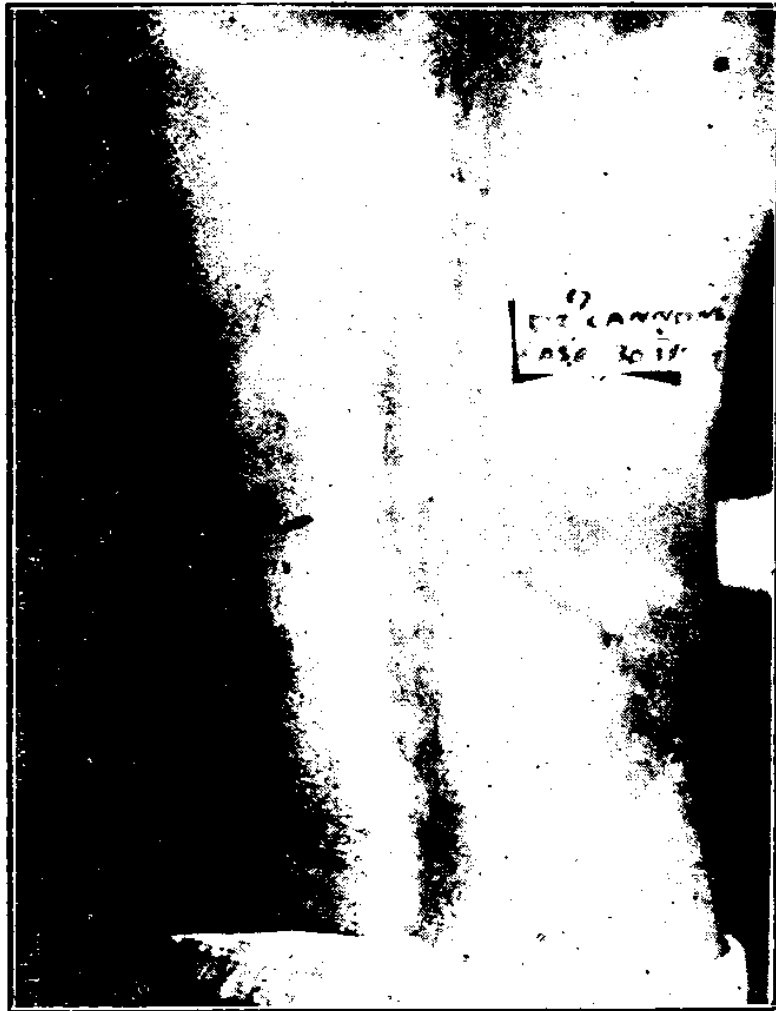
N.B. Inflammation set up and intensified by rubbing up with impure  $\text{CHCl}_3$  and then photographing and developing with double strength "Meta" (Pagoda Paget plate used).



22nd April, 1929.

Wellington plate.

Case VIII.



30th April, 1929.

Nothing to see until  $\text{CHCl}_3$  rubbed over the area, when a faint red appearance where body of worm is, appears.

*N.B. I intend trying the method, later, with some skin disease and seeing what the difference is in photographic effect; to the naked eye the "black line" just looked a good pink inflamed delineation.*

The oil, chenopodium was then given on 4th May, 1929. On 6th May, faeces contained no ova, and repeated examinations after chologogues showed absence of ova. On 19th May readings as follows:—

Total reds	4,500,000	emm.	Hb.	70%	D.C.	=	polymorphs	.....	70.0%
							large lympho	.....	5.0%
							small lympho	.....	20.0%
							large monos	.....	3.0%
							eosinophils	.....	1.3%
							basophils	.....	0.7%

Age 40 years, weight 140 lbs., height 5' 4½".

Case 19.—*Typhoid fever*. Russo's test + ve. (to five c.c. of urine four drops of a 0.1% aqueous solution of methylene blue are added, and an *emerald green* colour immediately appears: normally bluish green in yellow urine . . . occasionally in measles, small-pox, and tuberculosis the test is also + ve.) Vidal reaction + ve for *B. typhosus* in high dilution . . . para A & B neg. 14 injections brought about a recovery which was not anticipated, as the man was almost dead on admission. Three other cases of typhoid (all confirmed by tests) have been tried with A.H.T., and after 7 to 14 injections (14 to 28 days) were discharged as cured. Age 30 years, weight 121 lbs., height 5' 6".

Case 20.—*Gumma of the inner end of the clavicle* (see photographs shown in the February number of the "Caduceus"). The above are just a few outline cases for criticism. We must face facts and answer this question: is there anything good in autohæmotherapy? I think the answer is Yes.

#### Summary.

1.—Results count most with the public: so far we have been rewarded by having no failures, in eighty-three cases to date.

2.—There is no reaction, and no pain.

3.—1 c.c. of sterile water plus 9 c.c. of the patient's own blood are injected into the gluteal muscles, every other day, forty being the maximum number of injections required, and two the minimum. Keloid requires much more.

4.—Improvement usually commences after 24 hours. End results, slow but sure.

5.—This treatment costs nothing, except for the price of the syringe and sterilization incident costs: it is fool-proof within wide limits, and is safe. No skill is required.

6.—No drugs are required: *it can be carried out in the wilds, when all drugs have perished*, and medicine has failed.

7.—The blood-pressure was lowered appreciably in all our cases, sometimes with benefit, and never showing any drawbacks.

8.—One case of marked portal cirrhosis (a form of fibrous tissue in the liver) with marked *caput medusæ*, cleared up slowly in two months and a half, whereas usually death is the end result.

9.—A new channel of research is opened up: *these results must be taken as preliminary: they have not stood the test of time and may not be permanent*.

10.—Autohæmotherapy is Nature's cure, the blood carrying the particular antidote that the owner of that blood requires for the toxin which is getting the upper hand, whatever that poison may be . . . from cocci, bacilli, virus, or X. Is it not more than likely that such treatment, if carefully studied, will open the door to even a cure for that curse of mankind, namely cancer? Nature has lived longer than we have and her knowledge is vast, but in times of stress she may need assistance, which is to be found in the practice of auto-hæmotherapy carefully and wisely used. Are we not told in Leviticus xvii 11 "the life of the flesh is in the blood." Let us study the blood, in all its winding maize.



## AFFECTIONS OF THE EYE IN GENERAL PRACTICE.

by

R. Lindsay Rea.

Ophthalmic Surgeon to the London Lock Hospitals;

Surgeon to Western Ophthalmic Hospital, etc.

## Article XIII.

*Injuries to the Eye.*

When describing some of the injuries to the eye I am forced to think of several cases which I have seen during the past few weeks. These were cases in which the eye had been struck a blow, two of them by the knuckle while fighting. In both of these cases there was a great deal of pain and redness of the eye, but the eyes were intact and there was no sign of blood in the anterior chamber. While looking at the eye of the first with an ophthalmoscope 18 inches away I could see when the patient directed his gaze slightly downwards a crescentic shaped substance which I knew to be the top of the dislocated lens. The lens indeed had been driven downwards into the vitreous.

In the second case there was no lens to be seen, while the fundus could be clearly seen with an ophthalmoscope. It was only the shaking of the iris in its whole circumference that indicated that the lens was lying at the bottom of the vitreous.

What happens in such cases if they are left alone? The text books tell us that either Irido-cyclitis or Glaucoma follows.

The pressure of the edge of the lens on the back of the iris and ciliary body readily produces irido-cyclitis, so that if the lens is but partially dislocated, known as subluxation of the lens, this condition may be expected, and this eventually may lead to sympathetic ophthalmia. As both of these cases which I have just mentioned showed complete dislocation of the lens, glaucoma such as I had expected supervened. I did not wait until the vision was destroyed, but using my own cataract knife which is much smaller than the ordinary Græfe I transfixated the cornea, cutting out as in an ordinary cataract operation keeping all pressure of the eye-lids from off the eye-ball. I knew vitreous would escape and was therefore prepared for it, but in the first case as soon as I had opened the eye the lens was forced up by the vitreous into the anterior chamber and I carefully removed the lens with a vectis with but the loss of a drop of vitreous. The resulting vision in this eye was 6/12.

In the second case the lens did not present itself, so carefully slipping the vectis down to the bottom of the vitreous chamber by touch I recognised I was in contact with the lens and brought it to

the wound; just at this point the patient lost his nerve and squeezed viciously; half of his vitreous was lost, and yet he is now getting a very good result.

A third case of dislocation of the lens was produced by a blow from a squash racquet. When the patient was brought to me the anterior chamber was full of blood. He was placed in a Nursing Home and the eye carefully watched. Three days later the blood had become absorbed and when oblique illumination was used I could see the golden rim of the edge of the dislocated lens. The lens had been dislocated forwards through the pupil into the anterior chamber. On the fifth day after the injury the lens was removed with a minimum loss of vitreous, the resulting field of vision was good, but owing to destruction of the macula by concussion central vision is very poor indeed.

Observe then, in all cases of blows on the eye, if the iris appears to shake either in whole or in part. Normally the iris is kept steady in position through being in contact with the anterior surface of the lens.

Should a hæmorrhage occur into the vitreous as a result of a blow on the eye-ball, the blood may become rapidly absorbed and but few opacities remain.

In a street fight a man was struck a blow on the eye with a pair of heavy pliers. Later the blood became absorbed and I could see through the cornea. I found the iris almost completely detached from its root and nothing but a long slit-like pupil remained. The light from the ophthalmoscope was reflected from the fundus back through a large round pupil containing in its centre this slit shaped aperture. The lens was not dislocated. I watched this eye for many months and neither irido-cyclitis nor glaucoma supervened.

Suppose as a result of a blow rupture of the sclera takes place and the lens escapes beneath the conjunctiva, it might appear natural to some to open the conjunctiva and allow the lens to escape, but this would be entirely wrong. By allowing the conjunctiva to remain intact the sclera will heal, vitreous will not be lost and the dislocated lens lying beneath the conjunctiva will become absorbed.

The commonest injury of the eye met with by the general practitioner is that of a foreign body embedded in the cornea. So often these small particles consist of coal dust, emery or steel filings, which if they protrude slightly upon the surface of the cornea produce intense pain on winking. These small bodies are often infected so that when the eye-lid is rubbed conjunctivitis will follow. It is quite easy to miss a foreign body embedded in the centre portion of the cornea when the pupil forms the background, and so the wise doctor when examining a cornea with the naked eye will not alone

look straight into the patient's eye, but will direct him to look upwards and downwards and from side to side. A small black foreign body shows up readily when a grey iris forms the background. To remove such a foreign body a few drops of 5 per cent. cocaine should be instilled into the conjunctival sac, and by means of a spud, not a needle, while the lids are held apart by the 1st and 2nd finger of the left hand the doctor standing slightly to the right or behind the patient, remove the foreign body by levering it from its position. A scraping movement should be avoided as the intention should be to avoid further damage to the surrounding corneal epithelium.

If the injury has occurred on that or the previous day, by washing out the eye with a lotion and applying a little boracic ointment, the eye being bandaged, healing may take place in a few days. If atropine is instilled the workman may not be able to do his work for 7 or 10 days so that one avoids atropine if the wound appears not to be contaminated but should the foreign body have been present some time and the cornea immediately surrounding the foreign body appears hazy then the removal of the foreign body should be followed by the use of atropine ointment 1 per cent. combined with a little boracic ointment 10 per cent. This should be used thrice daily. In elderly patients care must be taken that atropine shall not produce the onset of glaucoma. Unfortunately it has been my lot to see two such cases.

Should a patient go to a doctor with a redness of the eye and complain of pain and the eye is carefully examined and no foreign body found, do not come to the conclusion that this is a case of mild conjunctivitis, the pain is out of all proportion to the redness of the eye. What should be done? Take a small piece of cotton wool at the end of a match and asking the patient to look down gently evert the upper lid and there you will find the small offending foreign body lying on the surface of the lid which can be easily wiped away without cocaine; there is then immediate relief.

It is interesting to know that one of my patients carried a piece of a rose tree the size of a clove beneath the upper eye-lid in the superior fornix from August to November, it was only when the purulent discharge became profuse that she sought assistance. I found the piece of wood had produced a groove on the eye-ball, yet the patient had not complained of excessive pain. One special care, therefore, in examination of the eye is not to omit everting the eye-lids and examining the conjunctival surface.

Another common form of injury to the eye, and generally seen first by the doctor is a burn produced by hot water, molten metal or caustics in chemical works. Strong alkalies and acids produce severe burns. When looking at the eye the cornea may appear quite



clear but if one drop of fluorescein or bengal red be instilled it is seen that the cornea has been denuded entirely of its epithelium. Such an eye should be carefully watched and carefully treated. To neutralize, the eye should be gently washed out with either weak alkalies such as lotio. Sod. Bi. Carb. 3 per cent. or weak acids as lotio Ac. Boric or milk. If there are solid particles of lime present these should be picked out with forceps and the eye worked out with boric lotion or and a few drops of castor or olive oil instilled. As the conjunctiva may be severely injured a glass rod laden with sufficient boracic ointment should be swept round beneath the lids to prevent adhesions forming, and should symblepharon still threaten the glass rod should be used daily, as prevention of this condition is indeed much easier than cure. Abramovicz in the British Journal of Ophthalmology remarks that ammonia burns of the eye are always serious. Ammonia absorbs water and dissolves albumin, this tends to destroy the corneal epithelium and Bowman's membrane. Prognosis in such cases should be very guarded.

Although it does not fall to the lot of the general practitioner to treat eyes which have been perforated he should know what course to follow when such a case comes under his care. This recent example is illuminating—Just before midnight I was rung up on the telephone by a doctor who had been sent for to see a lady who on going to bed, and while still in the dark stooped down to pick up her slippers. She wore pince-nez, she did not realise she was standing so close to the foot of the bed, as she stooped she struck her face violently against the wooden rail. At once there was severe pain, she realized that the smashed lens of her glasses had injured one eye. The doctor could have applied a bandage and put the patient to bed and perhaps given morphia, but instead he wisely, decided to ring up about the case. She was brought to me at once in a car and when I examined the eye I found a large loose "V" shaped flap cut out of the cornea. The apex was opposite the middle of the pupil. She was placed at once on the operating table and under sterilized cocaine the eye was gently searched for broken glass, none could be found. The conjunctiva was carefully dissected up from around the limbus and slipped up over the cornea. this proceeding pushed the "V" shape flap back into position so that in a few days the cornea was completely healed with two thin grey lines as scars, but now it was observed that the capsult of the lens and the iris had been injured. The lens growing opaque was gradually extruding itself into the anterior chamber and so on the 8th day after the accident to prevent the onset of glaucoma the upper half of the cornea on the limbus was incised by the use of the cataract knife the soft lens matter was gently extruded and the iris replaced. The eye healed by first intention, and there is quite a good deal of vision left and the eye does not show any deformity. I would refer

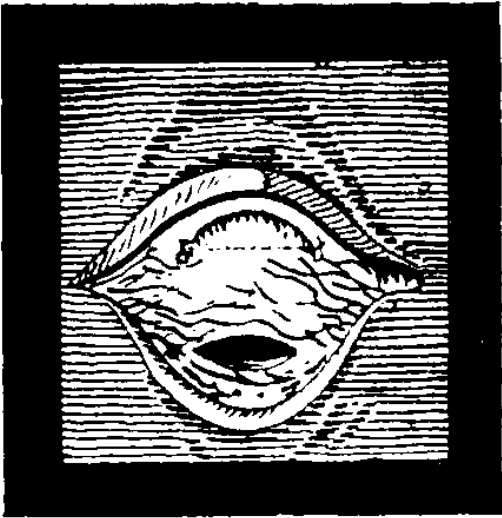


FIG. 1.

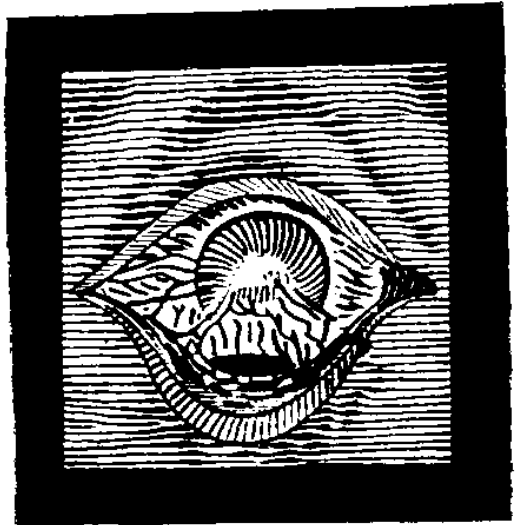


FIG. 2.

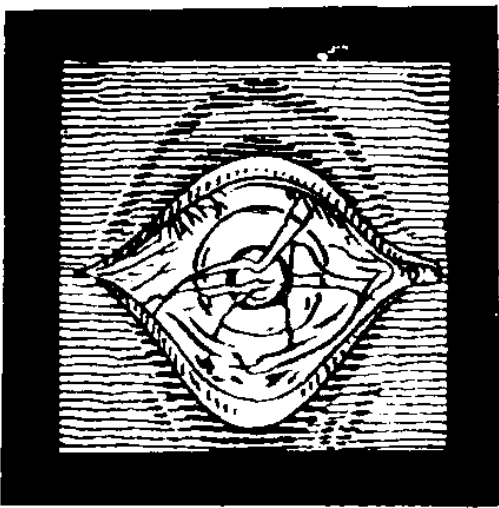


FIG. 3.

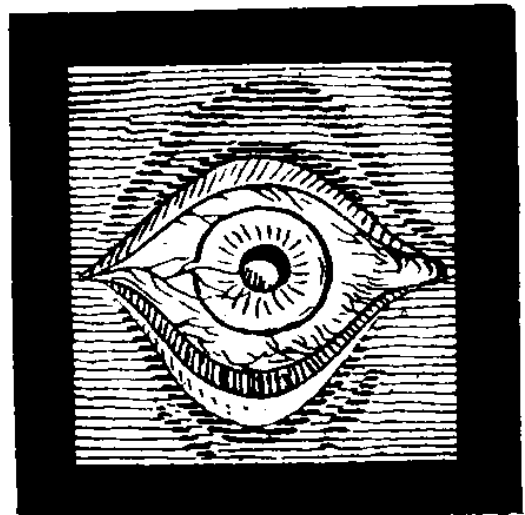


FIG. 4.

RE: Plastic Repair of Perforation of Cornea. See p. 129.

those of my readers who are particularly interested in the repair of injured eyes to an article of mine in the Royal Society of Medicine 1926, Vol. XIX. Section of Ophthalmology and where I have illustrated the *modus operandi* of such grafting operations. I have mentioned that the non-vascular cornea can be aided in its healing by gently slipping the conjunctiva over its surface. As a rule when healing has taken place the conjunctiva by virtue of its own elasticity withdraws itself. But perchance should it remain adherent it is not at all difficult to clip it away by means of a fine pair of scissors and nature will soon reduce what is left to the thinnest scar possible.

A perforated eye should not therefore be considered lost, but the operation which I have just referred to should be performed before there is a chance of infection overtaking the wound.

Think of the wisdom of the doctor who at midnight did not delay in sending his patient for attention.

By kind permission of the Editor the illustration which accompanied the article referred to in the proceedings of the Royal Society of Medicine has been reproduced. Briefly the description of the operation is as follows:—The lids are held apart from off the eyeball so that there is no pressure applied. Ragged epithelium from the edge of the wound is removed. The conjunctiva is dissected up half way around the limbus of the cornea while a horizontal incision is made several mm. below the cornea so as to allow the flap of conjunctiva to be drawn upwards over the injured area. The flap is held in position by two sutures as shown in figure 1. 8 to 10 days later it will be found that the conjunctiva is adherent to the wound and filling up the area of lost substance and the remainder of the conjunctival flap by virtue of its elastic tissue is withdrawing itself from the surface of the cornea shown in figure 2. By passing a lacrimal probe beneath the flap and using scissors the unattached portion of the flap is cut away, and now it will be seen that the little conjunctival graft is being fed by new blood vessels passing to it through the substance of the cornea. The surface of the graft, although raised above the surface of the cornea should not be trimmed, but the action of the eye-lids smooths down the surface and gradually the deep vessels shown in figure 3 shrink and the final result is shown in figure 4. These four illustrations were taken from a boy who suffered from a perforating phlyctenular ulcer. This operation is of use in

- (1) Traumatic cases; I have seen a wound of 15 mm. involving cornea and sclera healed by this method.
- (2) Perforating phlyctenular ulcers.
- (3) I have carried out this method in operating for perforating septic ulcers, a good result is much more common than failure.

*Cataract.*

If the reader will glance for a moment at the accompanying diagram, No. 1 and observe the position of the lens situated behind the Iris, he will understand immediately that if this lens, which is normally transparent should for any cause lose its transparency, then light cannot pass through the pupil to the retina. The opaque lens will interfere with the passage of light. In other words, there is a cataract present.

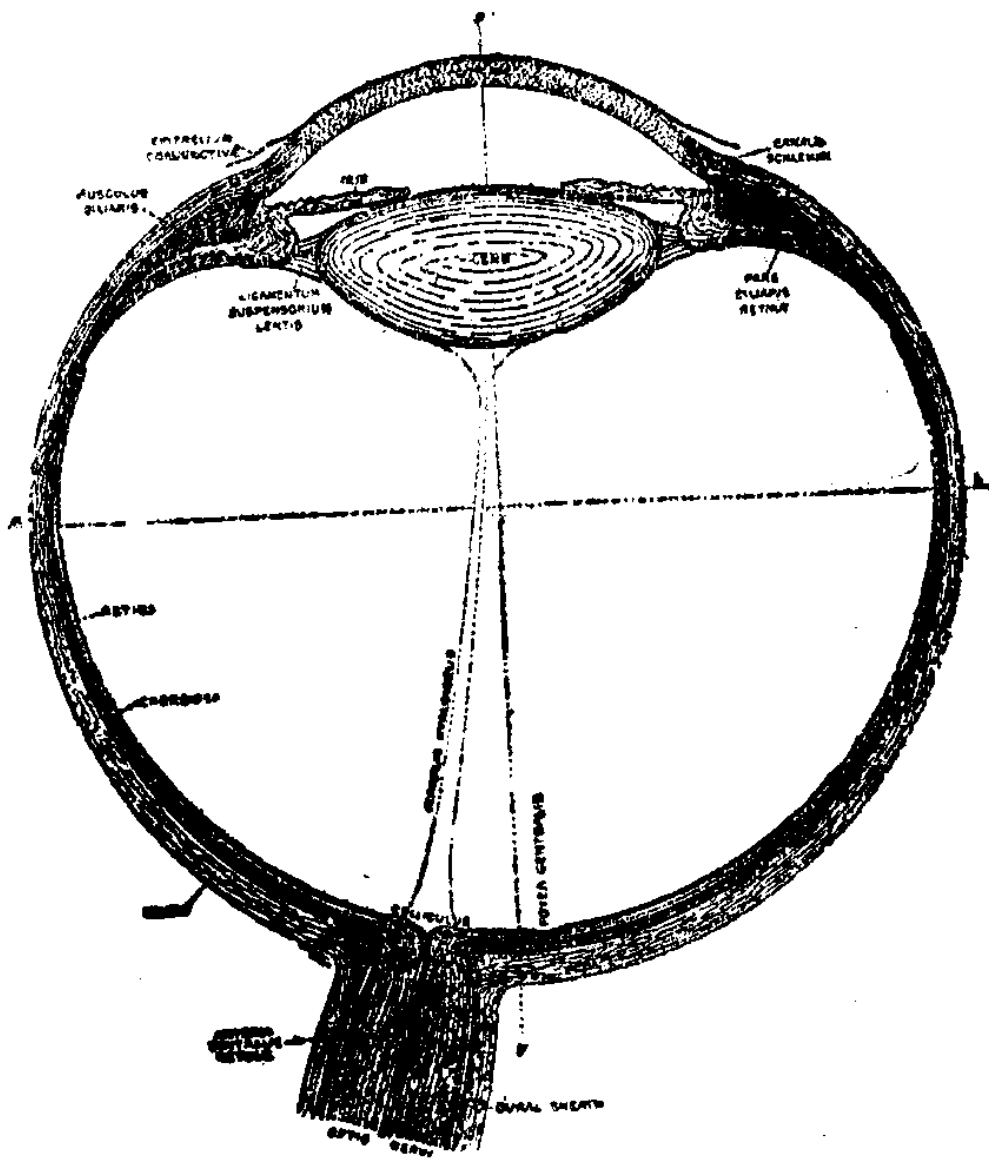


Diagram No. 1.

So it will be seen that dense corneal scars which lay people sometimes term cataract has nothing whatever to do with this condition. If there is a dense scar in the middle of the cornea, and it is known that the lens is perfectly clear, then an operation of iridectomy, or the removal of the piece of iris will allow light to pass uninterruptedly to the retina, and so a blind person may be made to see. A few weeks ago, such an operation was done on a patient's eye. This eye had not been used for 40 years, but now he sees sufficiently well to

get through the traffic of London safely. But this has nothing to do with cataract, beyond the fact that I wish to emphasize that cataract is nothing else than an opaque lens.

The first type of cataract which I will discuss is what is known as Lamellar cataract. This type of cataract is seen in young people. The whole lens is not opaque but if the eye is looked at through the mirror of an ophthalmoscope held sixteen inches away, the pupil being dilated, immediately within the pupillary margin there will be a clear red reflex, and within this an area which reflects the light of the mirror and has a background more or less red according to its density. (See figure 2).

What has produced this cataract? Most probably it was not present at birth, but during the first few years of life there has been a period of malnutrition which has affected such parts of the body, the enamel of the teeth for instance, which has its development from the epiblast of the embryo. The teeth show defective enamel, these eroded teeth may show transverse lines across them. It will be remembered that the lens of the eye is also developed from the epiblast, and as only those teeth whose enamel germs were being formed at the same time are affected, so we connect the two things in general, when the lamellar cataract is found we look for defective incisor teeth.

The treatment for such cataract depends upon its density. If the vision obtainable is 6/12 or 6/18 and the child can just read, that is, accommodation is present, it is better than doubtful vision after a cataract extraction with accommodation absent. If the vision is poorer than 6/18 then iridectomy can be done so as to allow light to pass between the edge of the cataract and the periphery of the lens. Such sight, however, can never be better than 6/12.

Occasionally children are born with congenital cataract. Instead of the pupil being black, the pupillary area is more or less white. The only hope of restoring vision to such a child is to have a needling operation performed as soon as possible.

Let me warn my readers of another condition which produces a white or yellowish pupil in infants, it is that condition known as Glioma of the retina. It is almost always congenital. It usually affects both eyes and pursues a course similar to intra-ocular sarcoma.

Glioma kills by metastases of the cranial and other bones, also by extension to the brain.

Occasionally the fibro-vascular sheath, which is present at the back of the lens in the foetus and which is supplied by blood from the Hyaloid artery passing through the vitreous in what is known as the Canal of Stilling, persists, this too produces a white pupil. While yet it must be remembered that a large tuberculous mass growing forward from the retina produces the same appearance.

May I repeat then, should a general practitioner see a baby with more or less white pupils he should think of:—

- 1st. Congenital cataract.
- 2nd. Glioma.
- 3rd. Persistent fibro-vascular sheath.
- 4th. Tubercle.

A formidable list which should at once enlist the help of the specialist.

The commonest type of cataract seen either by a general practitioner or an oculist is what is known as senile cataract. As the normal lens grows older there is a slowly progressive increase in optical density. The lens absorbs light in such a way that if the narrow slit-like beam of light from a slit lamp is thrown into the eye the lens appears to be tinted yellow. As this density increases the reflected light becomes more yellowish, tending towards a brown colour. The reflection from the ophthalmoscope may show nothing but a dull red reflex, and the vision may be poor indeed. To this type of cataract the term "Brown" is given. It may be extracted while the vision is still 6/60 and the lens is usually delivered complete at the operation.

Of senile cataract the commonest is that which shows radial spokes or sectors creeping in from the periphery of the lens. With the ophthalmoscope the red reflex of the pupil is interrupted by these spokes, and even the lens substance between the spokes is so clear that vision may still remain at 6/6. Although if the pupillary area is occupied by these cataractous opacities, see illustration No. 3 which represents the reflection from the pupil in a case of senile cataract with radial spokes, not alone the length, but the width of these radial spokes increase, so that ultimately the lens becomes uniformly opaque and sight is reduced to counting fingers at 8 inches, and then it may be said the cataract is ripe for operation.

It is a fortunate thing that both lenses do not usually become completely cataractous simultaneously. One cataract may be ripe, while the other eye may still see 6/18 or even 6/12.

What are the metabolic processes underlying cataractous changes of the lens? A great deal of work has been done lately on this subject, and certain factors have been elucidated. The lens proteins are four in number ("Jess") albumoid, which is a water soluble protein found in the nucleus of the lens; two water soluble crystallines found in the cortex; and a small quantity of albumin. As we grow older the insoluble albumoid increases, and the soluble crystallines decrease. The formation of opacities in the lens is therefore a coagulation of the proteins. Its coagulation is brought about by any

form of radiant energy, heat, light, and ultra-violet light, also radium. In addition mechanical shock will produce these opacities. After a certain amount of exposure to ultra-violet light the proteins are more easily coagulated by other influences such as changes in the salt concentration of the body fluids.

Clinically we know that toxic changes will produce cataract. I have seen a young lady of 25 years of age suffering from a toxic neuritis in the body while at the same time developing cataractous changes in one eye.

The nutrition of the lens which is entirely avascular is governed by the efficiency of the capsule which is a semi-permeable membrane and can be interfered with, for example; when the eye is radiated with thermal or abiotic radiation or when its vitality is lowered by disease, or its continuity is broken by trauma. One sees so many patients employed as cooks suffering from early cataract that one is forced to believe that the heat radiating from the fire is the direct cause directly of the lens opacities. While in accidents where the eye-ball has been perforated and the lens capsule opened, cataract is seen to rapidly supervene.

There is constant osmotic action between the aqueous humour in the anterior chamber and the lens substances, the osmotic action taking place through the lens capsule.

In diabetes where sugar is present in the serum, fluid tends to enter the lens. The lens becomes slightly swollen so that the patient becomes somewhat myopic or short sighted, but this abnormal osmotic action will eventually lead to opacities forming in the lens so that following this diabetic myopia there will be true diabetic cataract. If the diabetes can be controlled the progress of the cataractous changes may be retarded, but if opacities have formed by the changing of the proteins of the lens, these opacities will not diminish, and one can easily understand that the cataract cannot be cured. If vacuoles have formed in the lens in the early stages of diabetes, such can be removed if the faulty osmosis can be corrected, and in some conditions of injury to the lens, by the removal of these vacuoles cataractous opacities will clear up.

In the past various medicines have been prescribed for the cure of cataract, and naturally people who dread a cataract operation will willingly try such specious medicines recommended by some people. I have seen ripe cataracts which have had every form of known treatment applied without the slightest benefit. One patient who came to me with double cataract had used patent drops for six years, when I saw him both cataracts were passing into over-maturity. There is at least one substance which seems to have had some degree of success, that is a compound consisting of Calcium, Sodium, and Iodine, this,

first tried in France, and of which a good report was heard, one still waits to see the result of such treatment, for obviously correct deductions can be come to only when a large number of cases have been examined.

Nowhere do we find such nonsense spoken of regarding cataract as in books containing faith-healing teaching. One of the latest I have seen published is a disgrace to any person attempting to teach the lay mind.

In a previous article, and in this one, I emphatically assert that delay in many cases means irretrievable blindness. Those who write books on faith-healing are indeed responsible for a great deal of suffering and misery.

When should a cataract be operated upon? If a cataract is present in a patient under 21 years of age simple discission is all that is necessary, that is, the discission needle is passed through the capsule of the lens which is freely opened the lens matter then partially extrudes itself into the anterior chamber and gradually is completely absorbed. In the case of a senile cataract the best operation I know is that described as the simple cataract operation. It is an operation that involves the least amount of intra-ocular manipulation. Some years ago I began my cataract operations by using a Græfe knife, several times I was forced to use a Græfe knife that had been sharpened more than once and so had a greatly reduced blade, the results I obtained with such a knife led me to ask Messrs. Weiss of Oxford Street, to manufacture a special knife for me. It is stronger than Herberts knife and much narrower in the blade than an ordinary Græfe. With this knife the cornea is transfixated and on its passage through the anterior chamber by means of the point of the knife the capsule of the lens is opened from six o'clock to twelve. As the knife cuts out at the limbus the widely dilated iris is seen to slip behind the knife's edge, so that when the cataract lens is delivered by merely smoothing the corneal surface the iris is replaced without being touched by any instrument whatever and the round pupil is reformed.

It is delightful to find in many of these cases where double cataracts have been removed that the vision in each eye is not alone 6/6 but that binocular vision is once more regained.

There are times when one is forced to do an iridectomy, but at all times one avoids delivering the lens in its capsule, such an operation is not suitable for European eyes, and once more I repeat that my operation of choice and I can heartily recommend it to others, is that known as the Simple Cataract operation done with one instrument only, a fine cataract knife such as I have described above.



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## Review of Books.

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*Sensation and the Sensory Pathway.* John S. B. Stopford, M.D., F.R.S.  
Messrs. Longmans Green & Co., Ltd. Price 7/6 nett.

In the 148 pages of this book, of which 7 are devoted to index, Dr. Stopford has made available to a wider audience the lectures which he delivered at University College, University of London in 1927.

In arriving at his conclusions, he has drawn largely from experimental work, both his own and that of such people as Head and Rivers, as well as from an extensive clinical field of over 15 years. There is no doubt the result well repays the labour. An intimate knowledge of the pathways of the cord and brain is indispensable to a good physician and it must be admitted that most text books whether physiological or anatomical tend to be rather vague on many of the nervous pathways especially on some of the sensory ones, and a standard work such as this cannot but be a welcome addition to the library of any physician or teacher.

Of the numerous things which may claim a mention in a review, one may select one or two which are of special importance e.g., the interesting work on the bulbar distribution of the posterior inferior cerebellar artery, the distribution of the trigeminal fibres, the intraneural patterns and an explanation of the 2-stage recovery in peripheral nerves.

The argument for the existence of protopathic and epicritic parallels in deep sensibility is well put, both from the experimental and the phylogenetic points of view.

The book is not overburdened with references, but each chapter ends with those which are considered of most importance and from these original works, fully detailed references may be obtained.

As might well be expected, the book is well got up and is illustrated by a number of fairly clear diagrams, although from a teaching point of view one feels that a book on the nervous system can not be over-stocked with good diagrams or photographs of actual sections.

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*"Gray's Anatomy,"* Descriptive and Applied. Twenty-Fourth Edition. Edited by T. B. Johnston, M.B., CH.B., Longman's Green & Co., Price 42/- nett.

After 25 years the Editorship of Gray's Anatomy has changed hands, and excellent as the old editors were, advances in science of late years have made changes in our standard text-books inevitable. Such changes are made necessary not only by the advancement of our

knowledge year by year, but also by the advance of teaching methods which the added years of experience bring.

A new editor has happily been chosen who can cope with both these demands. The new diagrams and the slight rearrangement of the older material are a result of his teaching experience and the new matter especially in Embryology & Neurology is the outcome of scientific advances.

The question of terminology has been the subject of much consideration as evidenced by the paragraph in the Preface and although there may be many who do not agree with the method chosen, one must acknowledge the wisdom of stating a policy and sticking to it.

For such a large volume—it contains 1,466 pages—the corrigenda is very small, a trivial point but one which indicates the care and labour expended in the compilation of the edition.

It is to be hoped that the Editor will reconsider his decision to further curtail the paragraphs on Applied Anatomy. A book such as Gray's Anatomy once bought, has to last the average student a life time and to have his Applied Anatomy always with him in his Anatomy book is a great consideration.



### Acknowledgments.

We beg to acknowledge with thanks the receipt of the following contemporaries :—

The University College Hospital Magazine	...	Vol. XV, No. 3.
The Queen's Medical Magazine...	...	Vol. XXVII, No. 5.
St. Mary's Hospital Gazette	...	Vol. XXXVI, No. 3.
" " " " " "	...	Vol. XXXVI, No. 4.
The Hospital	...	Vol. XXVI, No. 6.
St. Bartholomew's Hospital Journal	...	Vol. XXXVII, No. 9.
The Hacket Medical College for Women	...	June 1930.
Bulletin of The New York Academy of Medicine	...	Vol. VI, No. 5.
" " " " " "	...	Vol. VI, No. 6.
The Journal of The Ceylon Branch of the B.M.A.	...	July 1930.
The Post-Graduate Medical Journal	...	June 1930.
The Medical Journal of Australia	...	Vol. I, No. 26.
" " " " " "	...	Vol. II, No. 1.
" " " " " "	...	Vol. II, No. 2.
" " " " " "	...	Vol. II, No. 3.
The Malayan Medical Journal	...	Vol. V, No. 11.
The Japan Medical World	...	Vol. IX, No. 12.
" " " " " "	...	Vol. X, No. 1.
Okayama-Igakkai-Zasshi	...	Jg. 42, Nr. 5.
" " " " " "	...	Jg. 42, Nr. 6.
Chiba-Igakukwai-Zasshi	...	Bd. VIII, Ht. 4.
" " " " " "	...	Bd. VIII, Ht. 5.
" " " " " "	...	Bd. VIII, Ht. 6.
Index Universalis	...	Vol. VII, Fasc 7.
The Tainan Medical Review	...	Vol. X, No. 3.
" " " " " "	...	Vol. X, 2.
Archives de la Societe des Sciences Medicales	...	Fasc. IV.
El Salvador Medico	...	Ano. IX, No. 48.
The Japanese Journal of Experimental Medicine	...	Vol. VIII, No. 3.

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Dr. Huang's Medical Journal ... ..	Vol. VII, No. 6.
The Taiwan Igakkai Zasshi ... ..	No. 302.
Memoirs do Instituto Oswaldo Cruz ... ..	Tomo XXIII, Fasc. 4.
Arquivos de Clinica Medica ... ..	Tomo III, No. 2.
Revue Medicale Roumaine ... ..	III Annes., No. 2.
St. Bartholomew's Hospital Journal ... ..	Vol. XXXVII, No. 10
The Medical Journal of Australia ... ..	Vol. II, No. 4.
The Bristol Medico-Chirurgical Journal... ..	Vol. XLVII, No. 176.
Bulletin of The New York Academy of Medicine	Vol. VI, No. 7.
The Moukden Medical College Journal... ..	July 1930.
Health and Empire ... ..	Vol. V, No. 2.
The Journal of Bone & Joint Surgery ... ..	Vol. XII, No. 3.
The Japan Medical World ... ..	Vol. X, No. 2.
The Hospital ... ..	Vol. XXVI, No. 7.
Okayama-Igakkai-Zasshi ... ..	Jg. 42, Nr. 7.
The Middlesex Hospital Journal... ..	Vol. XXX, No. 4.
The Birmingham Medical Review ... ..	Vol. V, No. 7.



## Notes and Comments.

### *PHILIPPINES SOCIETY OF PARASITOLOGY.*

#### Manila.

Realising the importance of parasitology in the Philippines, a group of workers organised in Manila on August 20th, 1930, the Philippine Society of Parasitology in order to (1) encourage interest and research, and (2) to acquaint the members of the Society by means of informal papers and discussions with the activities of the local workers, in parasitology. The following were present at the meeting: Major Joe. H. St. John, member, U.S. Army Tropical Medicine Research Board; Dr. Paul F. Russell (President), Rockefeller Foundation; Dr. Justin Andrews, Dr. Walfrido de Leon and Dr. Lamberto Leiva, University of the Philippines; Dr. Cristobel Manalang (Vice-President), Philippine Health Service; Dr. Otto Schobl and Dr. Marcos Tubangui (Secretary-Treasurer), Bureau of Science; Mr. Atherton Lee, Philippine Sugar Association; and Mr. Gonzalo Merino, Bureau of Plant Industry.

We print below a list of the new appointments made to fill the posts as House Officers at the Government Civil Hospital from July 1st to December 31st, 1930. We are also publishing a complete list of the examination results of the Degree Examinations held last May, and in doing so we take this opportunity of offering those successful candidates our heartiest congratulations.

#### *HOUSE OFFICERS:*

Clinical Assistant to the Medical Unit .....	Miss P. Ruttonjee.
Clinical Assistant to the Surgical Unit .....	Yu Chiu Kwong.
Clinical Assistant to Obstetrical & Gynæcological Unit .....	Lam Shiu Kwong.
House Physician .....	Peter Pau.
House Surgeon .....	Shi Man Wei.
House Obstetrician .....	Cheung Shiu Fan.
Out-Patient Officer .....	Miss Leung Chum Ha.

The Following Have Completed The FINAL M.B., B.S. EXAMINATION:—

Cheah Khay Chuan	Pau Choi Chue—Miss
Lam Chi Wie	Pau Peter
Leung Chum Ha—Miss	Ruttonjee, P.—Miss
Ooi Phee Tuan	

The following have passed in MEDICINE in the FINAL EXAMINATION:—

Lam Chi Wie	Phoon Seck Quoi
Ng Yeok Boon	Souza, G. de
Ooi Phee Tuan	Tan Tiong Lam

The following have passed in SURGERY & OBSTETRICS in the FINAL EXAMINATION:—

Adams, H. E.	Ooi Phee Tuan
Chamarette, N. P. P.	Pau, Choi Chue—Miss
Cheah Khay Chuan	Pau, Peter
Lam Chi Wie	Ruttonjee, P.—Miss
Leung Chum Ha—Miss	

The following passed in JUNIOR PATHOLOGY & PHARMACOLOGY:—

Cheung Kung Leung	Ng Tin Fong
Enok, V.	Tan Liang Hoat
Hiptoola, F.	Wong Hock Nin
Lee Ho Tin	Yeoh Guan Eng
Ling Ke Dien	Yip Yuet Fong
Loke Kam Thong	Yuen—Miss Hilda

The following passed in SENIOR ANATOMY & SENIOR PHYSIOLOGY:—

Bee Hoat Teck	Loke Kam Thong
Chau Kwok Wa	Teoh Thean Ming
Harrison, E. L.	Tsu Tsoong Ji
Hui Luk Yip—Miss	Wong Siong Hing
Lee Ho Tin	

The following passed in JUNIOR ANATOMY & JUNIOR PHYSIOLOGY :—

Chau Woon Nin	Rodrigues, A. M.
Lo Chong Fie	Sung Sheung Hei
Quek Cheng Kim	

The following passed in ORGANIC CHEMISTRY :—

Chan Seck Fong	Rodrigues, A. M.
Lew Khoon Shin	Souza, O. de
Quek Cheng Kim	

The following passed in PHYSICS :—

Guterres, J. J.	Chandah, C.
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The following passed in INORGANIC CHEMISTRY :—

Choong Gim Seong	Tan Boon Piew
Kho Pek Po	Tee Eng Liat
Lee Chwee Moke	Sie Tjoan Djin
Ng Yew Seng	

The following passed in BIOLOGY :—

Choong Gim Seong	Ling Sing Hang
Kho Pek Po	Tee Eng Liat

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At the Annual General Meeting of the Society it was announced that three prizes of \$50.00 each would be awarded to the student who published in the "CADUCEUS" the best article of Clinical interest, one prize to be awarded in Medicine, one in Surgery and one in Obstetrics & Gynaecology.

These prizes have been donated by residents of Hong Kong who have, on many previous occasions shown in a practical way that they have the welfare of the University at heart. By founding these prizes they have further shown that they have the welfare of the individual student at heart also, for any action which encourages students to write up and publish important and interesting cases, is also not only encouraging them to learn, but actually teaching them how to teach themselves.

The Donors are :—

Hon. Dr. R. H. Kotewall, C.M.G., LL.D.,

The "Edith Kotewall Prize"—Obstetrics & Gynæcology.

Messrs. H. Ruttonjee & Son.

The "Ruttonjee Prize"—Medicine.

Major H. B. L. Dowbiggin.

The "Dowbiggin Prize"—Surgery.

and we take this opportunity of publically recording our thanks to these gentlemen, and our deep appreciation of their liberality.

It remains now but for the students, to crown with the success it deserves, the work so unhesitatingly inaugurated by our benefactors.

