SURGICAL PROBLEMS AND DIFFICULTIES IN THE TROPICS.

By D. J. Harries, D.Sc., M.D., F.R.C.S. (Eng.), Capt. (Tempy.), R.A.M.C., Kasauli, India.

In this article I shall endeavour to draw attention to a few of the difficulties which the operating surgeon has to meet and overcome when treating surgical cases in a tropical country like India. I wish it to be understood that my experience is confined almost entirely to operations performed on British troops and civilians and also on Turkish prisoners of war. Possibly some of my remarks do not hold good when applied to operations performed on Indian soldiers and civilians.

There is a general belief in England that chloroform is the only anaesthetic that can be administered on an open mask in India. This was put to the test in the 34th General Hospital, Deolali, in 1916, and it was found that ether given by the open method acted almost as well as it does in England; but possibly a little more had to be administered, especially if a preliminary dose of morphia \( \frac{1}{4} \text{gr.} \) and atropine 100th gr. had not been administered half an hour before the anaesthetic was commenced. The temperature in the shade at Deolali during the hot weather goes up to 104-106. It is quite probable that at temperatures of 110-116 the administration of open ether might present insuperable difficulties, but this should not be made an excuse for the complete abolition of ether from the operating theatre during the cold season.

When one comes to the actual operating the temperature of the theatre again becomes an important matter from the point of view of both the operator and his patient. The surgeon has to decide whether the discomfort caused by the wearing of a headgear and face mask is more than compensated for by the increased protection afforded to the patient. By wearing these articles the amount of perspiration lost by the operator is certainly increased; but on the

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other hand, there is less danger of any dropping into the operation area. Personally I consider that the latter advantage outweighs the disadvantages, and I now invariably use both a headgear and a face mask when operating. It is often stated out here that, even if a few drops of perspiration did accidentally fall into the wound, very little effect would be produced on the way it heals; but I doubt if this statement ought to be accepted as a fact, and it would certainly not be readily accepted if the operator happened to have a number of boils or pimples on his face.

The technique of the actual operation has to be modified to meet the abnormal way the tissues react to trauma. This brings in the question of oozing into wounds, incisions, etc. It is soon realized by the surgeon that far more bleeding points have to be tied in any ordinary operation performed in the tropics than in the same operation carried out in England. Moreover, the tendency for oozing to take place after the operation, and even after the removal of the stitches, has to be taken into account in applying the dressings and bandages. From the above remarks it is clear that collodion dressings should never be employed after any operation, or even after the removal of the stitches.

Oozing is more pronounced during the monsoon season, and like many other unexplained physiological phenomena in India, is put down to the patient's "thin blood." A careful inspection of the blood lost during an operation shows that there are definite reasons why the expression continues to be used. The blood undoubtedly appears to be paler and more fluid than blood in England and it certainly does not clot so quickly: facts which readily explain why it is necessary to tie every bleeding point encountered during an operation, and to apply firm bandages afterwards.

This subject has an important bearing on operations on joints; more especially the removal of loose cartilages or bodies from the knee joint. However, if Sir Robert Jones's advice "to use a tourniquet" is followed, the actual operation presents no more difficulties than when carried out in England. It is unnecessary to add that all vessels external to the synovial membrane should be tied; and before a tourniquet is removed, the knee should be firmly bandaged over a thick layer of wool, extending about 3-4 inches beyond the limits of the joint capsule. This dressing is left on until the stitches are removed on the 7th or 8th day. When the above instructions have been carried out the results show no appreciable differences from the results obtained in England.
There is a generally accepted belief in India that individuals who have contracted malaria make bad subjects for operative treatment. The reasons for this belief are not hard to discover. In the first place, the anaemia following an attack of malaria aggravates the oozing into the wound; and this is a matter of importance when operating on organs where it is impossible either to tie all bleeding points or to apply the requisite degree of pressure after the operation, e.g., operations on the liver or intestines.

**Chart II. Malarial attack after operation.**
In the second place it is soon realized by the surgeon that an operation, even a minor one, will almost certainly precipitate an attack of malaria. Charts 1 and 2 give some idea of what generally happens. Sometimes the patient has never had a previous attack, and never knew he had been infected; or he may have gone for several years without an attack, and thought he had completely got rid of his malaria. The most important factors concerned in precipitating the attack are still matters of personal opinion. There are obviously three possibilities. The attack may be precipitated by—

(1) the mental worry,
(2) the actual trauma,
(3) the action of the anaesthetic.

Regarding the first, it is fair to state that I have actually seen attacks precipitated in patients who have been told that they were to be operated on next day, but for some reason or other they were not operated on. Why undue mental activity should cause increased activity of the malaria parasite is a problem which may possibly interest the pathologist and physiologist of the future.

The influence of trauma is well known to all surgeons, as any injury, such as the fracture of a bone, in a malarial subject is often followed by a recrudescence of the disease.

It is obviously impossible to estimate the effect of the anaesthetic in stimulating the activity of the parasite. Cases are known where a malarial attack has followed an examination under an anaesthetic, but here, of course, one cannot eliminate the influence of the accompanying mental disturbance.

It is quite obvious that all these factors interfere with some mechanism which keeps the parasite under control. It is well known that the incidence of almost any disease including a "chill" may precipitate a malarial attack. Many theories could be advanced to explain this problem, but it would be more to the point to try to find some explanation applicable to all cases. It seems reasonable to suggest that the circulatory changes, induced by all these different disturbing agents, may be the most potent factor causing the liberation and multiplication of the parasites. Dr. T. R. Elliot has shown that collapse, however produced, rapidly causes the suprarenals to discharge their chromaffin bodies in the attempt to supply the pressor substances necessary for the maintenance of a good circulation. A diminution in the supply of these pressor bodies allows changes in the circulation which possibly favour the activity of the malaria parasites. The popular expression "that the patient is run down" means much the same thing, and so does the scientific expression "diminished vitality."
It has been suggested that trauma liberates some ferment which stimulates the malaria parasites.

It might also be suggested that the lipoids, which may help to keep the parasites under control, are dissolved by the anaesthetic; but these two suggestions would not be applicable to attacks following on mental worry or shock in the absence of an anaesthetic.

However interesting these theoretical considerations may be to the pathologist, I think that the surgeon will be more interested in knowing the practical fact “that a temperature of 102-104 coming on a few days after a carefully conducted laparotomy or arthrotomy in a malarial subject is more likely to be due to the malaria parasite than to sepsis.” After encountering a few cases of this description the operator will carefully ask each patient before operating on him if he is a malarial subject, and if so, he will put him on quinine for 3 to 4 days before the operation and continue giving it for about 10 days. By doing this he will obviate all rises of temperature due to the malaria parasite.

There is another condition due to the malaria parasite which is of considerable importance to the operating surgeon, viz., the condition termed “abdominal malaria.” During an attack the patient has a rise of temperature, and symptoms and signs suggestive of acute peritonitis. I have seen it mistaken for cholera during an epidemic of the latter disease, but the finding of the parasite in the blood and the absence of the vibrio from the excreta established the correct diagnosis. I have myself opened an abdomen for what I considered to be acute peritonitis, secondary to appendicitis. The condition found inside the abdomen was unlike anything I had seen before. The intestines were slightly injected and appeared to have been painted over with a thin layer of milk. Here and there I came across very small collections of the same sort of fluid lying between coils of intestines. I removed the appendix, but found it practically normal. The appearance of the temperature chart next day, together with a history of a previous attack of malaria, suggested the correct diagnosis and the parasites were found in the blood.

I have also seen a colleague open an abdomen for what he considered to be a perforation of some part of the intestine. The condition found inside the abdomen was exactly the same as I found in the supposed appendicitis case mentioned above, and the subsequent discovery of the parasite in the blood rendered the diagnosis clear.

There is another condition which simulates to some extent a perforation of the intestine, namely, an acute dysenteric abscess of the liver presenting in the epigastric region. This type of hepatic abscess develops very rapidly and within 24-48 hours of the ap-
appearance of symptoms a large swelling is formed in the epigastric region. A localized collection from a gastric ulcer which has slowly perforated presents very much the same symptoms and physical signs, and the exact diagnosis is often impossible to establish before a laparotomy has been carried out. An X-ray examination before operation might demonstrate the collection to be entirely within the limits of the liver shadow, and so strengthen the evidence in favour of a liver abscess; but one must remember that the same appearance would be presented by a collection lying under the liver, but covered over by an overlapping anterior liver margin. Putting in an exploring needle is not justifiable in such cases unless followed by an immediate laparotomy.

As a laparotomy is the correct treatment for either condition, there is no advantage in first exploring with a needle. Another peculiarity of these epigastric liver abscesses and one which is rather disconcerting when present, is the fact that they may show pulsation, which at times appears to be expansile. I recently operated on one the size of a tangerine orange in the anterior margin of the liver in a man forty-two years of age. It was adherent to the anterior abdominal wall and felt like an aneurism of the abdominal aorta. The appearance of the temperature chart and the absence of all murmurs decided the diagnosis and this was confirmed at the operation. (Chart 3.)

**Chart III. Temperature in Abscess of Liver.**

There is one other subject of practical importance I should like to touch on, viz., the subject of mechanical appliances. When re-
commending these in preference to an operation the surgeon must take into consideration the discomfort caused by any appliance in a tropical country. A truss or belt for a rupture may be easily tolerated in a cool climate; but in a hot climate the skin soon shows signs of irritation at all points of pressure, and marching becomes an impossibility. Apart from the diminished efficiency of the man with a truss the above consideration should influence the surgeon to advise an operation in every case, unless contraindicated by some systemic disease.

FIVE CASES OF FASCIOLOPSIS INFECTION, WITH REMARKS.

Written for the Transactions of the Royal Society of Tropical Medicine.

By A. F. Cole, F.R.C.S. (Ed.), Ningpo, China.

The rarity of such infections is obvious from a study of the literature; the existence of an endemic focus where material for clinical and pathological study is always available is not generally known.

Although about one hundred miles from the district in point, a large number of patients admitted to the wards of the C.M.S. Hospital, Ningpo, from Shao-hying-fu, were infected, and the notes on five cases appended by no means represent all the cases seen.

As regards histology of the flukes, I regret to say that of the many hundreds of sections made by me in attempting to differentiate the species, I have lost every one during the war. From my study of the sections—longitudinal, transverse and horizontal—I did not observe any differences of moment between the so-called F. buski, rathouisi and goddardi types.

A well illustrated and most thorough paper by N. W. Brown, "Fasciolopsinae of China," Bulletin Johns Hopkins Hospital, Vol. 28, pp. 322-329, goes into the question of cuticular spines, opercula, variations in size of ovum and parasite; and J. W. W. Stephens, after describing the Fasciolopsis group in Animal Parasites of Man, remarks, in conclusion: "It is evident that a re-examination of fresh material is required before the validity of all these species can be accepted."

It is with some diffidence that one attempts to add anything to N. W. Brown's monograph on Chinese Fasciolopsinae, but having had the privilege of examining some hundreds of fresh flukes—in
many cases alive and squirming like a freshly caught flatfish—I wish to suggest that the differences in measurement of length and width and thickness are compromised by the fact that a dead fluke when passed may be in any stage of degeneration, from mere muscular relaxation to actual commencing maceration and digestion. Kwan's fluke (so-called) illustrates how a new species may be discovered; by inspection of the original specimen in the helminth collection at Endsleigh Gardens Tropical Diseases Hospital, it is obvious that it has no claim on recognition as anything more than a macerated \textit{F. buski}. Scores of similar specimens were noted whilst investigating case 729.

The freshly passed flukes appear reddish brown, like raw beef, with marked movements in many cases. They did not alter position in the faecal pot, but I have no doubt they do so within the bowel; the cuticular spines and the musculature would conceivably act to this end, and the epigastric discomfort and irregular diarrhoea, commonly complaints in these cases, might be caused by migratory movements. Whilst on the subject of movement, I may say that I have no recollection of having seen any specimen of N. W. Brown's Group I, unspined fasciolopsinae in actual motion. This may point to the unspined feature being merely a post-mortem product; if so, the differentiation into \textit{F. buski} and \textit{F. spinifera} becomes useless. Elongation, flattening, visibility of the vitellaria, as seen by naked eye in freshly passed specimens, may be explained by the same post-mortem action, and may account for discrepancies in the records of various observers of the spines in this group. The ova illustrated by Dr. N. W. Brown may also point in the same direction—the contents degenerating and the opercula tending to be missing.

I have endeavoured to avoid the question of identification of species and have failed. As a result of my own observations, I incline to the belief that in the part of Chekiang province where I have lived, it has not been clearly shewn that there is more than one species, \textit{Fasciolopsis buski}. As regards clinical facts, the cases appended suggest:

1. The parasites live in the stomach, duodenum and the first part of the small intestine only; when found in large bowel they are nearing the end of their existence.

2. Their ill effects are not in the direction of blood destruction, but are produced by toxic absorption, which leads to secondary anaemia, general oedema, ascites, and skin changes. There is no fever directly caused by it.

3. No melaena has been noted, even in the massive infection case 729. Diarrhoea common. Many of the patients state they
Fasciolopsis Infection.

have passed blood, but a freshly passed fluke in a mass of pultaceous faeces exactly simulates blood clot; moreover, there is a Chinese proverb: "Ten men, nine hemorrhoids; ten women, nine leucorrhoea"; which bears on the subject of melæna.

(4) No cases were observed in infants or young children; this may be connected with the fact that weaning is often delayed to the third and fourth year.

(5) The disease may be fatal unless the parasites are expelled by art or by accident. I had one death (not here recorded) within twenty-four hours of admission for bowel troubles, in which the typical ova were demonstrated before death.

(6) Rapid recovery follows when the parasites are evacuated, unless in the later stages of exhaustion.

(7) Faecal examination and re-examination are the essentials for success, the fasciolopsis ova being characteristic. Certain observations were made on the relative sizes of ova in utero and in the faeces; also in the analogous case of Fasciola hepatica infection in the pig of Shanghai abattoirs.


Ningpo boy, æt. 15, quite well in Ningpo. Went to work as apprentice to carpenter in Siao-saen, near Shao-hying-fu, Chekiang. After six months there developed symptoms which brought him to Hospital in Ningpo.

On admission he was unable to stand from weakness, lies in an extremely dyspnoeic condition, and there is advanced general œdema. No history of melæna (no note made of presence or absence of diarrhoea.—A. F. C.).

History of having vomited flukes, and faeces contain certain ova averaging 135μ × 85μ.

Large doses of male-fern extract no effect; three doses of thymol, amounting to 45 grains, on an empty stomach produced 113 flukes per anum. Patient insisted that he could hear the flukes crying out before they were passed! Measurements of flukes from 29 to 42 mm. in length by 9 mm. to 16 wide.


Servant of Rev. H. Barton, C.M.S., Shao-hying-fu, Chekiang.

Complains of great weakness, and irregular diarrheal attacks without any blood. Appetite fair, not feverish, tongue is coated, great discomfort in epigastrium. No œdema present. Wasted appearance.
Examination of faeces on three days, some 20 slides in all, gave in addition to ova of *Trichocephalus dispar*, five oval single contour granular ova of following measurements:

\[
\begin{align*}
170\mu \times 85\mu \\
170\mu \times 85\mu \\
200\mu \times 90\mu \\
180\mu \times 80\mu \\
170\mu \times 95\mu 
\end{align*}
\]

\[
\text{Mean} = 178\mu \times 87\mu.
\]

Eucalyptus oil 5 ss with chloroform 5 ss and oleum ricini 5 ss was given, and five hours later he was said to be in agony, which was relieved by vomiting. In spite of the strictest orders his motions and vomit were thrown away into the common lot, and, though search was made, no discovery of flukes. In January 1911, the patient says he has been in good health ever since the above treatment; living now in Ningpo.

**Case 606.** Under care of Dr. A. C. Hutcheson, Kashing, Chekiang. June, 1911.

Slave girl, æt. 7, from Siao-saen, near Shao-hying-fu, walked into Dispensary with five flukes on a mulberry leaf, which flukes she had vomited. History of having both vomited and passed flukes per anum on several occasions. Child is pale and weak, looks very sick, motions very loose and frequent, and ova of liver flukes present, average of 20 ova =143\mu \times 82\mu.

Thymol grs. xii. on three occasions brought away some fifty flukes. Child left Hospital in fine condition, improving rapidly.

**Case 729.** Under care of Dr. A. F. Cole. April, 1911.

Schoolboy, æt. 17, Hangchow bred, from C.M.S. Trinity College, Ningpo, admitted for wasting and general debility. Commenced with mild diarrhoea 2-3 times a day about 2½ months ago, about the same time that he was in Shao-hying-fu, but he says he was there only two days and already unwell. He says he never has passed blood; he is too weak to play any games, or even to hold a tennis racquet firmly. He has a mild diarrhoea of a chronic nature.

Present condition.—Patient looks wasted and seems very weak; skin and face dry and scaly. Pulse 72. Respiration normal. Temp. normal. Breathlessness on exertion. Urine 1010, acid, no albumen, reduced Fehling's solution on one occasion (?). Lungs normal. Heart, all 2'—sounds accentuated, no murmurs. Discomfort in epigastrium. Faeces said by dresser to contain only Ascaris ova. Blood contains no parasites: reds 3,443,000, whites 8,000, haemoglobin 90
per cent (differential white count not made). About 30-40 ounces of urine passed in 24 hours. There is no oedema and no cough.

For 25 days patient was under observation and treatment, being given tonics, and bismuth mixtures for the diarrhoea. Faeces were examined some four times by same student, who reported only Ascaris ova to be present. Finally examined by Dr. Cole, who found quantities of *Fasciolopsis buski* ova, and treatment was forthwith commenced. Faeces greyish and bulky.

*April 10.*—After 45 grs. thymol 11 flukes passed: average, 15·7 mm. × 10·2 mm. Ova seemed to be of two sizes: average of 30 large ones = 123 μ × 77 μ. Small and large lying side by side: average of 13 smaller = 78 μ × 59 μ. Possibly mature and immature: average of total 43 = 109 μ × 69 μ.

*April 11.*—Thirteen additional flukes: average, 20·8 mm. × 10·2 mm.

*April 12.*—Seven more passed, some much larger than before: average, 28·5 mm. × 11·7 mm. Of these the two largest measured 42 mm. × 1·75 mm. and 40·25 mm. × 12·25 mm.

*April 21.*—After two courses of β-Naphthol (B. W. & Co.), grs. 45, each divided into three doses, without the use of a purgative, three more flukes passed; average size = 19·4 mm. × 8·6 mm.

*April 24.*—Diarrhoea still continuing, four more passed per annum: average size = 28·4 mm. × 11·4 mm. Patient says he is immensely improved; his skin no longer dry.

*April 28.*—After another course of thymol, grs. 45, patient evacuated 128 flukes of the smaller type. Not measured.

*April 29.*—Eleven more flukes to-day.

*May 5.*—Another course of thymol, grs. 45, resulted in 180 more flukes being passed. They seemed much larger parasites: average, 28 mm. × 10·75 mm. (Only 21 measured out of 180.)

*May 6.*—No less than 71 more passed to-day, all very small. Average of ten measured, 17·7 mm. × 10·40 mm.

*May 12.*—Ova having been found in faeces, another course of thymol. Measurement of ovum = 150 μ × 100 μ.

*May 14.*—After a whole day without a motion 27 more flukes passed, large and small kinds mixed. Nearly all were whitish yellow from commencing digestion in bowel.

*May 21.*—Ova still present in faeces. Calomel, grs. 6, at night, followed by thymol, grs. 45, on empty stomach in morning in three doses at an hour's interval, and white mixture Σ subsequently. Twenty-six more flukes passed.
June 3.—Three successive daily examinations of faeces have shewn no ova, and as patient seems a new creature, and fairly fit, he is allowed to return to College, having passed a grand total of 485 flukes whilst under treatment, six distinct courses of thymol or -Naphthol having been given. Thymol seemed to give better results.

Case 972. Case under Dr. G. J. Evans, Hangchow. September, 1911.

Man, æt. 31, admitted for distension of abdomen and general discomfort. History that the distension had been gradual, and dated back some two years; that he had had some fever, but he had not been laid up by illness; during the last four months abdomen increasing in size rapidly.

On admission there is definite ascites, the abdomen is generally enlarged, spleen and liver not palpable, heart and lungs normal. Urine acid, no albumen or sugar, specific gravity 1023. Pulse 76. Not specially anaemic, does not appear "ill." Faeces are yellowish-green and well formed, and contain ova of Fasciolopsis species. No history of passing blood, and he denied diarrhoea in the past two years. No œdema of legs and no dyspnoea. He feels discomfort after a meal, not specially in epigastrium.

He was given on an empty stomach the following:—

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Quantity</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oleum eucalypti</td>
<td>5 ss</td>
<td>Repeated</td>
</tr>
<tr>
<td>Chloroform</td>
<td>5 ss</td>
<td>after an hour</td>
</tr>
<tr>
<td>Oleum ricini</td>
<td>5 ss</td>
<td></td>
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</tbody>
</table>

He passed the same day about 100 flukes of very varying sizes and shapes, of which the longer type (usually called Fasciolopsis buski) predominated. Dr. Evans selected three specimens of each of three types, and, except for washing them in rainwater, measured them untreated in any way:—

- **Type A**—"Longest"  
  \[
  \begin{align*}
  \text{Length:} & \quad 50.8 \text{ millimeters} \\
  \text{Dimensions:} & \quad 50.8 \text{ millimeters}
  \end{align*}
  \]

- **Type B**—"Medium"  
  \[
  \begin{align*}
  \text{Length:} & \quad 44.3 \text{ millimeters} \\
  \text{Dimensions:} & \quad 38.1 \text{ millimeters}
  \end{align*}
  \]

- **Type C**—"Shortest"  
  \[
  \begin{align*}
  \text{Length:} & \quad 27.9 \text{ millimeters} \\
  \text{Dimensions:} & \quad 27.9 \text{ millimeters}
  \end{align*}
  \]

In addition, Dr. Evans measured ova from the uterus of each of these three types, and the average of ten ova in each case was as follows:—
SEVERAL CASES OF A RARE FORM OF SUBCONJUNCTIVAL GRANULOMA.
A Rare Form of Subconjunctival Granuloma.

Type A—‘‘Longest.” Average of ten ova 156μ × 99μ.
Type B—‘‘Medium.” ” ” 142μ × 97μ.
Type C—“Shortest.” ” ” 142μ × 102μ.

The note was made that the measurements of the ova in the faeces before treatment was practically identical with the average of the ova removed from the uterine coils.

Specimens of Fasciola hepatica from cattle (Shanghai slaughter-house):—

1. Very long fluke. Average of 14 ova from uterus = 190μ × 105μ.
3. Short fluke, No. 1. Average of 7 ova from uterus = 168μ × 109μ.
4. Short fluke, No. 2. Average of 2 ova from uterus = 167μ × 88μ.

SEVERAL CASES OF A RARE FORM OF SUBCONJUNCTIVAL GRANULOMA.

Fred H. Judd, B.A., M.B., B.Ch., China Inland Mission, Jaochow, Kiangsi.

In the January 1921 number of the China Medical Journal Dr. McAll published some “Notes on a rare form of Subconjunctival Granuloma met with in Central China.” Having had several of these cases he has asked me to publish them too. His description is so good I need add no more except to say that most cases seem to follow inflammation. In at least three of these five cases the non-affected eye was blind through inflammation, and in three cases the condition followed inflammation, and in one case traumatism.

1. Ch’eng. Male, age 19. Native of Loping in this prefecture. Right eye, blind from inflammation during childhood. Left eye, had a tumour which began at inner canthus three years ago. The former was in two portions, the larger near the inner canthus, the smaller behind the outer half of the lower lid. In consistency it was fairly firm, but slightly moulded by the lids and eyeball. The tarsal part of the upper lid was enlarged and thickened, and to a less extent the lower also. Otherwise the eyeballs were normal.

Three weeks treatment with Pot. Iodide, Mercury, and inunction of Ung. Hyd. Oleas had no effect at all. The patient then disappeared, but returned three years later, the tumour being appreciably larger. On 1/8/06 I removed almost the whole of the inner portion and sutured the conjunctiva over the wound. The
The China Medical Journal.

deepest parts I could not get at without probably doing more harm than good. A month later the outer portion was removed, but with more difficulty. The growth was more friable in parts, and deeper, and bled much more freely. The deepest parts were also left behind. Last year, 1921, I saw the man for the first time after many years. The upper and lower lids are thickened, and somewhat curled inwards. There are small firm masses of recurrence, but as they are not enough to obscure his vision and apparently have not increased in size of recent years he did not wish further treatment.

II. Wang. Male, 34, from Ü-kan, in this prefecture. Three and a half months ago both eyes became inflamed. Now both cornea are opaque and flattened, and the patient cannot see more than the shadow of a hand moving across his eyes. The growths are triangular, flat, thin, movable at the free edge which can be lifted from the eyeball with a flat probe, and moulded by the lids. Consistency like firm jelly. A smaller but similar tumour was growing from one upper fornix. As the sight could not be improved no treatment was desired.

III. Li. Male, 36, from Ü-kan. The right eye became inflamed fourteen years ago for about three weeks, after which the vision became good, but a growth appeared at the inner canthus, and grew across under both upper and lower eyelids. Nearly a year ago the left eye became inflamed, and blind, after which the right one got worse through fretting, till he could only just see his way about. On admission, July 1907, the left eye was sunken and blind from a large central corneal opacity. On the right a firm fibrous mass extended all along underneath the upper and lower lids, about one inch long and half an inch wide, apparently wedge-shaped and extending backwards above and below the eyeball. Connecting these was a less firm red mass at each end, partly moulded by the lids. On July 24, I removed a large part of the lower mass through a horizontal incision below the lower eyelid. It bled freely. On August 7, I removed the mass at the inner end, and on August 14, the mass at the outer canthus, and a piece of skin from the lower lid as in operating for entropion. His sight was improved so that he could count fingers, but we have seen nothing of him since he has left the hospital.

IV. Feng. Male, 69. Unfortunately his history is incomplete. The upper mass behind the inner half of the upper lid was very soft, thin and mobile, apparently only attached to the fornix by an edge. The lower masses were rounded, lobulated and soft, easily
The Bonime System of Tuberculin Therapy.

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torn by forceps and scissors. The deeper parts of the upper mass were not removed.

V. Fan Hen Hsing. Male, 38, from South Kueiki, 300 li south of this place. Six years ago a blow from a piece of firewood caused a 'black eye.' This subsided in a week, and instead there grew this mass from the lower lid followed in a few days by one on the upper. Since then they have scarcely enlarged at all. On admission, 18 October, 1911, there was a firm mass in the upper lid which seemed like a much thickened cartilage, so much so that the lid could not be inverted. The mass in the lower lid was more nodular. This case may not be of quite the same nature as the others, but unfortunately no section of it was made. I am sorry the notes of some are so scanty. The accompanying sketches will perhaps make them clearer.

THE BONIME SYSTEM OF TUBERCULIN THERAPY.

Tuberculin therapy, since its introduction by Koch, thirty years ago, although it has had warm supporters, especially in Britain and Germany, has never gained universal favor. This is due, in large part, to disastrous results following its use because there has not been a thorough understanding of the reaction and method of dosage by some who have attempted it.

At Kuling last summer, Dr. W. H. Venable put me in touch with a new system of dosage which Dr. Ellis Bonime, of the New York Polyclinic Medical School and Hospital, worked out from experience and careful analysis of the principles underlying the tuberculin reaction. The difference between this method and the three other methods that have been used is that there is a minute increase of the dosage, thus allowing of a maintainance of a balance between tolerance and hypersusceptibility, so that if there is a reaction it will be a mild one, which does no serious damage. The excellent results reported by the originator in glandular, skin, renal, bone, and pulmonary tuberculosis, warrant us, I believe, in giving the method a thorough trial. I regret that I have no end results in my own cases to bring before you, for the five months that I have used the method is too short a time to complete a system of dosage in one individual. I hope by presenting the method that you will be interested in giving it a trial and then by a comparison of results we may come to conclusions as to its worth. I will first state briefly
the technique of making the dilutions and the system of dosage, then we will consider the theory and principles underlying tubercular therapy in order to better comprehend the reasons for this new method.

Koch's Old Tuberculin, "O. T.," is the tuberculin of choice, because it possesses that element which brings about that maximum amount of tolerance to protein poison, and also produces the maximum amount of focal reaction by hyperæmia (one of the objects of tuberculin therapy).

The diluent used is half of one per cent carbolic in normal saline (one drachm of 5 per cent carbolic solution added to nine drachms of sterile normal saline placed in a sterile bottle). The course begins with the fifth or fourth dilution and goes down through the first, this requires about seven months. A toxic immunity is thus obtained by "O. T." After this the first dilution of Bacillary Emulsion, "B. E.," is injected, and a bacillary immunity is thus sought for. (See accompanying table of dilutions, dosage and alterations in dosage from a reaction taking place.) The usual dose to start with is .1 mil of the fifth dilution or .001 mg. tuberculin. In the in-patients I have never seen a rise of temperature nor in the out-patients any discomfort following the administration of the first dose of the fourth dilution, i.e., .01 mg. tuberculin. Except in acute cases of rather short duration, I think it is safe to start with the fourth dilution, thus saving considerable time. At the point of injection induration of the subcutaneous tissues with perhaps reddening and tenderness may manifest themselves; this is called a local reaction, the order of dosage is nevertheless to be pursued. However, should there be a slight rise in temperature, for which there is no other known cause, accompanying this local reaction, together with malaise, the order of dosage is interrupted, for this means a general reaction. An interval of a week is allowed to pass before the next dose is given and the quantity administered is the same as the third from the last dose and the increase should be reduced to the same quantity as at the beginning of the treatment. Pain or tenderness at the site of the disease is called the focal reaction and is merely a manifestation of the therapeutic and physiological effect of the tuberculin and does not indicate either a reduction in dose nor lengthening of the interval.

The success of tuberculin administration depends upon the accuracy in the preparation of the dilutions and in the dosage injection, also a general knowledge of the tuberculin reaction is necessary. Do not choose a patient in the last stages of the disease.
The Bonine System of Tuberculin Therapy.

nor use the method as a last resort. The most suitable cases to begin with are lymph-adenitis and lupus. Fever in itself is not a contraindication to the use of tuberculin.

Preparations of tuberculin dilutions.

<table>
<thead>
<tr>
<th>No.</th>
<th>Dilution</th>
<th>Remove of diluent</th>
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Showing scheme of dosage without reaction.

<table>
<thead>
<tr>
<th>Date</th>
<th>No. of Treat.</th>
<th>Dil. No.</th>
<th>Quant. per cc.</th>
<th>Reaction</th>
<th>Local Temp.</th>
<th>Dosage Increase</th>
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<tr>
<td>12</td>
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<td>0.18</td>
<td>+0.04</td>
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<td>22</td>
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<tr>
<td>26</td>
<td>8</td>
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Showing the effect on dosage and intervals of a local reaction and a constitutional reaction.

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<th>Dil. No.</th>
<th>Quant. per cc.</th>
<th>Reaction</th>
<th>Local Temp.</th>
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Note.—As no name is attached to this paper we are unable to credit the author.—Ed.
It will be well for us now to consider briefly the theory of the tuberculin reaction, and the former methods of injection.

Tissues which have never come in contact with the tubercle bacillus, show no reaction to the tubercle products; enormous doses can be injected, even up to 1,000 cmm., without the production of any general disturbance. These tissues have made the acquaintance of the tubercle bacillus, to them tuberculin is a powerful poison. Previous contact with the tubercle bacillus has given these tissues a power not possessed by the tissues of the healthy, that is, the power of rendering toxic the previously innocuous tubercle products. The tissues have become "sensitive" or the patient is said to be in a state of "hypersusceptibility" or to have developed "idiosyncrasy" to the tubercle bacillus. According to the theory of Wolff-Eisner the tissues of the tubercular produce a specific antibody capable of breaking down the tuberculin molecule with the formation of toxic products in much the same way that a digestive enzyme breaks down an albumen molecule into a simpler and a highly toxic albumose. This antibody is called a lysin. In the non-infected organism none of this lysin is present, the injected tuberculin is not broken down but circulates as a harmless foreign albumen. In the infected organism the tuberculin meets lysin at the site of injection, is broken down with the formation of a toxin which produces a local reaction. If in sufficient quantity this toxin reaches the general circulation and causes a general reaction, and finally a focal reaction by irritation of a tubercular focus. The injection leads to an increase in the antibody content of the blood, and an increase in the lysins, which leads to tolerance.

The results of the tuberculin reaction, that is, the general symptoms, are bound to be to a certain extent deleterious; however, by the focal reaction there is obtained a flooding of the tubercular area with blood, and antibodies are brought to bear on the focus of disease. At the same time there is a danger that bacterial products and even bacilli may be washed into the surrounding parts, so while a powerful asset in the treatment of tuberculosis tuberculin may at the same time cause harm, there are, therefore, certain harmful symptoms and results to suppress and certain useful actions to encourage.

The methods of tuberculin administration that have been in use since its introduction are:

1. Reactive. This was the method originally used by Koch. The dose is sufficient to cause a reaction and the same dose is repeated every three to four days. Disastrous results followed, the cause being that the hypersusceptibility was not then known and the action
of the immunizer upon the diseased individual was not thoroughly understood.

II. Non-reactive. The same minute dose was inoculated every three to seven days. The hypersusceptibility, however, can only be reduced by increasing doses, the same dose has no further effect upon the hypersusceptibility after one or two inoculations; in fact when a small dose is repeated for any length of time the hypersusceptibility increases, a distinctly harmful effect in cases with a good outlook where the process is quiescent and hypersusceptibility is not very marked. This harm is often overlooked and laid to the progress of the disease.

III. Small doses increased according to the amount of hypersusceptibility in each individual case. To obtain toxic immunity the first dose must be less than that required to produce toxicity, this dose being increased in proportion to the acquired tolerance of the patient. The danger in this method is that the increase in tolerance does not keep pace with the increase in tuberculin; severe reactions are therefore frequently encountered. In this method the careful choice of patients is necessary.

Upon analyzing the principles involved in the physiological action of tuberculin Bonime brings out the following facts:

I. The dose of tuberculin has no effect if it is less than the maximum amount that can be tolerated without reaction by the individual.

II. It requires more tuberculin to reach the amount of maximum tolerance at each succeeding dose.

III. The subsequent doses although larger than the first in amount, have no effect if the first dose was less than the maximum amount that could be tolerated by the individual and if the amount of increase is not enough to bring the total to the maximum amount of tolerance.

IV. Any constitutional reaction, however mild, increases the amount of hypersusceptibility, the maximum amount of tolerance thereby decreases thus requiring a diminution of the dose after such a reaction.

V. The only index of the measure of tolerance in any individual is a constitutional reaction, hence a constitutional reaction is desirable in every case.

VI. Since the constitutional reaction lowers the point of tolerance, we must be sure to make such a reaction as mild as possible in order not to lower the tolerance to too great a degree.
Upon these points Bonime bases a system of dosage which begins with a certain dose of tuberculin, increasing this dose subsequently by a definite amount for a certain number of treatments, then increasing the increase at definite intervals until a reaction is reached. The reaction thus produced is mild because it is produced by the smallest amount of tuberculin required to produce such a reaction in the individual, taking account of the tolerance produced by the previous injections. By increasing the intervals after such a reaction and decreasing the dose by a small amount to offset the decreased tolerance produced by the reaction, we know that we are using a quantity of tuberculin as nearly exact for that particular individual as can be approximated to produce the ideal effect. A second, or even a third reaction may develop during the course of treatment, but these can be but mild. The continued maximum effect produced by thus constantly keeping at the level of maximum tolerance far outweighs the ill effect produced by such reactions.


ABSTRACT OF CONFERENCE.

By Dr. J. G. Clark of Philadelphia at the Obstetrical and Gynecological Sectional Clinic on September 19th, 1921.

Subject:—"Radium in Gynecological Conditions."

The speaker drew on the blackboard a scheme representing the menstrual cycle and pointed out the differences which characterize the normal cycle. Using the same scheme he discussed the pathological alterations of the cycle as regards the occurrence of menorrhagia and metrorrhagia dealing specially with haemorrhages due to hyperplasia, fibroids and malignant disease.

He then took up the question of the radium treatment of these haemorrhages especially in regard to carcinoma. Speaking favourably of his results, he estimated that there ought to be at least 100 milligrams at the disposal of the operator, preferably in a 50 milligram tube, a 25 milligram tube and 25 milligrams in a couple of needles for insertion into the broad ligament. He advised against its use in inflammatory conditions.

In carcinoma, at first he used 100 milligrams for 24 hours, shielded with rubber tube and lead protectors, but this was not found satisfactory on account of the occurrence of burns, proctitis.
and fistulae. Now he uses an anaesthetic, remove any large cauliflower outgrowth, but otherwise leaves the cancer alone. A tube of 50 milligrams is placed in the cervix and needles into the broad ligaments, the vaginal wall being carefully packed off by means of gauze so as to be held well away from the radium. At first a second exposure was given after six weeks, but recently this has not been found necessary in many cases. After successful radiation in an inoperable case, it is not wise to operate as a rule, for a protective barrier is set up by the radiation and this may be destroyed during the operation.

In the event of a hysterectomy being performed, it is well only to radiate after an interval of 14 to 21 days and then only under careful protection and for 12 hours.

Cases of cancer of the fundus, unless too far advanced, or unless there is a critical surgical contraindication, should be submitted to operation and followed from 14 to 21 days later by a light radiation of the vaginal form.

It must be borne in mind that the chief blow at the disease is given at the first radiation.

With regard to fistulae it is undoubtedly the fact that radiation sometimes causes them.

The speaker quoted statistics as follows:—Among our 112 living patients, thirteen have had fistulae; of the 201 dead, twenty-one were noted sooner or later before death. In the case of the living patients these were due practically all to the irradiation but most of these date back to the lead protector days. Amongst the 201 dead patients, there were approximately 10 per cent of fistulae and this is a triumph for radiation, for out of these 201 there were no fewer than 60 in whom local healing was maintained to the end, the patients dying of metastases. Had these 201 patients not been irradiated there would have been a much larger number of fistulae as a natural result of the cancerous process. Whilst not advocating the use of radium as the best treatment in an early case where operation can be undertaken, the speaker put it forward as the best treatment we have in the cases which too often, alas, still come with the disease far advanced.

At the request of the meeting Dr. Clark also took up the question of operations for sterility. Using plasticine he demonstrated the steps of an operation, in which using great gentleness the tube was cut and the horn of the uterus sliced off till the endometrium appeared. No stitching was done and vessels were ligatured with care, so as to avoid bleeding. He cited one case in which this procedure had given the desired result.
TECHNIQUE FOR STAINING THE AMŒBA WITH IRON HÆMATOXYLIN.*

By CHAS. A. KOFAD, Sidney S. Kornhauser, Olive Swezy.

(Heidenhain Hæmatoxylin.)

1. Take a small amount of feces, mucus being the best, mix with a drop of normal saline on slide or cover glass; while still wet put in Hot Schaudine Sol. Specimen side down.

Schaudine.
Saturated Sol. Mercuric Chloride . . . . . 200.00 gm.
Glacial Acetic Acid . . . . . . . . 15.00 "
Alcohol ninety-five per cent . . . . . . 100.00 "

This solution should be heated to 60°C. before placing the slide in it. Leave it in this solution for ten (10) minutes or longer.

2. Place in seventy per cent alcohol and stain at leisure. In case you care to have the specimen confirmed by some one else, carry the technique to this point and ship in a container containing seventy per cent alcohol.

3. Transfer to basin of clean water for ten minutes.

4. Place in four per cent aqueous solution of Iron-Alumn (Ammonium-sulphate of iron), for one to three hours.

5. This solution acts as a mordant. Wash in water freely.

6. Place in Heidenhain Hæmatoxylin half per cent aqueous solution of hæmatoxylin. (This solution should ripen for at least six weeks, the older the better, even though mould grows on it. Leave in the above stain overnight.)

7. Wash in water.

8. Destain in one and a half per cent aqueous solution of Iron-Alumn. Leave specimen in this solution one to five minutes (wash quickly in water to stop the action of the iron-alumn), place on glass slide, being sure to keep it wet (never let it dry) and look at it through the scope to see that the destaining has gone far enough to bring out the finer details you are looking for.

Sardia cysts about eight minutes.
Amœba cysts about five minutes.

* This is the technique, which was given to me, and instructed by Charles Edmund Simon, M.D., of the School of Hygiene and Public Health, Johns Hopkins University, in his original work on the Sardia.
Cheloniastix cysts about three minutes.
Live ameba about one and a half minutes.

9. Run up through alcohols. Thirty per cent three minutes, fifty per cent four minutes, seventy per cent four minutes, eighty per cent four minutes, ninety per cent four minutes (absolute one hundred per cent) five minutes.

10. Clear in Xyol (Xylene) for one minute or more.

11. Mount before it dries in Balsum.

The two best references on this subject are the book, Human Intestinal Protozoa in the Far East, by C. M. Wenyon and F. W. O'Connor, Welcome Bureau of Scientific Research, London. Also Criterions for Distinguishing the Endamoeba of Amebiasis from other Organisms, Vol. 24, of Archives of Internal Medicine, No. 1, July 15th, 1919.
Staining the Amoeba with Iron Haematoxylin.

Christmas day, 1921, he noted a slight weakness of the legs, some dizziness with headache in the left temporal region; this headache changed to the same region on the right side and down the side of the neck, leaving the left side quite clear of pain. On the day after Christmas he played a game of basketball, got very hot and did not put on his clothes right away. As a consequence he got chilled, to which he attributes all of his troubles.

From the physician in charge of the University I obtained the following history:—For the last two years he has grown very rapidly, and is much above the average height. With this growth there has been a corresponding bodily weakness, with susceptibility to infection. It was reported, the students said, he had dreams at night and was acting queerly about Christmas time. There was no fever, pulse was normal, and blood was negative for malaria. The condition suggested neuritis.

The patient went home on the first of January and from the father I obtained the following history:—Complained of headache; arms, legs and hands were also very painful; slight cough with profuse expectorations. Unable to sleep either night or day, eyes would not close but stood open about one-quarter of normal, all the time. Incessant mumbling all the time, sometimes one could understand what he was saying and at other times not. At times he would sing hymns and college songs, then he would read aloud, quite plainly, from some standard book. He would often, from memory, recite his school books. Again he would call his sisters and brothers to bring their toys and play with him. This condition was a gradual development from the time he came home up to the time I saw him on January 16th, 1921, when I asked him to come to the Hospital.

The above story was told me in the presence of the patient. I asked him if he could remember any of it. He said that he could remember part but not all of it. He told me a most weird detective story, of being up in a balloon and ending up with the use of a flying machine.

EXAMINATION.

Lies on his back, incessant mumbling, muscles of the whole body at times jerking: eyes about one-quarter open, quite a fixed
stare when eyes are not moving from side to side. Answers ques-
tions very slowly, sometimes having to be asked the question
several times before the answer is given. At times there are chorei-
form movements of legs and arms. Weight about one hundred
and twenty pounds, thin, slim body but seems well nourished. Color
good; skin clear.

Eyes. Pupils somewhat dilated, eye-grounds unobtainable on
account of nystagmus. Reaction to A and L not obtained very
clearly. Quite a distinct ptosis.

Mouth. Tongue coated, very visible tremor when asked to
protrude it, deviates to the left side on protrusion. Teeth good
shape. Corners of the mouth twitching all the time, with twitch-
ing of the muscles of the left side of the face. When asked to
whistle his mouth would deviate to the left.

Glands. Nothing abnormal found.

Reflexes. Patellar, biceps and triceps not obtained.

Lungs. Left lung from the first interspace to the third, along
the sternal border, can be heard friction sounds. Right seems
normal. Percussion note over the left seems a little lower than the
right. Vocal frematus seems to be somewhat diminished over the
left.

Heart. All sounds seem to be normal.
Mitrar (apex) 5 cm. to left of sternum in 5th interspace.
Aortic 3 cm. to left of sternum in 3rd interspace.
Pulmonary 2.5 cm. to left of sternum in 2nd interspace.

Liver. Dullness starts at the seventh rib, nothing abnormal
found.

Abdomen. Nothing abnormal found.

Extremities. Course tremor of hands when placed in apposition
over the chest. Complains of pain in arms and hands as well as
legs, also weakness of all extremities. Disturbances of all the motor
functions of the extremities. Unable to stand without support.
Babinski positive. Ankle clonus positive. Jerking of muscles over
all the extremities, when lying uncovered for observation.

OBSERVATION FROM DAY TO DAY.

January 19th. Slight twitching of the left corners of the
mouth. Respiration very laborious and deep. Very pronounced
tremor of the tongue and hands. Wakes with slight convulsive
movements, and for a few seconds there is a very plain choreiform
movement. Nystagmus, eyes deviate to the left. Low mumbling
talk which cannot be understood. Tongue protrudes to the left side. Abdominal reflexes seem to be a little sensitive. Nurse reports his walking in his sleep (when asked to stand was unable). Talking sometimes quite plain again of the low mumbling variety. Some convulsive movements.

January 21st. Slight improvement but still very restless.

January 23rd. Convulsive movements quite improved, seems to be asleep, but is not, lies very quiet. Will answer questions quite clearly but slow. On the whole seems to be improved.

January 24th. No dreams that he remembers of, mind seems to be quite clear, tongue still coated, little or no tremor, course twitching of the corner of the mouth.

January 25th. On the whole still improving, though eyes are still open only about one-quarter of normal. No dreams, no tremor. Nurse said that he had dreams last night and the night before, but did not seem to disturb him. Says that he seems to be sleeping for the first time since he came.

January 26th. Eyes wide open seems to have changed to a new person during the night. Mind is quite clear. Answers questions clearly and quickly; eyes bright and clear. Wants to eat and get up. This seems to be the turning point.

January 27th. About the same as yesterday, though the nurse reports him as having had dreams, though it did not seem to disturb him, and he does not remember having had a dream.

January 28th. Eyes show no tendency to close, laughing and talking, asking questions about his trouble. Takes an interest in everything and all that is about him. Patellar, biceps and triceps reflex about normal. No tremor of tongue or hands. Eyes seem to be normal, has perfect control as to position. Can follow an object in the hand, by sight, without any abnormal sign. Mouth shows no tendency to deviate at all, can pucker the lips as any normal person can. On talking to his father who spent the night with him, he says that he still has dreams, but they do not seem to disturb him. This improvement kept up until February 9th, when he was discharged on request. I have since seen him in his home and he still seems to be improving, though his pulse was quite high for the first few days after leaving the Hospital. I saw him on February 15th, and he still seems to be improving, though one can see he has been a sick boy. He walks and talks but seems to have little energy to do either.

June 1st. I saw the boy and he seems to be quite normal again, full of life and is anxious to be back in school.
I feel that this disease should be divided into three stages, i.e.:
1st. Stage of onset.
2nd. Stage of motor disturbances.
3rd. Stage of recuperation.
I do not see any necessity for further dividing it, for it would further complicate matters, and bring symptoms into stages. I feel that a clear history will bring out my points of division. Constipation was a constant feature of the disease as well as incontinence of the urine. I think the lethargic stage, called as such by some, is the stage at which the disease is at its height, or stage of motor disturbance, and that we should not use the term 'lethargic' to designate any such disturbances of consciousness. These patients are quite able to answer questions during any stage, when forced to collect their thoughts and co-ordinate them with speech.

LABORATORY REPORT.


January 18th. Blood. Basophiles .3 per cent, Poly morph. 96.6 per cent, Lymph .3 per cent.

Spinal fluid normal to color and pressure, Cell count 12.

January 24th. Whites 12,200, Reds 5,432,000.

REFERENCE.

All references are taken from the American Medical Journal.
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Vol. 72, No. 11, March 15th, 1919.
Epidemic Encephalitis (Nona).
Peter Bassoe, M.D.
Vol. 72, No. 14, April 5th, 1919.
Lethargic Encephalitis.
  Preliminary Report.
  Frank A. Ely, M.D.
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  Beverely R. Tucker, M.D.
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  Paul Wegeforth, M.D. and James B. Ayer, M.D.
Vol. 73, No. 1, July 5th, 1919.

Occurrence of Bilateral Sympathetic Ophthalmoplegia.
  William B. Cadwalader, M.D.

Epidemic (Lethargic) Encephalitis.
  Clinical review of cases in the Pacific Northwest.
  William House, M.D.
Vol. 74, No. 6, February 7th, 1920.

The delirious and the Meningoradicular types of Epidemic
  Encephalitis.
  Peter Bassoe, M.D.
Vol. 74, No. 15, April 10th, 1920.

The diagnosis of Epidemic Encephalitis.
  Leo Loewe, M.D. and Israel Strauss, M.D.

Observation of a green producing coccus from the brain in a
case of Encephalitis.
  S. John House, M.D.
Vol. 74, No. 13, March 27th, 1920.

Hitherto undescribed sign in diagnosis of Lethargic Encephalitis.
  Thomas F. Reilly, M.D.

Acute infectious myoclonus multiplex and Epidemic myoclonus
  multiplex.
  (Epidemic Encephalitis)
  J. Ramsay Hunt, M.D.
Vol. 75, No. 11, September 11th, 1920.

Insomnia following acute epidemic (lethargic) Encephalitis in
  children.
  William M. Hopp, M.D.
Vol. 75, No. 20, November 13th, 1920.
Epidemic Encephalitis.

CHURCH GENERAL HOSPITAL, WUCHANG

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Temperature, Blood Pressure, and Heart Rate chart.
SUMMARY OF THE CASE HISTORY OF A PATIENT.

Examined by G. S. SHIBLEY, M.D.


Chief Complaint: Drowsiness, diplopia and dimmed vision, duration ten days.

Family History: Unimportant.

Past History: Venereal diseases denied. Similar case is said to have occurred in the same camp that the patient was in.

Present Illness: Onset about twenty days ago with chilliness, fever, malaise uneasiness and bad breath. About ten days ago noted diplopia, vision was blurred and eyes itched. Next day had generalized twitching movements with pain in back and pulling of mouth to right. Swelling appeared over the scapulae. The patient feels sleepy, but his back pain and twitching keeps him awake; mentally he is perfectly clear. Day before he was admitted symptoms became worse, drowsiness marked, twitching more frequent, vertigo present: slept a good deal and sleep was deep; he was arousable for meals and when awake was quite clear mentally. Headache was also noted.

Physical Examination: The patient is semistuporous, he lies in bed muttering, there are occasional grimaces, there are slight purposeless movements of the extremities, especially the upper. The patient can be aroused and when awake seems reasonably clear, although he is somewhat uninterested in his surroundings. Orientation for person and place accurate, time not quite certain. Routine physical examination negative except for a badly coated tongue.

Nervous system examination, Cranial nerves: Motor III, IV and VI: slight divergent strabismus, no ptosis. V, VII, IX and XII negative; XI slight stiffness of neck, sensory nerves unaffected.

Spinal Nerves: Sensory unaffected. Motor, there is some stiffness, possibly there is a voluntary resistance factor here as relaxation does occur; occasional twitching movements, muscles groups, not individual muscles or their parts; Tone of muscles normal. Reflexes: Deep, active, equal, not increased, no clonus: Superficial present, right supraumbilical greater than left; No Babinsky or related phenomena.
Summary of the Case History of a Patient.

Laboratory Findings: Blood: W.B.C. 16,000, polys 66 per cent, eosins 6.5 per cent, bases 0.5 per cent, lymph 21.5 per cent, large mono and trano 6 per cent. Urine and sputum negative. Feces—ascaris. Blood Wassermann—negative. Spinal fluid: Clear, normal tension, cells 2 to cm., globulin and Wassermann tests negative.

Course: Slight fever at onset, 37.5, 38. C. disappeared in three days. Pulse rapid on admission, 120 down to 80-70 in four days. On supportive treatment the patient improved steadily and left the Hospital practically well, except for slight drowsiness, on February third.

(The notes on case No. 1 were sent to Dr. Andrew H. Woods, of Peking, who in a personal communication made the following comments.)

"Epidemic encephalitis has been prevalent in and around Peking, and cases have been reported from other parts of China, as far south as Canton, during the past three years. In the interesting case reported by you the peculiar clouding of consciousness, oculo-motor trouble, twitching and tremors, and the pyramidal tract symptoms predominated. The word 'lethargy' is to be applied only to the condition of somnolence out of which the patient can be more or less completely aroused, but back into which he promptly sinks after the stimulus is removed. It is by no means a constant feature of encephalitis epidemicæ. It is marked in many cases, and is the feature of the disease which has caught the attention of newspaper reporters, and has thus become the part of the concept of the disease grasped by the public. The disease is often, therefore, called 'sleeping sickness,' and has become confused with African 'sleeping sickness' (caused by trypanosoma gambiense).

The onset in your patient was typical, and its manner of development forces one to think of the condition as an infectious process. The ptosis, or other palsies, often appear shortly after the febrile onset. In this early appearance of nuclear paralysis it resembles anterior poliomyelitis, with which epidemic encephalitis is closely allied both in symptomatology and in pathology. Nystagmus has been present in some of our patients, and is mentioned in many others reported in the literature.

The muscular jerking (myoclonus) is perhaps the most dramatic feature of the disease. I have seen it so severe that the patient danced jerkily about like a choreic Punch and Judy manikin. Myoclonus when present may be very persistent, and in some of my cases has continued till late in convalescence. It may affect
a few muscles; again it may affect most of the muscles of one-half of the body (hemiplegic distribution); or it may keep muscles in all parts in motion. I think that without exception in my patients it has ceased during sleep. Athetoid or choreiform movements and tremors are seen rather frequently. They are probably due to lesions affecting the corpus-striatum-red-nucleus system, which regulates the tone and synergy of the muscles.

Pain sometimes described as sharp, even agonizing, but often only moderate, is frequently present. Tenderness of nerve trunks and of tendons may exist and last long into convalescence.

Your patient appears to have had distinct involvement of his cortico-spinal (pyramidal) system, since he had feebleness of the extremities with clonus and extensor (Babinski) plantar reflexes. The failure to elicit tendon reflexes may have been due to involvement of the anterior horn cells at the appropriate levels. In two of my patients this poliomyelitic lesion was demonstrated in microscopic sections after autopsy.

The lesions uniformly found in these cases consist in general hyperemia, infiltration of lymphocytes into the pia-arachnoid, destruction and phagocytosis of the nerve cells. These lesions may be limited to certain areas, perhaps most often to the region around the aqueduct of Sylvius and the basal ganglions; though I suppose the brain cortex is rarely entirely spared. In your patient the symptoms are explained by lesions affecting the motor cortex (weakness, clonus and Babinski reflex), the basal ganglions (chorea), the oculo-motor nuclei and parts of the anterior horn cells of the spinal cord (muscle palsies with flaccidity).”

THE COMMUNITY SANITARY SURVEY OF KULING.

The survey of Kuling’s health, now practically complete, has been made by public-spirited residents under the direction of physicians. The full report occupies about sixty pages and even a complete summary (in the Bulletin) is impossible because of lack of space. The facts, as they have been carefully collected, their interpretation and the recommendations for improvement are available for the use of the Council and anyone else interested.

In this survey we have tried to be single-minded, having in mind the sole motive of the prevention of disease by the best available methods. There are large economic and administrative problems involved to which we have not been blind, but we have set
health as the goal that is worth the price of economic and perhaps administrative readjustments. In this work no attempt has been made to improve on the truth. It is assumed that the presentation of such carefully collected facts as these will be eloquent and sufficient in itself.

A careful study has been made of the nature and prevalence of preventable disease in Kuling. While exact statistics are not to be had, the significance of the diseases present (here) may be indicated as follows: Malaria is widely prevalent, in excess of seventy-three cases per 1,000 residents within two years. The malaria-carrying mosquito is present and has access to carriers and to active cases of the disease, because of lack of care in screening and in use of bad nets, so that this disabling and death-producing disease is a danger (here).

Diarrhoea and dysentery are widely prevalent, an estimate on available reports indicates 573 cases in Kuling this summer before July 15th. The diarrhoeas of infancy and of adult life, amoebic dysentery, typhoid fever, cholera and intestinal worms are commonly spread by gross contamination of water, milk and other food by human feces. Direct channels for this contamination exist in Kuling where: (a) Feces and urine are scattered widely over the hillsides from which we get our water, by careless individuals and by Estate scavengers who relieve the weight of their night soil loads in concealed places. Even if not directly deposited in streams, the frequent rains serve to make all surface water, inclusive of many so-called springs, unsafe for use unless thoroughly boiled. In the face of this, twenty-one per cent of the community is drinking unboiled water!

(b) Housewives frequently fail either to provide facilities for, or even to encourage, the careful washing of hands of kitchen servants and children's amahs, thus affording a direct channel for this and other types of disease to spread. (c) Fresh night soil is used in liquid suspension and is sprinkled broadcast over growing vegetables in the nearby gardens, so that any food not thoroughly cooked offers a direct channel for these diseases. (d) Flies breed unrestricted in the night soil disposal pits and in many other collections of filth. They then provide a fourth and important channel of spread of intestinal disease. In these four ways, preeminently, short circuits are established between the intestinal discharges of those ill with disease or carriers and the mouths of those who become infected with these living parasites which cause disease.

Typhoid fever is not rare, is now present in Kuling, and is so easily preventable by inoculation that it is a shame at our intelligence
that fifty-eight per cent of the people here are unprotected. Trachoma, a highly communicable disease, is widely present and is spreading through lack of medical inspection of individuals and servants, failure to treat and cure the active cases and our lack of emphasis on personal contact as a means of spread.

The other acute infections, diphtheria, scarlet fever, smallpox, whooping cough, etc., are frequently present in the Gap and they not uncommonly spread to the foreign community. It should be a matter of public concern that twenty-eight per cent of our children under one are unvaccinated, an age in which smallpox is by no means rare and is extremely fatal; even adults from twenty to thirty-nine are only half of them protected by a recent, successful "take." The fact that neglect of such a profitable and safe procedure as vaccination should be prevalent (here), speaks for a lack of sanitary consciousness among us who have lived in surroundings of Chinese neglected sanitation, where our senses have been dulled. As a result of this very neglect, records were recently collected of 111 cases of smallpox and twenty-eight deaths among missionaries in China, a fact that should pierce through to our senses!

Diphtheria, though not highly prevalent during the summer months, is nevertheless responsible for six per cent of all deaths among missionary families in China, besides much sickness and disability. The occurrence of this disease can now be prevented with almost absolute certainty by a simple inoculation which should be given to children at this time to prevent the occurrence of the disease in the diphtheria season. Later this month in Kuling opportunity will be offered everyone to be tested for susceptibility to diphtheria. Children who are susceptible can then be protected for life against the disease.

While the responsibility for these measures of protection is essentially a personal responsibility, there is still a large place for the expression of a strong public opinion which, if properly wielded, can be far more effective than the most perfect set of laws could ever hope to be.

We must not forget that eighty-five per cent of the total Kuling population is Chinese and the relation of the Gap to the Estate is a significant relationship on which much careful study was spent in the Survey. The fact that in the Estate no public provision has been made for toilet facilities for this large portion of the population suggests one aspect of our obligation to the Chinese portion which is intimately bound up with the health of Kuling.

Again, we are dependent on the Chinese to a very large extent for the purity of our milk supply. Twenty-one dairies with over
350 cows supply the daily demand of the youngest, most susceptible and most valuable part of our human community. How many mothers look further than the container in which their daily supply arrives to inquire of its preparation? There is no official community supervision, although a revenue tax is collected of distributors. The high fat content of this milk permits its dilution, about which many housewives are concerned, but far more important, the whiteness of the milk serves to mask all forms of dirt that can easily be demonstrated to be in it. No precautions are taken by the dairies to prevent the spread of tuberculosis through milk and it is fortunate that we are immune to the large amount of rinderpest now present among the herds. Inspection of cowsheds and of distribution arrangements shows that dirty methods are in use everywhere. Experience has shown that it is impossible to produce clean milk from such surroundings.

Although actual boiling will kill most of the bacteria capable of producing disease through milk, this process does not entirely offset the disadvantage of contaminated milk. Babies fed on boiled dirty milk have a greater amount of diarrhoea and enteritis than babies fed on clean milk. They also lose some valuable vitamins when milk is boiled. Besides diarrhoea, dysentery and typhoid fever, milk is known to play a part in the spread of tuberculosis, diphtheria and scarlet fever. In brief, what should we do? The dairies will probably be run by Chinese for some time to come. The dairymen should be rewarded by a premium on clean milk produced by approved methods. A central milk depot should be established where all milk sold on the Estate would be bought on the basis of fat content, clarified, pasteurized or boiled and distributed in sterile, sealed containers. Business initiative, money and an intelligent community cooperation are necessary for success. Those who at once desire clean milk that will be completely under their own control can obtain powdered milk and, with some brands, make a completely satisfactory milk for infants.

A comprehensive survey of the water problem has been made and the following are the outstanding features: The community uses the following sources of water: Twenty per cent from piped springs; twenty-eight per cent from open streams; fifty-two per cent from open "springs." Outside of several privately owned pipe systems, there is in operation only one public piped supply, situated in the northeast section of the main valley. After successful operation for several years, the feasibility of this method of clean water supply has been established. There are some sections where at present the supply is insufficient and some constructive plan will have to
be promptly devised. Plans for impounding water at points beyond the Estate limits have been made in numbers, but they commonly neglect the serious problem of acquiring the property involved. A well protected watershed is desperately needed in view of the only other supply available and every effort should be made to secure such a source. Failing that, we shall have to make the best use of what supplies we have. Inspection and laboratory analysis shows extremely few sources, even in piped springs, where use of the water without boiling is safe. Even then, the easy expedient of boiling the water is a factor of safety which the provident housewife will not overlook. However, at present twenty-one per cent of the population is using unboiled water. It is safe to say that there would be a substantial reduction in this twenty-one per cent if every housewife would herself trace back the water she uses to its source.

A well-thought-out plan to conserve the available spring water and to distribute it to the houses in a cleanly manner is worthy of our best effort. Kuling can well afford to replace her present mediæval system with a modern plan in which she can avail herself of the clean water at her door and appropriate this greatest single achievement of modern preventive medicine.

The following summary of the sewage disposal situation represents only a fraction of the work and effort expended by the committee on this subject. The present system is inadequate because: (a) A nuisance is present in connection with the operation of the existing pail system and direct damage to the health of the community results. (b) The scavenger coolies are doing work that is unsatisfactory to at least half of the community, as recorded in the questionnaires, even though they are well paid to do efficient work. (c) The volume of urine, feces and garbage from a community of over 3,000 persons is obviously more than the volume, supposedly representing all the excreta, which appears at the disposal grounds. There is also known to be a significant discrepancy between the volume of sewage collected, as indicated by the tag system, and that delivered at the disposal grounds by actual count. Furthermore, many residents have personally seen the disposal of the remainder of the excreta by the following methods: (1) Liquids are strained off the tops of buckets along roadways or in streams, usually in secluded places. (2) The commode rinse water is quite generally thrown out on the ground, not carried away. (3) Truck farmers are known to come themselves and carry off part of the nightsoil. These men are not employed by the Estate and their methods are under no direct control.
These facts, borne out by repeated instances and many observers, make plain the conclusion that a very considerable portion of the excreta of the community is scattered abroad, promoting disease, flies and discomfort. The present system, in short, is not accomplishing what can reasonably be expected of a satisfactory and sanitary disposal system.

The prevalence of flies is largely affected by the ease of access to the dejecta afforded by: (1) Promiscuous scattering of commode contents and lack of privy provision for coolies and others. (2) The widespread breeding of flies in the feces at the disposal pits. (3) The breeding of flies in neglected public or semi-public toilets very near residences, e.g., in the Church lot comfort station. (4) Failure to make commodes in homes flyproof. Twenty-two per cent of the householders frankly acknowledge this defect.

It is a noteworthy fact that, among the acute diseases most prevalent on the Estate, diarrhea and the dysenteries represent a very large and important part. These diseases of the intestinal tract, along with typhoid fever and cholera, are known to have their sole source in the dejecta from the bowels and kidneys. A very direct channel for the spread of these diseases is established through the promiscuous scattering of feces and urine not only from foreigners but from many hundred Chinese who are known to be carriers of intestinal disease. The fact of the widespread prevalence of these very diseases in a locality in which such evident opportunities are existent for contamination of water, milk, food from fingers and flies, etc., makes a very clear case against the existing methods. Experience abundantly demonstrates that such conditions as these described:

(a) Are responsible for much disease.
(b) Are unnecessary, especially in a country where labor is cheap.
(c) Can be corrected with a resultant saving in health and life. This saving holds true not only in those diseases known to be directly spread by the intestinal tract, but in other diseases as well.

Several methods for improvement have been carefully thought out by the committee ably assisted by expert engineers. It is impossible to give more than an outline of improvements suggested. (a) The present system may be improved by better supervision, more scavengers and more care at the pits. (b) Modifications in the present system are suggested which would obviate the use of the open pail and make the delivery of the nightsoil at the pits more certain. (c) A method of water carriage in tile pipes with liquefying sewage tanks either in several parts of the valley or simply at the lower end. Piping would not connect each house.
but suitable hoppers would be provided in each section of Kuling to receive the nightsoil. This would largely obviate spilling nuisances, danger from flies and disposal to uncontrolled gardens. Its cost would be largely that of installation. Operation would be automatic under intelligent supervision.

A very commendable means for the disposal of specially soiled waste water, for instance commode rinse water, is proposed. Each house should have a simple wooden box sunk in ground with a filler of wood ashes and charcoal into which such liquids should be poured. In this brief way is epitomized the careful work of the committee on sewage disposal.

In summary of the findings it is well to speak of the discoveries in relation to household sanitation with which one survey section deals. Under existing conditions the degree of success of household sanitation will generally determine the danger of this situation to the individual. It is possible to check most of the channels of disease by appropriate prevention in the home; it is better economy, however, to do for the community what each housewife will probably not do for herself and her household.

Five per cent of the 1,370 servants employed in households have had a medical examination to exclude communicable disease. Only thirty-eight per cent of the housewives give even occasional supervision to the boiling of drinking water. Sixty per cent of families here eat fresh vegetables or fruit without cooking and in spite of the high degree of contamination of such foods known. Twenty-four per cent rely on chemicals to disinfect their vegetables and there is grave doubt of the safety of the process. A number of families are relying on chemicals which are entirely incapable of killing the cysts of amoebic dysentery.

Only forty per cent of houses have any screening at all and half of the residents use no bed nets. Of the 1,220 commodes in use, twenty-two per cent are not flyproof and in thirteen per cent no use is made of disinfectant solution to kill infection and keep flies away. Scores of failures of the scavengers to do their proper duty are reported. A third of the housewives have provided no facilities to encourage their servants to wash their hands and, even more, have failed to encourage or require this helpful practice. On the part of many households there is serious failure in not having inoculations against smallpox, typhoid fever and diphtheria made at proper intervals and regular medical examinations are neglected.

In conclusion, Kuling can well ask herself if she is willing to pay the money price to set these things right or whether she will waste in sentimental anguish the invaluable opportunity to begin a
constructive program in 1922. It has been said that the facts brought out in this survey are not new facts. No attempt has been made to report any but the existing situation and if this situation has been recognized for a long time, then who is responsible for the existence of these grossly unhygienic conditions? (Are you contributing your part of a wholesome community spirit which can really make Kuling a healthful place in which to live?) An ounce of prevention is worth many pounds of cure!

R. M. Atwater, M.D., C.P.H., Dr. P. H.

MINUTES OF MEDICAL MISSIONARY CONFERENCE AT ST. LOUIS DURING A.M.A. CONVENTION
MAY 22-26, 1922.

Minutes of Meeting held Tuesday Evening, May 23rd.

Meeting opened with Prayer.

Following officers were elected:
Dr. E. M. Dodd, Chairman,
Dr. L. F. Heimburger, Secretary.

Following Committees were appointed:

1. AGENDA
   Dr. J. G. Vaughan, Chairman
   Dr. Harriet Davies
   Dr. Thomas H. Coole

2. RESOLUTIONS
   Dr. R. H. H. Goheen, Chairman
   Dr. J. L. Harvey
   Dr. Adelaide Woodward

3. PUBLICITY
   Dr. R. T. Shields, Chairman
   Dr. R. H. H. Goheen
   Dr. Arthur H. Norton
   Dr. L. F. Heimburger
   Dr. C. C. Drummond

4. RECOMMENDATIONS
   Dr. Wm. W. Cadbury, Chairman
   Dr. Dennis V. Smith
   Dr. Nathaniel Fedde

Meeting closed with Prayer.
Minutes of Meeting held Wednesday, May 24th.

Meeting opened with Prayer.

The discussion led by Dr. Vaughan was on the question of the preparation of medical missionaries to the field. The following resolutions were adopted:

"That we express to the Boards our judgment to the effect that:

1. Every medical missionary have at least one year of internship in America.

2. All new medical missionaries spend at least one year with a well-equipped hospital on the field.

3. All new medical missionaries going to tropical or subtropical countries have a course in tropical medicine.

4. All new medical missionaries take at least the State Board examinations before going to the field—preferably the National Board examinations—to secure license to practise in America."

Minutes of Meeting held Thursday Evening, May 25th.

Resolutions of Continuation Committee—voted as follows:

1. That we recommend to the Committee of Reference and Counsel of the Foreign Missions Boards of North America, the appointment of a Continuation Committee to be composed of Drs. Vaughan, Dodd, Dickinson and Haynes, with power to co-opt other members.

The duties of this Committee—to prepare for and make arrangements for next year's Annual A. M. A. Conference, to be held at San Francisco.

2. This Committee shall secure suitable material from the Secretaries of the various Boards, and from missionaries at home and on furlough.

3. Prepare one or more sets of slides for giving illustrated lectures on Medical Missionary work and, if possible, prepare and provide a Moving Picture Film.

4. To inaugurate plans early to get missionaries at home on furlough to prepare papers for the Scientific Sections of the A. M. A.

5. The preparation of suitable printed matter and leaflets, explaining purpose and aim of Medical Missions.
6. To prepare a permanent Portable Exhibit which may be shipped from place to place and may be included in the Exhibits of Missionary Societies as well as State and County Medical meetings.

These Exhibits must be non-sectarian and international.

Following the above resolutions, Dr. Frank B. Kirby, Sales Manager of the Abbott Laboratories, Chicago, addressed the Conference.

Suggested that more space should be used next year for our Exhibit, and that the material should be exhibited by subjects.

Dr. Kirby further suggested that space be acquired in the A.M.A. publication for Foreign Medical Missionary work. He stated that inasmuch as he was on the Editorial Staff of the Journal of Clinical Medicine and also the Retail Druggist’s Journal, he would see to it that we were given space in those two papers. He also suggested that the Journals of the Foreign Medical Missionary Associations be sent to him for exchange items.

On motion it was voted to suggest to the Committee:

That arrangements be made for souvenirs, supplied from the Mission fields, to be distributed at the next exhibit of the A. M. A.

That we suggest that a Foreign Mission Medical Exhibit be held in the Southern Medical centers next November.

That the Shantung Christian University School of Medicine, Severance University Hospital, Korea, and such Institutions prepare exhibits for the next meeting of the A. M. A. similar to the exhibits of the Mayo Clinic, etc., etc.

That Programs of the A. M. A. Conference be sent early to furloughed medical missionaries so they can discuss matters of interest in the sectional meetings.

Questions from letter of Mr. Bible, dated May 20th, 1922, to Dr. E. M. Dodd:

“1. Would it be feasible for the Mission Boards to ask the medical missionaries of a given country to outline a plan and program for safeguarding the health of missionaries and their families? Under this general question there might be a subhead such as this:

The Committee of Reference and Counsel, acting for the North American Boards, asks the China Medical Missionary
Association to take up the entire matter and make recommendations to be presented to the Boards.

2. Have the members of this group at St. Louis found it possible to secure opportunities for the special study they have desired to do while on furlough? If not, has the difficulty been primarily financial?

You will recall that we have assumed that the medical missionaries need help and direction in this particular. The inquiries which I sent out through the Boards to their medical missionaries on furlough did not in the main bear out this assumption.

3. What suggestions can be given by this group as to practical help which a Medical Advisory Board might render?

In answer to Mr. Bible's letter requesting information from the missionaries in conference, the following was voted:

In answer to Question 1—Yes.
In answer to Question 2—Yes.
In answer to Question 3—Suggestions for Advisory Board as follows:

1. Postgraduate Work.
2. Counsellors in Medical Educational Problems.
3. Co-operation in Publicity.
4. Courtesies of Medical Organizations in America.
5. Use their influence in enlistment of personnel.
6. Medical deputations to field.
7. Scholarships and remitting tuition for prospective candidates.
8. Medical books and journals.

Minutes of Meeting held Friday Evening, May 26th.

The following resolutions, presented by Dr. Goheen for the Resolutions Committee, were voted as follows:

1. (a) That for exhibits of meeting of Medical Associations and other Assemblies as may be determined by the Medical Sub-committee, a permanent collection be maintained of charts, portraying the scope and achievements of Medical Missions; Reports of Mission Hospitals; representative Journals published by medical missionaries; Photographs and Lantern Slides and Moving Pictures of Hospitals, Dispensaries, staffs and patients; specimens of Pathology and native instruments and drugs.

(b) That similarly the Medical Sub-committee have published for free distribution at such meetings or assemblies appropriate leaflets briefly indicating the scope and achievements of Medical Missions.
(c) That every opportunity be grasped to place such exhibits at large and important gatherings of medical men (in particular the Annual Meeting of the A. M. A.) or other Assemblies as may seem best to the Medical Sub-committee.

2. (a) That it be recommended that every medical missionary on furlough, under consultation with the Medical Sub-committee, be expected to take up postgraduate work for at least four months.

   (b) That Foreign Mission Boards should provide adequately for such postgraduate work.

3. That it be recommended that each Foreign Mission Board have a physician, preferably a medical missionary, as Medical Secretary, honorary or full time.

4. That it be recommended on the staff of each Mission Hospital of 50 beds or more there be at least two medical missionaries, or the equivalent, and two foreign missionary nurses.

5. In 1912 in India the Government passed a Medical Registration Act—Any person may practise medicine in India, but only those with degrees are eligible to registration. Medical missionaries have been exempted from taking the examination for British degrees, if they have diplomas from Grade A Medical Schools of America.

Therefore we approve the resolutions submitted by the Medical Mission group from India as follows:

   (a) That it is our firm conviction, contrary to certain advices, that great medical work remains to be done in India in more adequately staffing, equipping and enlarging existing Mission Hospitals; in developing new Hospitals, Dispensaries, Sanitariums for Tuberculosis, Leprosariums and Insane Asylums.

   (b) That existing Schools for training Christian medical assistants should be supported and developed by union effort.

   (c) That existing Schools for training Christian nurses in connection with many hospitals be supported and encouraged to become standardized.

Voted: That we heartily endorse the Medical Brotherhood Movement as initiated by the Board of the M. E. Church, North, and recommend its favorable consideration by the other Boards.

Meeting adjourned with Prayer.
A Sanctum-onious Retreat.

A summer lethargy must have overcome the members of the C.M.M.A. and while the Printer howls for copy, the Locum Tenens looks through his desk in vain; therefore my Brethren, if the September Number lacks the sleek, well-fed look, you are responsible for temporary famine condition in the sanctum.

You will all doubtless breathe a sigh of relief to know that the Editor, Dr. Merrins, is on his way to China, improved in health, and is going to devote his whole time to the Journal. It is a duty that may well tax the strength of any man, even if he has the proper backing.

Thanks to the virility of the Staff of the Peking Union Medical College there has been no lack of material during the past two years. If some of the readers have felt that there was too much U.M.C. matter and not enough from other sources: theirs be the sin. The L. T. has published practically everything in sight that was worth while, and perhaps something that was not.

With this issue the Locum Tenens is finished; the pen slips from his nerveless hand, and he loses himself in the ranks of the silent majority, “where the wicked cease from troubling and the weary are at rest”: at least so far as it is humanly possible to do so this side of the Styx.
Sanitary Salvation.

One reads so much in the medical journals of to-day of the wonderful advances in the field of hygiene and preventive medicine that he might be inclined to believe that life, in the course of a few years, by parental supervision and legislation, could be made almost fool proof. But the great obstacle and ever present barrier that will delay our advent into that Utopia is the human equation, and by that I mean not the individual vulnerability to this or that disease, but the mental state of the genus homo, which ever inclines him to take chances with his own health or with that of the community.

Sanitary consciousness is a matter of education, and as most educators know that all progress in learning depends not only upon the teacher but the mentality of the pupil; so the acquisition of a universal sanitary conscience will be a long and laborious process.

The report of the Sanitary Survey of Kuling is pretty sad reading and indicates that the medical profession is in no immediate danger of going out of business from lack of patients,—bogus creeds and pathies to the contrary notwithstanding.

The task before us, like the preaching of the Gospel, is an enormous one, and if we consider the time that it has taken since Christ came on earth to develop a Christian conscience, need we despair because the awakening of the sanitary conscience is such a slow process. The parallel between the spread of religious truth and medical truth is very close: those who hear and follow generally live and prosper and those who do neither are cut off.

Health like salvation is the gift of God, but it also depends upon the common sense application of the laws of Nature; and there are certain general principles that should be followed. If in the fullness of time these can be made a part of our method of living, all will be well, but until then, we must keep on with the education of mankind in the laws of health and right living, and, as our good friend Dr. Duncan Main would say, “keep smiling.”
Obituary.

Dr. Andrew Young, of the English Baptist Mission in Shensi, Surgeon in charge of the Baptist Hospital in Tsinanfu, came to China in 1905, after a term of service in the Congo, and entered into Life Eternal in May, 1922.

He was a man of deep spirituality, and his zeal for the physical and spiritual welfare of his patients was untiring.

Foreigners and Chinese knew him as a physician and loved him as a friend. On account of the sweetness of his character he was often affectionately referred to among his friends as "St. Andrew."

The recent deaths of Drs. Stanley Jenkins and Cecil Robinson left him in charge of the always overcrowded hospital, and he too fell a victim to the dreaded typhus, that, in times of war and famine, has taken such a heavy toll of the missionary doctors and nurses in this country.

Dr. Young is survived by his wife, who was Miss Charlotte Murdoch of Baltimore, Maryland, and three children.

Fukien Medical Missionary Association.

The Fukien Branch of the C.M.M.A. held its Annual Meetings at Kuliang, August 3rd and 5th, 1922.

The serious loss that Medical work in the Province has sustained during the past few years by death, retirement or transference to other spheres of eleven doctors, was noted, and the secretary was instructed to write to the Secretaries of the Home Boards concerned pointing out the depletion of Staff and the impossibility of maintaining efficiently the existing work.

Very interesting Papers were read by Dr. J. L. Maxwell, "Some by-paths of Surgical Practice;" Dr. H. D. Matthews, "The Treatment of Leprosy;" and Dr. R. R. Walker, "Kaolin in the Treatment of Cholera." Lengthy and helpful discussions followed each paper.
SOME BY-PATHS IN SURGICAL PRACTICE.

James L. Maxwell, M.D., B.S., Lond.

A paper read before the Fukien Medical Association, Kuling, August 1922.

When your Secretary asked me to read a paper to this meeting, I felt considerably at a loss for a subject that would prove of practical value. The surgical experience of most of us is pretty extensive and to deal with any of the familiar roads, that we have all so often travelled, would be neither interesting nor profitable. But after many years work out here we have either picked up from others, or worked out for ourselves, variants on the ordinary surgical procedures, which, if small in themselves have proved of no slight value in our own hands. To put it in simple words, we each of us have worked out our Surgical Tips, and I propose to-day to give you some of mine. I do this also in the hope of inducing others here to give us their's, and so make this meeting a really valuable one to us all; for it is in such short-cuts, that take us more quickly to our goal, that much of our success lies.

Little that I have to tell you to-day is original, and some of the points I bring up may be commonplaces to you already, but I believe that, for the most part they are not in general use and in some cases I have found them myself of great value.

I. Bladder Surgery. To all of us from time to time come cases of vesical calculus, yet probably to none of us in sufficient numbers to make litholapaxy the operation of election. For practical purposes I suppose we all of us use suprapubic lithotomy almost entirely. I am astonished to find, on looking over the books at my command, that little or no mention is made of the use of air for dilatation of the bladder rather than a fluid medium for this operation. If any of you have not used this method I beg of you to try it on your next case and I am certain you will never again dilate a bladder with fluid for suprapubic incision.

For ease of procedure, for bringing the bladder well up to the anterior abdominal wall, for avoidance of flooding of the wound with fluid and the ensuing mess that ensues when the bladder is opened, and for speed, there is no possible comparison between the two methods.

A catheter is passed, the urine drawn off and the bladder washed out, if so desired; though personally I have quite given up washing out the bladder unless the urine is evidently infected and have found no ill effects result from this omission. Air is then injected through the catheter or the catheter withdrawn and the air injected directly through
the penis. I use a four-ounce all-metal ear syringe for the purpose. About four syringefuls of air are usually enough, but the bladder is easily felt to rise, often seen to rise, against the anterior abdominal wall, and the necessary amount thereby easily determined.

The usual incision is then made, a knife pushed into the bladder, its presence there being proved by the escaping air, and the rest of the operation carried on as usual.

Of very special value is air dilatation when an impassable stricture of the urethra exists, as occasionally is the case.

I have never come across a stricture that would not admit air, and I know of no other way in which such a bladder can be dilated.

I cannot pass from the question of bladder surgery without referring to the question of Lateral Lithotomy, an operation perhaps the very easiest and simplest in surgery, which, fallen from its high estate, has now very unfairly lost its reputation altogether.

I acknowledge frankly that the suprapubic operation is easily the best operation; as nowadays one may reasonably expect to get primary union of the bladder wall. In a few cases where skilled assistance is not available, the bladder very septic or an old wound over the pubis make the suprapubic route undesirable, the lateral method is still the best. When I first came abroad I used it entirely for all small stones and have done the whole operation in two minutes by the clock.

The usual skin incision is made. The lateral sound pushed out against the perineum making it easy to engage the point of the knife at once in the groove and knife and sound pushed on together into the bladder. A director or sound is then passed in to keep the opening patent and the knife withdrawn enlarging the incision as much as is required as it is withdrawn. The finger is pushed into the bladder along the director, a scoop introduced beside the finger, the stone extracted and the operation is finished. No vessels requiring ligature are cut.

2. URETHRAL STRICTURE. There are few who have done any urinary surgery who have not laboured for hours, and perhaps laboured in vain, to find the proximal end of a tightly strictured urethra. The perineum in these cases is often riddled with sinuses, nature's attempt to break through, or false passages man's equally futile attempt to open a way.

We have now given up all perineal urethrotomy operations in favour of a newer method that goes by the un-euphonious title of "Retrograde Dilatation." No attempt is made to deal with the stricture through the perineum, but the bladder is opened and a sound passed from the inner opening of the urethra down to the stricture. A second
sound is introduced through the penile end of the urethra down to the stricture on that side. The urethra is thus completely straightened out, and with a little manipulation the points of the two sounds can easily be made to meet in the stricture itself. With the inner sound now acting as a guide, the outer one is forced through the stricture and the passage dilated to full size. A large rubber catheter is now passed down the urethra and the bladder sewn up. Recently this work has been entirely in the hands of my colleague Dr. Cheal but from the few cases I have done myself and from a number I have seen him do, I have no doubt of the value of the procedure, and I shall never willingly cut down on a stricture in the perineum again.

The only difficulty is in introducing a full sized rubber catheter at the end of the operation. Dr. Cheal has overcome this difficulty by passing a long probe, to which is tied a rubber catheter, from the bladder end of the urethra and so bringing it out by the penile end, that is in the reverse direction to which a catheter is ordinarily passed. Perhaps a better method might be to introduce the catheter stretched on a catheter introducer but such are seldom to hand and require the use of the old-fashioned hollow ended rubber catheters which are not very easily obtained.

In this operation too, great help may be got by distending the bladder with air. The only difficulty in doing this is the tendency of the air to escape by urinary sinuses, if such be present. This can be overcome by the assistant closing the ends of the sinuses by firm finger pressure while air distension is being carried out.

3. Proctotomy. We, and probably you, meet with many strictures of the lower part of the rectum especially in women. The pathology of these is obscure but in my opinion they are mostly the result of gummatous ulceration; though some are probably due to chronic gonorrhoeal infection from the trickling down of infected discharges from the vagina. Once more I am astonished that no book I can find gives any adequate rules for treatment. Perhaps the condition is rare in the West.

The treatment by Posterior Proctotomy is absolutely simple, free from risk and gives very fairly satisfactory results.

The only instrument required is a curved blunt-pointed bistoury. The patient being anesthetized, the left fore-finger is forced through the stricture and the knife slipped up flat against the finger till its point is well beyond the stricture.

The finger is withdrawn, the knife turned into position and made to cut its way out dividing the stricture and posterior rectal wall as it does so.
Two rules are to be carefully observed in doing this:—

1.—That the cut be exactly in the posterior median line—theby avoiding all vessels of any size. It is the rarest thing to have to tie a vessel and this only occurs when the stricture has so distorted the rectum that the posterior line of the viscus no longer corresponds with the posterior line of the body.

2.—The cut must deepen as it comes to the skin surface, the deepest part of all being where the knife emerges through the skin. If necessary the latter may be cut right back to the coccyx. In this way there is no possibility of discharges being retained.

The wound is then packed with a strip of gauze and a tube inserted. As in almost all rectal cases, I prefer to open the bowels on the next or at latest on the third day. Rectal bougies should be passed from the fifth day increasing in size till almost the largest size can be passed without pain.

A wooden bougie, made by our hospital carpenter, is then provided, and as soon as the doctor is assured by personal inspection that the patient can herself pass the bougie sufficiently deeply in, she is allowed to go home.

Precise and strict injunctions for subsequent use of the bougie are given. These are, that it be used for three years—viz., for one year daily, for one year weekly, and for one year monthly. Where these instructions are carried out, a complete cure is practically certain.

4. Hysteropexy. The number of Chinese women suffering from uterine prolapse is very large, many of the cases being aggravated by years of complete procidentia. I have seen the uterus and a large part of the small intestine in one huge hernial protrusion. In other cases simple procidentia, often with attendant urinary troubles has been in existence for 15 or 20 years. The discomfort caused by this condition is great, and if any small operation can assist these sufferers it is well worth while. I do not propose here to enter into any discussion of the principles involved in the operation I do. I hope to be able to deal with the matter fully, giving a detailed account of fifty consecutive cases and their after history, at the next General Meeting of our Association. There is a very strong prejudice against the operation in the West and I hope to be able to show that out here at least this is unjustified. But in justification of the practice may I give you a few figures. Of 24 cases that I operated on up to 1914, which cases I then followed up, all were successful as to the immediate result. Two, however, had recurred within a couple of years of
operation—one following on the birth of another child and one on the rapid development of a greatly enlarged spleen. The remaining 22 were all satisfactory. Thirteen children had been born to eleven of these women since the operation had been done. In no case had there been any parturition difficulties or puerperal troubles. Twelve children were then alive, one had died shortly after birth from causes unconnected with the delivery. While acknowledging that the numbers here dealt are small I think that I have enough evidence to show that the primary risk of the operation is practically nil, the subsequent history fairly satisfactory and uncomplicated by any serious danger.

The operation itself is simple and speedy and in an ordinary case should not take many minutes to perform.

The patient is anaesthetized. An assistant passes a sound into the uterus, completely replaces the prolapse and, with the sound, holds the top of the uterus against the anterior abdominal wall as high up as possible, where it can easily be felt by the surgeon through the parietes. An incision about two inches long is made in the median line over this point, the abdomen opened and the top of the uterus caught by a pair of fine volsellum forceps. The sound is now withdrawn and an assistant holds the uterus by the volsellum forceps well up against the wound so as to fill the whole of the wound with the front of the body of the uterus. The surgeon passes three sutures of non-absorbable material, through the skin at least two inches outside the wound, obliquely through the tissues of the abdominal wall, being careful to catch the posterior sheath of the rectus muscle near the edge of the wound, through the front wall of the uterus, and out in the reverse order through the other side of the abdominal wall, ending opposite where the suture entered at least two inches from the edge of the wound in the skin. These three sutures are drawn quite tight and fixed at the points of entry and exit with metal buttons. The volsellum is taken off and the uterus will then be found to fill the whole of the base of the wound. No other deep sutures should be required unless the incision has been too long when a single one closing the peritoneum at the upper end should be inserted. The skin edge is approximated by a few superficial sutures and a tampon put in the vagina for 24 hours. Skin sutures are removed in a week's time—the deep sutures in from ten to fourteen days. Note two points about the deep sutures.

1.—These should not include the peritoneum.

2.—And this is most essential in women within the childbearing period—the highest of the three sutures should be well below the top of the uterus. In this way no distortion of the organ takes place in subsequent pregnancies.
5. **Chronic Intussusception.** In Formosa, and probably therefore in South China, the commonest form of abdominal emergency that we meet, apart from strangulated hernia is Intussusception. The acute form occurs in infants, but is so rapidly fatal that we seldom see a case, and never in time for successful operation. This form differs in no way from the acute intussusception of Western lands.

The chronic form to which I wish to refer, is quite a different proposition and while common here is excessively rare in our own homelands. The only paper on the subject that I could find after a prolonged search was one by Dr. H. W. Goodall in the Boston Medical and Surgical Journal of 7th April, 1910. After scouring the wealth of clinical material of the United States for such cases, he was only able to produce 122 cases the large bulk of which had been undiagnosed; and, no single surgeon having dealt with more than two or three cases, the suggestions for treatment were quite valueless. Now compare this with a single surgeon working in a small hospital in South Formosa and we have the startling fact that I can claim myself to have operated on some thirty cases and we have had nearly forty diagnosed cases through the Hospital in the last few years. I believe indeed that we can claim a world's record in this disease, and experience too has taught us that, in the bulk of cases, the diagnosis is easy and if seen within a reasonable period of onset the treatment is eminently satisfactory. I hope some day to be able to deal fully on paper with our experiences in Intussusception so will try to be brief here.

Diagnosis and treatment are the two points that interest us most at this meeting and I will deal with these alone. Diagnosis:—There is only one constant symptom—that is pain. There may be constipation or diarrhoea with or without the occasional passage of blood and mucus. There may be vomiting but this is comparatively rare. There may or may not be a tumour to be felt. There is no febrile reaction and there may be little or no prostration. The one and only constant symptom is pain and severe pain.

When this is the typical characteristic pain it is quite pathognomic and one might safely diagnose the case without examining the abdomen or even seeing the patient; such quite typical pain is unfortunately not the rule. The pain in all cases is spasmodic, severe and paroxysmal and clears up completely between the attacks except for a slight continued aching pain in advanced cases. The attacks of severe pain may last from half an hour to one or two days and the intervals may be anything from a few hours to a few days or even weeks. In an absolutely typical and early case the pain start in the right iliac fossa passes up the right side of the abdomen and across the pit of the
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stomach. In other words it precisely follows the course of the colon from the cecum upwards and across. Watching such a case it may even be possible, as the pain comes on, to see a lump form in the region of the cæcum travel up the ascending colon and enter the transverse colon. Then as the pain disappears one may see the lump gradually fade away. This pain, as I have said, is absolutely pathognomic, but unfortunately is rarely so distinct. Usually a paroxysmal pain, doubling up the patient and making him cry out is met with, the pain being always on the right side and often also in the centre of the abdomen. It may also be associated with a sausage-shaped lump, most commonly felt in the region of the transverse colon. The remissions of the pain are usually complete even though the lump may still be felt. A sense of emptiness is found on examination in the cecal region. I depend quite a little on this in diagnosis but it is a sign that requires quite a little experience in these cases before it can be relied on.

The only cases that give rise to serious difficulty in diagnosis have in my experience been cases of tuberculous peritonitis and more than once I have opened the abdomen with an open mind as to which I should find. Usually such cases have turned out to be ones of tuberculous peritonitis. One point should be remembered, however, that there is usually more chronic obstruction in tuberculous peritonitis than there is in chronic intussusception, in which latter obstruction is often completely absent. In one case I was absolutely deceived. I operated on what I considered was a typical case of intussusception and found that I had to deal with a massive tuberculous infiltration of the great omentum, involving the transverse colon, narrowing its lumen and giving rise to paroxysmal pain and a sausage-shaped tumour.

Operation:—Cases of Chronic Intussusception divide themselves for operative purposes into two classes, early and late; but these terms apply not to time but to the state of the bowel. In what I call early cases the intussusception, however large, and it may reach well into the descending colon, is for the most part reducible though possibly with considerable difficulty. In the late cases extensive adhesions have formed between the layers of the bowel and reduction of much of the tumour is impossible. Happily these latter are comparatively rare and I greatly regret to say that I have no advice to give on their treatment. Resection of the affected bowel means a very extensive operation which these patients are in no condition to stand. Lateral anastomosis leaves a mass which eventually ulcerates through at some point, with fatal results. A temporary artificial anus on the proximal side has not proved successful in my hands. If any one here can advise me how to deal with these advanced cases I shall be deeply grateful.
On the other hand the treatment of the early cases is eminently satisfactory. I had at one time a series of 18 consecutive cases all with successful results. The first of these, indeed the first successful case I operated on, was a man whom I still meet every few days. He was then a lad of 15, later he became a medical student, graduated and acted as a house surgeon in our hospital for a couple of years. He is now, 15 years after the operation, a doctor in Tainan city doing a large practice and without any disability due to his former condition.

The actual steps of the operation are these:—A right para-rectal incision of large size; room must be given for free manipulation. The hand is introduced into the abdominal cavity and the diagnosis confirmed. The tip of the intussusception is sought, usually at the splenic flexure or in the descending colon; and, by squeezing back along the course of the colon the furthest part of the intussusception is reduced. This can, as a rule, be easily done as far as the hepatic flexure. The mass, which now consists of the intussusception in the ascending colon, is dislocated out of the wound and the rest of the reduction carried on under direct vision. The nearer one comes to the cæcum the more slowly and carefully this must be done, and five or ten minutes spent over the reduction of the last few inches is no waste of time.

For the main part the force of reduction should be from the distal towards the proximal end, squeezing the mass out; little pulling on the ileum should be done and only with the greatest care. It is at this stage that extensive tears may be made in the peritoneal coat or even in the bowel wall itself unless the utmost care is exercised.

*It is always better to leave a few inches of intussusception unreduced rather than damage the bowel wall.*

In about one-third of these cases reduction can be completely carried out, while in the other two-thirds some small amount of intussusception remains. This is of no great importance as the subsequent procedure is the same in either case. Even though reduction is complete there remains a massive thickening of the cecal wall, partly no doubt congestive, but also, I believe, always of a chronic inflammatory nature and probably tuberculous. The operation is therefore not complete until this mass, reduced or unreduced, is at least temporarily eliminated. Healthy portions of the bowel are therefore picked up a few inches away from either side of the mass and a lateral ileo-colic anastomosis is carried out by suture. The bowel is then returned to the abdomen and the wound closed.

Surprisingly little shock is caused by the operation and nothing special in the way of after treatment is required. If convalescence runs
smoothly we expect to have the patients out of the hospital in a fortnight.

One interesting question may be asked; I have often asked it of myself. What becomes of the intussusception left behind? I am sorry I cannot answer it. All I can say is that the tumour rapidly disappears and I suspect that the remaining inch or two gradually reduces itself, the ileo-cecal valve again becoming patent and the newly formed stoma gradually ceasing to function. Certainly in cases examined years after operation no thickening of any kind can be felt even though a considerable mass may still have been present at the end of the operation.

6. ASCITES DRAINAGE OPERATIONS. I propose to close this paper by referring to this question, though I have only a tentative suggestion to make in the matter.

Chronic and massive ascites associated with splenomegaly and cirrhosis of the liver, is sadly common in Formosa and parts of China.

The tendency in all these cases is to a finally fatal termination usually after a prolonged series of tappings at progressively shorter intervals. Can anything be done to relieve these sufferers? Splenectomy if successful gives very satisfactory results, but in advanced cases it is usually fatal and in even comparatively early cases the death rate is high. I believe that by improved technique this death rate may be greatly reduced and I look forward to the day when splenectomy will be the rule for all such patients either in the pre-ascitic or in the early ascitic period. There will always remain a residue of cases too advanced for such operation to be safely carried out. Can anything be done to introduce a permanent drain between the fluid-distended abdomen and the body tissues, and so obviate the constant tappings with increasing exhaustion from loss of body fluids?

I have tried, in the past, a number of operations such as Talma-Morrison's operation of scraping the surface of the liver, omentopexy, and drainage through the femoral canal but none of them have given much satisfaction and the first of these is a sure operation for patients in their condition.

Recently I read an account in the British Medical Journal of a new operation which seems to me to be worth a trial. We have used it on two cases. In the first case the patient died a few days later, but the disease was very advanced and it is doubtful if the operative procedure had anything to do with his death. In the second case a certain amount of relief has been afforded but the operation was too recent to allow of any definite opinion.

The operation consists in the insertion, after a preliminary tapping, of a small hollow silver-stud drain making a way for the fluid to escape from the peritoneal cavity into the tissues of the abdominal wall. A
small stud is made of thin silver plate of \( \frac{3}{4} \) inch diameter at the broad end, \( \frac{1}{4} \) inch diameter at the narrow end, standing \( \frac{1}{2} \) inch high and with a \( \frac{3}{8} \) inch central canal.

A curved incision is made over the linea semilunaris in the line between the umbilicus and the anterior superior iliac spine, a small flap of skin-subcutaneous tissue is turned back, the muscular tissues separated near the base of the flap and a nick made in the peritoneum. The broad end of the stud is inserted into the abdominal cavity, a purse string suture in the peritoneum holding the stud in position. The muscles are then allowed to fall together over the stud and the flap closed by a few suture points.

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**Neon, a Rare Element, Appears as an Important Factor in Reducing Certain Health and Accident Hazards.**—"Neon is one of the rare gases of the air and was discovered in 1898 by Sir William Ramsey. No practical use of it was made until about a year ago, when a New York concern produced an incandescent lamp without filaments—using neon in place of wire, inasmuch as neon becomes luminous when electrified, and emits an orange-red glow.

"Neon lamps are used for exit lights in buildings and are said to be particularly visible through fog or smoke.

"In the spark-detecting instrument neon is useful because it offers exceedingly low resistance to the passage of electricity. A spark that will jump only one inch in air will jump approximately 75 inches in neon.

"It also has been used in combination with mercury to produce a powerful white light instead of the unpleasant greenish-blue light thrown off by mercury lamps now in general use. The orange-red color produced by neon is said to combine satisfactorily with blue glow from the mercury vapor in building up a white light.

"There are five rare gases which comprise about 1.86 per cent of the air. They are helium, argon, krypton, neon and xenon. Argon has recently been made use of as a ‘filling’ for incandescent lamps, because of its low heat-conducting property. Helium is now widely known as the most successful non-inflammable balloon gas ever discovered. Uses for krypton and xenon are still to be developed."—The General Chemical Bulletin, Vol. VIII, No. 5, March, 1922, p. 143.