HUMAN ANTHRAX AND ITS TREATMENT
A REPORT OF THREE CASES
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Anthrax has claimed its greatest toll among grazing animals. Cattle and sheep have been the chief victims, although not infrequently it has occurred among horses, hogs and goats. M. Adrien Loir, Pasteur representative to Australia in 1891, estimated that annually over 200,000 sheep were affected by anthrax, and 25-35% of these animals succumbed to the disease in certain parts of Australia. He added that this was a much higher mortality than obtained in France for the same period. In Russia, where the disease is most common, 72,000 horses are said to have died of the disease in one year (1864). The disease in infected cattle and sheep is usually acute, killing in one or two days. Zinsser places the mortality extremely high, fluctuating about 80%. Though there is some variance in the death rate reported by different authors, the mortality among animals is unusually high. This is partially due to its widespread geographical distribution, Osler having named it as the most widely distributed of all the infectious diseases.

No continent has missed its terrifying ravages; ancient writers having described a disease attacking man and animals that answers the description of anthrax. Such writers as Homer, Plutarch and later Dionysius have given us accounts of a disease infecting men and herbivora, producing the same symptoms we now know to be those of anthrax. Livius relates an account of a disease affecting priests and the sacrificial animals used by them. During the period 740-425 B.C., mention of the disease is made in many places, and repeatedly after this. In 1617 Athanasius Kirchner refers to a disease of the bovine species which was transmissible to man, and which killed 60,000 people.

In 1849, Pollender announced that he had found in the blood of anthrax infected animals considerable numbers of "fine little sticks."
Fig. 1. Case 18367. Cutaneous anthrax lesion. Partial healing has occurred as shown by the disappearing edema, and absence of a large number of vesicles; the serous fluid is also diminished.

Fig. 2. Case 18367. Lateral view of a cutaneous anthrax lesion, showing the elevation above the surrounding area.
Davaine in 1863 was the first to call attention to the fact that the disease could be produced experimentally in animals from the blood of the animals already suffering with the disease, and suggested a direct etiological relationship between the two. It remained for Koch to isolate on artificial media, and reproduce from the organisms obtained from culture, the disease in animals, his work being done in 1876. This work of Koch opened up a new era in bacteriology, for the first time a micro-organism was definitely proved to be the etiologic factor in an infectious disease.

The incidence of the disease in man has to a lesser extent been parallel with that in grazing animals, since anthrax in man is always derived from some domestic animal directly or from such imported animal products, as skins, hides, wool, bristles, horse hair, shaving brushes, and butchered meat. The latter etiological factors are responsible for most of the cases in such countries as have reaped the benefit of Pasteur's monumental work, since anthrax in these countries has practically been stamped out among animals, and imported animal products remain as practically the only sources of infection. In such countries, the number of deaths from this cause barely reaches a hundred cases a year. In Russia, however, there were 13,000 cases in the year 1924, and in Italy for the fifteen years up to and including 1916, 36,425 cases were reported. Since Sclavo's production of a highly effective serum, and a greater celerity of recognition and treatment with this serum in industrial areas where it is most prevalent, the mortality from anthrax has been greatly reduced.

The comparative rarity of human anthrax among English speaking peoples has brought about a sparsity of material (except perhaps in ports of entry and in cities where the industries call for the use of infected material) for clinical study. The failure in application of effective treatment has in many cases been due to a lack of this knowledge. With others, lack of recognition of the true nature of the condition, by the physician, has resulted in many fatalities. Finally, the patient having but few constitutional symptoms at first, has sought his physician too late, in many cases, to save his life. Granting that a goodly number are victims of anthrax and receive treatment too late because of a lack of clinical experience on the part of the physician, there still remains a large number who increase the mortality rate because of faulty or inadequate treatment, or even seriously detrimental treatment. Nature is hard to match in many ways, as is proved by the fact that many cases recover without any treatment other than "expectant" or symptomatic. If we are to attempt therapy, then, our results should at least be as effective as when no treatment has been applied.
Historically speaking, the therapeutic procedures upon which most authorities rely today, have come into use within the present generation, Marchoux of France and Sclavo of Italy, publishing their original work on the production of the anti-anthrax serum for man, independently, in the year 1895. This serum was not introduced into England until 1904, and Eichorn serum was not introduced into the United States until quite recently. Sclavo-Marchoux serum is now used extensively in Europe and South America. Very recent work with the use of biological products has been done by Hruska of France and Erb of Germany. Hruska performed some experiments on horses, producing a highly active anthrax antiserum which he believed to have high therapeutic value. It was employed in three stables in which an anthrax epidemic had broken out. The sick animals recovered, and new cases did not occur.

His method of producing this serum was as follows: Horses hyperimmunized against anthrax were injected with anthrax virus in one shoulder. The other shoulder was injected with edema fluid formed in cows at the point of inoculation with anthrax vaccine. The area where the edema fluid was injected presented a much more intense reaction than where the virus was injected. It remains to be seen whether this type of anti-anthrax serum may be applicable to the treatment of the disease in man. Erb treated a case of anthrax recently by the injection of the patient's blood into the tissue in and around the anthrax carbuncles. In malignant cases, he suggests cauterization or excision of the primary focus following the hematoma treatment. His work was based on the method first described by Läwen. In animal experiments, Erb was able in some cases to prevent or delay the spread of the bacilli in the blood by this method. The hematoma acts as a mechanical hindrance to bacterial invasion, according to his belief. Is it not possible that the foreign protein reaction of the blood serum is similar in its effects to that produced by the beef serum used by Kraus and his coworkers? The antibodies already formed in this injected blood might also serve to increase the patient's immunity and delay the progress of the disease.

Kraus, Penna and Cuenca already referred to, have treated a large number of patients by the injections of normal beef serum, with favorable results in their hands.

Kolmer, after experimenting with beef serum, concluded that while it contained some anti-bactericidal properties, they were without demonstrable protective and curative value in experimental anthrax infections in mice and rabbits.

Vaccarezza and his colleagues in South America have treated a series of 204 patients by the use of various biological products either
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talone or in combination, and have obtained the best results by the intramuscular injections of peptone (from 10-20cc. a day of a 10% solution). They state that it showed a therapeutic potency not inferior to anthrax serum, although naturally it has no specific action.

Dr. Georg Becker was the first to use neosalvarsan in the treatment of human anthrax, a report of a case treated by this method appearing in 1911. Later in the same year, Laubenheimer and Bettman reported its successful use in a case with positive blood culture for anthrax. The case treated by Dr. Becker was the eleventh case in which the presence of anthrax had been proved by blood culture, the first ten patients having died as a result of this infection. As the prognosis for his last case was practically hopeless, he decided as a desperate measure to try the injection of neosalvarsan. After the administration of 0.6 gm of this drug immediate improvement in the patient was noted and the next day the blood became sterile. In a few days the temperature became normal and in a short time the patient was discharged cured. Such of these newer therapeutic measures as have been referred to here have come into use, largely because of a growing lack of confidence or a dissatisfaction with the prevailing modes of therapy, and also because of an increase in the incidence of the disease.

The forms of treatment having the greatest antiquity in point of usage, are surgical intervention, the use of the cautery, and strong caustics, such as iodine, carbolic acid, potassium hydroxide, bichlorid of mercury, zinc chloride, and many others. These are usually applied in the form of hypodermic injections into the tissues in and about the lesions. Local applications are legion. Eusol, bichlorid of mercury or mercury in other forms, formalin in weak solution, balsam of Peru, and many other antiseptics, and healing agents, being used.

Bodin proposes the local use of powders, as thymol iodid in conjunction with serotherapy.

Muskett in 1888 reported 50 cases in which the local application of pulv. ipecac. suspended in water was responsible for the cure of all but one of these patients. He believed that he had a specific for the infection, and in the laboratory ipecacuanha has been shown to kill anthrax bacilli, as proved by this writer, himself. As an adjunct to other more specific measures, this drug applied to the superficial lesion should prove of value. In septicemic cases, its superficial action could have little effect, since the bloodstream is not reached.

Prophylactic specific prevention is certainly indicated among those working with infected materials, but aside from injections of immune serum in cases already affected by anthrax, no attempts in this
direction have been made. There is a question whether such inoculation would be effective, however, for Furich mentions a case with recurrence within twelve months.

In England, auromin and aurochrome have been used by various physicians but their success on the whole has not gotten beyond the stage of encouraging results.

Mortality. The mortality in human anthrax seems to vary, but it is far from negligible. Most statistics do not differentiate between pulmonary, gastro-intestinal, and cutaneous anthrax. The majority of cases fortunately are cutaneous, but even for these one must assume a fairly high death rate. It has seemed to us worth while to arrive at a general basic average in a large series of cases in order to gain a relative evaluation of the effect of this disease upon man. Both treated and untreated cases are included, since the good results of some forms of therapy tend to offset the results obtained by less effective measures. Conversely, untreated cases are known to have as good if not better chance for recovery than that secured by the use of some curative devices. Furthermore, varying success is shown with the same treatment in the hands of different authors. We have chosen from the reports made by various authors from Health Board statistics, and quotations from other writers, a series of mortality statistics that appear below in table form, for the sake of clarity and brevity. These records aim to cover roughly the period in which the more successful treatments have been in use.

<table>
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<tr>
<th>Locality or author</th>
<th>Year(s)</th>
<th>Cases</th>
<th>Deaths</th>
<th>Mortality %</th>
<th>Treatment</th>
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<tr>
<td>England</td>
<td>1899-1907</td>
<td>447</td>
<td>120</td>
<td>26.8</td>
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<td>Italy</td>
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<td>5812</td>
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<td>1920-</td>
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<tr>
<td>Selavo</td>
<td>1908</td>
<td>164</td>
<td>—</td>
<td>6.00</td>
<td></td>
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<tr>
<td>D. Prat (S. America)</td>
<td>1915-1923</td>
<td>300</td>
<td>—</td>
<td>18.77</td>
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<tr>
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<td></td>
<td>(56)</td>
<td>—</td>
<td>(10.6)</td>
<td>6.0</td>
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<td>—</td>
<td>(23.0)</td>
<td>22.2</td>
<td>Peptone</td>
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<td>—</td>
<td>(6.6)</td>
<td>18.7</td>
<td></td>
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<td>415</td>
<td>—</td>
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<td>(9)</td>
<td>(4)</td>
<td>(44.0)</td>
<td>6.0</td>
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<td>(18)</td>
<td>(3)</td>
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Total number of cases: 28,331 Average % 19.06.
From the above table, in which 28,331 cases of human anthrax are presented roughly covering the period in which the etiology has become generally known it is seen that the average basic mortality is 19.06 per cent. Relative mortality rates under various authors are here shown, so that the efficacy of separate methods of dealing with the disease may be shown, in the numerical value of each. This is as far as we can safely make any judgement in the matter of treatment since so many factors enter into such a compilation as location of the lesion, time of treatment, i.e. early or late in the disease, amount of treatment, potency of the therapeutic agent in the case of the various serums, etc., that its real value can at best be but an approximation. Some value may be attached to the figures obtained, however, since there is a wide range between the death rate among cases treated surgically and those treated by the use of immune serum, for instance. Governing factors should be as nearly equal as possible, and these are best equalized by a large series.

It is noted that the mortality among cases treated with biological products as immune serum, normal beef serum, peptone etc., is on the average, low. Kraus and his colleagues with the use of normal bovine serum had a mortality of 4.3% among 415 patients treated by this method. Vaccarezza, using the same type of serum on 15 cases had a mortality of 20.2%, evidencing that this method is not specific in nature. Vaccarezza had a result of 6.67% by the use of 10% peptone solution injected intramuscularly. His use of immune serum alone, however yielded a death rate of 19.6%, which illustrates that all the facts are not yet known about the production and administration of this remedy. J.C. Regan has given us a good account of the results of serotherapy, but his figures are chosen from the most satisfactory recorded series and are therefore but a picture of the results in the hands of those with a large experience and acquired skill in the administration of this product. Taking a series of cases treated by several authors in various countries and under varying conditions, (from the table) we find that the average ratio among 705 cases treated by the use of immune serum reaches a mean average between them of 13.8 per cent. This result, is about twice as high as that recorded by some of the authors.

The mortality from surgical intervention is shown to be very high, 40.9 per cent for 46 cases thus treated. This of course is an unfair estimate, but nevertheless points out the danger of this procedure. Many cases are recorded in the medical literature in which surgical excision or incision has definitely brought about the final fatal issue. Scholl recorded this fact in his observation of such cases. The high death rate in New York City and Bellevue Hospital was
due in part to the use of surgery and partly because of a high frequency of lesions about the face and neck, it being universally true that such localization of cutaneous lesions shows a much higher death rate. Massachusetts General and Bellevue Hospitals were compelled to abandon the surgical intervention in these cases, because of the high percentage of fatalities occurring after its use. Surgery alone cannot be held responsible for the serious prognosis obtaining in some of these cases since some of them recovered after excision. My opinion is that recovery resulted in spite of the remedy, the patient's own resistive powers being sufficient to overcome the onslaught of the bacterial invasion of his blood naturally resulting from surgical procedure.

In general there is an encouraging increase in the number of cures of anthrax infection in man in the various countries in which treatment has become most effective. This is due in the main to the more efficient control in industrial areas, legislative protection through various health organizations, and earlier recognition of the disease. Anthrax investigating Boards in England have served to keep the employer and employee alert to the seriousness of the infection, and thus have the recoveries been increased through an earlier institution of treatment. This has been true also in Italy, France and the United States. This has been noticeably true in Italy since the introduction of Sclavo's serum, in 1895. Certain industrial cities have come to know the efficacy of the serum, and individual workers seek treatment by this serum to the exclusion of all other methods.

Diagnosis. Most cases of cutaneous anthrax seek medical aid when the lesion is well advanced. This is due in the main to two facts, namely,—the patient is apt to think too lightly of his condition, not recognizing its serious nature, or the disease fails to produce serious or disquieting symptoms until late in its course. This is true, in the large majority of skin cases, while the pulmonary and gastrointestinal types present no visible lesions. For our purposes here the latter forms will be omitted from the discussion since such cases are rarely met with, and the symptoms are so obscure as not to admit of early recognition.

The facts above referred to, make the physician's task simpler than first anticipated, providing he thinks of anthrax. By referring to any standard dermatology, he is able to obtain a good description of the skin lesion, and most of them describe or illustrate the advanced types. The lesion may begin as a small spot or papule not unlike an insect bite, or may have a small vesicle on its summit that is often ruptured. In a few cases there is no visible central lesion, and only an extensive edematous area upon which a few vesicles may later appear. An erysipeloid infection is suggested by such a process.
The size of the papule in the typical lesion varies from a pinpoint diameter to one of several centimeters. In one of the cases described by us it was oval in shape, and measured 2x3 cm. and was \( \frac{1}{2} \) cm in height. A fully developed "malignant pustule" is hard to mistake for any other condition. There is a papule or nodule of varying size, circular or oval in contour, with a central blue-black, umbilicated, necrotic eschar, which is surrounded by a more or less complete ring of vesicle, that is either distended or ruptured with copious exudation of clear serous fluid in the uncomplicated anthrax infection. This lesion forms the crest of a much larger edematous area. In one of our cases, this area extended for a radius of 5-7 cm. in all directions.

Each of these features may be present only in slight degree or may be dominating the whole picture. Redness may be absent and in its place an extensive white edema may be seen (Eutrich). The central eschar may be absent, and replaced by bullae or vesicles. The color plates show the mature skin lesion, in this case being located on the left side in the subcostal area of the abdomen.

A smear from the lesion viewed microscopically will show the organisms. Culture made from smears is easily done on ordinary media, and the typical doll's hair growth appears the next day. Blood cultures usually reveal the micro-organism in late septicemic cases. A leucocytosis generally accompanies the disease. Other laboratory findings are not remarkable.

While the anthrax lesion itself presents a forbidding aspect, the patient may have septicemia and yet show no signs of distress. For this reason, according to Symmers the only justifiable attitude of the physician is to assume that every anthrax pustule from the start is attended by the dissemination of the bacilli in the blood, and to treat the patient on this assumption.

Zinsser in some experimental infections in animals, described the fatal end result in the animal as follows: "—some animals may appear well and comfortable until a few hours or even moments before death, when they suddenly become visibly very ill, rapidly go into collapse and die." The parallel of this is often seen in man. Zinsser adds that although the bacilli are not demonstrable in the blood until just before death, they nevertheless invade the blood and lymph streams immediately after inoculation, and are conveyed by these to all the organs. This was shown clearly by experiments where inoculations into the tail or ears were immediately followed by amputation of the inoculated parts without prevention of the fatal general infection.
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The bacilli are probably not able to proliferate at the site of inoculation in the blood, and doubtless they proliferate in the organs until the resistance of the infected subject is entirely overcome. At this stage of the disease, no longer held at bay by any antagonistic qualities of the blood, they enter the circulation and multiply within it (Zinsser). Their mode of action is as yet an unsettled point. It is probable that death is brought about to a large extent by purely mechanical means, such as capillary obstruction, since neither a true secretory toxin nor an endotoxin have been demonstrated for the anthrax bacillus. The decidedly toxic clinical picture of the disease, however, in some animals and in man, precludes our definitely concluding that such poisons do not exist. It is a matter of fact however, that neither culture filtrates nor dead bacilli have any noticeable toxic effect upon test animals, and exert no immunizing action.

Treatment. The various therapeutic agents and devices most commonly applied in the treatment of anthrax infection have already been mentioned, but a fuller account of their comparative value is indicated. The choice of procedure depends on certain criteria that should apply for all cases, if the method is to meet its greatest usefulness. Points to be considered, are, (1) the amount of scarring or deformity produced; (2) the relative applicability of the form of treatment to different types assumed by the disease, and stage it may have reached; and (3) the length of time elapsing between the beginning of treatment and the resumption of employment. This point is especially important in connection with the industrial worker and industry. Local applications have but a palliative effect, and will only be considered here in the light of their supportive action along with the more effective measures. Since experience and experiment have shown anthrax to be a blood and lymph stream infection, only those products that reach the blood by the intradermal or intravenous route should be considered as effective.

Surgery. Most authorities agree that the use of surgery as a method of treatment is contra-indicated and even harmful. The ancient origin and long establishment of this method, however, make it very difficult to uproot. While reference works and text-books still recommend surgical measures the reason for its continued use is not far to seek. Nelson’s Loose Leaf Medicine makes the comment that “the actual cautery or excision with the knife are the two procedures most highly recommended. In either case the disease tissue must be removed”. Later, in the same paper serotherapy is advised but not to the exclusion of the surgical method.

In Italy, France and South America where the disease is well known, surgery as a means of dealing with anthrax has long been
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discountenanced. The United States has been slowest among enlightened countries in casting aside the surgical treatment of these cases. Regan, Santee, Scholl, and many others, have now definitely given up this method in the handling of their cases, however, because of the high percentage mortality produced.

Some authors claim that anthrax begins as a local infection, this being contradictory to the findings of Zinsser already referred to above. In any case it is beyond the ken of a surgeon to decide whether or not he has a septicemic case on his hands. Valuable time is lost in making blood cultures and furthermore the clinical symptoms in most septicemic patients are so deceptively mild that decision is practically impossible except in cases already in a state of collapse.

Scholl reports his conclusion on surgical intervention in these words: "In several of the surgical cases, a rapid increase in the edema, a steady decline in the patient's general condition, and death several hours later, definitely pointed to the operation as the causative factor." Our experience in this hospital could be duplicated in these words, in regard to one of the cases thus treated. No surgeon can safely incise or excise any anthrax lesion. The length of time that is required for recovery in these patients is always prolonged. Scarring and deformity may occur, and for this reason surgery is not applicable to lesions located upon the face or neck. This treatment is not applicable to all forms of the disease, nor to all stages of the disease, and finally, the anthrax bacillus is thereby disseminated in the blood rather than removed from the blood. Every one of these points fails to fulfil the criteria necessary in properly treating human anthrax.

Serotherapy. This form of treatment has the greatest number of advocates. Reasons for this are its efficacy in the hands of experienced men who are acquainted with proper dosage and frequency of administration, and who are best fitted with equipment for the specific treatment of the disease. Many claims have been made for serotherapy, and from the review of the mortality statistics already given, the results in the hands of some writers have been gratifying. Still there are very low mortality rates reported in fairly large but isolated series of cases by other methods, such as those of Kraus and his collaborators with normal beef serum, of Graef with potassium hydroxide, of Muskett with ipecacuanha, and of Fortineau with extract of pyocyaneus. Low mortality alone, is not the only factor to be considered, however, in the selection of an ideal remedy for anthrax; other points previously referred to must be considered. Some of the objections to the above agents have already been registered. Normal beef serum is not specific, potassium hydroxide is horribly painful as a
hypodermic solution, ipecacuanha is but local in effect, and extract of pyocyaneus is not readily obtainable, nor has its value in septicemic cases been thoroughly tried.

The governing factors connected with the use of serum administration must be correct, however, if the best results are to be secured. The best test of a remedy is its curative value in cases previously considered hopeless. In anthrax septicemia immune serum has given a high measure of success in certain instances. The literature is full of reports of septicemic cases treated by immune serum injections, that have been followed by recovery. Symmers reviewed six cases from the literature, adding his own case, where definite proof of dissemination of anthrax in the bloodstream of the patients was proven, and in whom recovery followed the injections of serum. Rappaport and Amory have reported a severe facial case with marked edema recovering rapidly after 80cc. of the serum was given intravenously. Bandi reported two cases in 1904, with remarkable recovery after serotherapy. Many more examples of these successful cases could be given.

On the other hand, these results are not obtained by all physicians attempting serotherapy. D. Prt, already referred to, lost by death 18.77% of 339 cases. Santee lost three out of four septicemic cases treated by serotherapy out of a group of sixteen in which immune serum alone was used. Vaccarezza lost 20% of the cases he treated by this method. In addition to the question of its therapeutic value other points need to be considered.

The varying results obtained under serotherapy by different authors seems to indicate an incomplete knowledge of its use. Although Sclavo-Marchoux serum has been in use for over thirty years, the experimentation on sera and biological questions relating to its action, potency etc. are still being done, as evidenced by the work of such men as Eichorn, Erb, and Hruska, and many others. These experimental efforts were brought about by certain insufficiencies, or hazards obtaining from the use of prevailing methods of preparation and administration of immune serum. The original Pasteur method possessed these hazards, his vaccine being either too weak to protect or too virulent to be safely used. The Sclavo-Marchoux serum was the most efficient for many years. Eichorn, formerly chief of the Bureau of Animal Industry of the United States, brought out a very potent serum that was shown in tests to be twice as potent as several of the European makes, his serum being put on the market in 1915. Erb's method of the use of injections of the patient's blood is suggestive of further possibilities, but thus far rather doubtful in value. Zinusser in referring to the question of the potency of immune serum, states that it is necessary to carry immunization to an extremely high degree in order
to obtain even an appreciable protective power in the serum. It is possible that Hruska's work already referred to will bring into use a still more effective therapeutic serum for man.

Excellent results have been obtained by the use of normal beef serum, and it is not altogether improbable that some so-called immune sera, have actually had little more real immunity value than is normally found in ordinary blood serum. A relatively impotent serum would necessarily need to be given in larger amounts than one of greater strengths, this fact doubtless accounting for many of the unsatisfactory results in certain series. The uncertainty of potency of even standard preparations is well known. This fact in a measure accounts for the incomplete knowledge of the proper dosage in these cases. Regan attempts to overcome this difficulty, by offering a method and dosages for the different stages and types of the disease. For those who rarely encounter anthrax, however, specific information of this nature is not known or not readily obtainable without going through much of the current literature upon the subject. Regan's dosage is chiefly based upon Eichorn's recommendations.

All authorities advise the use of fairly large and frequent doses of the serum. This brings the expense for effective treatment rather high. One case mentioned by Symmers had a total injection of 1100 cc. of the serum. At a cost of 5 cents per cc., the cost of this patient's treatment would be $55. Santee used from 250-1115 cc. in individual cases treated by him. In addition to the cost of such treatment it is a question whether such large amounts of a foreign protein should be given to such patients, in view of some of the physiological effects that might be produced. In giving blood for transfusions, it is not considered advisable to give more than 600-700 cc. of blood at any one time, because of the danger of dilatation of the heart. This fact ought to apply in the giving of a foreign protein substance, if there is logical basis for it. Cases of anaphylactic action are recorded from the use of anthrax serum, this being true, sensitization tests should be done before large amounts are given intravenously. This is a time consuming device in a case having but few hours expectancy of life! One of our cases was dead four hours after admittance to the hospital.

Rappaport and Amory were obliged to discontinue serum treatment in one case because of the rather severe reaction resulting. Graham and Detweiler mention a patient with a severe chill lasting fifteen minutes, following the use of serum and Chloramin T intravenously. P. Graf mentions that reactions often follow the use of the serum intravenously, and for this reason, he leans toward the use of salvarsan in anthrax infection.
In addition to the above factors anthrax serum is not always readily obtainable. Pijper states that he was unable to secure the serum in South Africa, and at the time of writing his paper doubted whether it was possible to secure this serum anywhere in South Africa. In this hospital, where most remedies are usually available, the antiserum was not on hand when we were in need of it. Whether the product will keep for long periods its initial potency is also an open question. With all these factors in mind, if we still have a remedy that will bring about effective cure, we are justified in its use. On the other hand, if there is a method that is equally as effective without these objections it most certainly ought to be attempted.

*Salvarsan.* Salvarsan or neosalvarsan is a chemotherapeutic agent without many or most of the above disadvantages, and is a drug universally obtainable. No special outlay or preparation is needed, it may be applied at a moment’s notice, and is safe, sure and quick in its action, does not require large or numerous doses, is inexpensive, and, after its use lesions heal with a minimum of scarring.

Some have raised the objection that this remedy is in its experimental stage, and that is not theoretically sound to use such a drug. Experiments proving its specificity for anthrax have however been done and this remedy has now been in use in Germany, at least, since 1913. Boidin found malignant pustule to yield under its application. He refers to the successful treatment of anthrax rabbits with salvarsan, in which .0034 grams per kilogram of animal weight was used. He also cites several cases where the use of it in man was successful. In 1911, Bettmann and Laubenheimer performed experiments on mice and guinea pigs by injections of salvarsan following inoculations with anthrax, and recently Ernolow and Golotina have made contributions to the experimental bases for the neosalvarsan treatment of anthrax.

If the experimental evidence is not yet complete for animals, where conditions of bodily response are different than in man, the increasing number of cases that have recovered following the use of salvarsan and its allied products in man, gives abundant proof of its specificity and rapid curative action. In Germany, those having the largest experience with serum and salvarsan treatment are leaning more and more upon the use of neosalvarsan for the treatment of anthrax in man. P. Graf reports the treating of fifty cases with injections intravenously of this drug, with but two deaths, and in these two the fault lay with the patients and not with the remedy, according to that author. Because of some anaphylactic phenomena resulting from the injections of serum in several of his patients, he prefers to rely upon the chemotherapeutic agent. His excellent results with this agent appear to amply justify him in his choice.
Pijper introduced the use of neosalvarsan into South Africa in 1918, and in 40 consecutive cases treated by this method, including a very severe septicemic case, not a single fatality has resulted. It must be admitted that he had no pulmonary anthrax in this group. Some cutaneous infections, however, were very severe, and one or two were admitted in a moribund condition. As a result of this series of successful cases, the Secretary for Public Health of the Union of South Africa sent special circulars to district surgeons advocating this treatment. It is noteworthy, says Pijper, that only a few deaths from anthrax during these years have occurred, and in these salvarsan was not used. Rosving recently reported the good results he obtained, and Eurich in England has also resorted to its use in severe cases. The remarkable success that Pijper had in his first two cases led him to adopt this remedy to the exclusion of all others. The two cases referred to, not only survived, but made a particularly rapid recovery. Since 1921, he has not used any method other than salvarsan treatment. A case treated by us with neosalvarsan, made a very rapid recovery and was discharged from the hospital in less than a week, and could have been discharged sooner if our experience had been larger. The case reported by Becker previously mentioned, in which salvarsan was used when the case had been given up as practically hopeless is but another example of the dramatic and rapid recovery resulting from the use of this drug. The rapid response to salvarsan treatment in these severe cases is the best recommendation that can be given for this therapeutic agent.

In order to illustrate the results from the various methods of treatment, used in this hospital, we append below the records of three cases that have been treated here during the last six years. It is hard to explain the presence of so small a number of cases presenting themselves for treatment here, in a city in which anthrax-infected hides and skins etc. must be numerous. China is notoriously responsible for the shipping of infected hair, hides, furs, skins, and meat to other countries, where sporadic cases and epidemics of anthrax infection in man have occurred. It may be explained by the fact that the Chinese have developed a fairly strong immunity to this infection as they have to many other diseases, or that they either get well spontaneously or in certain cases die before they are able to seek treatment. The fact that systemic symptoms are not remarkable until late in the disease is a factor in keeping them away from the foreign hospital until too late. Many of the more ignorant seek out the native medical man who does not understand the seriousness of the disease any better than the patient seeking treatment.
Case 5848. F. L. Male, 46. This patient was admitted August 27, 1928 and died the same day.

History. The patient was admitted with a small red swelling about the size of a pea on the upper lip, which was of four days duration. Two days after the onset, the neck became swollen, spreading into the right maxillary region and down to the supraclavicular fossa, and accompanied by an increasing difficulty of respiration. At no time was there much pain, but the patient had difficulty of respiration and deglutition for several days previous to admission.

When seen the patient was breathing laboriously, was covered with cold perspiration, had a weak thready pulse, and was practically in a state of collapse. Throat examination by an otolaryngologist showed extensive edema of the whole pharynx as well as of the glottis. No record of a lung examination was made. Treatment: Adrenalin, 1-1000 sol. 1 cc. by hypo., Adrenalin and cocaine (1%) spray to the throat. Ice to the neck.

Operation: Crucial incision of the lesion showed pure culture of anthrax. Preparation was made to give 50 cc. of anti-anthrax serum. While venepuncture was being attempted, the patient suddenly ceased breathing, the heart stopping at practically the same instant. The patient died four hours after admission.

Diagnosis. Anthrax. Anthrax bacteremia. Edema of the glottis. The diagnosis was confirmed by exam, of a smear from the lesion.


History. Admitted with a lesion of the right forearm of five days duration that began as a pin-head-like papule on the anterior surface of the right forearm. It probably became vesicular as the patient stated that she “broke it”. After this, the lesion became much worse, swelling, local heat and edema developing. For the three days previous to admission, the patient was chilly and feverish. For this same period symptoms of anorexia, feelings of weakness and depression were experienced. A yellowish Chinese powder was applied, a black crust forming over the lesion. No pain was noticed, but the patient had some pruritis. She noticed enlarged glands in the right axilla for the two days previous to admission.

General physical examination was negative except for the following positive findings: General toxic condition as evidenced by weakness and depression. Ulcer of the right forearm with surrounding edema. Spleen palpable. Wound smear showed B. anthracis and streptococci.

Lab: W. b. c. 18,700. P. 88%, Sugar 125 mg per 100 cc., O2 combining power of the plasma 53.8%.

Impression in O. P. D. Streptococcic infection. Later the diagnosis was a mixed anthrax and strept, infection. Local exam. of the arm showed a gangrenous depressed ulcer, about 2 cm in diameter with a sanguino-purulent discharge and pustular vesicles about its border. The hand, forearm and a large part of the upper arm were edematous and red, and possessing local heat.

Treatment. Excision 1 cm. beyond the lesion. 30 cc. of serum was given and rapid recovery was noticed thereafter, the temperature dropping to normal in a few days. Patient was discharged against advice but the temperature was normal and the patient was on the road to recovery.

When the patient first noticed it, it was a small bleb about the size of a peanut, with a slight redness of the surrounding skin. It felt hot and hard but did not bother him in any way. It grew progressively larger, until its present size was reached (2 x 3 x 1 cm). He began to feel chilly the day before coming to the hospital, but did not even mention this fact until he was asked about it. The patient has been a wool sorter by trade for the last ten years and was admitted to the O. P. D. once before because of a lesion upon his neck, which might have been an anthrax infection. The patient states, however that he had never had a similar lesion previous to this one.

The lesion is located just below the costal margin on the left, in the mammary line. It is raised, has a black umbilicated, central eschar, surrounded by vesicles either broken or filled with serum. Large amounts of serum ooze continuously from these broken blebs. There is a large edematous area around the lesion extending for about 7 cm in each direction. Smear before admission showed anthrax bacilli, and culture from smear showed large numbers of the anthrax bacilli in the typical doll's hair formation. Microscopically the strand-like growths of the organisms are seen.

Treatment. Neosalvarsan 0.6 gm. and 0.45 gm were given on successive days intravenously. The temp. went up the first day following the treatment and also on the second. Thereafter, the temp. was normal and the patient was discharged, Oct. 31.

These cases illustrate clearly some of the points already referred to, the more important will be mentioned again to substantiate those statements. The fatal termination in the first (5848) case where surgery was used bears out only too well the hazard in this form of therapy.

The case (6123) in which surgery and serum were both used, illustrates clearly that immune serum was the responsible curative agent.

Case 18367, in which neosalvarsan alone was used, showed a rise in the patient's temperature after each injection of the drug. The temperature was normal by the afternoon of the second day of treatment, however. The rise in the temperature in all probability was due to the destruction of large numbers of the bacteria within the bloodstream, bringing about a protein reaction upon the part of the body. The angry edematous area surrounding the lesion began to disappear within two hours from the time the first injection of neosalvarsan was given.

This patient was able to return to his former employment within two weeks from the time of his admittance to the hospital. The patient has been seen a number of times since in the O. P. D. and the large lesion formerly present has practically left no scar whatsoever.
CONCLUSIONS

In all respects, the use of arsphenamine or its allied products is shown to be definitely superior to any other form of treatment yet discovered for the therapeutsis of cutaneous anthrax infection in all stages. It fulfills all important criteria governing the successful treatment of these cases. Arsphenamine is a chemo-therapeutic agent that is obtainable practically anywhere in the world, is easy to administer, is standardized, so that dosage is easily governed, and no time need be lost in its administration. Reactions from the use of this remedy are rare. It requires no special outlay for administration, and is very inexpensive. No scarring or disfigurement is caused further than that caused by the disease itself. The use of this drug has passed the experimental stage, having become established as the usual procedure in South Africa and in certain parts of Germany. The results obtained by all authors invariably show a very low or even negative mortality. The patient is early returned to his work, producing the least possible economic loss to himself and industry. This remedy may be applied when the location of the lesion is such that the use of other methods would be ineffective or even dangerous, such as in lesions about the face and neck. Convalescence begins within a few hours after the injection of neosalvarsan. It also arrests extension of edema so that in extension from neck lesions to the throat, danger from suffocation is slowed and finally, completely stopped. Destruction of tissue is also early reduced. And finally, no early case is fatal if arsphenamine is used.

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THE LIGHT TREATMENT OF TRACHOMA

A painless method for the rapid Cure of Trachoma by Ultra-Violet Radiation and some notes on the extreme value of Ultra-Violet Radiology in Ophthalmology.

G. M. Harston, M.D., D.O.

Much has been published in Medical Literature recently concerning the amazing effects of Ultra-Violet Radiology in various affections, more particularly in the many manifestations of Surgical Tuberculosis and in Ophthalmology.

As Ophthalmic Surgeon to the Tung Wah Hospital, Hong Kong, for 20 years my experience in Trachoma has been considerable, and I have had many opportunities of testing the various treatments advocated by Ophthalmic Surgeons in various parts of the world, and I have myself initiated some methods.

I was much dissatisfied with the old fashioned Sulphate of Copper treatment with its resultant pain and extreme discomfort to the patient. In the year 1912 I published a series of cases treated by Carbon dioxide snow, following the lead given by Mr. Bishop Harman. This treatment being far from painless I discarded it in favour of treatment by the application of Chinosol (1 in 4900 in glycerine). Under this treatment Trachoma is slowly cured, but prolonged treatment is necessary to eradicate all trace of the disease. I continued the search therefore for a more rapid and effective method of treatment.

I found such a treatment most admirably afforded by Ultra-Violet Therapy, when administered by a special technique, which I will describe later.

At this point I must emphasise at once the immense superiority of the Open Tungsten Arc for all special work whether in Ophthalmology or other sphere of Light Treatment. It is immeasurably superior to the Mercury Vapour type of lamp, because the latter is so variable in its output of U.V. Ray. No two M.V. lamps are alike and the same lamp varies from time to time so that dosage is uncertain and inaccurate. One cannot use to any extent the short wave lengths owing to the difficulty of application at close range without violent re-action. The M.V. lamp is relatively much richer in long wave lengths than in short, and this is an enormous disadvantage.

There is nothing which can be achieved by the M.V. lamp which one cannot do with the Tungsten Arc and much better by the latter. The general trend in both London and New York is to turn more and more to Tungsten. Workers are finding out that they can do more with it than they can with any other source of production of U.V. Ray. I also deprecate the prolonged seances with Carbon Arcs.
In one article as long as four hours was mentioned as the period of exposure to the Carbon Arc. Such lengthy exposures are too great a tax upon the time of both patient and doctor or nurse.

It may be pertinent to inquire why four hours should be spent when the same result—possibly a better result—can be attained by a different method of application. I will now detail the technique I have adopted.

It is well known that U.V. rays, unlike X rays, have their path impeded by blood. As a preliminary therefore I denude the parts of as much blood as possible by the installation into the conjunctival sac of 1-2 drops of a 1 in 1000 solution of Adrenalin. I then seat the patient in front of the Tungsten Arc lamp, his eyes being at a distance of 2½ to 3 feet from the Arc and on the same level as the Arc.

The patient is told to close his eyes gently as if asleep, but is also told not to screw up or wrinkle the eyelids at all.

A nickelled copper adjustable mirror is employed to focus the light on to the closed lids. (This kind of mirror absorbs fewer of the rays than does the ordinary mirror.)

Each eye is radiated through the closed eyelid for a period of 2 to 4 minutes, a maximum of 8 minutes being all the exposure that is required, and sittings are repeated twice weekly at 3 to 4 day intervals.

I have now treated not less than 50 cases of Trachoma by this method and complete cure has resulted in every case. The cases varied in type from granular and papillary affections of the conjunctiva without corneal involvement, to those cases in which there has been serious involvement of the cornea by pannus which latter invariably clears up provided Bowman's membrane has not been penetrated as indicated by the formation of dense corneal cicatrisation.

The following clinical cases are sufficiently striking to demonstrate the extreme value of Ultra Violet Ray treatment in Ophthalmology when quick results are desired.

C.C.—Chinese, male, aet. 21—profession, working jeweller—consulted me on account of a traumatic cataract in the right eye, which had been caused by a penetrating wound of the eye-ball as a result of the breaking of the porcelain shade of an electric lamp suspended vertically above his head while working at his profession. There was slight ciliary injection around the cornea but otherwise the eye was quiet, the pupillary aperture being occupied by grey cortical lens matter completely obstructing vision in the eye which was reduced to perception of light only. I gave a guarded prognosis and expressed the hope that "it might be possible" to cause absorption of the soft lens matter by Ultra Violet rays from the Tungsten Arc lamp through the closed eyelid using the method I have already detailed.
To my astonishment, on his return after the third sitting, he stated that he could see, and I found on close examination, that two absorption holes had formed in the soft lens matter. After two further sittings these two holes coalesced, there was thus formed an artificial pupil through which he could see, and could count accurately fingers at 3 metres. He stated that he had always been slightly short sighted, and his vision after two further treatments with the aid of a +8.0 sphere = ⅝.

The most gratifying results with the Tungsten Arc are seen when it is employed in cases of severe Irido-Cyclitis.

Formerly one almost dreaded the advent of these cases in one's consulting room, but since the introduction of U.V. radiation in the treatment of such cases, one rather welcomes them than otherwise because at the end of 5 minutes application of the Open Tungsten Arc applied by the method I have detailed, one is able to completely relieve the patient's pain, which does not recur.

The most striking evidence of the value of this treatment for this complaint is seen in the altogether marvellous way in which precipitates in the anterior chamber clear up, with consequent restoration of vision. In chronic cases in which these precipitates have been present for years they disappear in a marvellous fashion. The following case, occurring in a medical man, is sufficiently striking and typical of many that I have treated successfully by U.V. radiation.

A.W.—Gynaecological Surgeon.—Chinese—aet. about 35. woke up one morning to find that he was suffering from what he took to be, at first, an attack of conjunctivitis in the left eye.

He realised however, that the eye was too painful for the case to be one of simple conjunctivitis. He therefore consulted a colleague of mine, who correctly diagnosed the case to be one of acute Irido-Cyclitis, and at once instilled atropin, in spite of which one posterior synechia developed.

After 4 or 5 days I was asked to see the case in consultation, and found the eye to be very acutely inflamed, and on examination with the Gullstrand Slit Lamp, many precipitates could be seen on the posterior surface of the cornea, and on the anterior capsule of the lens. Vision was reduced to hand movements at which he was naturally greatly distressed. I was however, able to re-assure him, that with the aid of U.V. rays applied by means of the Tungsten Arc, we could restore vision to its former acuity and moreover, we could immediately relieve his pain.

He found all these prognostications to be true, for he regained ⅝ vision in the eye at the end of one month's treatment and his pain was completely relieved after 5 minutes exposure to the Arc. He was able to enjoy a refreshing sleep free from pain the same night. I gave not only local treatment, but also body or bath, treatment as the latter method adds at least 100% to the efficiency of the Rays.

He now says that vision in the eye is as it was before—i.e. absolutely normal.
Such a case affords striking evidence of the value of U.V. radiation and is sufficient to set at rest all controversy on the subject, for there has been much adverse criticism recently of U.V. radiology. Some critics even going so far as to make the unwarrantable assertion that the effect of the rays is in the main attributable to, and enhanced by, their "theatrical surroundings."

I have found the light treatment equally effective in all Bacillary affections of the eyelids, such as Hordeola, Blepharitis of the lid margins, Koch-Weeks conjunctivitis, angular conjunctivitis caused by the Morax-Axenfeld bacillus, and Phlyctenular disease. We have in the light treatment a valuable auxiliary to our therapeutic equipment.

SYMPATHETIC OPHTHALMIA*

REPORT OF CASE

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It is by no means an unusual experience among ophthalmologists that in some cases of penetrating injury of an eyeball there may arise a very serious complication known as sympathetic ophthalmia. This peculiar disease began to attract world-wide attention when MacKenzie published his famous writings on the subject some ninety years ago. Since his time an enormous amount of research work has been undertaken in an attempt to clarify the mystery which has shrouded the etiology and various other aspects of the disease. The result of the work, however, has been only partially successful.

The purpose of this paper is to give a full report of a typical case of sympathetic ophthalmia, which recently came under our observation.

CASE REPORT

Chang Chen Ko, Hospital no. 18459. Patient, a Mukden military officer, aged 30, was severely injured in the left eye by fragments of exploding bombshell on October 17, 1927, during fighting near Hsüan Hua. It was followed almost immediately by complete loss of eyesight. He was then taken to a military hospital, and kept there for about a week without any improvement. At first he experienced no discomfort whatsoever in the injured eye, but soon afterward he felt some pain in the eye associated with some swelling of the lids. Finally he came to our clinic on October 29, 1927, that is, on the 13th day after the injury.

*Read at the Biennial Conference of the National Medical Association of China, January 31, 1928.
Sympathetic Ophthalmia

Upon immediate examination we found that the right eye had an excellent vision of 6/5. It was in a perfectly normal condition except for a tiny piece of metallic foreign body embedded in the superficial layers of the cornea. Two or three such metallic foreign bodies were found also underneath the skin above the orbital margin. The metallic particle in the cornea was removed shortly afterwards.

The left eye, on the other hand, was practically blind, retaining only a very slight light perception with virtually no projection. The lids were slightly swollen. The palpebral and bulbar conjunctiva was inflamed and edematous. A definite rupture was found in the sclera just beside the limbus at 7 o'clock complicated by prolapse of iris, which appeared as a small dark-colored nodule, half centimeter in diameter, and was covered over by a thin layer of fibrinous exudate. The pupil was pear-shaped. The anterior chamber was shallower than normal, containing a trace of blood. There was a thin whitish film on the surface of the lens. Tension was slightly lower than that of the other eye. X-ray examination showed a small piece of metallic foreign body in the lower and inner part of the eyeball, and incidentally it showed such foreign bodies also in the adjacent nasal region.

From the above findings it was evident that the left eye had received a perforating injury involving the ciliary body region, and was, therefore, not only in an irretrievable condition itself, but also constituted a menace to the other eye. As a prophylactic measure against the possibility of sympathetic ophthalmia developing in the good eye, the blind eye was enucleated on the same day he came to us.

On November 4, 1927, 6 days after enucleation, patient was discharged and advised to come back for observation in the outpatient clinic, and at the same time referred to the Surgical Department for removal of foreign bodies beneath the skin of the right upper orbital margin as mentioned above.

On November, 8, 1927, 10 days after enucleation, patient complained of rather severe bilateral neuralgic pains in the head, accompanied by some blurring of vision both for distance and near. The visual and accommodation tests, however, showed normal findings. There was no evidence of uveitis. The fundus was normal. Neurological findings were negative. From that time on patient continued to be troubled by the neuralgic pains associated with visual disturbances. But careful and repeated examination of the right eye failed to give us any clue as to the cause of his symptoms. The possibility of a sympathetic ophthalmia was kept in mind, but the clinical picture at that time was not such as to confirm our suspicion.
On November 21, 1927, that is, a little over one month after the injury, and about three weeks after the enucleation, his vision became slightly worse (6/7.5). There was still no sign of uveitis. Fundus examination showed definite papillitis with edema and hemorrhages in the central and lower temporal part of the retina. Visual field showed slight concentric contraction. Patient was readmitted into the hospital for observation. On account of the persistent headaches and changes in the fundus, it was considered wise to do a lumbar puncture, and the spinal fluid showed the following findings: Pressure 125; fluid clear and colorless; protein 155 mg. per 100 cc.; cells 118 per cc., chiefly lymphocytes. Blood examination showed a white count of 7300; differential count: poly. 66%; lymph. 30%; mon. 4%. Urine contained a faint trace of albumin and a number of leucocytes. Neurological examination was again negative. Blood and spinal fluid Wassermann was negative. The ocular movements were normal. Ear, nose, throat and sinuses were normal.

On November 24, three days after readmission, he developed, all of a sudden, an acute plastic iridocyclitis with multiple posterior synechiae along the pupillary margin, accompanied by marked ciliary injection. A few faint deposits were found on the posterior surface of the lower portion of the cornea. Atropin crystal was immediately applied, followed by subconjunctival injection of two minims of 1-1000 adrenalin. As a result, the adhesions were pulled off completely and the pupil became maximally dilated, leaving behind a number of brownish spots, arranged in a circle on the anterior capsule of the lens. From that time on the eye was treated with hot compresses and atropin instillation. In addition he had mercury inunction for six successive days, three injections of typhoid vaccine, and one injection of neosalvarsan. In the course of this vigorous treatment, a new row of posterior synechiae were formed along the margin of the widely dilated pupil. In the meantime his headaches and local symptoms gradually subsided. The papillitis gradually disappeared, and the retinal hemorrhages became smaller and smaller day by day until on December 13 they were entirely absorbed. But on the same day a number of choroiditic foci of varying size were discovered in the peripheral parts of the fundus, which appeared as irregular yellowish patches. A diagnosis of peripheral sympathetic choroiditis was made on this finding.

Slit-lamp examinations were made several times after the onset of the uveitis, and they showed minute grayish deposits on the posterior surface of the cornea, and numerous fine shining particles floating in the aqueous and vitreous chambers.
A General View of a Sagittal Section of the Injured Eyeball.

Fig. 1.

a. Destroyed choroid and retina,  b. Thickened sclera,  c. Cavity in which the shell fragment was lodged,  d. Extensive hemorrhage into the vitreous,  e. Thickened choroid,  f. Small focus of endophthalmitis.
Fig. 2.

Sympathetic inflammation in the choroid (showing the changes more prominent in the outer layers).
Patient was discharged on December 13, 1927. His right eye was then quiet and had normal vision (6/5). He was followed up until January 10, 1928, when he went back to Mukden. During this period the eye condition remained stationary.

Pathological examination of the enucleated eye showed changes characteristic of sympathetic ophthalmia. A brief report of the findings is as follows:

**MACROSCOPIC EXAMINATION**

The sclera close to the limbus at 7 o'clock showed a rupture, through which some uveal tissue had prolapsed, with the formation of fibrous tissue. Otherwise the external appearance of the eyeball showed nothing remarkable. When the eyeball was cut open vertically in the anteroposterior plane it was found that the sclera on the lower and inner side of the eyeball from the optic nerve to near the ciliary body was considerably thickened (Fig. 1). On the inner surface of this part of the sclera there was lying a fragment of shell 6.5 × 3 × 2.5 mm. in size. Several smaller pieces were in the neighborhood. The overlying choroid and retina were largely destroyed.

Aside from the inflammatory reaction around the metallic foreign body lodged on the lower and inner surface of the sclera, and the attending destruction of the overlying uveal tissue at that particular region, the microscopic changes were confined chiefly to the uveal tract, namely, the choroid, ciliary body, and the iris. The changes were most pronounced in the choroid, and consisted of a uniform infiltration in the entire choroid with confluent nodules of lymphocytes, among which are epithelioid cells and occasional giant cells (Fig. 2). There was no caseation. The infiltration was chiefly in the layers of large and medium blood-vessels. The choriocapillaries were comparatively free. There was extension into the sclera along the blood-vessels and nerves, but the lamina vitrea and retinal pigment epithelium were not broken through. The blood-vessels had partially disappeared. Similar changes were found in the ciliary body and the iris, but in a much less pronounced degree. Sections made through the rupture in the sclera showed extensive prolapse of the ciliary body and the iris in the wound at that particular region. Other changes were found in the eyeball, such as hemorrhage and a certain amount of endophthalmitis around the foreign body. The optic nerve is edematous (Fig. 1).

**DISCUSSION**

The diagnosis of sympathetic ophthalmia, as stated by Fuchs, is in many instances an easy one. There is the trauma to begin with, then it is followed by inflammatory changes in the exciting eye,
and finally, after an incubation period of 2 weeks to 40 years, the whole process is completed by a series of destructive changes in the sympathising eye. This picture is particularly characteristic when the sympathising eye was previously in a normal condition, and the victim of the disease was in perfect health and free from such constitutional diseases as syphilis and tuberculosis. This is represented by the case just reported to you. The pathological changes found in the exciting eye leave no room for any doubt as to the diagnosis. It is further stated by Fuchs that the prognosis in sympathetic ophthalmia is absolutely bad. There may be remissions, but only temporary. It is, therefore, perhaps too premature to draw any conclusions at this moment as to the effectiveness of the treatment which we have employed in this case. Fuchs seems to take the extreme view that practically no treatment can influence the disease once it is on.

Time and space do not permit us to discuss in detail the pathology, etiology, and mode of production in this disease, however interesting they may be, and we are obliged to take them up briefly as follows:

(1) Thanks to the labor of Fuchs* and other noted ophthalmologists the pathological anatomy of sympathetic ophthalmia has been carefully worked out and found to be the same both in the exciting and sympathising eye. The changes are confined to the uveal tract, namely, choroid, ciliary body, and iris, but particularly the first-named. They consist essentially of diffuse and nodular infiltrations with lymphocytes, among which are found epithelioid cells and often giant cells. These changes involve the outer part of choroid, the inner part of ciliary body, and the posterior part of iris. They practically never go beyond the uveal tract. Exudation on the inner surface of the retina is practically absent. Often there is an extension of the process along the vessels or nerves that pass through the sclera. There is seldom caseation. The blood-vessels are gradually destroyed. Finally the cellular infiltrations disappear and the whole uveal tract is converted into a solid connective tissue membrane with secondary changes in the other parts of the eye, ending in complete shrinkage of the organ.

(2) The question regarding the etiology of sympathetic ophthalmia has been a subject of much dispute. On the basis of clinical experience and animal experimentation, various theories have been advanced, according to which it is considered to be a form of infection, intoxication, or anaphylactic reaction. None of these theories, however, can explain every case, and the question of etiology remains open for much investigation.

Sympathetic Ophthalmia

(3) Our knowledge regarding the mode of production in sympathetic ophthalmia is still far from being satisfactory. MacKenzie was the first one to advance the theory that the optic nerve and chiasma might be responsible for the transmission of the disease from the exciting to the sympathising eye. Then came the ciliary nerve theory and the blood circulation theory. All these theories still need further investigation.

The old saying that an ounce of prevention is worth a pound of cure holds good in the treatment of sympathetic ophthalmia. Enucleation of the exciting eye at the right moment is the only effective prophylactic measure against the disease. In doubtful cases it is much better to take out the offending eye immediately than to allow sympathetic ophthalmia to develop in the good eye on account of delay due to hesitation, for one can never foretell what may or may not happen in any given case of penetrating injury of an eyeball.

ON THE ETIOLOGY OF PEPTIC ULCER AND GASTRIC CANCER

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Last year's exodus from China brought with it the privilege of spending five months in charge of a small mission hospital in Mokpo, Korea. During this time I personally examined about 900 Korean patients and visited 4 of the nearby hospitals, some of them repeatedly. I was at once struck with the relative frequency of ulcer of the stomach and duodenum, and of cancer of the stomach. Among the 900 cases seen at Mokpo there were 29 cases of ulcer and cancer near the pylorus; and I recall a visit to the Kwangju Hospital, where 4 of the 50 inpatients had one or the other of these lesions, and a visit to the Soonchun Hospital the following day, where 3 of the 40 inpatients were similarly afflicted. This finding was the more striking, because, in my short experience, these lesions are relatively uncommon in China.

A rather unsatisfactory attempt to verify this impression is shown in the following two tables. Such an attempt will demonstrate to him who makes it how unavailable for scientific study is the mass of clinical material in most mission hospitals.
The China Medical Journal

TABLE NO. 1.

<table>
<thead>
<tr>
<th></th>
<th>Mokpo Korea</th>
<th>Soonchunjeong Korea</th>
<th>Peking 1</th>
<th>Soochow 2</th>
<th>Margaret Williamson 3</th>
<th>Saint Luke's 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peptic Ulcer</td>
<td>In (150 cases)</td>
<td>OPD (750 cases)</td>
<td>In (1100 cases)</td>
<td>OPD (5000 cases)</td>
<td>In (3372 cases)</td>
<td>OPD (19285 cases)</td>
</tr>
<tr>
<td>2.7%</td>
<td>2.1%</td>
<td>2.7%</td>
<td>1.4%</td>
<td>0.5%</td>
<td>0.16%</td>
<td>0.7%</td>
</tr>
<tr>
<td>Gastric Cancer</td>
<td>2.0%</td>
<td>0.8%</td>
<td>0.5%</td>
<td>0.2%</td>
<td>0.25%</td>
<td>0.0</td>
</tr>
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</table>

Roughly speaking then, this series shows these lesions to be seven times as common in Korea as in China. When one begins to search for the underlying causes of so great a discrepancy granting that it exists in races as closely related as the Korean and Chinese, he is led to some interesting findings, which may throw light on the moot question of the etiology of peptic ulcer.

(a) This includes all ulcers variously listed as gastric, pyloric, duodenal, perforated.
(b) All obstructive and operated upon.
(c) 8 of the 16 obstructive.
(d) 2 of the 3 obstructive.
(e) Personal communication from Dr. J. M. Rogers.
(f) 9 operated upon, 7 with obstructive symptoms. The high percentage of obstructive cases suggests an even larger incidence of non-obstructive ulcers not seen by the mission hospitals.
(g) Care has been taken to exclude foreigners from this series.
(h) One must keep in mind, however, that at present Korean patients are more apt than Chinese to seek hospital treatment, and that in Korea cases requiring major surgery tend to collect at Mission rather than at Japanese or Korean hospitals. Furthermore in comparing these percentages with those in Americas and Europe, one must remember that these include only those diagnosed clinically, or at operation, and not any found at autopsy.
The modern view is that the anatomical arrangement of the blood vessels in the pyloric region makes it peculiarly susceptible to injury. The injury from infection is thought to come chiefly by way of the greater omentum, particularly from the appendix. Mann has produced ulcers experimentally by altering the chemistry in the first portion of the duodenum. It has long been known that circulating toxins may produce ulcers in this region, but the mechanism of their production is not well understood; they probably injure the mucosa as they are excreted into the gastro-intestinal lumen. Nakamura is convinced that Rosenow's theory is a factor. Diet and alcohol are held to be accessory rather than primary etiological agents.

As to the etiology of cancer and its relation to peptic ulcer, there is a wide divergence of opinion. Surgeons on the whole are apt to lay more stress upon carcinomatous degeneration of ulcers than are the clinicians.

To take up these suggested etiological factors one by one: One could hardly believe that any anatomical difference exists between the Korean and Chinese pylorus, although proof must await the day when autopsies will be permitted in these countries. Neither does infection seem to account for the divergence in incidence. I was at once struck with the cleanliness of Korean mouths, where perfect sets of teeth and healthy gums in adults, even those of middle age, are the rule rather than the exception, as in China. I saw only two cases of appendicitis (both abscessed) among the 900 cases, which is not a higher incidence than in China. There was only one possible gall bladder infection in a patient who refused operation, and in the hospitals visited cholecystitis was considered rare. And in this series of cases skin diseases and superficial infections were much less common than in China, although deep subcutaneous and interfascial pyogenic abscesses were more common perhaps (5 in 900 cases). Likewise it is hard to see how altered physiology or circulating toxins play a greater role in Korea than in China. Elective action of bacteria may indeed play a part in the production of peptic ulcer, but it must be a secondary factor; else one must believe either that this particular organism is more prevalent in Korea, or that the Korean pylorus is a specially congenial habitat.

In the matter of diet and alcohol, however, one finds a striking difference. Koreans (at least in Southern Korea) imbibe alcoholic beverages in larger quantities, and in far stronger concentrations than do the Chinese, and the ordinary Korean diet contains surprisingly large quantities of pickled foods, peppers, and highly seasoned mixtures, irritating to the mouth and throat of the uninitiated. This contrasts strongly with the simple and almost insipid daily menu of the Chinese.
Again, I gained a distinct impression although I have not been able to gather any statistics in support or refutation of it—that intestinal parasites and associated "sour stomach" are more common in Korea than in China.

The high incidence of gastric carcinoma, running a parallel to the ulcer, would point to an etiological relationship.

**SUMMARY**

1. The incidence of peptic ulcer and gastric cancer is much higher in Korea than in China. The series of cases on which this conclusion is based is too small, however, and calls for cooperative collection of data.

2. None of the chief etiological factors listed in text books seem to account for this difference.

3. The large quantities of irritating substances in the Korean diet, and possibly the large consumption of alcohol, may be clues that will repay further investigation.

**REFERENCES**

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3. Report of the Margaret Williamson Hospital, Shanghai, 1925.
PERSONAL OBSERVATIONS ON CHRONIC DUODENAL ULCERS*

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Reflections on a period of more than twenty five years of personal observations on the progress of knowledge in regard to duodenal ulcers are profoundly amazing in the radical revision of once accepted thought and opinion, if not total reversal of previously established dogma.

The more that is known of organic disease of the upper alimentary tract, the less frequently do cases, formerly considered functional, appear as such on our diagnosis sheet. Not uncommonly a patient actually suffering from chronic duodenal ulcer was told that he was a victim of "acid dyspepsia" or "acid gastritis", "neuralgia of the stomach", "hyperchlorhydria" or other equally vaguely diagnosed disorders, with the explanation that they were all functional conditions.

According to the statistics of the largest clinics, the average duration of a duodenal ulcer was ten years (Mayo ten, Finney nine) before the advice of a gastro-enterologist or surgeon was sought for relief. Earlier recognition and appropriate therapy is the plea of this paper.

The inference must not be drawn that the failure in early diagnosis is due to the fault of the medical adviser but to the peculiar failing of the patient with dyspepsia, who regards his symptoms as too trifling to demand a painstaking, methodical and comprehensive examination, which alone affords an opportunity of establishing an accurate diagnosis. He stubbornly pins blind faith on the efficacy erroneously accorded to the widely advertised remedies of commercial products and their alleged curative properties. He seeks only such symptomatic relief as they may temporarily provide, and pays no further heed to the persistent recurrence of his stomach attacks, which may be the alarm signalling perhaps actual organic disease of the stomach, or indicating disease elsewhere in the abdomen which is giving rise to stomach manifestations and thus disguising their true origin. An educational campaign is suggested for preventive measures in the care and treatment of our dyspeptic patients as has been so successfully done in other branches of medicine, notably in tuberculosis, prenatal obstetrics and with appendicitis.

*Read at a Meeting of the Society of German Speaking Physicians, Shanghai.
Surgical successes have been materially enhanced by practical application of the results obtained by scientific investigation, particularly of the physiologist and biochemist to the preoperative preparation of patients suffering from diabetes, cardio-vascular disease or of the thyroid, kidney and prostate, of the biliary tract, and of the gastro-intestinal tract complicated by general toxemia from retention and obstruction. Success has long ago been achieved by collaboration of the general practitioner with the obstetrician in avoiding the development of serious complications and resulting catastrophes of gestation and labour, and with the surgeon in almost completely stamping out neglected appendix cases with their disastrous results. These achievements of the combined efforts of internist and surgeon in other fields should serve as the best argument for friendly co-operation and against the illogical division of dyspepsia into a distinct medical and a separate surgical classification. Otherwise the failures of each must inevitably be magnified. There is no conflict between medicine and surgery in this sphere as a perusal of much of the past literature may lead one to believe, and which we realise now was based more upon tradition than on actual knowledge.

Medical and surgical statistics of duodenal ulcer in the past literature regarding the results obtained by each and their respective percentage of cures alleged, are deceiving in their confusion between clinical opinion and clinical fact, inasmuch as the surgical cures have been actually derived from the admitted failures of many years of medical and dietetic treatment. Statistical confusion is furthermore reduced because the failure to distinguish between gastric and duodenal ulcer as separate entities, treating them under the combined classification of peptic or gastro-duodenal ulcer, is now eliminated. Since the classification of all ulcers distal by ⅙ to ⅛ inch to the pyloric vein as duodenal, many of those formerly considered pyloric or gastric are now considered duodenal. Contrary to former opinion, duodenal ulcer is not a rare disease but a very common affection, while, since we have acquired the more accurate methods of inquiry, particularly by radiological evidence and surgical inspection, the gastric ulcer, previously looked upon as the more common disease and often spoken of as ulcerated stomach is now considered the rarer affection. In consequence, many of the statistical medical cures of duodenal ulcer, being based on inaccurate diagnosis, we now realise are necessarily fallacious.

Gastric ulcers yield more readily to medical treatment than do duodenal ulcers, which are, according to Moynihan, Murphy and Mayo, contrary to gastric ulcers, surgical as soon as the diagnosis is demonstrable. John B. Murphy once said when asked whether he always operated on duodenal ulcers: "In the early stages if you make
the diagnosis it is a surgical case at once, just like appendicitis, because even if the ulcer does heal it will recur. Remember the average history of duodenal ulcer is twelve years of suffering and then a visit to the surgeon for relief. That tells the story."

Although in duodenal ulcer prognosis is less serious for malignancy than in gastric ulcer, in fact development of carcinoma being extremely rare in duodenal ulcers, they predominate as high in proportion as five of duodenal to one of gastric ulcers. Embryologically the stomach and duodenum as far as the ampulla of Vater are one, as constituting the foregut and differentiated only anatomically with the appearance of the pylorus about the second month. The difference in the degenerative changes may be due to the different reactions of their respective secretory juices.

Unless there is relief, not only from the symptoms, but also from the progressive changes of the disease and a cure established, there is constant danger of acute complications such as hemorrhage and perforation, which, according to Ashurst, occur in twenty to thirty percent of the cases. It is well known that intermission of attacks and intervals of freedom from symptoms do not mean cure or even remission of ulcer formation; that the symptoms are not caused by the loss of structural continuity of the ulcer itself, but are awakened by infection of other source of local or remote toxic influence causing spasms or hyperacidity. With the healing of a duodenal ulcer under medical treatment Ashurst claims there still remain the crippling periduodenal adhesions interfering with the evacuation of the stomach, distorting the gall bladder and semi-invaliding the patient; in other words requiring surgical relief for a complete cure.

In uncomplicated cases operation statistics as quoted by Ashurst, show eighty five to ninety per cent free from symptoms one or more years after operation, after a history of many years illness, whereas after perforation there is a mortality of 37.7% when operated under twenty four hours, 82.5% over twenty four hours and later than twenty four hours, as high as 90%. With earlier diagnosis and speedier surgical relief, a percentage approaching one hundred cure may reasonably be anticipated.

Until recent years the development of treatment of chronic duodenal ulcers has been in abeyance for the reason that we had but little knowledge of the living pathology except its dreaded complications of hemorrhage and perforation. Surgery then offered only temporary relief, being based on post mortem revelations of secondary complications and terminal infections, and chemical and biological examinations rather than radiological and early operative investigations during the
curable period. We now know that living pathology is far removed from dead pathology. It is no longer considered a rare disease but a common one. To quote Moynihan from his recent edition on the subject: "We now know the great progress of the disease. Every month I operate on more cases than were formerly recognised in the post mortem rooms in ten years."

Duodenal ulcer, according to Moynihan, was first recognised as a clinical entity by Travers, who reported three cases in 1817. For over seventy five years interest lagged as only the terminal stages came under observation until about 1900, when Robert Weir and Foote gave the result of their work to the world. It was my good fortune to have had the opportunity of assisting with Robert Weir's work at the New York and Roosevelt Hospitals as hospital intern about that time and my personal recollection is that though his cases were all late ones, mostly with terminal complications, he proved them to be susceptible to surgical relief and helped to arouse surgical conscience to the possibilities of early diagnosis. Further recollections gleaned from intern days in New York from 1900 to 1904 with McBurney, Wm. T. Bull, Willy Myer and Frederick Kammerer all pointed to the fact that though the diagnosis before hemorrhage or perforation was rare and then more or less an accidental finding during exploratory or other operative procedure, gastro-enterostomy gave encouraging results. Later observations made mostly from patients in the wards of the Indianapolis City Hospital, during three years incumbency as superintendent of that institution, and during ten years in my service at the Indiana University Hospital, it was noteworthy that knowledge regarding duodenal ulcer was progressively increasing, due to the impulse excited by Moynihan and Weir, diagnosis being occasionally made earlier on the medical hospital service and referred to my surgical clinic before disastrous complications supervened. In private practice, however, contrary to experience in the University Hospital, such evidence of progress was still lacking. During the war and especially after the armistice, fortunate circumstance, as director of surgical services in evacuation hospitals in France, allotted me the opportunity to observe the noteworthy incidence of perforation precipitated by the administration of three in one injections of typhoid paratyphoid inoculations, which, as a result of the severe negative phase ensuing, appeared to awaken latent lesions which were dormant until then, having given rise to no stomach symptoms deemed serious enough by the patient to demand expert medical advice.

The lack of closer approximation to accuracy in diagnosis now possible, particularly owing to the radiological advances achieved since then, and the consequent lack of finer distinctions between gastric and
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duodenal ulcer and other conditions both organic and functional mimicking peptic ulcers caused many disappointments from operative interventions, as a result of unjustified and incomplete operative procedures. Many failures were undeservedly attributed to surgery instead of to the precocious enthusiasm of the too ambitious surgeon. After all, evaluation of surgical successes, as in other spheres of real worth is based on mature judgment to be gained only by studious preparation, thorough training under able direction, plus experience as a guide, and the mistakes of the enterprising operator who may have mastered the carpentry and tailoring of surgical technique should not be recorded to the discredit of surgery.

The author recalls three cases referred to his hospital service at Indiana University as late as 1916, in which the then popular gastro-enterostomy had been done with bad results following, one of which was relieved by a cholecystectomy for an overlooked diseased gall bladder. In another, an appendicectomy eliminated the symptoms simulating peptic ulcer and in the third, the reparation alone of the artificial anastomosis gave relief, in this case there was no organic pathological lesion evident responsible for the symptoms for which the gastro-jejunostomy had been done.

There has been a vast amount of experimental work done to explain the pathogenesis of duodenal ulcer notwithstanding which the true etiology is not yet completely established. Hunter believed that living tissue cannot be digested. Claude Bernard showed that the leg of a living frog is digested in the acid gastric juice. Parry attributed the protection of the mucous membrane to the alkaline blood circulating through the stomach wall, whilst Stucker considered the mucus in the stomach as the protective agent against autodigestion. Virchow claimed that ulcers are produced by disease of the blood vessels bringing about a local ischaemia and causing disturbance of nutrition. Cohnheim agreed that ulcer is caused by local circulatory disturbance but did not believe that it is due to disease of the blood vessels since arteriosclerosis would be more frequently the cause of ulcer, and ulcer would be more frequent in the aged whereas it is a disease of early adult life.

There is no doubt that acid secretion and ischaemia due to vascular spasm are influencing factors, of which experimental proof is not lacking, yet it is known that excessive acid secretion in the stomach is present in the greater number of functional diseases without causing ulcer, as well as that actual ulcer exists with normal subacidity or even anacidity, but that fact does not prove that the acid was not at one time a factor in the production of the ulcer. At any rate as far
as normal acidity is concerned one can hardly standardise, as this is frequently influenced by such variable factors, as emotion, diet, smoking, drinking and so forth and what may be considered normal in a constitutionally healthy stomach or duodenum, may cause pathological changes in constitutionally inferior tissues. But clinically we find that hyper-acid secretions must play a role in the formation of peptic ulcer, since ulcers occur in those parts on which the acid juice is most prone to act, as in the case of ulcer of the oesophagus, on the lesser curvature and the pylorus, in the first part of the duodenum and in the jejunum after gastro-jejunostomy.

Remote causes as well as local conditions in the stomach and duodenum may be responsible, as long ago shown by Schieff and Ebstein who caused ulcers of the stomach and duodenum by producing lesions in the pedunculi cerebri, and Brown Sequard who encountered ulcers in human beings as the results of injuries to the medulla oblongata and different parts of the brain.

Archives also record the causative relation of vagus lesions to gastric and duodenal ulcer which has been shown especially by Talma, who stimulated the vagus in the neck of an animal causing spastic contraction of the muscularis mucosae and ulcer formation. The vagus influence was supported by Roessle, who considered ulcer a secondary disease, second to diseases outside the stomach, such as gall stones, and constipation which by nervous impulses caused contraction of the muscularis mucosae and ischaemia.

Rosenow goes a step further in his infection theory to show that the infection of the appendix, gall bladder, hepatic or even more remote lesions is responsible when superincumbent upon the vagus influence and local ischaemia which predispose to bacterial invasion.

We have then, more than one cause for the formation of the ulcer, not always the same. Besides the factors of acid secretion, local vascular disease and the influence of the vegetative nervous system and infections of remote lesions, we have the individual constitutional factor evidenced by records of the family history of ulcer in members of the same family for generations. Thus may be explained the incompleteness of experimental proof on animals.

In the majority of cases the ulcer is situated in the first portion of the duodenum (suprapapillary) the anterior wall being the more frequent seat though frequently found on the posterior wall by the pathologists, which is probably the result of secondary changes in the later stages. It varies in size and depth, often not visible on the serosa, but only in the mucous surface, through which it has not penetrated. There is at times marked hypertrophy of the pylorus, as
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the result of chronic pylorospasm, to many times the normal thickness of the pylorus, with penetration of the ulcer into the neighbouring organs as in a case referred to the writer about four years ago by the late Dr. Cumming. This patient was a sea captain and gave a history of indigestion of fifteen years standing. While on the high seas and for three days before making the port of Shanghai he had been suffering from severe pains and the vomiting of blood. Operation disclosed multiple duodenal ulcers with an old fistulous tract into the gall bladder which had again perforated, a suppurative fatal peritonitis ensuing before surgical intervention could be obtained.

Detailed descriptions of the symptomology and diagnosis of duodenal ulcers are found in most modern text books, which it is needless to repeat. However, the outstanding early features are those commonly referred to by the patients as complaints of "indigestion" or "stomach trouble". These complaints, it is well known, may be due to a variety of conditions and causes bearing no direct relationship to the stomach but to constitutional disturbances, toxic infection, neurosis or chronic abdominal disease other than lesions in the stomach. Eliminating from the stomach all the complaints which are the result of general diseases, we eliminate about one third of all gastric disturbances. With almost any type of chronic abdominal lesion the manifestations are those with symptoms of dyspepsia predominating. These symptoms, eliminating those of malignancy, may be classified as (1) reflex, (2) ulcer dyspepsia. Reflex dyspepsia is commonly caused by chronic constipation, especially with the cathartic or enema habit, gall bladder disease, chronic appendicitis, degenerative diseases of the liver, chronic pancreatitis and disease of the urinary and pelvic organs.

Duodenal ulcer presents a fairly constant syndrome and if one would make an early diagnosis, one must forget the text book picture of pain, vomiting and hemorrhage, because these occur late. Of greatest diagnostic importance are the four following features: first, chronicity; second, intermittency; third, meal relation; and fourth, food ease. Ulcer exists for years and is distinctly non-prostrating, patients appearing in good health, with no loss of weight and strength, in contradistinction to most other conditions sometimes confounded with it, particularly gastric ulcer. Intermittent for a period of months sometimes, the characteristic distress of "heart burn", "water brash", "hunger pain", even if not distinctly painful, at least an unpleasant sensation regularly occurring one and a half or two to four hours after a meal, aggravated by the emptying of the stomach into the duodenum as shown in ninety one per cent of the cases in the Mayo clinic and in ninety seven per cent of the cases these symptoms are relieved by the taking of food or soda. Patients feel more comfortable with food
in the stomach and eat more, frequently taking a glass of milk or a cracker before retiring, to avoid being awakened by the characteristic distress or "hunger pains", which they find are benefited by lying on the left side. They are not aware that it is due to some pathological lesion but believe that it is just an idiosyncrasy of theirs to keep the stomach consistently busy. Vomiting seldom takes place unless, according to Murphy's observation, there be a lesion deep enough to cause either an irritation of the peritoneum or its inflammation suggesting an old ulcer, or if there is a secondary gastric ulcer or one in association with cholecystitis or pericholecystitis. Later complications such as stenosis, subacute perforation, or embarrassing adhesions, may vary the time of appearance of the distressing symptoms, as well as the position of the ulcer, manifestations appearing earlier the nearer the ulcer is situated to the pylorus.

Haematemesis is not characteristic as was formerly taught, occurring only in ten per cent of the cases. It is of no diagnostic importance occurring in other conditions much more frequently especially in hepatic cirrhosis, splenic anaemia and pernicious anaemia; jaundice is rare unless associated with complicating biliary disease.

Reflex symptoms have the characteristic tendency to constancy rather than intermittency. Functional disorders variously referred to as neurosis or neurasthenia gave stomach trouble as their chief complaint in twenty six per cent of the cases at the Mayo clinic in 1925. The multiplicity of other symptoms, lack of uniformity of digestive distress, or even qualitative food discomfort, which occurs usually immediately after ingestion of food, the disabling and sometimes complete prostration, exceptional in ulcer, and general nervous instability characterises this class as distinct from ulcer patients.

The three organic affections most frequently confused with chronic duodenal ulcer are, first, gastric ulcer, second, chronic appendicitis, third, gall bladder disease, with which latter two conditions it is not uncommonly associated. From gastric ulcer it may be distinguished by the long interval after food before the occurrence of distress, also immediate or partial relief after taking milk in gastric ulcer, when it requires fifteen to twenty minutes for relief in duodenal ulcer. Exacerbations in cold or wet weather more frequent in duodenal ulcer, unusual in gastric. Moynihan thinks that flatulent dyspepsia is characteristic of gall bladder disease and furthermore, duodenal ulcer is distinguished from gall bladder disease by the regularity of symptoms at a specified time after the ingestion of food, complete absence of symptoms during intervals between exacerbations. Aside from the characteristic, but possibly infrequent, attacks of biliary colic, definite pain is not a feature, while qualitative food distress is a constant
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feature in gall bladder disease. Symptoms occur immediately after food and tend to improve as the stomach empties itself, contrary to that of duodenal ulcer. There is a full feeling, constant desire to belch, burning sensation and acid eructations benefited by a selective diet, avoiding fats, greasy and fried foods, and all indigestibles as pickles, cabbage and so forth. There is characteristic X ray evidence in both, except in difficult border line cases such as periduodenal adhesions due to gall bladder disease alone or associated with ulcer as often happens. Chronic appendicitis is often difficult to differentiate but the symptoms do not bear the same relationship to the intake of food but usually to indiscretions in diet or following unusual exercise. Food relieves duodenal ulcer and aggravates or has no effect in appendicitis. It is well known that X ray diagnosis is of doubtful importance in appendicitis except in its indirect signs and secondary effects on the gastro-alimentary tract. Physical examination reveals little of importance early in the disease of duodenal ulcer and presents no pathognomonic manifestations as does the anamnesis. There may be superficial tenderness and later pain on deep pressure after the peritoneum has become involved at a point situated a little to the right and above the umbilicus which is by no means accorded the importance that is given to McBurney's point in appendicitis. Boas called attention to a spot opposite the twelfth dorsal vertebra, which is of no constant significance.

Chemical examination of the stomach contents does not enjoy the importance formerly accorded it; it should however not be neglected, for it serves a very definite purpose in eliminative diagnosis. A hyperchlorhydria occurs in only about forty two per cent of duodenal ulcers. An anacidity may indicate degenerative malignancy, syphilis or a pernicious anemia or an asthenic neurotic state coupled with hypotonic dilated stomach even in the presence of deformity revealed by the X ray. The variations in the curves also are helpful in differentiating functional disorders. Rehfuss describes a secretion curve in duodenal ulcer with rapid rise in acid curve and slow decline, but he admits that this is not characteristic for duodenal ulcer as it may occur in normal or other conditions and serves only as an adjunct.

Whereas clinical examination and the history is of prime importance X ray is the most important recent development in the preoperative diagnosis of ulcer. It is the most difficult field in the whole scope of X ray diagnosis and may prove a dangerous factor except when done by experienced and competent roentgenologists. To show its great value at the Mayo clinics, in only 2.65% when an ulcer was reported, none was found, and in only 3.83% where a negative report was made, was an ulcer found at operation. To Cole of New York
belongs the credit for having called attention to the persistent deformity in the case of duodenal ulcer. It is important to combine fluoroscopy with roentgenograms as duodenal bulbs may show up only by fluoroscopic manipulation. The tendency of clinicians or those ill prepared and not possessing the necessary skill and experience to interpret the roentgenogram, even if the technical part of taking the picture may be overcome, should be deprecated. To interpret an X ray picture properly entails as much study, skill and experience as does the interpretation of the picture under the microscope, yet, lacking the proper and necessary training, how many would presume to make a diagnosis of a pathological section, but do not hesitate to give a definite opinion in roentgen ray diagnosis, and thus court possible disaster for the unfortunate victim? Without radiological proof, the accuracy of the diagnosis is uncertain, as clinical and chemical evidence is not alone adequate to establish the presence of an ulcer. The roentgenologic signs that can be depended upon in duodenal ulcer are deformities of contour of the bulb and changes in the time of evacuation, peristalsis and tone of the stomach. With the majority there is hypertonia hypermotility and hyperperistalsis of the stomach and deformity of the bulb, which distortion may be due to scar formation, to penetration or perforation of the ulcer or to spasm. Spasm must be permanent in contradistinction to reflex spasms as seen in other conditions mimicking ulcer, when it is inconstant and relieved by sedative drugs such as atropine. When the ulcer has produced obstruction, the stomach loses its tone and becomes dilated and instead of rapid evacuation there is delay.

Before the days of more exact diagnosis in duodenal ulcer the prognosis was unfavourable because of the fact that the diagnosis was made late after development of one of the grave complications or of perforation or hemorrhage. With the present day facilities for early diagnosis the prospect no longer presents the gloomy aspect of former days and restoration to sound health is the prerogative of every patient.

After a reasonable and conscientious medical treatment has failed in cases presenting clinical evidence of duodenal ulcer and when X ray shows such indirect signs as hypertonia or hyperperistalsis without obstruction, operative intervention is relatively indicated and when X ray shows periduodenal adhesions, six hour retention with dilated stomach and such direct signs as a niche or bulbar deformity, even without a niche, which may be too shallow to be visible, operation is absolutely indicated.

For the medical management it is unnecessary to mention the admirable methods of Einhorn, Lenhardt, Smithies, Held and Gross. The very strict treatment of Leube is only indicated in bleeding cases.
The Lenhartz and Sippy method as well as the duodenal feeding as advocated by Einhorn may be given a trial though not too prolonged. These methods entailing selective diet and gastric lavage are so beneficial in all cases of alimentary infection and the physical rest, which is part of the treatment, of such general benefit that definite conclusions are difficult to form. The above described and associated regime is known to produce conditions which prolong the intervals of attacks or even eliminate them altogether, these often recur however, when normal habits and regular diet are resumed. It is a serious question whether the ulcer ever heals under such treatment, whether it remains healed, and whether in a case of healing it does not produce conditions which need surgical treatment for their ultimate relief.

Notwithstanding these considerations in all early cases when a definite diagnosis has been ascertained a serious effort with medical treatment should be made, invariably under radiological supervision and continued only until the first signs of recurrence.

It must be emphasised that prophylaxis should be practised more often than is being done at present as ulcer develops very insidiously and requires the closest scrutiny and the eradication of all focal infection. This means the proper treatment of teeth, sinuses and tonsils and the eradication of infected gall bladder, especially an infected appendix, as well as the infected foci of prostate and female generative organs often causing hyperacidity and dyspeptic manifestations.

The unstable vegetative nervous system tends to develop disease in organs interrelated by the vagus or sympathetic and it must be remembered that a condition of vagotonia invariably aggravates gastric manifestations. It may be mentioned that the smoking of tobacco by its influence on the vagus may produce harmful effects in ulcer patients.

Taking into consideration that surgery has, in the past, been the "dernier ressort" of therapy, after a history of many years standing and confessed failure of other methods of treatment, there is not much grounds for criticism of results. Nevertheless, there is still a fifteen per cent of failures as these results now stand, that is to say, after a more or less prolonged attempt and failure with other methods, they do not restore the patient to sound health. With earlier diagnosis and a more expeditious resort to surgical relief with the first signs of a warning recurrence, these remaining failures should be wiped out.

As yet there is no ideal method of surgical procedure for chronic duodenal ulcers, to which fact the diligent efforts and numerous surgical procedures offered amply testify. Partial gastrectomy for gastric ulcer and pylorectomy for duodenal ulcer are being strongly
advocated by European surgeons. American surgeons have not adopted the practice to any extent. While the necessity for radical removal of ulcers is recognised, small ones can be completely excised so satisfactorily and when combined with gastro-duodenostomy or gastro-jejunostomy, give such good results with comparatively insignificant risk that the hazard of partial gastrectomy or pylorectomy does not seem warranted.

Of all methods gastro-enterostomy has in the past been the most popular method of operating, with, however, by no means perfect results. The operation was introduced by Woelfler of Vienna in 1881. Moynihan believes that many of the poor results have been due to (1) operation done in the absence of any organic lesion justifying it, (2) in cases of chronic extra-gastric lesions that have been overlooked, (3) incomplete operation, ulcer not having been dealt with, (4) defects in technique. He admits, however, that even when done under the best auspices there may be unsatisfactory sequelae, such as pain, vomiting, hemorrhage and diarrhoea. These can be explained as being due to altered physiology and to the stomach emptying itself too rapidly into a part of the intestine not physiologically adapted to the function artificially forced upon it.

Normally, the food when it enters the stomach is subjected to a very thorough grinding and mixing with the gastric juices. Chymification is complete before the closed pyloric sphincter permits it to pass onward. When the acid chyme enters the duodenum, the pancreatic secretion starts, and by means of the "panrythmic segmentation" of Cannon and Blake the churning movements of the duodenum brings the bile and pancreatic ferments into intimate contact with the chyme before it is permitted to pass onward into the jejunum which is necessary to ensure complete digestion.

The experiment of Baylis and Starling who cut off the nerve supply after isolating a loop of jejunum and ligating both ends and then injecting 10 c.c. of a 0.4% HCL solution proved that pancreatic secretion is started immediately after the injection. They furthermore showed that the greater the distance from the pylorus the acid was injected, the less pronounced and scantier was the pancreatic secretion. The logical conclusion derived from this experiment is that the highest functional pancreatic activity is to be obtained only when the acid chyme is present in the duodenum, and that when entering the intestinal tract at a lower point the pancreatic digestion is impaired.

A revolutionary change in the physiology of digestion must take place after a gastro-jejunostomy, and it is surprising that patients get along as well as they do when one reflects that coarse unchymified
boluses of food are forced through an artificial stoma into the jejunum which it is not prepared to receive. Nor can it intimately mix the chyme with bile and pancreatic juices as provided in the duodenum with its highly specialised function of rhythmic segmentation. The highly acid and coarse bolus not having been neutralised by the alkaline bile and pancreatic secretions is rapidly injected into the ill prepared jejunum by which unphysiological action an ulcer not infrequently forms at the point of anastomosis, a lesion more serious than that for which the gastro-enterostomy is usually done. Nor does gastro-jejunostomy prevent the formation of a new ulcer in the duodenum as shown by Moynihan, who has now abandoned its practice, nor the ulcer formation in the stomach, as recorded by Coffey in two cases after gastro-enterostomy for duodenal ulcer.

However, gastro-enterostomy has saved many lives in the past in certain kinds of embarrassing conditions and is not to be discarded as a valuable aid in need. But it has limited indications and does not restore the patient to sound health.

I am of the opinion that we all agree on one thing, which is, considering the bare physiological facts, that the most rational method of therapy is to excise or cauterise the ulcer, eliminate the obstruction by enlarging the natural outlet of the stomach and thus ensure the unhindered passage of its contents.

Shoemaker has been responsible for the revival of the Billroth I operation, which had fallen into disrepute because of the risk of leakage from the "fatal suture angle". However, Shoemaker has shown that a safe anastomosis may be made in selected cases and that the value of any operation depends upon its proper application as well as its skilful performance.

There are a number of these more physiological operations proposed, among which the Heineke-Mickulicz pyloroplasty is one. This, in my experience, makes too small an opening, and is less adequate in comparison to the one the writer has been doing by choice in selected cases during the past twelve years. The operation was proposed by Finney and seems to meet requirements best though there are cases and conditions unfavourable for its successful performance. Dense massive adhesions about the pylorus and duodenum as found in late cases and especially as the result of a slow perforating ulcer make the operation a particularly difficult one and inadvisable. Finney's gastro-duodenostomy permits physiological digestion to progress in a normal way, the enlarged opening being placed in the regular course and physiologic direction of the peristaltic wave. The base of the inverted U shaped incision which connects its two limbs into the adjoining
walls of the stomach and duodenum severs the pylorus muscle but even when the sphincteric action of this muscle is thus destroyed the rhythmic segmentation of the duodenum prevents the stomach from emptying too rapidly. As in the case of the severed anal sphincter muscle, the action of the pyloric muscle is often regained.

One of the cases recently done has had a particularly fortunate result and warrants a short report, including the radiological findings. The case is one Mrs. B., age 27 years, who came under my observation with the history of the typical digestive disturbances of only two years standing. It is noteworthy that so early in the history, there is radiological evidence of distortion characteristic of the lesion of which serial roentgenograms, by Dr. Bowen, are appended. The Wasserman, Sachs-Georgi and 3rd. Meinicke, which reaction is most important, and should be taken in every case, were negative. Analysis of the stomach contents shows nothing abnormal.

Operation Sept. 7th. 1927. Modified Finney gastro-duodenostomy without clamps. Inverted U shaped incision extends well down to greater curvature of stomach through the markedly hypertrophied pylorus muscle, and to a point on the duodenal side corresponding in length to that on the stomach, thus enlarging the pyloric orifice from the narrow opening admitting barely the tip of the small finger to the breadth of three fingers. Excision of ulcer bearing tissue from the anterior wall of duodenum just distal to pylorus and not visible on the serosa. Completing suture in the usual way. Uneventful recovery. Discharge from hospital, Sept. 17th. 1927. Nov. 4th. gain of weight from 90 lbs. to 105 lbs. No recurrence of symptoms. Each month since, for past six months records a steady gain in weight to 115 lbs. and no recurrence of symptoms.

The post operative radiograms were taken just two and a half months subsequent to operation and show a rather remarkable change from the dilated hypotonic stomach with its six hour residue, and typical bulbar deformity to a condition of the gastro-alimentary tract approaching normal. For comparison, there are a few other roentgenograms submitted, taken from selected cases showing conditions of the gastro-enteric tracts a result of disorders which may mimic manifestations of chronic duodenal ulcer.

In conclusion, I wish to emphasise the great importance of continued study of all cases post operatively, not alone from the standpoint of symptoms, but radiologically as well, so that we may follow up our endeavours over a period of years and finally be able to adopt that form of therapy which leaves the gastro-intestinal tract mechanically, and physiologically, in a condition approaching the most normal.
Fig. 1.

Lumbar spine before operation: Shows constant deformity of dorsal spine.
Fig. 2.

Duodenum after operation: Shows constant deformity different from previous one and probably the result of the pyloroplasty.
Chronic Duodenal Ulcers

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DISCUSSION

Dr. Engel described the radical standpoint of German and Austrian surgeons and reported about a modification he used on a case of ulcus duodenii (Billroth II).

Dr. Bowen and Dr. Engländer showed interesting Rontgen pictures of ulcers duodenii et ventriculi.
Some time ago I published in this Journal (Vol. 41, October 1927) a provisional growth-curve of the striped hamster. Since that time a series of measurements of young animals from birth to the end of the fourth week, when they are sexually mature, has indicated that the postnatal part of this growth-curve which was based only on the measurements of a single animal was not correct. The length of the animal excluding the tail, is 30 mm. on the day of its birth. From that time the approximate increase in length is as follows:

<table>
<thead>
<tr>
<th>Days</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>5</td>
<td>38</td>
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<tr>
<td>7</td>
<td>42</td>
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<td>9</td>
<td>46</td>
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<td>50</td>
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<td>60</td>
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<td>19</td>
<td>65</td>
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<td>22</td>
<td>70</td>
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<tr>
<td>25</td>
<td>75</td>
</tr>
<tr>
<td>28</td>
<td>80</td>
</tr>
</tbody>
</table>

In determining the age of a young animal it may be useful to know that when it is seven days old a white spot appears on each side near the hip. Two days later a black spot appears slightly in front of the white one. These two spots disappear when the animal reaches the age of seventeen days.

The eyes of the animal open on the fifteenth day.

In the same material studied before, the corpora lutea of the ovary were investigated microscopically. Altogether fifty-four females were used, twenty-nine of which had no corpora lutea. None of these animals was pregnant, but four had young, measuring on the average 47, 50, 60 and 63 mm. It is evident that if no second pregnancy immediately follows the first one, the corpora lutea may disappear before the young have reached a length of 47 mm., or, in other words, an age of nine days. On the other hand, four non-pregnant females with young still had corpora lutea in the ovaries. Their young measured 34, 55, 57 and 65 mm. In the case in which the young measured 55 mm. the corpora lutea were degenerating. This corresponds to an age of thirteen days, which is the time when the eyes are nearly open and when the young animal seems to be ready to take food other than milk. That is to say that, as in other animals, when the corpora lutea disappear, lactation diminishes. Since, however, normal corpora

*From the Department of Anatomy, Peking Union Medical College,
†Milne Edwards has given this name, not Thomas as stated previously.
Further Notes on the Striped Hamster

Lutea may be present even when the young are 65 mm. long or nineteen days old, the moment of resorption of the corpora lutea seems to be very variable.

Twenty-five female hamsters had corpora lutea in the ovaries. The number in one ovary varied as follows:

<table>
<thead>
<tr>
<th>number of corpora lutea in one ovary</th>
<th>number of ovaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5 6 7 8 9 10</td>
<td>3 9 12 11 5 4 3 1 1 1</td>
</tr>
</tbody>
</table>

This is an average of $3.94 \pm 0.28$ with a standard deviation of $\pm 2.00$.

When both ovaries of the same animal were taken together the variation in the number of corpora lutea was as follows:

<table>
<thead>
<tr>
<th>number of corpora lutea in both ovaries</th>
<th>number of hamsters</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 7 8 9 10 11 12 13 14 15</td>
<td>7 5 7 2 1 2 0 0 0 1</td>
</tr>
</tbody>
</table>

The average is $7.92 \pm 0.41$ with a standard deviation of $\pm 2.05$. As might be expected, this number is greater than the number of egg chambers ($6.55 \pm 0.29$) found in the pregnant uterus because not all eggs are fertilized and some fertilized eggs die young.

As mentioned above four of these twenty-five females were not pregnant but had young. Three were not pregnant and had no young, but the uterus was puerperal, showing microscopically that the animal had given birth a short time before. It is probable that the young had been eaten by the mother or had been lost in some other way. There was only one animal not pregnant, with no young and with no puerperal uterus. In this animal the corpora lutea were corpora lutea spuria; in other words, ovulation had not been followed by fertilization.

It should be noted that in the non-pregnant females, with or without young, all the corpora lutea of one ovary are first resorbed and then those of the other follow.

In addition to the eight non-pregnant females, seventeen pregnant females had corpora lutea. Eleven of them had no young. Six, however, had young which measured 63, 64, 66, 70, 72 and 78 mm. Each of the ovaries of these six animals contained one set only of corpora lutea, belonging to the embryos, the corpora lutea belonging to the young having already disappeared at this time.
PUERPERAL TETANUS

L.H.H. Byrne, L.R.C.P. and S.I., Loyuan Women's Hospital, Fukien

The following case seems of sufficient interest to report and I would be grateful for suggestions re the possible source of infection in this case.

I was called to see a multipara who had been in labour 48 hours. She had been attended by a Chinese nurse (foreign-trained) who had advised calling in medical help some time previously, when no progress was being made. The relatives had refused, and it was only when the patient was becoming exhausted and her condition seemed hopeless that they consented to foreign help.

On examination no fetal heart could be heard, the cord was prolapsed and protruding at the vulva, but not outside. On vaginal examination a neglected shoulder presentation was found.

Under chloroform with difficulty version was performed and a full term stillborn baby delivered as a breech.

The placenta was expressed after waiting half an hour. There was slight hemorrhage.

An Iodine douche was given and ½cc Pituitrin. The uterus contracted well, there was no perineal laceration. The patient's general condition was much better. She was given an Ergot mixture and the puerperium was uneventful until the 14th day. On the 15th day I was called again to see the patient by the nurse; she had been attending regularly and reporting on the case. The patient complained then of difficulty in opening her mouth and stiffness of the neck muscles. I saw her the same day and found marked trismus, slight opisthotonos, which rapidly became more marked, and painful spasms of the neck muscles. Unfortunately I had no anti-tetanic serum at hand, sedatives even in large doses failed to control the spasms which rapidly became worse and she died on the 5th day after the commencement of symptoms.

When I saw her on the 15th day on examination the pelvic condition was normal.

She had of course remained in her own home, which was extremely dark and dirty.

I can find no record of any case of Tetanus occurring in this district nor any case of Tetanus neonatorum, although it is common in other parts of Fukien.

I should be glad of the opinion of others on this case.
LEPROSY

Recent months have seen a considerable quickening of interest in the problem of Leprosy, especially as regards fresh methods of treatment of the disease.

This is shown both in the amount of space devoted to the subject in medical literature and in new drugs or combinations of drugs for treatment.

The British Empire Leprosy campaign is probably responsible for a good deal of the increasing interest in the subject and, as China is one of the great reservoirs of Leprosy, the matter is one of much importance to us out here.

We have therefore attempted this month to gather up the newer information as regards treatment in the Current Medical Literature Section and from this some facts stand out.

Among these the most important is the use of Potassium Iodide. Those who have been interested in the treatment of Leprosy for many years have long realised that the effect of Pot. Iod. on leprosy patients was often an untoward one and in the pre-organic-arsenic days we were sorely puzzled how best to treat tertiary syphilitic lesions in lepers. Now Dr. Muir has shown that the reactions caused by Pot. Iod. so far from being undesirable are, under proper and careful control, a most important agency in cure. The papers on this subject in Current Medical Literature should be carefully studied.

To this note on Pot. Iod. should be added that the use of this drug is combined with the usual treatment with Chaulmoogra derivatives. While yet another form of treatment has been suggested viz that of protein shock the results of which are not yet sufficiently clear.

Many of us a few years back got very excellent results from the intravenous use of Sodium Hydnocarpate and, but for its constant action in causing thrombosis of the veins, would hardly have been persuaded to abandon it. Good results we hear are being obtained from the use of Alepol (Burroughs Wellcome), reference to which was made in News and Comments in March. This is a form of Sodium Hydnocarpate which is much less liable to cause thrombosis. It will be noted in the papers already referred to that thrombosis may also be avoided by mixing blood in the syringe with the hydnocarpate solution before proceeding with the injection and this seems a very simple expedient worth trying.
The use of Ephedrine in relieving nerve pains in leprosy is emphasized in another paper and is well worth remembering.

Yet another paper deals with the Wassermann reaction in lepers which our readers will remember gives a positive in a high proportion of cases. In regard to this we should like to quote from a personal communication recently received from Dr. R. G. Cochrane, Medical Adviser to the Mission to Lepers. He writes:

"I personally think that too much stress can be laid on the Wassermann reaction. Unless there is clinical syphilis or a very strong Wassermann reaction, or better Kahn reaction, I do not treat for syphilis.

A useful line would be to take a series of strongly positive Wassermann reactions and give them ordinary anti-leprosy treatment and see (1) whether the reaction were influenced, (2) whether in spite of the reaction they improved under treatment. Very few people have investigated the Wassermann in nodular cases before and after treatment."

It may be that some of our Members would be willing to undertake a little bit of investigation of this nature.

The last of the papers referred to above is from Culion giving the results of treatment in children. This is at one and the same time most encouraging and rather disappointing. In final results it is very encouraging to learn that more than two-thirds of early cases and over a third of more advanced cases have become negative (presumptively cured). It is disappointing to find that the cure has taken up to five years of regular treatment, less than a third being negative after two years treatment. Experience may show that with treatments giving more strenuous reactions such as that with Potassium Iodide this negative period may be reached more early. Regular treatment for five years in China is not easily attained.

THE OUTLOOK FOR CHINA

While it is most interesting to read of the progress of the leprosy campaign in other parts of the world, the first question that affects us is—What about China?

With the possibility that political conditions may settle down here before very long, and in view of the fact that in the South, which, with the exception of Shantung, is the region most affected by Leprosy things have already improved enormously, it is high time that the leprosy problem came again to the fore.

Three bodies are already working in this country. In order of seniority in time these are: the Mission to Lepers, the American
Mission to Lepers, and the Chinese Mission to Lepers. There are also individual missions, especially in the south, which have been carrying on leper work for a considerable number of years.

Despite all this the leprosy problem of China remains almost untouched. It has been estimated that the lepers number a million souls and while this is probably a considerable exaggeration they certainly run to several hundred thousand. The proportion of these that is reached by the agencies mentioned above is not more than two or three per cent, and probably only a minority of these are receiving any proper medical attention.

This is a thoroughly unsatisfactory situation and the time is more than ripe when something should be done to improve it.

The first step in this direction is to attempt to visualise clearly the difficulties in the way, and when these are plain we may then go on to consider how they may be overcome.

We think that the difficulties might be enumerated as follows:

I Economic

(a) Sufferers from leprosy are usually of the poorer classes.
(b) In some districts they are outcasts and hardly able to earn a living, much less pay for treatment.
(c) They are scattered in relatively small numbers over wide areas and the cost of constant travelling to treatment centres would be heavy.

II Medical

(a) The period of treatment is lengthy, one to five years.
(b) Treatment which is not continuous is of little value.
(c) Few hospitals can admit such sufferers into their general wards.
(d) Leper homes are few.
(e) Doctors are few and not available in many country districts.
(f) Drugs have to be provided.

This statement of the position while not covering all the difficulties gives a general idea of the problems to be met. Perhaps the more important of them might be summarised as follows:

The problem is to provide continuous treatment over a period of years administered by those capable of doing this and employing somewhat costly drugs.

The question of drugs is a comparatively simple matter as the Missions to Lepers already mentioned are prepared to give assistance in the supply of these drugs wherever efficient treatment can be guaranteed.
The question of continuous treatment is however a very difficult one. The ideal would be to provide a number of leper homes in touch with various hospitals in the country districts. Apart from that, a certain amount of good work can be done by leprosy clinics in the hospitals, but these can only reach sufferers in the vicinity and they fail to meet the difficulty that a healthy regime with plenty of good food is an important adjuvant to the cure of leprosy. There is also an unfortunate tradition from the past to be overcome, that leprosy is an incurable disease and that all that can be done for it is to provide homes where the sad declining years of the leper’s life can be spent. There are probably a number of homes in China where the influence of this idea still prevails with the natural result that no treatment is attempted and only old mutilated cases are admitted which are largely beyond the hope of permanent cure even if treatment can be obtained.

Of the first importance then is the matter of education of missionary and other charitable bodies that leprosy is a disease which taken in reasonable time can usually be cured and that leper homes should be largely used for the cure of leprosy as much and more than for the comfort of dying lepers. Not only could valuable healing work thus be done but its very success would encourage the provision of such homes in other leper centres. The appeal of leprosy to the charitable public is a strong one and if it could be shown that curative work could be done on a large scale, we do not believe that the financial support for these homes would be lacking.

But how is such curative work to be carried out? Let us recognise at once the difficulties; that scientific trained physicians in China are very few and specially so in country districts and that it is out of the question to provide regular medical attendance at homes at considerable distances from hospitals.

But while this would be ideal, is it necessary? Our own view is that an enormous amount of most valuable work could be done apart from this. Much of the treatment of leprosy is purely technical and the technique is not difficult to acquire. We believe that to each leper home should be attached a trained nurse, if this be any way possible, but if even this be not possible one with a fair education and a limited amount of training might be useful. We would give such a nurse two or three months careful training at a leprosy centre in the giving of injections and the use of other drugs and would then expect him or her to give regular routine leprosy treatment to the inmates of the home. It should not be difficult anywhere to arrange for the visit of a doctor say once a month or so to inspect the home, give further directions for
treatment and arrange for the discharge of such cases as are apparently cured. In such a way as this the financial cost of running a home should be very small indeed.

We have recently read a very interesting article in the Indian Medical Gazette which we hope to reproduce in a later issue of the Journal, and to which we shall refer again; on a new method adopted in one area in India for giving medical first aid to poor country districts. Selected head-masters of primary schools are sent to hospital training centres for two and a half months and given intensive courses in a few simple ailments and are then sent back to their schools with very simple provision in first aid medicines and dressings for the villagers. Apparently the experiment is working well. If this be possible in India would not something of the same sort be possible for extensive treatment of leprosy in China?

The question of ridding China of leprosy is a very big one and a very urgent one and cannot possibly be handled on ordinary lines. We shall be very glad of the opinions of Members on how this problem should be solved.

THE LIGHT TREATMENT OF EYE AFFECTIONS

Dr. Harston in his valuable paper on this subject has brought to our notice a matter of great importance and we would ask the growing number of our Members who are interesting themselves in the use of light in treatment to let us have more of their own experiences in practice for publication.

We have unfortunately to see this ourselves from the point of view of an outsider, but of late we have several times heard remarkable statements of the value of light treatment in eye affections. Recently we had the pleasure of the company of one of our leading doctors, who had himself been taking this treatment for an ocular affection and who spoke about the results, especially as regards the relief of pain, with unbounded enthusiasm.

Perhaps the Ophthalmological Section of the coming Conference would take up this matter for the general information of Members.

ANTHRAX

The subject of Anthrax in China is one of considerable importance and our thanks are due to Dr. Canright for his article on the subject in this issue. With the article he sent us excellent coloured sketches which are reproduced as the frontispiece of this number.
The importance of the subject, and the reason that we have gone to the expense of having coloured reproductions made, is that the reports received in this country of cases of anthrax are very few, whereas there are reasons to suppose that the disease is much less rare than this seems to imply.

Anthrax is by no means a rare disease in animals out here, and there is a considerable trade in hides and animal hair. Anthrax from time to time is reported from widely distant places, and there have been a number of cases of the disease in foreign countries where the source of infection has been skins and hair imported from China.

All this suggests a much higher prevalence of infection here than is reported and as successful treatment depends largely on early diagnosis the importance of being on the lookout for cases is evident.

We have to thank Dr. Canright for clear directions as to treatment which it were well to follow, but it seems to us that he does scant justice to surgery in his enthusiasm for the methods that he suggests. Some of us received our training before these simpler methods were available and the impressions that we received were that malignant pustule treated early by surgical methods yielded a very high proportion of cures. We note that 100 cases treated in Guy’s Hospital, London, spread over a period of fourteen years, and including late as well as early cases, gave a mortality of only nine, and it has yet to be shown over a large series that modern methods are much more successful than this.

1929 CONFERENCE

Attention is called to the names of officers of the following section as a change has been necessary in this:

Section of Ophthalmology and Otolaryngology

Chairman Dr. J. Hua Liu, Union Medical College, Peking
Secretary Dr. T. M. Li, 25 Jinkee Road, Shanghai

Will Members who are interested in these subjects and are prepared to read papers thereon communicate with one or other of these officers?
1. Medical work is more than a temporary expedient of missions, it is vital to a full, true expression of the spirit of Christ, and must be made a part of the permanent work of the Church.

We recommend that as rapidly as possible the work should be strengthened and given more adequate support, so that as medical work it may be worthy of the name of Christ. Our hospitals and dispensaries should be equipped and staffed according to modern medical standards, i.e. that the work be thoroughly Christian and worthy medically.

2. We recommend that the East Asia Central Conference request the China Medical Association Hospital Committee to survey all the hospitals of the Methodist Episcopal Church in regard to equipment, staff, finances, patients, and to give a rating to each hospital.

3. We urge that the great evangelistic opportunity afforded by the medical work be more fully utilized. To this end, we recommend that our hospitals and dispensaries do as much charity work as possible that they may be known as places where the poor may receive help in the Christian spirit. That these results may be conserved, we recommend that each hospital and dispensary adopt its plans for evangelistic work in consultation with the pastors and evangelistic workers. While encouraging self-support by our medical institutions, we realize that they cannot be made entirely self-supporting, hence must appeal to the church for aid, and must collect from those able to pay for the service rendered.

We also recommend that Christians and non-Christians be treated alike in the matter of free treatment or charges; all who are able to pay should be expected to do so, but the worthy poor should be treated as Christ would have us do.

4. We recommend that as soon as adequate legal protection for the security of the property can be assured, that holding bodies for hospitals and dispensaries be organized; that the members of the holding bodies be nominated or elected by the district or annual conferences, due provision being made for missionary representation where the missions have investments; the Christian character of the institutions must be safeguarded by charter provisions.
5. We recommend that where such have not been formed, that hospital boards for each hospital be organized, members to be elected by the district or annual conferences, due provision being made for missionary representation where the missions are concerned, and provision may also be made for coopting members where it is deemed advisable.

6. In order to extend this ministry of healing, we recommend that where the staff is adequate to undertake the work, they establish out-stations for medical work, which shall be visited regularly by doctors, nurses and evangelists; and that where the present staff is inadequate, that provision be made for such increase in staff and support as will make this work possible. Such work has been carried on from several centers with good results.

7. That the benefits of modern preventive medicine may be extended to all, we urge upon our medical workers a more active public health program, such as periodical health examinations and advice to staff and employees and their families, health examinations of the students in our schools, and public health education by posters, tracts, books, classes and campaigns. We recommend that place for such teaching be made in special Bible classes and institutes, and that evangelistic and educational workers co-operate with the medical workers in this public health program.

8. We further recommend that the East Asia Central Conference request the Board of Foreign Missions and the Woman's Foreign Missionary Society to provide for doctors of public health, public health nurses, and health educationalists for this special public health program.

9. We recommend that the East Asia Central Conference request each Conference Hospital committee or Medical School committee to consult with the Executive Secretary of the China Medical Association before deciding upon the location of any new institutions.

10. We recommend that since medical education is to be a major part of the work of the medical missionary of the future, our Boards provide for especially trained teachers for the faculties of the medical schools.
ABSTRACT OF PAPERS ON LEPROSY AT THE CONGRESS OF THE F.E.A.T.M.

Leprosy. Dr. Muir presented six of the twelve papers read, beginning with the treatment. The best results lately in his hands are from the use of Potassic Iodide. This may be given in all stages. Properly given, reactions occur in which B. leprae are liberated from the lepra cells, and so become open to attack by other cells. Gradual, but decided improvement occurs when the treatment is carefully continued. His paper appears in the Indian Journal of Medical Research for October, 1927.

The use of the Blood Sedimentation Test in the study of and control of reaction with K. I. treatment was detailed. Sedimentation is much increased in severe reactions and correspondingly less with the milder ones, being definite even when temperature may fail to indicate the effect of the K. I. Severe and prolonged reactions can be controlled by pot. antimony tartrate given intravenously, and severe nerve pains will yield to adrenalin solution intramuscularly. Potassic Iodide is also found to be valuable in testing obscure or arrested cases of leprosy, as it searches out the lesions and by producing congestion and swelling brings them to light if complete cure has not occurred. Thus superficial and deep lymph glands may respond to this test and indicate their rôle. Even the liver and spleen may respond.

Dr. Henderson read a paper on the haematological aspects of K. I. treatment. A marked leucocytosis is a feature of K. I. reactions, unlike those due to other causes.

Dr. Donaldson's paper on the Lady Willingdon Leper Settlement detailed the arrangement of building and the classification of patients. For those planning or developing such settlements there are many suggestions of importance, e.g., the desirability of separate asylums for men and women; the complete segregation of advanced and markedly deformed cases from those in the early stages, for psychic reasons, etc.

Sodium Hydnocarpate is now found to be the best preparation for injections when given intravenously, after admixing with blood drawn into the syringe while the needle remains in the vein. From 2 to 8 c.c. of a 2 per cent. solution is given, mixed with about an equal amount of blood. Mixing occurs when the syringe is rotated once or
twice *in situ*. The advantage of this method is that phlebitis does not occur; many injections can be given at the same point. But sod. hydnocarpate is hemolytic, and therefore should not be given too long. It is best to change periodically to oil or ester injection for this reason.

Dr. Row presented evidence of the value of his Tubercle Bacillary Autolysate by injection in Leprosy. It seems that the vaccines consist of bacillary residues after removal of the fatty capsules by the autolytic action of endolipose. The use of this vaccine in lepers has been followed by improvement, and is recommended for further trial.

*Journal of the Christian Medical Association of India. March, 1928.*

**POTASSIUM IODIDE IN LEPROSY**

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The following rules may be used as a guide to the dosage of iodide in the different types and stages of leprosy:

1. In 'B2' and 'B3' cases begin with a grain a day and increase the dose daily by one grain until there is a reaction as indicated by a rise of temperature to more than 99° and swelling and redness of the lesions *in the skin*, or marked tenderness of nerve trunks. In 'A1', 'B1' and 'A2' cases begin with 5 grains and increase by 5 grains daily up to 30 grains, or until a reaction is produced.

2. When the temperature has become less than 99° and the swelling and other signs of reaction have subsided, continue the iodide giving the same dose as produced the reaction. Iodide should now be taken only once or twice a week and not daily.

3. When no reaction follows a dose increase the next dose. When there is fever or swelling do not increase it.

4. The rate of increase must depend on the severity of reactions produced. In some 'B2' and 'B3' cases it is possible to raise the dose only very slowly, increasing by one grain at a time. In most 'A1' and 'B1' cases it is possible to double the dose each time till a reaction is produced; or a reaction may not result even with the maximum dose of 240 grains. In such cases increase may be made as follows:—5, 10, 20, 25, 30 grains, given daily in one dose; then 60, 90, 120, 150, 180, 210, 240 grains, given two days in the week, at three or four days' interval.

These larger doses may be divided into two, half being taken at 5 p.m. and half at bed time. *Until experience has been gained it is well to*
proceed slowly in 'B₂' and 'B³' and 'A₂' cases so as to avoid excessive reactions: In 'A₂' cases the pains in the nerve trunks and in the bones of the legs and forearms may be distressing.

5. When reactions last more than 48 hours, or if the patient feels weak after the reaction has passed off, iodide should be given only once a week, otherwise twice in the week.

6. If the patient still feels weak, a more prolonged rest from iodide may be given occasionally and an iron, arsenic and strychnine tonic administered, but it is important to carry on the treatment with as little intermission as the severity of the reactions and the strength of the patient permit.

7. Potassium iodide may be prescribed in the form of a mixture, but it is more convenient to prescribe it in the form of 1 gr., 5 grs., or 30 grs. tablets according to the size of the dose which is being taken. These should be dissolved in a large glass of water. The larger the quantity of water taken the less risk there is of iodism being produced.

8. Between 5 grains and 30 grains there are sometimes symptoms of iodism or there is even an iodine rash, but as a rule these do not occur or are less marked when the dose is larger than 30 grains; and in our experience they give very little trouble if the drug is taken as advised above. The taking of milk or butter also appears to lessen iodism.

9. The patient's temperature should be recorded at least four times a day when possible as this is very useful in the regulation of the dosage. But even when this is not possible (as in the case of illiterate out-patients), treatment can generally be carried on satisfactorily, the general appearance of the patient, the condition of his skin lesions and his symptoms being used as guides.

CONTROLLING THE REACTION

In patients in whom the reaction level is low and in those who have large numbers of ripe 'lepra cells' ready to break up, even small doses of iodide may cause reactions which continue for several days or even weeks. When fever and swelling of lesions last for more than three days give potassium antim. tart. 0-02 gram in 2 c.c. of sterile saline intravenously every second day and an iron, arsenic and laxative tonic till the signs of reaction disappear. Then stop the antimony and begin the iodide again. If there is a painful nerve reaction 3 minims of a 1-1000 solution of adrenaline chlor. (P. D. & Co.) in 30 minims of saline should be given intramuscularly and the dose repeated in 5 minutes if the nerve pains have not subsided in that time. Sodium salicylate, 4 grains, dissolved in 5 c.c. of normal saline and given
intravenously, relieves joint and bone pains. Subcutaneous infiltration along the line of a painful nerve with 10 c.c. of normal saline containing 0-25 c.c. of adrenaline chloride solution and 0.5 gramme of sodium bicarbonate often relieves the pain for a considerable time. The injection should not be made into the nerve.

In such cases, as we have mentioned above, it is generally found that the reaction level is gradually raised and that the reaction caused by iodide becomes less in severity and only lasts for one to three days, passing off as the drug becomes eliminated from the body. It is then possible gradually to raise the dose without fear of a prolonged reaction.


A PRELIMINARY NOTE ON THE USE OF EPHEDRINE IN LEPROSY

By E. MuiR, M.D., F.R.C.S. (Edin.), Research Worker under the Indian Research Fund Association, School of Tropical Medicine and Hygiene, Calcutta, and

S. P. CHATTERJI, L.M.S., Physician to the A. V. Leper Hospital, Gobra, Calcutta.

It was found while using adrenalin in the febrile and asthenic condition which is not uncommon among the leprosy patients at Gobra Leper Hospital, that in a large proportion of cases nerve pains were remarkably relieved. As a result all cases of nerve pain were treated with adrenalin, 3 to 5 minims of 1 in 1,000 adrenalin chloride solution (P.D. & Co.) in 30 minims of saline being injected intramuscularly. With a few exceptions in which there was no effect, this remedy was found to relieve the pains within a very short time.

The relief caused by adrenalin suggested that ephedrine, which has an action similar in many respects to that of adrenalin, might have the same effect. This was found to be the case, and indeed ephedrine was found to be more efficient and lasting in its action, having besides the additional advantage that it can be taken orally, whereas adrenalin in order to produce any result has to be injected.

The nerve pains in leprosy are due to the presence of the *Mycobacterium leprae* in the nerve trunks, especially those of the limbs, the ulnars and peroneals being the most affected. *M. leprae* causes by its invasion of the nerve trunks a granulomatous condition of the connective tissue (epineurium, endoneurium and perineurium) surrounding the axis-cylinders. Considerable cellular proliferation may take place gradually during the quiescent phase (Muir, 1928) of the disease, but
when reaction takes place and lepra cells are broken up either naturally or as the result of treatment, there is sudden vascular engorgement of the granulation tissue and the pressure on the axis-cylinders is suddenly increased, the nerve often becoming very much swollen within a comparatively short time. Were it not for these nerve reactions leprosy would be a comparatively painless disease; and a drug which while relieving this condition acts at the same time as a tonic and improves the general condition of the patient is a very great boon to sufferers from this painful condition. Ephedrine sulphate given in hard gelatine capsules in a single dose of 0.05 to 0.1 gramme is sufficient in most cases to cause relief in from 45 to 60 minutes. The action lasts for 12 to 24 hours or even longer.

In many patients nerve reactions are caused in the course of treatment with iodides, each dose of potassium iodide causing pain which lasts for 24 to 72 hours or even longer. If ephedrine is taken by the patient whenever he feels the beginning of the pain, he is able to continue treatment in comfort until the granulomatous condition is cleared up and the iodide fails to cause further reactions. Often a single dose is sufficient, freedom from pain remaining till the reaction has passed off.

The immediate action of ephedrine is probably due to its causing contraction of the arterioles of the nerve trunks and thereby relieving their vascular engorgement. It appears at the same time to raise the reaction level of the patient and make reactions less severe; it does not appear however to interfere with the beneficial effects of iodide in gradually clearing up the disease in the nerves and other parts of the body.

The action of ephedrine is in contrast to that of opium and its preparations which only relieve pains to a slight extent and that only for a short time, while they have a harmful effect on the general condition of the patient.

While the action of ephedrine is very marked in the majority of cases, there are some patients who are not relieved. The reason for this has still to be investigated, as has also the effect of this drug on the blood pressure of the patient. A feeling of vertigo is caused in some cases and it is well to begin with the smaller dose mentioned above in the first instance, so as to test the patient’s tolerance, a second dose being given after 45 minutes if there is no marked vertigo and if the nerve pains are not relieved by the first dose. If pain returns on the following day a smaller dose may suffice to produce the required effect.
Leprosy is the one disease which is non-spirochetal in origin in which a high percentage of positive Wassermann reactions is found. In association with my colleague Dr. Muir of the Calcutta School of Tropical Medicine, I have made an extended enquiry into this question; comprising an examination of over a thousand cases. We first of all attempted to decide whether leprosy was a sequela of syphilis. We find that the Wassermann positive percentage in the early stages of both the dermal and neural types of leprosy is approximately 15 per cent., a figure which is within the estimated syphilis rate of the community. We conclude accordingly that syphilis is a factor of no importance in determining the incidence of leprosy. Twenty-one of these Wassermann-positive early cases of leprosy were subjected to anti-syphilitic treatment; and in every case the reaction became negative. We deduce from this that all these Wassermann positives were due to associated syphilis, and that therefore the leprosy process, at any rate in its early stages, does not produce reagins which will lead to fixation of complement. In the later stages of skin leprosy the matter is not quite so simple. Here we find a high proportion of positive Wassermann reactions (40 per cent. to 60 per cent.); a proportion which is two to three times the estimated syphilis rate in a disease which, in its earlier stages, shows no evidence of special association with syphilis. Thorough anti-syphilitic treatment of thirty-eight of these advanced cases abolished the positive Wassermann reaction in twenty-eight, approximately 75 per cent.

Presumably then three-quarters of these positive reactions in advanced cases are due to associated syphilis. How are we to explain these results? We have ample clinical evidence that the presence of syphilis has a disastrous effect on a case of leprosy. A mild case of leprosy when complicated with syphilis tends rapidly to assume a grave form; and Dr. Muir and I are of opinion that this explains why the grave cases have a positive blood reaction in a far higher proportion than the early cases. In ten cases treated (25 per cent.), we found the Wassermann reaction resistant to anti-syphilitic treatment. Some of these are no doubt the so-called Wassermann-fast cases of syphilis. But we believe there is another factor, as there is evidence in leprosy, of a peculiar serum change which may lead to non-specific reactions when what may be termed "ordinary" Wassermann techniques are employed.
Dr. Muir is strongly of opinion that before instituting anti-leprotic treatment, the ground must be cleared by the removal of the co-existing syphilis if present; as otherwise such cases fail to respond properly to the leprosy treatment. This view involves the serological examination of the blood of every leper before treatment is commenced. This is now done as a routine in Calcutta.

It is essential to devise then a serological test for syphilis adapted to the particular case of leprosy. What may be termed 'ordinary' Wassermann methods, good in every other particular, will apparently always yield in leprosy, in addition to those positives caused by associated syphilis, some positives due to experimental factors. The reason for the latter is hard to determine, but it has been found by Kolmer that these non-syphilitic positives are eliminated by the use of his new Wassermann technique, an essential feature of which is the wide gap between the antigenic and anticomplementary doses of the antigen employed. It would seem therefore that the question as to whether leprosy will yield a positive Wassermann reaction is settled in the negative, provided syphilis be absent and a wide gap Wassermann technique be used.

As we find a preliminary serological test for syphilis to be essential before instituting antileprotic treatment, we should therefore use Kolmer's technique if the Wassermann test be used at all. We are now, however, experimenting with Kahn's flocculation reaction for this purpose; and up to the present the results have been satisfactory.


RESULTS OF ANTILEPROSY TREATMENT OF CHILDREN IN THE CULION LEPER COLONY

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(ABSTRACT)

The authors analyzed the results of treatment of seventy (confirmed) leper children, the majority of whom were still in the early stage of the disease.

SEX AND AGE OF PATIENTS AND DURATION OF DISEASE

Seventy children were placed under antileprosy treatment. Of these, 36 were boys and 34 girls, ranging in age from 1 year 8 months to 15 years. The duration of the disease could not be determined exactly in all cases; the duration of the bacteriologically positive lesions varied from a few months to five or more years.
KIND AND DURATION OF TREATMENT

All except three cases were treated with intramuscular injections of the mixed chaulmoogra ethyl esters with 0.5 per cent iodine, either alone (54 cases) or alternately with other chaulmoogra preparations (13 cases).

The duration of the treatment varied from ten months to five years six months. The majority had had more than two years' treatment.

RESULTS

The results of treatment may be summarized as follows:

Results in relation to sex and age.—Of the 36 males treated, 18, or 50 per cent, have become negative (that is, apparently cured); of the 34 females, 20, or 58.8 per cent, are now negative. Each of the different age groups—1 to 5 years, 6 to 10 years, and 11 to 15 years—of both sexes gave 50 per cent negatives except the 6-to10-year female group, which gave 65 per cent negatives.

Results in relation to kind of drug.—Of the 54 cases receiving only C. E. I. 33, or 61 per cent, have become negative. Of the 13 cases receiving this drug alternately with other chaulmoogra preparations, 4, or 30.7 per cent have become negative. One case received plain ethyl esters alternately with creosoted esters and iodized oil, without result. Two cases received wightiana oil and Mercado mixture, alternately; of these, one has become negative.

Results in relation to type and advancement.—Thirty-six cases had the early cutaneous form of the disease; of these 24, or 66.6 per cent, are now negative. Four cases had the early mixed type; of these 3, or 75 per cent, have become negative. So that, of 40 early cases, 27, or 67.5 per cent, have become negative. Fourteen had moderately advanced cutaneous leprosy, only two of whom, so far, have become negative, making a total of 10 (37 per cent) negatives out of 27 moderately advanced cases.

Three cases had advanced leprosy, one of the cutaneous and two of the mixed forms; of these only one, of the latter form, has become negative.

Duration of treatment.—The 38 negatives, at the beginning of the negative period, had been treated for periods varying from ten months to five years. Of the 27 negatives from the early or slightly advanced cases, 11 have become negative in from one to two years; 9 in from two to three years; 4 in from three to four years; and 3 in over four years of treatment. Of the 10 negatives from the moderately advanced cases, 2 have become negative in from ten months to two years; 4 in
from two to three years; 2 in from three to four years; and 2 in four or more years of treatment. The only negative from the advanced cases required more than four years of treatment. The average duration was two years five months for the early cases, two years seven months for the moderately advanced, and over four years for the advanced.

**Conclusion**

From the foregoing it appears that the treatment of early or lightly advanced cases of leprosy in children with the newer chaulmoogra preparations (the ethyl esters with 0.5 per cent iodine was the principal medicament used) is attended by a large percentage of apparent cures.

*Journal of the Philippine Islands Medical Association* March, 1928.

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**REVIEW OF AN ARTICLE ON ‘HYPERTONIC SALINE IN ADYNAMIC ILEUS’**

By Dr. J. W. Ross, of Toronto, in the *Canadian Medical Association Journal*, for March, 1926.

Read by H. A. Wolverton, B.S.A., M.B., Bethesda Hospital, Pithapuram, at the Kodaikanal Conference, May, 1927.

In certain cases following operation the bowels become inactive and distended, and it becomes necessary to cause the bowels to move if the patient is to live. For this purpose it has been the custom to use eserine and pituitrin, to cause the bowels to move and relieve the distension. But there are cases in which it seems impossible, with the drugs available and any number of enemas, to get peristaltic movements to take place.

Dr. Ross noticed, in the reports of experimental work conducted on the bowel of dogs with hypertonic saline, that as an incident of the experiment violent peristaltic movements were observed. He, therefore, undertook experiments to observe the effect on dogs of hypertonic saline on the peristalsis of the bowel. He found in cases even where the bowel was distended and physostigmine and pituitrin had no effect an intravenous injection of 30 per cent. saline brought on strong contractions. There were apparently no harmful after-effects following the use of the saline.

Dr. Ross reports three clinical cases in which the hypertonic saline was used. I cannot do better than give these histories in the doctor's own words.

**Case 1. Mrs. C., aged 54.** Admitted to hospital, Jan. 17th. Two days previously she had been seized with severe pain in the lumbar region and along the right costal margin. Since then she has
vomited almost continuously. There was marked distension and generalized tenderness. Temperature 101.8, pulse 170, W.B.C. 10,200. The distension suggested intestinal obstruction and the marked tenderness over McBurney's point. Under anaesthesia a mass could be felt beneath the lower right rectus, and I accordingly opened the abdomen over this area. I found the omentum rolled into a ball and adherent to a necrotic appendix, which I removed piecemeal. At 7 p.m. the following day the abdomen was glazed and tympanitic, and her condition was critical. The use of eserine, pituitrin and enemas of every description was futile. Accordingly 75 c.c. of 20 per cent. sodium chloride solution was given intravenously, and two minutes later she expelled large volumes of gas, and continued to do so for the next hour. Again on the following day distension rendered her condition critical in spite of all other known agents, and I again administered sodium chloride. In about two minutes cramps began, but, fearful lest they should not continue, I gave another enema and 1 c.c. pituitrin. Flatus passed for over an hour, and faeces were expelled next morning with complete recovery.

Case 2. G. A. M., aged 69. Admitted to hospital midnight, March 10-11, with perforated gastric ulcer. I repaired the perforation, which lay posteriorly 1/4 inches above the pylorus, and did a posterior gastroenterostomy. On the second day post-operative (March 12, 9.50 p.m.) he became very much distended, and, despite all types of enema, eserine and pituitrin, was in extremis. I explained to his son that the intravenous might save his life, while, on the other hand it might hasten the end. He accepted the risk. After 60 c.c. of 30 per cent. solution had been given, flatus passed immediately, and for an hour continued to do so. Thereafter the flatus could be moved with enemas and pituitrin. He made a good recovery and has gained 25 lbs in weight.

Case 3. W.A., aged 36. Admitted to hospital at 6 a.m., March 15, complaining of acute colicky pain in the abdomen, which had commenced at 10 p.m., March 13th. On examination the abdomen was rigid, with tenderness on pressure over McBurney's point, and the leucocyte count was 23,200. Operation was refused on the night of the 14th, but, consent having finally been obtained, he was operated on at 9 a.m. on the 15th. A gangrenous appendix was removed in the presence of general peritonitis, and the wound was closed with drainage. There was some distension on the 16th and again on the 17th, with relief by physostigmine grs 1/60 and strychnine grs 1/40 every four hours. A 1, 2; 3, enema, with one c.c. pituitrin hypodermically, was also effectual. During the 18th and 19th he gradually became more distended, and no relief could be obtained by the measures previously effectual. On the 20th he appeared to be dying, and at 3.30 p.m. 70 c.c. of 20 per cent. saline was given intravenously and another
hypodermic 1 c.c. pituitrin. The needle was withdrawn from the vein and the surgeon was clearing up his instruments when the patient asked for a bedpan. Before the nurse could obtain it the bowels moved, literally flooding the bed. He vomited no more, and flatus passed continually during the night. Recovery was uneventful, enemas and pituitrin thereafter being quite effectual.

*Journal of the Christian Medical Association of India; March, 1928.*

**A METHOD OF PREPARATION OF A LIVER EXTRACT POWDER FOR THE TREATMENT OF PERNICIOUS ANÆMIA**

By J. B. Collip

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The preparation of the extract is as follows: Frozen liver is allowed to soften and is finely minced while still in the semi-frozen state. It is then dropped in boiling water (approximately four volumes) and violently agitated. The temperature is not allowed to become higher than 80° C. It is kept at this temperature for a few minutes only and is then rapidly transferred to a large canvas bag and the juice immediately expressed. The press juice is transferred to a large number of enamel meat trays and these trays are placed in a wind tunnel. If there is any delay in the process at this stage possible bacterial action may be circumvented by the addition of a phenol preservative or by adequate acidification of the press juice. By means of a hot air blast through the tunnel the press juice is reduced to a small volume without itself becoming heated. Concentration by the air blast is carried on until the liquid is of a syrupy consistency. It is then transferred to a large enamel container and two volumes of acetone are added. The acetone precipitate is collected on large filters and allowed to drain. It is then air-dried at a temperature not exceeding 60° C. The airdrying can be conveniently carried out by placing the precipitate again in shallow trays in a wind tunnel or over steam radiators. When the drying process is completed the solid residue is powdered in a drug mill and is ready for use. It is most readily and satisfactorily administered in gelatine filled capsules.

Some points of interest in this method are:

1. The use of only one reagent, namely acetone.
2. A very large percentage of the acetone used can be easily recovered.
3. The non-necessity of the use of a vacuum at any stage.
4. The effective precipitation with acetone at 67 per cent concentration.
5. The non-necessity of adjusting pH.

6. From 15 to 17 grammes of the extract powder are equivalent to 1 pound of fresh liver.

**Extract**, the equivalent of 1500 pounds of fresh liver, has been used in the treatment of pernicious anaemia cases by a number of clinicians. Dr. Adamson of Winnipeg has recently reported two cases in which the extract has been used with excellent results.

It is too early as yet, however, to make any specific claims for the effectiveness of this extract. Nevertheless the results obtained by clinicians who have been good enough to test out the extract in pernicious anaemia cases in doses of from 10 to 15 grammes daily have been so uniformly good that a much wider trial would seem to be warranted.


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**TREATMENT OF GONORRHEA IN WOMEN BY SWABBING WITH MERCUROCHROME AND FLAVINE**

R. S. S. Statham, O.B.E. M.D., Ch.M.

The patient is placed in a gynaecological examination chair and the vagina is washed out with a weak solution of boric acid (mercurochrome acts best in a mild acid medium). A fenestrated Cusco's speculum, as large as can be tolerated, is then introduced and the vagina and fornices are fully stretched. All muco-pus is now cleared away with the boric lotion, and then a swab, sopped in 1 per cent. mercurochrome, is rubbed all over the cervix and vagina, so that the solution reaches every part, including the orifice of the cervical canal. As most cases display some urethritis at the beginning of treatment a small quantity is run into the bladder, retained there for a few minutes, and then passed again. The speculum is removed and the treatment is now ended.

In cases in which the gonococcus seems resistant to mercurochrome a change is made by using 1 in 1,000 flavine for seven days in exactly the same way, and then reverting to the mercurochrome.

**Comments**

This method of treatment is rapidly and easily carried out, but entails care and some practice on the part of those performing it. It is absolutely necessary that all parts of the vagina be fully distended and swabbed over, and that no pockets are left untreated. It allows free drainage for all cervical secretions and causes no irritation to the
inflamed surfaces. Mercurochrome, in an acid medium, penetrates to a remarkable extent, and the immediate result is a clearing up of the offensive discharge, with a consequent encouragement of the patient. Since using this method of treatment there have been practically no instances of patients failing to attend regularly and complete the treatment, though many of them have to come considerable distances for their daily swabbing.

Forty consecutive cases were treated daily except during the menstrual flow. (A few patients missed one or two treatments.) In all cases the gonococcus was present at the beginning of treatment.

Average number of days from the beginning of treatment till the first negative smear* was obtained ... 39.1
Longest period under treatment (one case) ... ... 100.0
Shortest period under treatment (one case) ... ... 4.0

Leaving out the extremes at both ends, it was found that twenty-eight days sufficed to render the smears negative in most cases.

Twelve cases were treated for one or two weeks with flavine 1 in 1,000 in place of mercurochrome.

Average number of days under treatment ... ... 45
Longest period under treatment ... ... ... ... 91
Shortest period under treatment ... ... ... ... 17

Complications.—The above fifty-two cases include one case of acute gonorrhoeal rheumatism of the wrist-joint, which cleared up very rapidly, and two Bartholin's abscesses, which were incised as complete removal was impossible.

Failures.—Two cases have failed entirely to respond to treatment and have also made no progress with routine treatment. In both cases there is a possibility of frequent reinfection, one case being a prostitute, while the other has a husband who will not undergo treatment, although he is infected.

It will be seen that by this "swabbing" method there is a reasonable chance of getting the first negative smear in about a month, while the patients' symptoms have usually vanished some two weeks earlier, and they feel correspondingly encouraged. As soon as a negative smear is obtained active treatment is stopped till after the next menstrual period, and the patient need not attend again till that date, when she comes up for smears and cultures only.

*First negative smear is taken to mean the first smear of the final series. If a positive smear occurred afterwards the whole series was started over again.
CONCLUSIONS

1. This method of treatment is efficient in that it appears to cure the disease.

2. It greatly shortens the time under treatment, and so is a sound economic factor, both for the patient and the venereal disease centre.

3. It is not in any way painful or unpleasant.

4. The rapid improvement in the symptoms is encouraging to the patient, and so regularity in attendance is promoted.

It is very probable that there may be other substances which will prove even more efficient than mercurochrome, and it is intended that a trial shall be begun at once of the solution of brilliant green and crystal violet, used by Messrs. Berkeley and Bonney as a vaginal disinfectant, this to be used in an exactly similar manner to the mercurochrome.

B. M. J. March 31, 1928

AMœBIASIS AND DYSENTERY

AMœBIASIS

JAMES (W. M.)
Remarks on the Diagnosis of Intestinal Amœbiasis

A worker in areas where Entamoeba histolytica infection is common, who wishes to diagnose correctly and treat the many varieties of "stomach trouble" which constantly present themselves, must be prepared to recognize amœbae in the stools and to differentiate E. histolytica from the three other amœbas often found, and often associated with it in the same stool—viz., E. coli, Iodamoeba butschlii, and E. nana.

In this paper Dr. James' theme—insistent, clear and convincing—is that the correct diagnosis of histolytica infection is not a mere routine laboratory procedure, but one requiring training, patience, and a reasonable degree of skill. None has greater claims than he to be listened to on this subject; and it is significant that in 1927 he is to be found urging that it is not a problem of the trouble it takes, but one of correct diagnosis of a common and often chronic disease of the large intestine with protean symptomatology, and endorsing DOBELL'S (1919) dictum that if it cannot be made properly it should not be made at all.

Survey figures, for the most part based on examinations of old stools and not checked, as a rule, by search in permanent preparations, show that one examination uncovers about one-third of the actual number of histolytica infections present in a community; three examinations between one-half and two-thirds; and six examinations
up to about 90 per cent.; an indefinite number of examinations may be required before the remaining 10 per cent. of infection is found.

The author states that his own figures to date show that in about one-half of his histolytica infections, excluding acute dysentery, only vegetative forms are found at any one examination, and these would have been lost in survey work. By using reasonably fresh material, and by the study of permanent preparations made from this—and it must ever be borne in mind that the smears cannot be allowed even the slightest touch of drying or the nuclei of the amoebae become distorted and broken up—he believes that in trained hands the percentage of positive observations in amoebiasis (not amoebic dysentery) can be raised on first examination to 75 per cent. The second examination, when the first has been negative, brings this up to 90 per cent. The figures are based on his own experience. Up to date in the study of permanent preparations from 250 patients, if the third examination had not disclosed a histolytica infection he has not found it in the fourth, fifth, sixth, or seventh examinations except very rarely. Moreover in a series of control smears from apparently normal patients, when the smears were negative in the first three examinations he had not found E. histolytica or other amoebas subsequently.

The variation in the number of amoebas, in both histolytica and other species' infections, from day to day is remarkable. In a given case on one day amoebas are very numerous and easily found—on another day only prolonged search in permanent preparations will reveal them and the fresh specimen will often be entirely negative.

Both for finding amoebas and for their differentiation examination of permanent stained smears is therefore obligatory. Their preparation takes time, but is no more difficult than other routine histological and pathological work.

In perfectly fresh stools, the thoroughly trained and competent protozoologist can, as Dobell (1919) stated, differentiate accurately between the five species of the intestinal amoebas of man. These specific conditions do not obtain for clinical and laboratory work in the tropics except, as yet, very rarely. To get suitable stool material Kofoed advocates use of bile salts or ox gall—and this does give good results. The author has found a mild laxative will serve in most cases. A soft stool, without purgation, is required. It is very difficult to make permanent preparations from liquid stools and a stool that contains material from high up in the bowel as well as from lower down is best. The largest numbers of amoebas are most often found after a mild laxative following one or two days of constipation.

This is a brief report for the past year which was one of considerable difficulty owing to political disturbances.

School. Owing to the disturbances referred to, the School had to be closed down in the latter part of March. It should be noticed however that the classes were able to recommence in August, and have been carried on successfully since up to the time of the May 1928 troubles.

A number of the Staff have been away on furlough while illness and other reasons have been the causes of several resignations.

The Council on Publication which has its headquarters at the school has been able to continue its work with little interruption beyond printing difficulties.

Hospital. Inpatients 1,819. Outpatient attendances 44,677.

It was happily found possible to keep the hospital open through the troubles of last year. Plans were completed at the time for rebuilding and land for the new hospital had been bought but the erection of the building was temporarily delayed.

For several months the Chinese members of staff ran the hospital without any foreign assistance and it was encouraging to see the efficient and capable manner in which the work was carried on.

Mention is made of encouraging progress with leper work in the leper hospital which had 30 patients when the report was written.

Mention is again made of the need for a new hospital with double the number of beds and of the difficulties connected with filling vacancies on the staff of the school.

The report closes with a financial statement and a list of students.

SHANGHAI GENERAL HOSPITAL, 1927

Medical Superintendent: Dr. C. Bennett

Inpatients 3,745 Out-patients 7,112

The report of the General Hospital is always one of particular interest as, with an excellent classification of diseases it gives an interesting basis of comparison of the causes of illness of the foreign
population with those of the Chinese population, particulars of which are given in the reports of the hospitals catering for them in the Settlement.

The difference is really with one exception not very striking, fevers, dysentery and influenza forming the bulk of the conditions needing treatment.

Dysentery, diarrhoea and enteritis cases numbered 288, and formed the largest group of all.

Next come the Fevers—Malarial type, 133; Typhoid type, 132—totalling 265.

Close after these come the Respiratory group—Influenza 106; Bronchitis 97; Pneumonia 49—totalling 252.

Tonsillitis comes high up the list with 108.

So far, we imagine that the difference in incidence between the foreign and Chinese population is not very great but the exception is Appendicitis of which no fewer than 189 cases were admitted.

On the other side eye affections are extraordinarily few, trachoma 3; iritis 2; corneal ulcer 2.

Among parasitic infections it is interesting to note that there were ten cases of Taenia Solium and one case of Trichiniasis.

We regret to notice that such an anomalous diagnosis as "Yangtse Fever" continues to figure in the lists; surely it is time that meaningless names of this kind were dropped.

The report closes with interesting figures from the X ray Department, Laboratory, Venereal Diseases Clinic and Tuberculosis Clinic.
in the new Union Hospital in which the two Missions are joining. The development of the work in the past 60 years has been very striking and is exemplified in the increase of the budget from $200 in 1866 to over $20,000 in 1927.

Much of the report is necessarily taken up with references to the terrible political conditions of the past two years through which the work of the hospital has been carried on without interruption.

There are interesting references to the new Union Hospital which will be dealt with separately and a brief report of the special Red Cross work of 1927.

HANKOW UNION HOSPITAL L.M.S., W.M.M.S.

This is hardly a hospital report in the ordinary sense of the word but a very brief description of the new Union Hospital, of what led up to its inception, of the work involved in its erection and of its needs.

Some day we hope to have plans for insertion in the Journal with details of costs. We put it to all builders of new hospitals that they owe this as a duty to their fellow-workers in China.

In the meantime this brief description has reached us and some reference must be made to it, if only to congratulate the Missions on the consummation of this long desired union, and those on the spot on the marvellous way in which they have been able to carry through the building of the hospital in the face of the constant disturbances in Hankow during the past two years.

The Union Scheme will eventually bring all the medical work of the L.M.S. and W.M.M.S. into one organization.

UNIVERSITY SCHOOL OF MIDWIFERY AND GYNAECOLOGY,
GOVERNMENT CIVIL HOSPITAL AND OF THE
TSAN YUK HOSPITAL, HONGKONG

for the Year Ending 30th April, 1927

This is a very exhaustive and extremely valuable report dealing with Maternity and Gynaecological work in Hongkong. A review of it is however quite impossible as it is in itself merely a very careful detailed summary of the work done. The low mortality and morbidity is as surprising as it is satisfactory and Dr. Tottenham is to be highly complimented on the result.
Hospital Reports

We have one criticism to make. The proof reading of this paper has been very badly done and scarcely a page but abounds with the grossest printer's errors. It does not accord with the the dignity of a University like that of Hongkong or of the writer of this valuable memorandum to issue a paper in this style.

LINGNAM HOSPITAL AND COLLEGE INFIRMARY, CANTON

July 1926-July 1927

Staff Drs. Cadbury, Jen, Sin, Chung and Lau (some of these were for part of the year only)

Nurses 3 Chinese

Lingnam Hospital Inpatients 426 Outpatient attendances 6366
College Infirmary Inpatients 251 Outpatient attendances 8080

This is a most interesting report which is hardly done justice to by distributing it in type written form.

Unfortunately the usual story of political or labour troubles has to be recorded requiring at one time the dismissal of part of the staff. It is interesting to note a very marked fall in the amount of malaria in the College.

A cases of heavy infection with Fasciolopsis Buski is recorded among the Hospital patients.

The report contains an interesting list of the villages round with the number of patients coming to the hospital from each.

There is a table of diseases at the close.

JAOCHOW HOSPITAL. C.I.M. 1927

Staff Drs. Cox and Tsen: Nurses 1 Foreign (absent)
Inpatients 85 Out-patient attendances 6212

This is a very brief report in the form of a letter to friends giving an account of the troubles of the past year and the successful re-occupation of the Station.

Despite the fact that a Red invasion stopped the general work of the Mission and seized most of the premises, the hospital under Dr. Tsen was able to carry on without interruption, and he is now in full charge of the work. The troubles seem now to be largely over and the prospects for the future are satisfactory.
The Training of Midwives

Union Medical College
Peking
May 28, 1928.

The Editor,
China Medical Journal,
23 Yuen Ming Yuen Road,
Shanghai.

Sir:

The item of the Minutes of the Executive Committee relating to Midwifery recorded in the April issue, leads one to several inquiries, which we would appreciate having answered.

1. When and under what circumstances did the jurisdiction of a nurses' association extend to be the arbiter of midwifery standards, let alone the question of midwifery apparently becoming a branch of nursing?

2. By what logic is the conclusion reached that only in China can the midwifery problem be solved through demanding that candidates for qualification must possess a nurse's training in addition to middle school education before undertaking midwifery courses? There are approximately 12 million births a year in this country. Practice in countries possessing as high midwifery standards as England (Lane Claypon) and Denmark (Rodness) estimates that one midwife can handle adequately 150 & 120 deliveries respectively a year. On this basis, reckoning that for another two generations the supply of physicians and economic conditions will require at least eighty per cent of deliveries to be done by midwives, the problem is to produce 64,000 of the latter. Is this to be accomplished through establishing requirements at the outset not yet attained by any other country? Doubtless, and we sincerely hope it may be so, many of the teachers in midwifery will be recruited from the nursing ranks but to limit the supply of licensed midwives to such a narrow field seems impractical.

The undersigned is sincerely desirous, in her capacity of chief of the division of midwifery in the Peking Government, of being instructed in the foregoing queries so as, if uninformed, to be able to correct her present viewpoint.

Yours truly,
Marion Yang.
**WANTED COLUMN**

**Internes for Hospitals**

We are informed that there are still a number of medical students who have just graduated from the Medical School of the Shantung Christian University who are desiring hospital appointments. Applications for their services should be made to:

The Dean,
Shantung Christian University
Tsinan.

**For Sale**

For sale a Microscope made by Baker in excellent condition. Fitted with a triple nose-piece, condenser with iris diaphragm, and a built on mechanical stage. Eye pieces X5 and X10. Objectives 1/2 Zeiss, 1/2 Waston parachromatic 1/2 Koritzka. Cost about £30. Willing to take a reasonable offer.

For sale a Urological Chair by Allen and Hanbury in excellent condition. Pattern as supplied to London Hospital. Knee rests, foot stirrups and pan for receiving fluid from douches. Suitable for gynaecological or genitourinary work. Cost £25. Willing to take a reasonable offer.

Apply Dr. A. C. Price
12 Szechuen Road, Shanghai

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**The All-India School of Medicine**

We are informed that the Rockefeller Foundation has made an offer to the Government of India of the sum of £100,000 to build and equip an All-India School of Hygiene, opposite the Calcutta School of Tropical Medicine, on condition that the Government of India becomes responsible for the staff, and that the Indian Research Fund Association, which controls the medical research work in India, becomes the governing body. This will allow the present hygiene section of the Calcutta School of Tropical Medicine to be used for the much-needed expansion of that institution.

* B. M. J., May 19, 1928.

**Mortality of Tuberculosis in U. S. A.**

Beyond question the greatest single public-health fact of 1927 was the large reduction from tuberculosis to a new minimum for all time. The death rate was 93.5 per 100,000, which is 4.8 per cent below the previous minimum of 98.2 established in 1925. Since 1920, when a figure of 127.0 was recorded, the reduction has been 32.2 per cent; since 1915 it has been 32.7 per cent; and since 1911, when the rate was 224.6, there has been the remarkable drop of 59.4 per cent. The death rate from tuberculosis of the respiratory system, which causes almost nine-tenths of all the deaths from tuberculous disease, has dropped 59.3 per cent since 1911.


**A Query**

Dr. Hagman of Nantungchow Christian Hospital writes:

"Will you please ask for a method of withdrawing the plunger of a glass syringe which has become stuck?"

Information on this point would be very welcome.
Ephedrine Spray

Messrs. Burroughs Wellcome & Co. have issued a useful 'Vaporole' preparation of ephedrine for application to the pharynx and nose by means of an atomiser. 'Vaporole' Ephedrine Spray Compound consists of Ephedrine 1%, Menthol, Camphor and Oil of Thyme of each 2% in a base of 'Paroleine' (a high quality liquid paraffin). Such a spray enables ephedrine to be efficiently applied locally in hayfever and congested conditions of the pharynx and nasal mucosa. It is stated that clinical trials of this new method are very satisfactory and promise to provide an effective weapon for the symptomatic relief of hay-fever and of engorged and catarrhal conditions of the naso-pharynx. The product is supplied in 1-oz bottles.

The Secretary's Movements.

The Secretary is planning to go to Kuliang from the middle of July to the middle of August. The Office will be closed for business for the first half of August. Letters will be received as usual but the Secretary fears that there will be some delay in replying to those that reach his office during the early part of next month.

There may also be a delay of a few days in the issue of the August Journal.

Liver Extract

We have received from the British Drug Houses Ltd. samples of Liver Extract for the treatment of Pernicious Anemia.

The extract is in the form of a powder put up in glass tubes each containing one daily dose, the equivalent of half a pound of fresh raw liver.

The agents in China are, Frost, Bland and Co., 20 Szechuen Road, Shanghai, and the price of the extract is $10.50 per box of six tubes.

NEW MEMBERS PROPOSED

Cresson, Marthe M. D. Univ. of Women's Christian West Gate, C.incinnati. Medical College Shanghai. Proposers:—Dr. Susanne R. Parsons Dr. Grace K. Martin.


Wolfram, William H. M. D., Columbus, Ohio Ind. Nanking, Ku. Proposers:—Dr. James L. Maxwell Dr. H. H. Morris.

NEW MEMBERS ELECTED