HUA TO

THE GOD OF SURGERY

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In the second century A.D., and about the same time, there lived two of the greatest medical men in Chinese history. One was Chang Chung King (張仲景), the famous physician and the other was Hua To (華佗), the great surgeon. The former is usually venerated as the Sage of Medicine while the latter is often worshipped as the God of Surgery. Hua To was born somewhere about A.D. 190 in the romantic period of the Three Kingdoms. A native of Ch'iao (讜) of the state of P'ei (沛) he had his education at Hsii T'u (徐土耳). About the time when Chen Kuei (陳珪) was Prime Minister he obtained the degree of Master of Arts. Though many literary positions were offered him, he refused them and took to medicine.

It is said that he used very few drugs in his prescriptions and was so accurate in dispensing that he never took the trouble to weigh the ingredients. In acupuncture he only punctured a few spots. He was a most accurate diagnostician and could predict the result of any disease with mathematical precision. A pioneer of hydrotherapy he applied it with marked success in a case of long continued fever. In spite of the cold weather he caused the patient, a woman, to sit inside a stone trough and ordered his assistants to pour one hundred bucketfuls of cold water over her. When only seven or eight buckets had been emptied the patient shivered so violently that his assistants were scared and wanted to stop. Hua To, however, insisted on giving the full number. After about eighty bucketfuls vapour began to appear which gradually rose to two or three feet around the patient's body. The hundredth bucketful poured, Hua To then lighted a fire to warm the bed for the patient who was heavily covered with quilts until a thorough sweating ensued. The patient recovered under this heroic treatment.
He was also the first exponent of systematic exercise. His observations on the value of exercise in its relation to health were fully described in his lecture to one of his disciples. "The body," he remarked "needs exercise, only it must not be to the point of exhaustion. For exercise expels the bad air in the system, promotes free circulation of the blood, and prevents sickness. The used doorstep never rots, so is the body. That is why the ancients practised the bear's neck, the fowl's twist, swaying the body, and moving the joints to prevent old age. I have a system of exercise called the frolics of the five animals, (五禽之戲) which are the tiger, the deer, the bear, the monkey and the bird. It removes disease, strengthens the legs, and ensures health. If one feels out of sorts just practise any one of these frolics. It will produce sweating, give a feeling of lightness of the body and increase the appetite." Unfortunately nothing is now known of these exercises. What is still handed down to the present time is only two books on this subject, namely the Canon of Changing the Sinews (易筋經) and the Eight Precious Chapters (八段錦). The former is attributed to Ta Mo (達摩), a famous boxer of the Wei Dynasty. It is more of a system of deep breathing than active exercise. The latter, said to be written in the Sung Dynasty by an unknown author, contains twelve lessons on surface development, generally known as tensing movements.

But Hua To's fame rests chiefly on his discovery of the use of anaesthetics and his marvellous skill as a surgeon. It may be pointed out that four hundred years before him Pien Chiao had employed these methods. The story is recorded in the Lecius as follows: "King Wu of Lu and Tsi Ying of Chao fell ill, and both asked Pien Chiao to treat them. Pien Chiao gave the two persons some narcotic wine to drink which made them unconscious for three days. He cut their chests open, removed their hearts, exchanged them and put them in again under the administration of some effective drugs. After their revival, they felt as before, took leave and returned home." This sounds more like a fairy tale than fact hence it is usual to associate anaesthetics with the name of Hua To who, it is said, performed all sorts of operations by this means. According to the Annals of the Later Han Dynasty he caused the patient to take an effervescing powder in wine which produced numbness and insensibility. He opened the abdomen or back, as the case might be, washed, cut, or removed the diseased portion. He sutured the parts together and then applied a salve to the wound which cleared up in four or five days completely returning to normal within a month. The Biography of Hua To gives another account of his performing an operation under anaesthetics. One man suffered from sharp cutting pains in the Kelly
Within ten days the whiskers and eyebrows dropped out. Hua To diagnosed the case as gangrene of the spleen and advised operation. Having administered a dose of medicine he put the patient in a recumbent position and opened the abdomen. The spleen was found half gangrenous. This was excised, the wound smeared with an ointment, and another dose of medicine was given. The patient made a complete recovery after one hundred days.

It is not known what was the exact composition of the narcotic wine of Pien Chiao or the effervescing powder of Hua To. Later physicians, however, employed datura alba, rhododendron sinense, jasmine sambac, and various species of aconite for this purpose. Prescriptions of this kind are rare. In fact, none can be found in any of the ordinary text books. The following two formulae are copied from an unpublished manuscript and are said to be effective.

No. 1. Datura Alba 7 candareens, Aconite, Angelica Anomala, Cryptotaenia Canadensis and Conicelimum Univittatum each 2 candareens. These should be ground into powder and taken on an empty stomach.

No. 2. Angelica Anomala, Gleditschia Japonica, Conicelimum Univittatum, Momordica, Cochinchenensis, Daphnidium Myrrha, Cryptotaenia Canadensis, Pinellia Tuberifera, Pimpinella Anisum, Ardisia Japonica (?) each 2 oz. Rosa Banksia ½ oz, Aconitum Fischeri and Aconitum Japonica each 1 oz. Dose 1 mace, to be taken in wine.

A long list of his marvellous cures of strange diseases are recorded in the Wei and Han Annals, the Three Kingdoms, and other historical works dealing with that period. This includes all sorts of operations which range from venesection and acupuncture to laparotomy, excision of spleen, intestines and liver. Sometimes he did this without any anaesthetic as in the case of Kwan-kung, a famous general of the Three Kingdoms, now deified as the God of War, whom he operated on for a poisoned arrow wound of the arm. Another story has it that he even offered to cure the headaches of a king by opening the skull which offer, of course, was declined.

Hua To attended most of the notables of that period among them was Tso Tso, King of Wei, who appointed him as his personal physician. He was hot tempered, irritable and hard to please. Not satisfied with the practice of medicine, as the profession was then held in low esteem by the people, and being also homesick he obtained leave to visit his native place under the pretext that his wife was sick. However, he did not return to court after his leave expired though repeatedly sent for. Tso Tso knew of this deception and was so enraged with him that he had him arrested, thrown into prison, and
later caused him to be killed. Just before his death Hua To gave his manuscripts to the warder, who, however, dared not accept them. He then burnt all his papers. Legend has it that a few leaves of his work were recovered from the ashes. It described the method of castration which is now the only operation still practised by the Chinese. His death occurred when he was near the century mark. Being a great exponent of the art of conserving health he retained a youthful appearance even up to the end. Of his pupils, two—Wu Po and Fan Ah—had become famous. Wu acquired all his master's skill in treating diseases. He diligently practised gymnastic exercises and lived to over ninety years with teeth, eyesight and hearing in good condition. Fan specialized in acupuncture performing skilful feats which no average doctor of that time dare attempt. The books bearing Hua To's name are two, the Nei Chao Tu (內照圖) and the Chung Tsang Ching (中藏經). It is obvious that they are forgeries but they date from an early period. In the last named work is a prescription which gives the earliest account of the internal use of calomel in therapeutics.

Undoubtedly, Hua To is the greatest Chinese surgeon who ever lived. It is a matter of deep regret that, in spite of his great discovery of the use of anaesthetics, Chinese surgery has never had a chance to develop on account of the Confucian dogma which holds the body to be sacred and not to be mutilated in any way. With such traditions it could hardly be expected that any progress could be made in anatomy and physiology. And without such fundamental knowledge no operation even of the simplest kind could be performed with real success. Thus the death of this great surgeon also marks the end of Chinese surgery. For since then history does not record the further use of effervescing powders and such substances, or of any surgeon who dare attempt major operations.

TABES DORSALIS AMONG THE CHINESE*
A Study of the Symptoms and Serology of Sixty Cases

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A. INCIDENCE OF TABES DORSALIS IN CHINA

It has been stated by many observers that although syphilis is prevalent among the Chinese, cases of tabes dorsalis are rather rare. Jefferys and Maxwell (1) in their "Diseases of China" (1911) mentioned that 'syphilis is one of the most common diseases of China',

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but that no well authenticated case of tabes dorsalis has yet been reported from China. Collins (2) reported one Chinese case in his American series. Another case in the Philadelphia Hospital was reported by Irish (3). Testimony of observers who had practised in China for many years up to 1916 agrees as to the low incidence of tabes dorsalis among the Chinese. Hodge (4) saw only one or two cases of tabes in Hankow; Maxwell (5) saw three cases in Formosa; Reed (6) saw two cases in Changsha. But Woods (7) in Canton had seen eighteen cases 1912 to 1917 which was probably the highest number reported up to that time.

According to our experience in the Peking Union Medical College Hospital, the incidence of tabes dorsalis seems to be about the same as in Europe or in America. During five years (July, 1921 to June, 1926) there were 756 neurological patients admitted into the wards of this hospital; among these, 43 cases or 5.68 per cent, were tabetic. Since during the same period 936 syphilitic patients were admitted, 4.59 per cent, of all syphilitic patients were tabetic. In other words, one of every 17.6 neurological patients and one of every 21.77 syphilitic patients were proven to have tabes dorsalis. This ratio is by no means constant; but it is sufficient to show that in China, or at least in Peking, tabes occurs not less commonly than in Europe and America. Woods found one tabetic amongst 175 neurological patients in Canton Hospital. Bonar (8) found that among 11,271 neurologic cases in Starr's clinic, Columbia University, 2.147 per cent, were tabetic. Lucke (9) found one tabetic out of every 12.46 neurological patients or 8.21 per cent in the Philadelphia General Hospital.

There are several possible explanations of this apparently increasing incidence—much higher than has been frequently stated—of tabes dorsalis in Peking.

1. The usually stated low incidence of tabes dorsalis in China may be more apparent than real, as pointed out by Woods (7) and by Lennox. (10) Hospitals in China are, as a rule, not so well organized or equipped as those in Europe and America for discovering cases of this kind. Doctors, who are usually busy with surgical cases, had to make the diagnosis on the basis of well-marked physical signs alone. Some of the physical signs of tabes, such as pupillary abnormalities, are easily missed in dark-eyed races. The neurological knowledge and experience of the average general practitioners do not absolutely guarantee as proven fact all that has been written on tabes dorsalis. This was especially true for hospitals and practitioners of fifteen or twenty years ago, when western medical knowledge was still in its infancy in China. Many cases of tabes might have been overlooked in the
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general run of medical and surgical patients. Whereas in the Peking Union Medical College Hospital, which is a teaching hospital comparable with those in Europe and America, a special neurological clinic has been maintained, and various laboratory methods, such as the cell count, the estimation of total protein and the gold colloidal reaction of the cerebro-spinal fluid, and the Wassermann test of blood and spinal fluid, have been freely used in confirming the diagnosis. Hence very few cases in the clinic went unrecognized. Before the opening of this institution, cases of tabes had been seen no more frequently in Peking than elsewhere; but during the past five years, after its establishment, the number of cases steadily increased. It will be seen that if hospitals in China had staffs and equipment which would make thorough search possible, there would be not much difference in the incidence of tabes between Chinese and Europeans or Americans. But still there remains a doubt in one's mind whether tabes dorsalis, had it always been as frequent as we see it now, could have been overlooked so easily. Syphilis has been known in China for more than three centuries, and was surely not less common at that time than it is now. So this explanation alone will probably not account for the apparent increased incidence of tabes. It is possible that some other factors must be considered.

(2) Syphilis, as is true for some other infectious diseases, has been changing its manifestations in the course of time; and nowadays in China it probably has gradually reached an attenuated form in which involvement of the central nervous system, as in tabes, becomes more and more common. Since syphilis has been known in China for more than three centuries, variations in forms due to this cause would be expected here as in Europe.

(5) According to A. R. Fraser, Pfister and others, the modern anti-syphilitic treatment favours, if not directly produces, the manifestations of syphilis of the central nervous system including tabes and general paresis. Fifteen or twenty years ago, Chinese had not been subjected to modern anti-syphilitic treatment, therefore cases of neuro-syphilis, including tabes, were rare. Since the great war, the use of salvarsan has been very common in China even among the native doctors who give it quite indiscriminately in small doses at irregular intervals. This theory, if true, would account for the increase in the incidence of tabes which we have met within the last few years. But in our experience the theory would hardly hold good, because practically all cases of this series had had no anti-syphilitic treatment before the development of the tabes, the symptoms of the primary or secondary stage having been usually so slight that they seldom called the patients' attention to their disease, and so failed to lead them to seek treatment.
Many authors believe in the existence of more than one strain of Treponema pallidum—the so-called dermatropic and neurotropic. The neurotropic strain has particular predilection for the central nervous system. There are various facts suggesting the theory of a neurotropic strain of treponema pallidum. In tabes and general paresis, usually only slight primary, slight and rapidly fading secondary, and seldom if ever tertiary lesions of lues occur. Metasyphilis is usually not amenable to anti-syphilitic treatment. Mates of metasyphilitic patients and patients infected from the same source, are reported to have developed metasyphilis. Instances of such cases in the medical literature are Moerchen's five officers, Mori's five students, and Brosius's five glassblowers. Before Chinese had come in contact with western civilization and so become exposed to western syphilization, it was probable that only the dermatropic strain was present with manifestations of marked skin and bone lesions only, although syphilis has been known in China for more than three hundred years. But since about half a century ago, especially since the great war, Chinese have gradually come more and more in contact with western civilization and had more and more chance to be exposed to western syphilization; therefore the number of cases of metasyphilis has steadily increased. Further investigations in tracing the sources of infections and more reliable statistics from inland China are needed before one can judge the value of this argument.

Since no series of cases of tabes dorsalis among the Chinese, except Woods' 18 cases, has been found in literature, it seems worth-while to analyze the symptoms and laboratory findings of our sixty cases of locomotor ataxia and to compare the results with similar European and American statistics so as to serve as a record of the type of locomotor ataxia as it exists among the Chinese at present. All the cases of this series have been either inpatients or outpatients at some time during the past five years in the Peking Union Medical College Hospital. Only those cases which have been thoroughly studied by members of the neurological staff have been utilized, hence only sixty cases have been selected from a much larger number. Incomplete and insufficient records have not been used. Records of foreign patients have been purposely omitted.

B. ETIOLOGY

As to the etiology of tabes there is nowadays no doubt that syphilis is an essential factor in its production: no syphilis, no tabes. The view of its syphilitic nature which Fournier (13) first in 1875 and various authors since, had come to by statistical methods, has been nowadays further confirmed by the Wassermann reaction, the
examination of cerebro-spinal fluid which shows the presence of cellular exudates characteristic chiefly of the syphilitic processes, and finally by the discovery of treponema pallidum in the spinal cord in tabetics by Noguchi (14). Of our sixty cases only 34 patients or 56.66 per cent. admitted a history of syphilis; 14 cases admitted venereal exposure but denied chancre; ten patients denied venereal exposure; and in two cases the venereal histories were not recorded. Denial of venereal exposure may be attributed to misstatement for reasons of shame. It has been frequently noticed that the early manifestations of syphilis are often very slight in men who later develop tabes. In those ten patients who admitted exposure but denied chancre, the early manifestations might be so slight that they did not attract attention. Among the 34 cases who admitted lues, only eight patients gave a definite history of chancre followed by a secondary skin rash; in 16 cases chancres were present but a skin rash was disclaimed; in ten cases chancres were present but whether the skin rash was present or not was not recorded. Most of these patients maintained that the initial lesion was mild—a little abrasion or pimple, and the skin lesion, if present, was slight and faded rapidly. The relation of tabes to "mild" syphilis has been noted frequently elsewhere, and has been taken as one of the factors which are in favor of the view that there is a special variety of treponema pallidum which is responsible for tabes.

Sex.—Tabes is much more common in males than in females. In our series 56 were males and four were females, a ratio of 14:1. The relative frequency of tabes between the two sexes varies greatly with the social status of the patients. As a rule Chinese women are much less social, so it is expected that tabes occurs much less frequently in them. Thirteen of Woods' 18 cases were males. Mendel and Tobias (15) found the average proportion to be 7.5 to 1 from forty European reports. The American reports give an average proportion of 7 to 1.

Occupation.—The role played by occupation is perhaps only a matter of increased opportunity to syphilitic infection. The occupations of our patients are as following:

<table>
<thead>
<tr>
<th>Occupation</th>
<th>M</th>
<th>F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchant</td>
<td>11</td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>Cook</td>
<td>7</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Official</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Clerk</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Soldier</td>
<td>5</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Housewife</td>
<td>3</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Servant</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Teacher</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>General</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Banker</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Prostitute</td>
<td>1</td>
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<td>1</td>
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<tr>
<td>Engineer</td>
<td>1</td>
<td></td>
<td>1</td>
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<tr>
<td>Electrician</td>
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<td></td>
<td>1</td>
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<tr>
<td>Policeman</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Car driver</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Beggar</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>No occupation</td>
<td>7</td>
<td></td>
<td>7</td>
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</table>
Tabes Dorsalis Among the Chinese

**Age at which patient came to the hospital.**—This is shown in Table I. The average age at which patients came to the hospital was 48.5 years.

<table>
<thead>
<tr>
<th>Table I</th>
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<tbody>
<tr>
<td>Between 20—30</td>
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<tr>
<td>Between 30—40</td>
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<tr>
<td>Between 40—50</td>
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<tr>
<td>Between 50—60</td>
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<tr>
<td>Between 60—70</td>
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**Age at which first symptom of tabes appeared.**—There is no age in which tabes may not occur, but it is rather rare for tabes to develop before the age of twenty-four because syphilis is seldom acquired before adolescence. Hereditary syphilis must be present in all the cases appearing in youth or in childhood. We have not seen a single case of juvenile tabes here. The age, at which the first symptom of tabes made its appearance, varies in our cases from 22 to 60 years; the average age being 39.8 years with maximum percentage between 35 and 45 years, as shown in Table II.

<table>
<thead>
<tr>
<th>Table II</th>
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<tbody>
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<td>20 — 24</td>
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<td>25 — 29</td>
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<tr>
<td>30 — 34</td>
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<td>35 — 39</td>
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<tr>
<td>40 — 44</td>
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<td>45 — 49</td>
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<td>50 — 54</td>
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<tr>
<td>55 — 59</td>
</tr>
<tr>
<td>60 — 64</td>
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</tbody>
</table>

In America, Collins (2) found the average age to be 35.5 years. Lucke gives 42.34 years. In Europe, Frey (16) found the average age for the incidence of tabes to be between 30 and 40 years. Mendel and Tobias gave similar figures. It will be seen that our figures run fairly parallel with those found in Europe and America.

**C Interval between Infection and Tabetic Symptoms:**—

This is calculated in 34 of our cases who admitted chancre, and is shown in Table III.

<table>
<thead>
<tr>
<th>Table III</th>
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<tbody>
<tr>
<td>Less than 5</td>
</tr>
<tr>
<td>5 — 9</td>
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<tr>
<td>10 — 14</td>
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<tr>
<td>15 — 19</td>
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<tr>
<td>20 — 24</td>
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<tr>
<td>25 — 29</td>
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</table>
Thus it is found in our cases that the average period between infection and the onset of first symptom of tabes is 8.7 years; the shortest period being one year, and the longest being 27 years. In most of the cases the interval was between five and nine years. This calculation, of course, depends wholly upon the truthfulness and the memory of the patients. Since the average intelligence of Chinese patients is low, the first subjective symptoms of tabes are often slight and their onset is usually gradual, and since, finally, the number of cases presented here is small, our figure must be taken as a minimum average.

D Symptomatology

The symptomatology of tabes is, as a rule, markedly variable. The symptoms often appear in an irregular combination. Nevertheless there is a certain group of symptoms that are usually regarded as characteristic; lancinating or shooting pains, loss of tendon reflexes (patellar, Achilles), ataxia, and inactivity of pupils to light. When all these four symptoms are present in one case together with a positive serology, one is quite safe to say that tabes is present. At least three of these cardinal symptoms together with serological verification should be present before the diagnosis is considered secure. A host of other symptoms may also be present in individual cases. An attempt is made to analyze the individual symptoms, as they occurred in our sixty cases, so as to show their proportionate occurrence.

Pains:—Severe lancinating or shooting pains occurred in 32 of our cases or 55.6 per cent.; they were absent in 26 cases; in two patients, the presence or absence of pain was not recorded. Pains came on as the initial symptom of 18 cases or 30 per cent. They occurred mostly in the lower extremities, in the sciatic and crural distributions. Collins found this as the initial symptom in 24.6%; Lucke in 31.2%. The total percentage was found to be 82.35% by Frey; 71.6% by Lucke; and 54% by Thomas. (18) From my experience, Chinese patients seldom describe their pains as lancinating or lightning. They often describe them as prickling, cutting, cramp-like, jumping etc. In one case, pain occurred for two years before any other symptoms made their appearance, and disappeared soon after the onset of blurring vision due to optic atrophy. Deep boring pain in back or joints occurred in three cases.

Girdle sensation occurred in ten of our sixty cases or 16.66 per cent. They usually described it as a sense of constriction, varying from a narrow cord to one of a broad cuirass enveloping a large part of the trunk.
Tabes Dorsalis Among the Chinese

**Tabes Dorsalis Among the Chinese**

**Crisis:**—Our figure is low in this category. It was present in two of our cases or 3.33 per cent. They were both of the gastric type.

**Objective sensory involvement:**—This is the most frequent symptom of tabes. Sensory disturbances of one form or another were present in 46 of our cases or 76.66 per cent; absent in 14 cases. Among the 46 patients who had disturbances of objective sensation, vibratory sense was lost in the legs in 30 cases; definite hyperesthesia over the trifacial areas on both sides was present in two cases. Hyperesthesia over both legs was present in 22 cases; however, subjective numb parasthesia occurred in eight additional cases; hyperesthesia for cold over the abdomen was present in six cases; anesthesia over the sacral region was present in two cases.

**Ataxia:**—In 47 of the 60 cases or 79%, an ataxic gait was present; in 12 cases it was absent; in one case this could not be tested as fracture was present. Incoordination in the upper limbs (as judged by the finger-to-nose test) was present in 14 cases or 23.33% and absent in 46; in all these cases an ataxic gait was also present.

**Romberg's sign:**—This was positive in 46 of our 60 cases or 76.66%, negative in 13, and could not be tested in one case because of a fractured bone. Of the 13 cases where Romberg's sign was absent, eight patients had optic atrophy. Limbach (19) found Romberg's sign in 88.75%, Frey in 54%, Bonar in 79%, Thomas in 76%.

**Reflexes:**—Only the patellar and Achilles reflexes are considered here. The knee jerks were found to be:

<table>
<thead>
<tr>
<th>Knee Jerks</th>
<th>Number of Cases</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Absent on both sides</td>
<td>52 cases</td>
<td>86.66%</td>
</tr>
<tr>
<td>Absent on one side</td>
<td>2 cases</td>
<td>3.33%</td>
</tr>
<tr>
<td>Diminished</td>
<td>3 cases</td>
<td>5%</td>
</tr>
<tr>
<td>Normal</td>
<td>2 cases</td>
<td>3.33%</td>
</tr>
<tr>
<td>Increased</td>
<td>1 case</td>
<td>1.66%</td>
</tr>
</tbody>
</table>

Limbach found absence of knee jerks in 92%; Lucke in 86.8%; Collin found this reflex absent in 84.3% normal in 4.3%, sluggish in 5.7%.

The Achilles reflex usually fails before the patellar reflex is lost and constitutes a valuable early test. It was absent in 55 of our cases. In those cases in which the knee jerks were absent on both sides, normal, or increased, the ankle jerks were also absent on both sides, normal, or increased respectively. In the three cases where the knee jerks were diminished, the ankle jerks were absent. In one case where the knee jerks were absent on one side and diminished on the other, the ankle jerks were normal.

In the case where the knee and ankle jerks were exaggerated, there were also ankle clonus and Babinski's sign on both sides. Argyll-Robertson pupils, shooting pain, ataxia, and loss of vibratory
sense were present in this case. It was a case of tabes combined with lateral sclerosis (posterolateral sclerosis).

**Hypotonia:**—Muscular hypotonia was present in 41 of our cases; absent in 15; and not recorded in four cases. Consequently in 56 cases where hypotonia was mentioned, it was present in 73.2%, and absent in 27.8%. Muscular hypotonia was regarded as present when in a patient lying flat on his back with the legs extended, the limbs could easily be brought up to a right angle or less than a right angle with the trunk.

**Weakness of lower extremities:**—The legs were weak in 17 patients, normal in 40, and their power was not mentioned in the records in three cases. In six cases it occurred as the initial symptom of the disease.

**The condition of the pupils:**

Equality of the pupils:—In 31 or 51.66% of the 60 cases, the pupils were unequal in size; in 29 cases or 48.33%, they were equal. Frey found unequal pupils in 52.35%; Bramwell (19) in 58%; and Lucke in 55.6%.

Regularity of outlines and margins of the pupils:—The pupils were irregular in 19 or 31.66% of our cases; and regular in 41 cases, or 68.33%.

Argyll-Robertson pupils:—Complete Argyll-Robertson pupils (complete loss of light reflex with active contraction upon accommodation) were present in 26 or 43.33% of our cases and incomplete in 20 cases, or 33.33%. In 11 cases, or 18.33%, the pupillary reactions to light and accommodation were both lost or very sluggish; in three cases or 5% the pupillary reactions were normal. Limbeach found Argyll-Robertson pupils in 70%; Collins in 77%; Bonar in 78.69%; Frey found Argyll-Robertson pupils in 70.54%; normal reaction in 4.7%, and sluggish or no reaction in 24.72%.

Eye-muscles:—Paralysis or paresis of one or the other muscles of the eye was present in 7 or 11.33% of our cases. Involvement of the left third and fourth nerves occurred in two cases; of the right third and fourth nerves in one case; and of the third and fourth nerves of both sides in one case. Involvement of the left sixth nerve occurred in two cases; of both sixth nerves in one case. Lucke found paresis of eye-muscles in 12% of his cases, Bonar in 12%, Collins in 10%, Mendal and Tobias in 13.8%.

Ptosis of eye-lids:—Ptosis of left upper lid occurred in three cases, and ptosis of right upper lid also occurred in three other cases. Therefore ptosis of eye-lids occurred in 10% of our cases. Ptosis of eye-lids is often transitory. Lucke found ptosis in 14.8% of his cases.
Optic atrophy:—This was present in 14 of our 60 cases or 23.33%. In most of the cases both eyes were involved. In five of these 14 cases, blurring of vision due to optic atrophy came on as the initial symptom of the disease. In eight of these 14 cases where optic atrophy was present, there was no ataxia of Romberg's sign. In the remaining six cases, ataxia was present. Bonar in a collective study of 1,088 cases of tabes reported by Von Gross, Berger, Bernhardt, Leimbach, Thomas and himself, found optic atrophy in 20.4%. Optic atrophy was observed by Bramwell in 21.2%; and by Lucke in 16%.

It is a clinical fact of much interest and importance that, as a rule, patients developing optic atrophy early do not show much ataxia, and the locomotor difficulties are only those of blindness. When the atrophy appears in the ataxic stage, there is little or no further increase of inco-ordination and in certain cases the ataxia thereafter almost disappears. This fact has been pointed out by Charcot, (20) and many other early writers. In five of our six cases in which blurring of vision due to optic atrophy came on as the initial symptom, ataxia was absent. In one case where shooting pain was the initial symptom, the pain disappeared soon after the development of optic atrophy and the general course became stationary.

Disturbances of bladder and rectal function:—The functions of the bladder are frequently disturbed at some stage. They were involved in 36 or 62% of our cases; normal in 22 cases; in two cases the functions of bladder were not mentioned in the notes. Among these 36 cases where disturbances of bladder function were present, incontinence occurred in three cases; slowness in starting the stream of urine occurred in three cases; urgency in urination was present in 11 cases; and in the remaining 19 cases weakness of the bladder was noted. Complete retention of urine is rather rare and was not present in our cases. Frequently bladder disturbance occurred at different periods in the same case. Disturbances of rectal function occurred much less often than vesical disturbances. They occurred in 10 of our cases; among these obstinate constipation was rather common and this might be not a direct result of tabes, since constipation is so common among the Chinese.

Sexual function:—The sexual power and desire was lost in 23 of our cases, diminished in 16 cases, normal in nine cases and not noted in 12 cases (four cases being females).

Arthropathies:—These occurred in six or 10% of our cases. They all occurred in the male sex. The joints affected were: both hip joints in one case; both knee joints in one case; left ankle joint in one case; left knee joint in one case; right hip in one case; left
tarsometatarsal joint in one case. In one case, Charcot joint (hips) occurred as the first symptom of tabes. The diagnoses of all these cases were confirmed by X-ray.

Spontaneous fracture in tabes:—This was present only in one case. A beggar, who had chancre 20 years before, suffered from a fracture of the right femur and also Charcot joints of both hips. This fracture was the result of a slight trauma.

Muscular atrophy:—General muscular wasting was present in four of our cases.

Association with general paresis:—Mental disturbances occurred in three cases. Euphoria and faulty judgement were noted in one case; irritability and impairment of memory were present in one case; and complete dementia was found in one case.

### Tabetic Symptoms and Signs in Order of Their Frequency

<table>
<thead>
<tr>
<th>Per cent</th>
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<tbody>
<tr>
<td>1. Absent or diminished knee and ankle jerks</td>
<td>95</td>
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<tr>
<td>2. Ataxia or staggering gait</td>
<td>79</td>
</tr>
<tr>
<td>3. Romberg’s sign</td>
<td>76.66</td>
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<tr>
<td>4. Argyll—Robertson pupils</td>
<td>76.66</td>
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<tr>
<td>5. Sensory disturbances</td>
<td>76.66</td>
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<tr>
<td>6. Muscular hypotonia</td>
<td>73.2</td>
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<tr>
<td>7. Disturbances of bladder</td>
<td>62</td>
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<tr>
<td>8. Lancinating pains</td>
<td>55.66</td>
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<tr>
<td>9. Unequal pupils</td>
<td>51.66</td>
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<tr>
<td>10. Loss of sexual power</td>
<td>48</td>
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<tr>
<td>11. Motor weakness of legs</td>
<td>30</td>
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<tr>
<td>12. Ataxia of upper limbs</td>
<td>23.33</td>
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<tr>
<td>13. Optic atrophy</td>
<td>23.33</td>
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<tr>
<td>14. Girdle sensation</td>
<td>16.66</td>
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<tr>
<td>15. Paresthesia</td>
<td>13.33</td>
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<tr>
<td>16. Paralysis or paresis of eye-muscles</td>
<td>11.66</td>
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<tr>
<td>17. Ptosis of eye-lids</td>
<td>10</td>
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<tr>
<td>18. Arthropathies</td>
<td>10</td>
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<tr>
<td>19. Mental symptoms</td>
<td>5</td>
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<tr>
<td>20. Vertigo</td>
<td>5</td>
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<tr>
<td>21. Visceral crises</td>
<td>3.33</td>
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<tr>
<td>22. Difficulty in articulation</td>
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<tr>
<td>23. Tinnitus in ears</td>
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### Laboratory Findings

**Blood:**—The Wassermann test of blood was positive in 49 of our sixty cases or 81.66 per cent; negative in eight cases or 13.33 per cent; and doubtful in three cases or five per cent. In three of the eight negative cases, the Wassermann test of spinal fluid was also negative; and in the remaining five cases the Wassermann test of spinal fluid was
positive. In the three doubtful cases, the Wassermann test of spinal fluid was positive in one case, negative in one case, and doubtful in one case.

*Cerebro-Spinal Fluid:*—The changes in the cerebro-spinal fluid in 55 of our 60 cases are fairly constant though of varying severity. We found in all these cases either some increase of cells, a positive globulin reaction, some excess of total protein, or a positive Wassermann reaction. Five of the 60 patients left without being punctured.

The Wassermann test of spinal fluid was positive in 46 of these 55 cases or 83.6 per cent; negative in seven cases; doubtful in one case; and anticomplementary in one case. In the seven negative cases, the Wassermann reaction of blood was positive in three cases, negative in three cases, and doubtful in one case. In the one doubtful case, the blood Wassermann reaction of blood was also doubtful. In the five patients who left without being punctured and in the one anticomplementary case, the Wassermann test of blood was positive.

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<th>Wassermann reaction of blood and C. S. F.</th>
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<td>Positive C. S. F. and blood</td>
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<td>Positive C. S. F. but negative blood</td>
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<td>Positive blood but negative C. S. F.</td>
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<td>Positive blood but anticom. C. S. F.</td>
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<td>Negative C. S. F. and blood</td>
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<td>Doubtful C. S. F. and blood</td>
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The average number of cells in the cerebro-spinal fluid of these 55 cases was 32. They were increased in 41 cases or 80 per cent; nine cells per c.mm. being accepted as the upper limit of the normal number according to Cornaz. The cells most often number from 10 to 60 per c.mm.

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<tr>
<th>Cell count of C. S. F.</th>
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The Ross Jones or globulin reaction of the cerebro-spinal fluid was positive in 33 of our cases or 73.33 per cent; negative in 12 cases or 26.66 per cent; and in 15 patients this was either not examined or not mentioned in the notes.

The average total protein content in the cerebro-spinal fluid in 47 of our cases was 0.71 mg. per c.c. We find that 0.35 mg. per c.c. is the upper limit for the normal quantity. It was increased in 45 instances, or 95.7 per cent. The total protein was below 0.35 mg. per c.c. in two patients; between 0.4 and 0.9 mg. in 29 cases; between 1.0 and 1.5 mg. in 13 cases; and above 1.5 mg. in three patients.
patients the protein estimation was not made or was not mentioned in the notes. The increase of total protein runs more or less parallel with the lymphocytosis.

The Lange or gold colloidal reaction of cerebro-spinal fluid in tabes gives a curve which is, as a rule, not typical. This test was done in 44 of our cases. Seventeen of these cases or 46% gave a luetic curve as ‘1232110000.’ A weak or sometimes quite strong curve of the paretic type as ‘5554210000’ or ‘4444321000’ was obtained in 15 patients (40.5%). In seven cases or 13.5% a curve more or less within normal limits—that is not above purple ‘2’ as ‘1121000000’—was obtained.

Cornaz (21) found in 13 cases of tabes that the blood Wassermann was positive in nine, or 69%. The average lymphocytosis was 39 and was increased in 11 instances or 85%. The spinal fluid Wassermann was positive in nine patients in the beginning, but after treatment with neosalvarsan it became positive in all the 13 cases. The average quantity of albumins is 0.6%

Greenfield (22) and Carmichael analyzed the result of the examination of cerebro-spinal fluid in 279 cases of tabes, and gave the following table:

| Cells: 0-4 per c.mrn. 5-9 per c.mrn. 10-50 per c.mrn. more than 50 | 30% 12% 38% 20% |
| Total 10-25 mgm. 30-50 mgm. more than 50 mgm. per protein | 54% 36% 10% |
| Nonne-Apelt reaction | negative “weakly positive” “positive” 23% 40% 37% |
| Lange reaction | normal luetic paretic 40% 45% 10% |
| Wassermann and blood | Neg. C. S. F. Neg. blood Neg. C. S. F. Pos. C. S. F. 21% 10% 5% 64% |

REFERENCES
3. Irish: Two cases of locomotor ataxia: one in a Chinaman, the other in a negro. Philadelphia Hospital Reports, Vol. 3, 1896.
POSTOPERATIVE MASSIVE ATELECTASIS

WITH REPORT OF CASE

HORACE EMERSON CAMPBELL, M.D., Pagoda Anchorage, Fukien.

Of the many complications that may follow surgical operations, one of the most recently recognized is that known as massive collapse of the lung, or better, massive atelectasis. It has been defined as "a febrile complication arising within a few days of operation, the characteristic and unique feature of which is the combination of the signs of unilateral pulmonary consolidation with displacement of the heart to the affected side" (Scott). When the clinical thermometer and pulse rate indicate to the surgeon that a postoperative complication is arising, or when
symptoms pointing to lung affection appear, an examination of the chest will often reveal the presence of consolidation, leading to the diagnosis of postoperative pneumonia. If the examination is carried further and there is displacement of the heart toward the consolidation, the condition is massive atelectasis, in the absence of preoperative findings of chronic fibrosis.

Onset and symptoms.—The onset may occur as soon as the patient has recovered from the anaesthetic or may be postponed until the third day. It may be fulminating, moderate, or latent. It may be so severe as to simulate pulmonary embolus, or there may be no symptoms more severe than tachypnea. An abrupt rise in the temperature, and in the rates of pulse and respiration may first attract the attendant. There may follow: pains in the chest, dyspnoea, cough, or expectoration. The sputum is mucopurulent, usually very tenacious even to the point of standing in the cup like gumdrops, and sometimes is blood-stained.

Physical signs.—It is by the physical signs that the diagnosis is made. The pathognomonic sign is the displacement of the heart toward the affected side. While fibrosis of the lung may produce this, no other acute condition does. Inspection will usually reveal cyanosis, and icterus has been noted. The affected chest is depressed. Its excursion is limited in its upper portion, but the base may be observed to move excessively, the costal margin moving more than normally, and more than the unaffected side. This is due to the high position of the diaphragm, and the consequent loss of a portion of its control of the costal margin. Locally, the lung shows signs of consolidation. The breath sounds may be diminished in intensity but are of bronchial character. Rales are frequently absent in the early stages, and appear in divers forms as the process subsides. The consolidation may involve the whole lung, or only a portion. Bradford* is referred to by Lee as encountering varieties in thoracic wounds divided into homolateral, contralateral, and bilateral, all of which may be lobular, lobar, or total. In a fatal case reported by Lee, there was complete atelectasis of the left lower lobe and partial atelectasis of the right lower lobe. Churchill describes three degrees; complete collapse of one lung, complete collapse of the lower lobe with partial collapse of the remainder of the lung, and collapse of the lower lobe; although Scott mentions a case (R.G.) in which the process was confined to the upper chest, and Lee refers to Pearson Irvine's case of diphtheritic paralysis of the thoracic muscles with an overaction of the diaphragm. In this case there was a definite collapse of the upper lobe of the lung.

*I regret that I have not access to Bradford's article which is held to be the most exhaustive treatise on this condition.
Even when the collapse is limited to the lower lobe, there is diminution of the intensity of the breath sounds over the rest of the affected side. This is considered by Bradford to be the most important auscultatory sign of massive collapse.

The right lung is usually involved and in its basal portion. The roentgen-ray is useful in demonstrating the extent of the local process, and the degree of displacement of the heart and mediastinum. Because of the density of the collapsed lung to the ray, Leopold believes that there must be retained fluid in the lung, and Sante that there must be an associated engorgement of the blood vessels and lymphatics. However there would seem to be no necessity to invoke these factors, although they are present to varying degrees, because the great density is to be expected in the total absence of air from the atelectatic portion.

Clinical Course.—The maximum temperature varies from 100°F. to 104.8°F. In the fulminating type, the symptoms subside after a few hours, becoming similar to the moderate type, in which the symptoms and temperature abate in a period of a few hours to ten days. The signs diminish with the symptoms but two weeks are often required for their disappearance. The atelectasis may disappear only to reappear one or more times on successive days (Leopold). It terminates by crisis, lysis, or complication. There has been no fatal case of uncomplicated atelectasis, although the case reported by Lee in which death occurred three days after Caesarian section, had a minimum of peritoneal pathology, but was marked by bilateral atelectasis, complete in the left lower lobe and partial in the right lower lobe.

Complications.—It is in relation to complications that the condition derives its importance. Elwyn maintains that most of the cases of postoperative pneumonia are due to infection spreading from the bronchi to atelectatic areas, which are presumed frequently to follow operations, especially those upon the abdomen. Lee believes that collapse of the lung is a constant factor in all postoperative pulmonary complications and that small emboli lodging in the atelectic areas produce the so-called postoperative bronchopneumonia. In cases following war wounds, purulent bronchitis and pneumonia limited absolutely to the collapsed lung were found (Bradford, referred to by Scott). Scott and Lee report cases of collapse of the bases complicated by broncho-pneumonia of the upper lobes.

The role of atelectasis in postoperative pulmonary complications must be an important one. Karsner has demonstrated that only when the venous return is obstructed or the lung collapsed by filling the pleural cavity, does infarction follow small experimental emboli in the dog's circulation. Cutler and Hunt have stressed the importance of small
emboli from the operative site as factors in postoperative pulmonary conditions. Cutler and Schlüeter have produced experimental lung abscess by freeing an embolus consisting of a segment of vein inoculated with bacteria, but infected clots, bits of meat, etc., have produced not abscess, but pneumonitis. May it not be that emboli of the latter group lodging in an area of atelectasis will produce abscess?

**Etiology.**—It is difficult to invoke any one factor as a cause. The relative airlessness of the basal lobes following abdominal operation, probable due to restriction of abdominal breathing (Briscoe, referred to by Scott, Lee, and others), would seem to be a possible basis at times. It is significant that both postoperative bronchopneumonia and postoperative massive atelectasis are largely limited to abdominal operations. Elwyn saw but one case of bronchopneumonia in 132 operations on the extremities, and Scott refers to Bradford’s statement that massive atelectasis was not seen after extensive war wounds of the extremities. On the other hand Lee says, “But, as we have elsewhere stated, he (Bradford) had knowledge of its occurrence following abdominal wounds, wounds of the pelvis, buttocks and lower extremities, but in no cases with wounds of the head or upper extremities.” Lee also states, “The military surgeons supply the next largest group in those following trauma, especially following unilateral wounds of the thoracic wall and occasionally wounds of the buttocks, pelvis and thigh.” Sante reported a case occurring after minor injury to the hip, and in the case report appended, massive atelectasis followed circumcision.

Nevertheless, most of the cases followed trunk injuries or operations. Bradford reports those following nonpenetrating gunshot wounds of the chest, with collapse of the contralateral lung, with no anaesthetic and no operation. This would seem to favor a reflex cause, but Tidy and Cymble (referred to by Lee) suggest that the patients naturally lay on the well side thus restricting its excursion and predisposing to its collapse. Leopold refers to Bradford’s cases in which the chest wound was so slight that the patient was not confined to bed prior to the collapse attack.

The presence of tenacious sputum in many cases and the rapid amelioration of symptoms when a mass of sputum is coughed up or removed bronchoscopically (Tucker), suggest that obstruction of the larger bronchi is a factor in maintaining, at least, the massive atelectasis. It is a well known fact that experimental plugging of the bronchus in animals will produce collapse very quickly, with shifting of the heart to the affected side.

That general anaesthesia is not entirely responsible is witnessed by the occurrence after local, spinal or no anaesthesia, Scott suggests a reflex phenomenon as evidenced by the reduction of vital capacity,
Postoperative Massive Atelectasis

in one case to 25 per cent of the normal, more than could be accounted for by the complete suppression of the functions of one lung. It would seem to me, however, that the conclusion is not warranted by this evidence, it being more probable that the unaffected lung had reached the limits of its distensibility in its effort to fill those portions of the thorax vacated by the collapsed lung, and was unable to maintain its vital capacity, although harboring far more residual air than normally. Bronchoscopic evidence would seem to indicate that the process is usually strictly unilateral.

In many of the cases there is immobility and high position of the diaphragm persisting for many days after the subsidence of the symptoms and the complete clearing of the lung as shown by roentgen-ray. It seems reasonable to postulate that the collapse is due in most cases to a combination of lessened respiratory movement with complete or partial bronchial obstruction, and in some cases to bronchial obstruction alone. The "reflex" causes of diaphragmatic paralysis and the cause of the tenacious mucopus so sharply limited to one portion of the bronchial tree have yet to be found.

Treatment.—Tucker describes immediate improvement following bronchoscopic removal of the secretion. It would seem that expectorants would be indicated in the absence of bronchoscopic facilities. However, the simple expedient discovered by Sante of having the patient cough while lying on the unaffected side eclipses the above difficult or uncertain methods. Aeration of the lung ensues in the course of minutes, sometimes with the production of a small mass of sputum.

REPORT OF CASE

An undersized and undernourished Chinese boy of 17 years entered the hospital March 28, 1927, because of phimosis. At about age thirteen had noticed that the foreskin could not be retracted. Since then it has become tighter and now the aperture is very small. Year before last had an illness of ten days duration marked by icterus and generalized oedema. No fever at that time. Some time later had a cough and sore throat. He maintained that he had malarial attacks occasionally. Mother dead, cause unknown, Father, two brothers, and one sister, all living.

Examination showed a poorly nourished boy. Mouth and throat negative. Heart and lungs normal, abdomen negative, spleen not palpable. Serum and taste normal, marked phimosis.

Operation: Chloroform anaesthesia, duration about thirty five minutes. The respiration was stertorous, and could not be relieved by lowering the head, elevation of the jaw, or traction on the tongue. The foreskin was excised, and the neck of the penis found obliterated with dense adhesions, and the frenum destroyed with retraction of the glans downward. Structures freed and the two layers of the prepuce sutured.
Postoperative course: After regaining consciousness the temperature (rectal) was 97.6 F., the pulse 64 per minute. Four hours later temp 99.6, pulse 96. About an hour later was reported to have had a slight chill. The next morning, the pulse was 108, the temperature 101.4F. and the respirations 36. The patient seemed distressed, was dizzy, dyspnoeic and cyanotic. Cough had started about 6: A.M. and there was a slight amount of yellow purulent sputum at infrequent intervals. Inspection showed the left chest smaller than the right, flattened in the infracavicular portion as the patient lay flat in bed, and moving less actively than the opposite side. The infero-lateral portion of the chest was seen to be moving actively outward, and the hands placed on the costal margins showed the left costal margin to be moving outward more than the right side, particularly in the lateral portion. Percussion revealed the left lung resonant anteriorly and above posteriorly, but just below the angle of the scapula was an area of dullness which extended to the base and forward almost to the midaxillary line. Fremitus over the upper portion of this area of dullness was increased, and diminished over the base. The dullness did not shift. The breath sounds over the right chest were exaggerated, over the left upper chest somewhat diminished, at the inferior angle of the scapula intensely bronchial with ægophony, and with subcrepitant rales during the latter part of inspiration. Below, the breath sounds were faint although bronchial and there were no rales.

The left border of cardiac dullness was 9/2 cm. from the midsternal line in the fourth space, 1/2 cm. to the left of the nipple. The right border was just beyond, i.e. to the left of the left sternal border. Not being free to make blood studies at this time, and fearing that malaria might be a part of the picture, I ordered quinine sulphate by mouth in five grain doses. Diagnosis: postoperative massive collapse of the lung. After two doses the blood was examined. There were 31,000 white blood corpuscles per c.mm., 98 percent polys. No malaria organisms or pigmented cells seen. The urine was negative for albumen and microscopic elements.

By afternoon, the temp., pulse, and respiration had fallen slightly, and the patient felt much better, still having an annoying cough, with rather frequent production of yellowish mucopurulent sputum, each portion assuming a flattened rounded shape in the cup. Cyanosis was still present and all other signs continued except that the breathing in the upper portion of the dull area had lost its intense character, and rales of the subcrepitant variety were now all over the dull area. No signs in the opposite chest.

On the second postoperative day, the temperature stayed below 99.2 F. The quinine was discontinued after fifteen grains a day for two days. The pulse remained below 84, the respirations below 24, and the patient felt very well except for an occasional cough. Herpes appeared on the upper lip bilaterally. The area of dullness had spread anteriorly at the base to the anterior axillary line almost to the area of cardiac dullness, which had not changed. The lateral portion of the costal margin moved outward even more than before.

On the third day the temperature remained below 98.6 F. all day, pulse reached 72 in the afternoon, respirations stayed at 24. Cyanosis remained, left chest moved better in its upper portion, heart had receded a trifle. There were sonorous and sibilant rales throughout the dull area, none in the right chest. Sputum less tenacious, more profuse. White count, 51,000.
Postoperative Massive Atelectasis

Thereafter, signs diminished till the eighth postoperative day, when there was no cyanosis, equal movement of the two chests, left border of heart 7 1/2 cm. from the midternal line, no dullness to percussion, and just a slightly bronchial character of the breath sounds at the angle of the scapula. Surprisingly, the white count on the 7th day was 12,000 and on the eighth day 15,000.

Comment.—The significance of this case would seem to be that it adds one more to the relatively rare cases of pulmonary collapse following operation or injuries elsewhere than upon chest or abdomen.

SUMMARY

1. A review of the available literature is made, presenting the current ideas of etiology and treatment.

2. Assent is made to the idea that restriction of respiratory movement together with varying degrees of bronchial obstruction are the important factors in causing and maintaining atelectasis.

3. The suggestion is made that infected emboli lodging in atelectatic areas are the basis of postoperative pulmonary abscess.

4. A case of postoperative atelectasis following circumcision is presented.

REFERENCES


FURTHER OBSERVATIONS ON THE TREATMENT OF
SCHISTOSOMIASIS JAPONICA*

GEORGE T. TOOTELL, Changteh, Hunan.

Two series of cases of schistosomiasis treated in this hospital have already been reported (1), (2). The present paper gives the results of treatment of cases encountered on a recent trip to districts near Changteh where schistosomiasis is endemic. Twenty-five patients suffering from the disease were persuaded to come to the hospital for treatment. They included cases of all degrees of severity, from mild cases without symptoms to far advanced cases with considerable ascites. The cases were divided into three groups, each group containing mild and severe cases. One group (five cases) was treated with Antimosan (Von Heyden 661)† the second group (eight cases) with mercuriochrome 220 soluble and the third group (twelve cases) with potassium antimony tartrate. In the mercuriochrome group four of the cases had such severe reactions to the drug that their treatment was completed with potassium antimony tartrate. These cases form a fourth “mixed” group.

The following clinical points are worth noting. Dysentery was remembered as a symptom in 17 cases (68 percent). The globulin precipitation test was performed in 23 cases and was found positive in all of them. The test became negative after the first or second injection in all the antimosan and potassium antimony tartrate cases. It ultimately became negative in the mercuriochrome and “mixed” cases also. In cases where hookworm eggs were found in the feces, oil of chenopodium and carbon tetrachloride were administered, one part of the former to nine parts of the latter, the age of the patient being the guide for dosage. During the treatment of all cases, Blaud’s pills and tincture of nux vomica were given t. i. d. One case, a boy of seventeen who had had the disease for ten years and who had ascites, developed acute abdominal symptoms twenty-six days after his last injection with antimony tartrate, and died two days later. Stool had been negative for schistosoma eggs for 24 days. Operation and autopsy were out of the question owing to local prejudice.

The results of treatment are shown in Table 1. Cases are designated as “Greatly improved” if the general condition of the patient was improved and if several stool examinations (usually four or more) were negative for schistosoma eggs or miracidia. Most of these cases are probably cured, but cannot be so designated until they have been followed up. Those cases are designated “improved” in which the general condition was improved but the feces were still positive or only

*Read at the China Medical Conference in Peking September, 1920.
†See note at end of article.
negative on one or two examinations. All except one of the "improved" cases left the hospital long before the desired amount of treatment had been given.

Special attention is directed to the following points, which are brought out in the table:—

**Antimosan Group.** Treatment was given at intervals of two days, unless a longer interval was indicated by the reaction produced. One case had two severe reactions with chilly sensation, nausea, dizziness and diarrhea. Aside from this, reactions were decidedly less with this drug than with either of the others. One case, a boy of nine, the youngest of the series, had eggs in the feces for 31 days after treatment was started, and had only one negative stool examination before he left the hospital. It is considered that the efficacy of this drug was about equal to that of potassium antimony tartrate, but the mildness of the reactions make it appear to be a better drug. The present cost, however, would make it prohibitive for routine use.

**Mercurochrome and Mixed Groups.** Of the eight patients whose treatment was started with mercurochrome, seven had severe reactions with chill, temperature 102°-105° F. and sometimes nausea, vomiting and diarrhea. Two patients left the hospital after the second injection. Four more refused to finish their treatment with mercurochrome. These were transferred to potassium antimony tartrate, and two were apparently cured. One other was possibly cured, and the fourth left the hospital before his feces became negative. Of the other two patients treated with mercurochrome alone, one was apparently cured after four injections; the other left the hospital after his third injection while his feces were still positive. It would seem from this series of cases that mercurochrome is not a satisfactory drug to use in this disease.

**Potassium Antimony Tartrate Group.** A two per cent solution was used. Of the twelve cases treated with this drug, ten remained in the hospital as long as was desired and all of these were apparently cured. Severe reactions occurred in only two cases, but reactions were of moderate severity in all but one of the others. The drug cannot be held responsible for the death of the one fatal case. The only objections to this drug are the reactions and the length of time required to effect a cure. Treatment averaged 23 days in duration in the cases of this series which were apparently cured; this is computed from date of first treatment to date of last treatment.

In connection with the treatment of these cases an estimate was made of the cost of treatment. This was done for the purpose of determining whether it would be economically possible for a hospital to treat
schistosomiasis on a large scale if cases were admitted as ordinary inpatients. Since most of the patients with schistosomiasis are farmers, their economic status is so low that they cannot afford to pay even the twenty-five cents per day charged to third-class patients. The cost of treating this series of cases therefore fell mainly on the hospital. If only the cases which were discharged as "greatly improved" are considered, the average cost was $8.00 per patient. It is necessary, however, to include also the cost of treating those who left before their treatment was completed. This raises the average cost to $14.00 per "greatly improved" patient. This does not include the cost of expensive drugs, which, in the case of the new antimony preparations would approximately double the cost of treatment. It may be concluded, therefore, that the in-patient treatment of schistosomiasis on a large scale would be prohibitive, even were it possible to bring large numbers of patients to the hospital. The establishment of field clinics in endemic villages should be seriously considered in order to make some headway against this disease in heavily infected regions.

During the journey on which the cases here reported were encountered, it was found that in some villages previously visited (3) the incidence of schistosomiasis had apparently decreased, but the disease was found to be present in two villages thirty li (ten miles) nearer to Changteh than it was known to be three years ago.

SUMMARY AND CONCLUSIONS

1. The treatment of twenty-five cases of schistosomiasis japonica is reported. The drugs used were antimosan (Von Heyden-661), mercurochrome 220-soluble, and potassium antimony tartrate.

2. Antimosan proved to be about as effective as tartar emetic, in the dosage and interval employed. Reactions were generally milder than with tartar emetic.

3. Mercurochrome almost always caused severe reactions and was uncertain in its therapeutic effect. It does not seem to be a satisfactory drug to use in this disease.

4. Potassium antimony tartrate justified its reputation of efficacy in both mild and severe cases. The moderately severe reactions produced by this drug, and the length of time required for a cure, make it important to continue the search for a more efficient drug.

5. The cost of hospitalization of patients would be prohibitive in treating schistosomiasis on a large scale. The establishment of field clinics for its treatment in heavily endemic villages should be started.

6. The disease is spreading to villages not previously known to be endemic.
Table I. Treatment of Schistosomiasis with various Drugs

<table>
<thead>
<tr>
<th>Case Number</th>
<th>Hospital Number</th>
<th>Age</th>
<th>Weight in Pounds</th>
<th>Duration in Years</th>
<th>Activity</th>
<th>Hemoglobin %</th>
<th>Pretosho %</th>
<th>Number of Injections</th>
<th>Total Drug, gr.</th>
<th>Total L.E. in Pretosho %</th>
<th>Treatment Days</th>
<th>S. J. Eggs in Preg.</th>
<th>Result</th>
</tr>
</thead>
</table>

**Antimosan Group. 5 Cases**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 5011 | 34 | 117 | 15 | 5 | 0 | 50 | 2 | 9 | 2.2 | 41 | 26 | 22 | 8 | twice severe | Gr. Imp. |
| 2 | 5041 | 13 | 50 | 7 | 0 | 0 | 50 | 65 | 11 | 1.35 | 59 | 25 | 24 | 9 | mild | Gr. Imp. |
| 3 | 5061 | 16 | 63 | 7 | 10 | 0 | 50 | 7 | 7 | 0.82 | 27 | 15 | 18 | 17 | mild | Gr. Imp. |
| 4 | 5081 | 9 | 25 | 1 | 0 | 0 | 50 | 18 | 12 | 0.74 | 46 | 31 | 33 | 17 | mild | Gr. Imp. |
| 5 | 5045 | 28 | 145 | 5 | 0 | 0 | 65 | 11 | 3 | 0.50 | 4.7 | 5 | 2 | 0 | none | Imp. |

**Mercurochrome Group. 4 Cases**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 5021 | 30 | 134 | 14 | 8 | 13 | 80 | d | 3 | 0.75 | 13 | 13 | 17 | 0 | severe | Imp. |
| 2 | 5052 | 22 | 106 | 6 | 15 | 0 | 50 | 5 | 4 | 0.84 | 17 | 17 | 21 | 19 | severe | Imp. |
| 3 | 5067 | 22 | 132 | 4 | 0 | 0 | 70 | 13 | 2 | 0.43 | 1.75 | 0 | 0 | 0 | severe | Imp. |
| 4 | 5069 | 34 | 127 | 7 | 0 | 0 | 70 | 5 | 2 | 0.40 | 0.69 | 0 | 0 | mild | Imp. |

**Mixed Group—Mercurochrome and Tartar Emetic. 4 Cases**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 4855 | 17 | 83 | 7 | 0 | 0 | 60 | 3 | M | 2 | 0.41 | 10.8 | 69 | 42 | 24 | severe | moderate | Gr. Imp. |
| 2 | 5145 | 11 | 53 | 8 | 0 | 0 | 60 | 21 | A.T. | 18 | 1.07 | 28.9 | 46 | 54 | 3 | severe | mild | Imp. |
| 3 | 5146 | 48 | ? | 1 | 0 | 0 | 70 | 5 | M | 3 | 0.62 | 1.32 | 25 | 35 | 0 | severe | mild | Imp. |
| 4 | 5176 | 30 | 108 | 3 | 0 | 0 | 70 | 5 | A.T. | 9 | 1.07 | 21.8 | 57 | 63 | 5 | moderate | severe | Imp. |

**Tartar Emetic Group. 12 Cases**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 5063 | 21 | 72 | 10 | 12 | 0 | 50 | 15 | 8 | 1.1 | 12.5 | 21 | 23 | 8 | severe | Gr. Imp. |
| 2 | 5070 | 25 | 100 | 2 | 0 | 0 | 57 | 16 | 3 | 0.06 | 1.3 | 3 | 0 | 0 | mild | Imp. |
| 3 | 5071 | 16 | 95 | 2 | 0 | 0 | 72 | 2 | 5 | 0.17 | 3.5 | 16 | 9 | 0 | moderate | Imp. |
| 4 | 5072 | 27 | 107 | 2 | 5 | 0 | 60 | 14 | 7 | 0.37 | 6.1 | 14 | 14 | 8 | moderate | Gr. Imp. |
| 5 | 5073 | 23 | 80 | 13 | 12 | 0 | 4 | 8 | 9 | 0.42 | 11.5 | 18 | 20 | 8 | moderate | Gr. Imp. |
| 6 | 5074 | 25 | 70 | 5 | 5 | 0 | 70 | 6 | 13 | 0.33 | 34.7 | 30 | 34 | 8 | moderate | Gr. Imp. |
| 7 | 5075 | 19 | 77 | 3 | 3 | 0 | 60 | 3 | 12 | 0.72 | 23.4 | 28 | 29 | 10 | moderate | Gr. Imp. |
| 8 | 5076 | 19 | 85 | 9 | 3 | 0 | 50 | 4 | 12 | 0.72 | 21.4 | 26 | 32 | 6 | moderate | Gr. Imp. |
| 9 | 5077 | 16 | 85 | 1 | 0 | 0 | 75 | 7 | 7 | 0.41 | 16.3 | 21 | 36 | 10 | moderate | Gr. Imp. |
| 10 | 5078 | 11 | 54 | 3 | 0 | 0 | 70 | 7 | 10 | 0.44 | 26.4 | 24 | 21 | 6 | moderate | Gr. Imp. |
| 11 | 5136 | 20 | 46 | 7 | 0 | 0 | 70 | 2 | 6 | 0.57 | 19.6 | 10 | 16 | 10 | moderate | Gr. Imp. |
| 12 | 5142 | 17 | 58 | 10 | 0 | 0 | 65 | 7 | 9 | 0.52 | 19.7 | 24 | 23 | 24 | severe | Died of Complic. |
LITERATURE CITED


Note—The Antimosan was kindly supplied through the Peking Union Medical College by the Chemische Fabrik von Heyden, Radebeul-Dresden, Germany. The drug is a complex salt of trivalent antimony, and was furnished in ampoules containing a two percent-solution.

DISCUSSION

H. E. Meleney: I think that Dr. Tootell's efforts are being directed along the proper lines. The search for a more potent drug is very important. It is to be hoped that gentian violet, which seems to be of value in experimental infection with clonorchis sinensis, according to Faust, will be tried by hospitals in endemic areas. Field clinics, like those in which some 200,000 schistosoma patients in Egypt are now being treated, would be a great improvement over the present hospital method in China. Teams could be organized which would visit endemic villages for the purpose. In hunting for the intermediate host, I have found that it cannot be done successfully by delegating it to assistants or natives. One must make the search in person when in the endemic region. I should like to emphasize the importance of publishing short notes on minor observations which may help others and aid in the progress of the study of this disease. The mention here of the use of inunctions of antimony in children is an example of this.

Dr. J. H. Wylie: The injection of tartar emetic intravenously is without doubt the most efficient way to use the drug. But in spite of most careful and efficient work, there are cases in which it is almost impossible to make the intravenous injection. In such cases a 10% ointment of metallic antimony if applied by inunction does give good results, its action is not so rapid as tartar emetic. Experience however in treatment of children for Kala-azar gives evidence that there are cases that have been cured with no other form of treatment than the inunction of antimony ointment.
In 1870 de W ecker introduced the practice of tattooing leucoma of the cornea. Since that time the operation has largely been used by surgeons the world over. Although some modifications of the original method have been suggested by various authors, the principle of tattooing has remained the same: Indian ink, lampblack, or candleblack (Holth, Blascovics) is introduced into the corneal stroma by means of a needle. The use of non-sterile injections is certain, however, to be fraught with danger, and Indian ink cannot be sterilized without precipitation. Hamilton has described a capsulated bacillus which he found in some Chinese ink. Several cases of infection of the cornea after tattooing with Indian ink and lampblack have been reported.

In 1925, P. Knapp of Basle, advocated a new method of tattooing the cornea with a gold chloride solution, the use of which he considered based upon sound chemical principles.

The chemical structure of gold chloride is AuCl₃, but the salt available on the market is chlorauric acid, i.e., AuCl₃ + HCl = (AuCl₄). The solution of this salt has a very strong acid reaction, as we should expect from its chemical structure. Auric compounds are strong oxidizing agents and are readily reduced. This fact explains why aurum chloride, after being applied to the cornea, deposits metallic gold in the tissue. The stronger the solution, the quicker the reduction. The rate at which gold is deposited is very important; if the gold is deposited very slowly, it will be deposited in exceedingly minute particles, and the color is determined by the fineness of the particles. Finely divided gold obtained by slow deposition is red, while that obtained by more rapid deposition is blue, whereas the precipitated metal appears bluish by transmitted light and brownish by reflected light. In order to insure rapid deposition a reducer such as tannin may be used. Tannin is penta-digalloyl-glucose. Tannin, as is the case with all glucoses, is easily oxidized.

As was mentioned above, gold chloride has a strong acid reaction. Even a five per cent solution produces a caustic action on tissues. In order to avoid this undesirable effect, weaker or neutralized solutions should be used. The neutralization may be done by adding alkalies.

* Read before the Section on Ophthalmology of the China Medical Association at the Conference, Peking, Sept. 1926.
such as for instance, sodium bicarbonate. This forms an alkali aurate with an intermediate formation of auric hydroxide, $\text{Au} + 3 \text{OH} \rightarrow \text{Au(OH)}_3; \ \text{Au(OH)}_3 + \text{OH} \rightarrow 2\text{H}_2\text{O} + (\text{AuO}_2)$. If a weak neutralized solution is kept for a long time, a reddish brown precipitate of alkali aurate is thrown down. Therefore, only newly made solutions should be used.

The method of tattooing used by Knapp and his followers is as follows: The epithelium of the area to be tattooed is scraped off. A cotton swab wrapped on the end of a glass rod is soaked in a solution of gold chloride and is applied to the denuded area for two or three minutes. If an acid solution of two to five per cent of gold chloride is applied, the corneal scar first stains yellow, gradually changes to a greenish or olive color, and then later on changes to a brownish-black. If the scar is vascularized, a drop of adrenalin chloride (1:1000 solution) quickens the deposition of the metal.

Since the publication of this method of tattooing cornea, many surgeons have used gold chloride for tattooing leucomas of the cornea. Some of them (Sallmann, Bruckner, Blascovics, Kubik, Salus and Huber) failed to obtain a staining of the corneal scar, while others (Weintraub, Lindner, Books, Saydel, Hunig, and Pretori) were satisfied with the results obtained. Knapp studied the possible causes of failure and tried to improve his method of tattooing leucoma. Finally he came to these conclusions.

1. Weak solutions (1% to 2%) of gold chloride may be applied without previous neutralization.

2. Stronger solutions (3% to 5%) must be neutralized (under the control of litmus paper) up to a certain degree, in order to make them harmless to the cornea.

3. Instillation of one or two drops of a one per cent solution of tannin followed by the application of a gold chloride solution accelerates the reduction of metallic gold.

4. Solution of gold chloride possesses high bactericidal power, e.g., a one half per cent solution of gold chloride kills staphylococci, streptococci, and bacterium coli in ten minutes.

We have tried this method of tattooing the cornea on a series of artificially produced scars. The cornea of rabbits' eyes were first destroyed by a thermocautery, and a month later, after a firm scar had been formed, the latter was tattooed by an application of gold chloride solution according to Knapp's method.

Experiment 1. June 25, 1926. Right cornea of a rabbit's eye was cauterized in two places, the upper segment at 90° meridian, and
Tattooing the Cornea

the central part of the cornea. August 4, 1926. A firm scar had been formed at the place of injury. No sign of inflammation existed. Under local anesthesia the epithelium was rubbed off from the upper corneal scar and to the denuded area an application of a two per cent gold chloride solution was made for a period of two minutes. The immediate effect was that the scar did not take any stain. Several drops of tannin one per cent solution were then instilled on the operated area. The scar then gradually changed its color to light brown. August 5, 1926. The tattooed area appeared olive brown. No sign of inflammation. August 11, 1926. The tattooed cornea was greenish in color.

Experiment 2. August 7, 1926. A corneal macula in the center of a rabbit's right eye was stained with a neutral five per cent solution of gold chloride, which was applied for three minutes. The macula became first slightly yellowish and later on greenish. After instillation of several drops of tannin (one per cent solution) the macula changed its color to light brown.

August 11, 1926. The corneal scar had a light brown color. The eyeball was enucleated for the purpose of microscopic study.

Experiment 3. June 20, 1926. The left cornea of a rabbit's eye was cauterized in the center.

August 3, 1926. The injured portion of the cornea showed complete healing. No sign of inflammation. A two per cent gold chloride solution of neutral reaction was applied for three minutes to the corneal scar, the epithelium of which had previously been scraped off. The scar did not change its color even after the instillation of tannin one per cent solution.

August 7, 1926. The corneal scar showed no stain.

Experiment 4. August 7, 1926. A gold chloride (five per cent solution, slightly acid) was applied to the macula of a rabbit's left cornea for two minutes. The macula gradually took on a brown color. After the instillation of two drops of tannin (one per cent solution) the stained area appeared dark brown.

August 11, 1926. The tattooed scar appeared black. The eyeball was enucleated for the purpose of microscopic study. The enucleated eyeballs were fixed in a ten per cent formalin solution.

Pathologic Examination

Macroscopic Examination:

R. E. The eyeball measures, anteroposteriorly 17 mm., vertically 12 mm., horizontally 12 mm. The cornea has two greenish spots at the 90° meridian near the limbus, one about 1.0 mm. in diameter, the other about 0.5 mm. in diameter, respectively. In the center of the
cornea there is an irregular greyish spot about 4 mm. in diameter. Its upper nasal quadrant is brownish in color. The cornea is excised for celloidin sectioning.

L. E. The measurement of the eyeball is equal to that of right eye. In the center of the cornea there is a round black spot, about 3 mm. in diameter. It has a thin whitish halo at the periphery. The eyeball bisected horizontally, and the lower part prepared for sectioning.

Microscopic Examination:

L. E. The cornea somewhat collapsed. In the middle third the epithelium is reduced to one layer, while in other places it has a thickness of five or six cells. In the middle third, Bowman's membrane is also absent. Here, too, the corneal lamellae have lost their regular arrangement, and the most superficial of them are poorly outlined. This area is invaded by connective tissue which involves the superficial half of the cornea. Its deeper layers contain numerous fibroblasts. The anterior half of the area is impregnated with thousands of minute particles of metallic gold, while the posterior half of the cicatricial area is not so densely impregnated with metallic deposits. The anterior chamber is normally deep; the filtration angle is open. The iris and ciliary body show no evidence of inflammation. The lens and the posterior part of the globe are normal.

R. E. Shows the same microscopic picture as that of left eye. with the exception that the corneal scar is not so deep and the metallic gold deposits are larger in size and less numerous, but they have also penetrated the entire zone of the corneal scar.

Since last September we have applied this method seven times, five times in cases of adherent leucoma and twice in cases of macula of the cornea.

Case 1. Chao, a girl, aged 17, hosp. no. 14299. Adherent leucoma corneae both eyes. Leucoma in each eye is situated in lower temporal quadrant. After the epithelium of leucomatous portion of the cornea had been scraped off, gold chloride (three per cent solution, slightly acid) was applied to the corneal scar for three minutes, and followed by instillations of adrenalin chloride (1:1000). The leucoma at once stained dark green, but two days later appeared light brown. The periphery of the scar took no stain. Then followed moderate irritation of both eyes, but no pain. The epithelium was restored in three days. When the patient was seen three months later, the color of the tattooed area still remained brownish.

Case 2. C. Y. Chang, male, aged 30, O.P.D. no. 94258. Central adherent leucoma corneae, L. E. Vision 1/30. Gold chloride (three per cent solution, slightly acid) was applied to the leucoma for three minutes. The leucoma immediately stained brown and after instillation of tannin (one per cent solution) became brownish black. This case has not returned for observation.
Tattooing the Cornea

CASE 3. P. S. Wu, male, aged 26, O. P. D. no. 95780. Macula corneae, L. E. Vision restricted to hand movements. The macula was tattooed with a gold chloride (three per cent neutral solution), followed by instillation of tannin (one per cent solution). Only part of the macula stained light brown.

CASE 4. T. Tung, a girl, aged 10, O. P. D. no. 95836. Macula corneae L. E. The macula was tattooed with gold chloride (three per cent solution, slightly acid), followed by instillation of tannin (one per cent solution). The central part of the macula was stained brownish black.

CASE 5. W. T. Feng, married woman, aged 28, Hosp. no. 15100. Adherent leucoma of both eyes. Vision R. E., 6/30; L. E., 2/60. Had had inflammation of both eyes since childhood. Has a white scar 3 mm. in diameter in upper nasal quadrant of right cornea, and another involving the lower nasal two-thirds of left cornea, about 5 mm. x 12 mm. in size. An optical iridectomy of the left eye was first performed. Eleven days later the leucoma of that eye was tattooed with gold chloride (three per cent solution, slightly acid). After an exposure of three minutes, instillations of tannin (one per cent solution) were given. The leucoma was stained brownish black. The next day the tattooed area appeared black, except the periphery where it remained unstained. The eye showed slight irritation. The right eye was tattooed with gold chloride (five per cent solution, slightly acid), for two minutes, followed by instillations of tannin (one per cent solution). The central part of the leucoma was stained black, but the periphery remained unstained. Two days later the peripheral parts of both leucomas were tattooed with gold chloride (five per cent solution, slightly acid) for two minutes, followed by instillations of one per cent tannin solution. The next day the leucomas of both eyes appeared black, but the peripheral parts were still not stained as deeply as the central parts.

Our experiments on animals and our treatment of clinical cases indicate that gold chloride in five per cent solution, in which the acidity has been reduced, does not irritate the eye. It stains corneal scars brown, a color which may be changed to black or brownish black by the instillation of tannin, (one per cent solution) as a reducer. In this case the gold chloride permeates deeply into the corneal scar where it is deposited as fine particles of metallic gold. If a five per cent solution of gold chloride is neutralized or made alkaline, it stains a corneal scar slowly to a light green. Gold chloride (two per cent solution, slightly acid) alone does not stain a corneal scar brown, but it stains a corneal scar a deep brown, if tannin solution is applied in the routine way. If a two per cent solution of gold chloride is made neutral or alkaline, it fails to stain a corneal scar, even with the help of tannin solution.

The peripheral part of a corneal scar does not take the stain easily, and requires repeated applications or longer exposures of strong solutions.

The advantage of this method over the de Wecker's method is that a larger area may be tattooed at one sitting without appreciable irritation of the eye.
The China Medical Journal.

REFERENCES


REPORT OF THE WORK OF THE RED CROSS UNIT IN WUHAN

F. C. Yen, M.D.

In response to an urgent appeal for doctors and nurses sent to the Peking Union Medical College by the Wounded Soldiers Relief Association through its chairman, Madame Sun Yat Sen, Mr. R. S. Greene left Peking for Shanghai June 1st. with the hope of organizing a Red Cross Unit to be sent to Hankow at the earliest possible date. The P. U. M. C. contributed to the Unit, in addition to Mr. Greene, a staff of one Chinese doctor, two foreign and five Chinese nurses who left Peking on June 4th.

Organization

In Shanghai a conference was held with the officers of the Shanghai Red Cross Society and it was decided to send out an appeal for volunteer workers to which some Missions responded by permitting their doctors and nurses to join the Unit. In addition, some Chinese and foreign doctors were engaged in Shanghai. The Shanghai Red Cross Society contributed a staff of three doctors, four nurses and two attendants. With such a mixed group of workers it was found best to organize the relief party as a single Unit, all working under the direction of a director.
Red Cross Unit in Wuhan

PERSONNEL

The unit is composed of 44 persons, of which 12 are doctors, 22 are nurses, two are pharmacists, a technician, 3 are administrative officers and 4 are attendants. Table No. 1 will show the personnel of the party. The majority of the party arrived at Hankow on June 16 per "Nanyang Maru" and the remainder arrived two days later on the Kiang Wo.

FINANCES

The Shanghai Red Cross Society paid the salary, travel and maintenance expenses of all its staff. The Peking Union Medical College assumed all the financial responsibility of its own staff and in addition the travel and maintenance of the volunteer workers. It also paid the salary of the foreign nurses engaged in Shanghai. It was originally hoped to raise a private subscription among the Chinese in Shanghai to meet the salary and travel expenses of these doctors and nurses who were engaged there but since no subscription has been forthcoming, these expenses were met by the P. U. M. C. Table No. 2 will show the sources from which the financial support of the unit was derived.

MEDICAL, SUPPLIES AND EQUIPMENT

A limited supply of medicines and surgical supplies and instruments were contributed by the Shanghai Red Cross Society and the P. U. M. C. and were taken up to Wuhan but as it was found that the Wuhan Wounded Soldiers Relief Association had ample supplies necessary for work in the Wuhan area, only a small part of the supplies brought up were used in Wuhan, the greater part being sent to Chengchow, Honan. The Soochow Hospital loaned to the Unit surgical instruments and an X-ray outfit.

CONDITION OF THE WOUNDED SOLDIERS IN WUHAN

Upon our arrival we found that there were approximately 11,000 wounded soldiers in Hankow and Wuchang. Owing to the unexpectedly large number and the inadequate arrangements for their care, due to the fact that they all came on the train in batches varying from several hundred to a thousand there was much confusion and neglect. A shortage of doctors and nurses made it very difficult to take care of the more severely wounded. The presence of the Unit was therefore much welcomed and after our arrival we were asked at once to take charge of a hospital where there were about 100 wounded, with but little medical and nursing care. Preparations for the opening of a second hospital were also started and the first batch of patients was received and admitted to that hospital three days after our arrival.
These two hospitals with a total capacity of 180 beds were in charge of our Unit. Only severe cases which required operative procedures were admitted. By the courtesy of the Military Hospitals and with the co-operation of the Wuhan Wounded Relief Association we were permitted to visit the military hospitals and to select those cases which required operation, for admission into our hospitals. In addition, the Church General Hospital in Wuchang and the Hodge Memorial Hospital of Hankow were found to have adequate facilities and staff to take care of the severe cases, hence these two hospitals were also assigned to this work. Table No. 3 will show the number of patients admitted into our two hospitals and the number of operations done up to the time of our departure.

Besides assuming the above duties, the Unit was also able to help in the following work:

1. A staff of one foreign doctor and three foreign nurses was assigned to re-enforce the staff of the Hodge Memorial Hospital. Dr. Crawford worked in that hospital from the time he arrived till July 20. One nurse worked till July 25 and the other two till July 30.

2. A Unit composed of four doctors, 4 nurses, one business manager and three attendants, all Chinese, left for Chengchow on July 5 at the request of General Feng Yu Hsiang. Since they left it has been reported that the number of wounded soldiers was not large so it is expected that this Unit will return in the immediate future.

3. We were also requested by the Wuhan Wounded Soldiers Relief Association to organize a base hospital in Kiukiang. A staff of one doctor, five nurses, one pharmacist and a business manager left for Kiukiang on July 25 to prepare for the opening of a hospital there. More doctors and nurses will be sent if necessary. This hospital will be conducted and financed entirely by the Wuhan Wounded Soldiers Relief Association. Our Unit here only helped in organizing the work and in finding the needed medical and nursing staffs.

4. Two members of the Unit have been asked to serve on the Standing Committee of the Wuhan Wounded Soldiers Relief Association which met regularly three times a week up to July 25.

5. Members of the Unit have also been asked to establish a central medical supply store and to supervise the purchase of medicines, and surgical supplies and to OK requisitions from the hospitals in Wuhan for medicines and surgical supplies. One of our pharmacists has given his entire time to this work in the central supply store of the Association.
6. A more important work is the inspection of the military and other hospitals in Wuchang and Hankow. This was done in conjunction with the officers of the Association. Practically all the hospitals have been visited, some daily, for a number of days. The object of these visits was to pick out the severe cases to be transferred to our hospitals and to give advice on the improvement of the sanitary conditions of these hospitals as well as on the care of the wounded soldiers.

7. Some Health Education work has also been done, although we regret to say that it has not been followed up. Two health posters were prepared, for the prevention of cholera, dysentery and typhoid. One hundred thousand of each were printed and they were distributed among the soldiers in Wuhan as well as to the patients in the hospitals. These posters were also sent for distribution among the soldiers in Chengchow and Kiukiang. Health pamphlets published by the Council on Health Education were ordered and an attempt was made to train some public health lecturers. It was originally planned to send out these workers to lecture in the camps but this plan was not actually carried out.

The major part of the Unit left on July 30, there remaining behind two foreign doctors and four foreign nurses who will probably stay through August. The P. U. M. C. will continue to meet their expenses. The expenses of the Chinese doctors and nurses in the Unit who remain behind will be carried by the Wuhan Wounded Soldiers Relief Association. After having sent away all the convalescents in these hospitals, Hospital No. 2 was closed on July 27, and one hospital, with a maximum of 100 beds was left. Table No. 4 shows the staff working in this hospital.

Our Unit feels that the actual number of cases treated by us is comparatively small, representing perhaps only 30% of all the severely wounded cases, yet we feel that some good work has been done in influencing the other hospitals to take better care of their patients. The management of hospitals is a very complex work and in working with officers and the members of the Executive Committee of the Association, who are mostly lay members but are thoroughly sincere in their attempt to relieve the suffering of the wounded soldiers, they have been enabled to see what is required in the proper organization of hospitals. Furthermore, our unit truly represents an International group, having Americans, British, Norwegian and Swedish members, and as such, much friendly relationship and good will have been established between Foreigners and Chinese.
In conclusion, the members of the Unit wish to express their appreciation to Madame Sun Yat Sen for her garden parties and to the members of the Executive Committee of the Association for their gifts to the members of the Unit and to the executive officers especially to Madame Wang and Madame Kou, Mr. S. Y. Hu and Mr. Frank Li for their whole hearted cooperation which has made our work in Wuhan both effective and helpful. Our association and acquaintance with them all will long be remembered by all the members of the Unit.

Table No. I

PERSONNEL

Doctors:

F. C. Yen
J. A. Snell
H. B. Taylor
Wallace Crawford
C. E. Harrison
L. E Harris
Wang Ch’ang Lai
Chang Chien Hung
Chang Tze Tao
Liu Chung En
Wang Wei San
Y. Wong

Administrative:

Mr. Roger S. Greene
Miss B. E. Myers
Mr. Liu Tse Ching

Pharmacists:

Chow Teh Ling
Sze Dah Tsing

Technician:

Tau Ming Dah

Nurses:

Miss M. Josselyn
Miss L. King
Miss M. Walby
Mrs. R. C. Riego
Miss E. Caspersen
Miss A. Indrebo
Miss A. Nelson
Miss Tseng Pi
Mrs. Julia Wang
Miss Wu Hsiu Ying
Miss Liu Pei Yu
Miss R. Paul
Mr. Chu Pao Tsai
Mr. Li Wei Kang
Mr. Tung Chuan Liang
Mr. Huan Chen Tung
Mr. Chang Loh Hsiien
Mr. Chang Ing Ching
Mr. Liu Hua Tsing
Mr. Soo Chuan Shang
Mr. Hsu Kuei Tsie
Mr. Shao Nya Fu

Summary:

Doctors 12
Nurses 22
Technician 1
Pharmacists 2
Administrative 3
Attendants 4

44
Red Cross Unit in Wuhan

Table No. II

Members of the Unit, Showing Sources of Support

Supporting Organizations                  No of Persons Financed
                                               For Salary  For Travel  For Maintenance
Shanghai Red Cross Society  9                   9               15
Peking Union Medical College  24                 28
American Church Mission  2
Norwegian Lutheran Mission  2
Swedish Covenant Mission  1
Southern Methodist Mission  1
West China Union University  1
British Wesleyan Mission  2                   1
Yale Mission  1
Society of Friends  1

No Travel  7
No Maintenance  1

Maintenance supported jointly
by Wuhan Wounded Soldiers
Relief Association and P. U. M. C.  27

44  44  44

Table No. III

Record of Patients in Hospitals Nos. 1 and 2.

<table>
<thead>
<tr>
<th>Hospital No. 1</th>
<th>Hospital No. 2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients admitted</td>
<td>265</td>
<td>86</td>
</tr>
<tr>
<td>No. of patients discharged:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cured</td>
<td>29</td>
<td>17</td>
</tr>
<tr>
<td>Improved</td>
<td>25</td>
<td>3</td>
</tr>
<tr>
<td>Transferred to other Hospitals</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Left the Hospital against advice</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Discharged</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>7</td>
<td>20</td>
</tr>
<tr>
<td>Transferred to Hospital No. 1</td>
<td></td>
<td>28</td>
</tr>
<tr>
<td>Transferred to Hospital No. 2</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Remaining in Hospital</td>
<td>88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>265</td>
<td>86</td>
</tr>
</tbody>
</table>
The China Medical Journal.

RECORD OF OPERATIONS

<table>
<thead>
<tr>
<th>No. of operations</th>
<th>184</th>
<th>54</th>
<th>238</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operation with General Anesthesia</td>
<td>21</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Operation with local Anesthesia</td>
<td>46</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Operation without Anesthesia</td>
<td>117</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>184</td>
<td>54</td>
<td>238</td>
<td></td>
</tr>
</tbody>
</table>

Table No. IV

STAFF OF No. 1 HOSPITAL

Administrative Staff: Madame Kou, Acting Superintendent
Dr. J. H. Shu, Asst. Supt.
Mrs. Wang, Matron

Medical Staff: Dr. Harris, Chief of Medical Service
Dr. Harrison
Dr. Y. Wong
Dr. Vedernikoff, Visiting Doctor
Dr. W. S. Wong, Resident
Dr. Willie Chow

Nursing Staff: Miss Wu, Supt. of Nurses.
Miss Paul
Miss Caspersen
Miss Indrebo
Miss Walby
Miss Tsang
Miss Huang
Miss Woo
Mrs. Hu
Mrs. Ching
Mr. Chen
Mr. Tsu
Mr. Li
Mr. Shao Nya Fu
Mr. Hsu Kuei Tsie
Seven students in training

Pharmacists:
Mr. Sze
Mr. Chow
Clinical Notes.

Clinical Notes

URETHRAL CALCULUS

A Unique Case

A personal letter to the Editor from Dr. Percy Cheal of Tainan, Formosa, tells the story of a case which must be one of extreme rarity. He says:

"A man at out-patients rose at my approach, fumbled in his pocket and produced a minature 'Gibraltar' with the startling remark: 'I passed that last night.' I regret to say that the two Formosan residents and I roared with laughter at the idea. However he stuck to it, so we adjourned to the examination room where the truth was revealed. The rock he had produced was a little over a third of the whole, for the rest was still residing in the end of the urethra peeping through a rent in the side of the same. The end of the urethra was occluded and a great big ulcerated hole in the side marked the exit of the piece he showed me.

The history was that two years ago he got an impacted urethral calculus which has been growing ever since. I have never heard of a case to beat this and wonder if any of the China Medical Journal readers have."

Dr. Cheal encloses a photograph in his letter showing the hole in the penis, but, unfortunately, the picture is not a good one for reproduction. One of the pieces of the stone referred to was an inch and a half in diameter.

Will readers kindly take up the challenge and cap Dr. Cheal's story?
The times are out of joint especially in China just now and the prospects for any ordinary appeal are poor. We have ventured on this one only because we believe that an Institute for Hospital Technology on a larger scale than anything yet attempted is one of the most urgent needs for the maintenance of Medical Mission Hospitals and that if this could be clearly brought home to the Missions engaging in such work there would be no difficulty in obtaining for it the fullest sympathy.

In support of this belief we would urge the following reasons which will be dealt with individually in detail.

1. The unsatisfactory position of the staff of Mission Hospitals
2. The mortality among Missionary physicians
3. The increasing difficulty in obtaining fully qualified doctors
4. The possibilities of meeting some of the difficulties by the use of technicians in hospitals
5. The practical experience gained by the work of the Institute in the past two years.

It is now proposed to deal with these points in detail.

1. The unsatisfactory position of the staff of Mission Hospitals has in the past been proverbial. The growth of knowledge in scientific medicine during the past half century or so has brought into being completely new ideas of surgery and pathology. The practical use of the microscope has entirely changed the conception of the nature of infections. The growth of tropical medicine has revealed many parasitic diseases hitherto unknown, the science of tropical parasitology becoming a department of itself. Radiant energy in the form of light and heat has won an important place in medicine and surgery so that a hospital without an X-ray apparatus and an ultra-violet ray lamp is almost an anomaly. Organic Arsenic and similar compounds in medicine and vaccine therapy both in prophylaxis and treatment have revolutionised the practice of medicine and have added enormously to the work and responsibility of the physician.

While these tremendous advances have been made in medical science involving complicated methods of diagnosis and treatment formerly unthought of, the personnel of the mission hospitals has
usually remained stationary or at any rate has not increased in any proportion to the new demands for knowledge and practice thrown on the hospital physicians. While we gladly acknowledge that there are splendid exceptions to this, yet reviewing the position of the mission hospitals in China as a whole there can be no question as to the truth of the statement.

2. The mortality among Missionary physicians.

That the breaking point has been just about reached is shown by the mortality and invaliding rate among Missionary doctors. It is difficult to get clear statistics on a matter of this kind but we believe we are right in saying that no body of workers has such a high death rate; as far as we can make out this is approximately 2% per annum. The invaliding rate is also very high. This is apart from the fact that quite a number of medical men and women find the strain of such work too great to endure and consequently leave the mission service in their early and what should be their most profitable years.

3. The increasing difficulty in obtaining fully qualified doctors.

It has long been recognised that the supply of physicians from abroad to meet the needs of the mission hospitals in China is a strictly limited one. This is necessarily the case, not only because the call for such service is recognised by only a small minority of medical students but even if this were not so the financial commitments of the Mission Boards make it impossible for them to send out more than a limited number of physicians. This is so clear and so much beyond argument that it must be accepted as practically axiomatic.

What we do feel is that this hardly excuses the Mission Boards for establishing or continuing Mission Hospitals that cannot in any way be adequately staffed. Either the Mission Boards should concentrate on fewer hospitals adequately staffed or fresh sources of help in carrying on the work should be sought. With regard to the first of these two suggestions we should regard withdrawing from the smaller hospitals as absolutely calamitous. The need of hospitals in the country districts is so great that we are almost inclined to say that they are better left utterly inadequately staffed than closed altogether. We say "almost" but there we must stop because we feel, as mentioned above, that the breaking point has been reached and that the time is shortly coming when it will be quite impossible to carry on these hospitals under the existing conditions. In view of the great importance of not having to close the country hospitals some fresh sources of help must be sought for them.

One possible source is the obtaining of Chinese fully qualified doctors to carry themselves the work of some of the hospitals and to
assist the missionary doctor in others. This suggestion is a possible solution but there are many difficulties in the way.

Chinese fully qualified doctors are almost as difficult to get as foreign doctors especially for country stations. The supply is small and with the closing and crippling of medical schools in China as the result of the present troubles the supply is ACTUALLY A DECREASING ONE. The call of city practices and appointments is a strong one and absorbs most of the fully qualified physicians who are available.

The financial position is hardly made easier by the direct employment of Chinese doctors by the Missions. It must be remembered that the foreign medical missionaries volunteer primarily as missionaries, having heard the call to missionary work in the footsteps of their Master. Their salaries are supposed to be on a scale that will enable them to live in comfort, but have nothing to do with their earning power as doctors. A similar appeal from a foreign Mission Board to a Christian Chinese doctor is a much less strong one, and as a matter of fact with a few splendid exceptions the Chinese doctor employed by the Missions must be paid his earning capacity which is very rapidly rising. The average fully qualified Chinese doctor in a city has a far larger income than a foreign missionary doctor. This being so the employment of Chinese doctors hardly relieves the financial position.

One solution of this problem must be referred to as it seems to us to be the only true one.

If the Chinese Christian Church would take over the responsibility of medical mission work in country districts we believe that the second difficulty would be eliminated. The Chinese Church could appeal to the Chinese doctors themselves in the same way as the Church at home appeals to doctors at home. It would get, we believe, a considerable response and should be able to employ them on a comfortable living basis instead of on the basis of their earning capacity.

In few places however has the Chinese Church reached the stage where it is prepared to shoulder this responsibility and it hardly touches the first difficulty mentioned, viz., the very limited supply of fully qualified doctors on which the Church could draw.

Some other solution of the problem is therefore required unless much of our medical mission work is to be jeopardised and this brings us to our next and most important point.

4. The possibility of meeting some of the difficulties by the use of technicians in hospitals.
The growth of the science of medicine noted above has been largely along what might be called mechanical lines.—The use of the microscope in the diagnosis of intestinal parasitic infections and blood conditions; the employment of precipitation tests for typhoid, syphilis etc.; the staining and examination of pathological discharges and sputa; the use of the X-ray in diagnosis and of light in treatment; the use of intravenous therapy etc., etc.

At the present moment the foreign, and for that matter the Chinese, doctor, working alone in a hospital is attempting to a greater or less degree to cover much of this work himself or with untrained assistants who take but little of the weight of responsibility from his shoulders. In many cases he is also undertaking the work at the same time of hospital management, oversight of the pharmacy and drug store. When operating he has too often to keep one eye on the untrained anaesthetist while he carries on delicate and critical surgical manipulations. Is it surprising that the strain of work is getting beyond the possibilities of one or even two men to carry?

We have pointed out that much of the work mentioned above is of a mechanical and technical nature and while it is more than ever essential that the physician in charge of a hospital should be a well trained all round man, it is far from essential that much of the work outlined here should fall on him individually. In other words it is essential that his experience and ability should correlate all the findings but not at all necessary or even desirable that the work entailed should be done by him.

And this brings us to our last point.

5. The practical experience gained by the work of the Institute of Hospital Technology in the past two years.

For some years the China Medical Association discussed the possibility of establishing an Institute of Technology for the training of technicians to help especially in the smaller hospitals. The difficulties to be met were considerable and the delays these entailed were very disappointing but they were finally overcome and about two years ago a definite beginning of this work was made. The thanks of the Association and of the Missions in general have to be very heartily accorded to the Wesleyan Methodist Missionary Society for lending Dr. George Hadden, who for many years has been especially interested in this work, to the Association, to give his time entirely to founding this new Institute. Similar hearty thanks have to be given to the American Church Mission, and to the staff of St. James’ Hospital, Anking in particular, for their generosity in allowing the Institute to find its headquarters in that hospital and for able assistance in carrying on its work.
The aim of the Institute has been to take young men and women who can be heartily recommended for such work by the doctors of individual hospitals and to give them a short intensive technical training. It has not been the desire of the Institute to set up a new class of workers, but to train hospital assistants having a quite moderate amount of education but naturally quick and intelligent, to learn thoroughly the technique of certain types of work and then to return them to the hospitals to which they belong to carry on all the mechanical and technical part of the work, under the charge of the doctors who sent them for training. The expense of training has been very small as the time allowed for this is in the first instance not more than six months and the enhanced salary of such workers on their return to their hospitals is only small.

As we write, a letter just received lies before us and from this we would quote the following:—

"I hope the day will soon be here when the Institute of Hospital Technology will again flourish. Our boys back from Anking are doing very good work."

This in our experience is the universal report about the technicians who have been trained in the Institute during the past two years. It has of course had to close down as the result of the present troubles.

The Institute of Hospital Technology when fully established proposes to train young men and women, as mentioned above, in the following subjects, this is not an exhaustive list but given as an example of the class of work undertaken.

Pathology. The use and care of the microscope and of simple pathological apparatus &c.: blood and differential counts with examination for parasites (plasmodia, filaria): Widal reaction: examination of sputum for tubercle, spirochaetes &c.: recognition of parasite eggs and cysts in stool: etc.

X-ray work. The X-ray machine, how to handle it, care for it and make minor repairs. The taking of X-ray pictures.

Pharmacy. The systematic arrangement of a dispensary, the making of ordinary mixtures, ointments etc., tablet making. A simple system for the arrangement of a drug store and of keeping a check on drugs.

Anaesthetics. The employment and dangers of the principal anaesthetics in use in the East.

Records keeping. How to make and store for easy reference inpatient and outpatient records.
Hospital Technology Section.

Hospital management. Systematic hospital management and the keeping of hospital accounts.

It will be seen at once that if men can by an economical course of training be taught to handle such branches of work as these, an enormous amount of routine work can be immediately taken from the shoulders of the overworked hospital physician. The expense involved in this is at the same time quite small and we have an impression that it will be fully made up for by an economy in care of delicate technical apparatus which the student will have learnt and which in our own experience in a busy hospital the doctor has little time to attend to.

Summary

We hope that we have been able to make the following points clear in the foregoing remarks:—

That the future of Medical Missions in China especially in the extremely important work of the country hospitals is jeopardised by the strain thrown on the doctor in charge; that this strain has about reached the breaking point; that little relief can at present be hoped for in the way of strengthening the medical staff either from home or on the field; but that much help might be given by providing technical assistance to the doctor and that this could be done at small cost to individual hospitals.

We have noted a number of lines along which technical training could be given. It is not suggested however that each hospital would require a number of men each trained separately in one of these subjects. This might be desirable in a few large hospitals. In the smaller country hospital by extending the time that one man was under training, he might be able to cover two or three of the subjects. Pharmacy and Pathology could be easily thus combined. Hospital management and Records keeping might also be combined. Indeed it is not the idea to lay down any fixed rule, but to attempt to meet the needs of individual hospitals and individual doctors.

What must be insisted upon however is that if this work is to be a success it must be a Union work. The Missions with considerable medical work in China should combine on this project and the smaller missions either contribute directly to the support of the Institute or agree to pay an enhanced fee for the support of students sent for training there. Hitherto the work has been done at a cost that barely covered the students' expenses and allowed nothing for the support of the Institute itself.

No attempt has been made in this paper to deal with detailed plans of what would be required for an Institute of Hospital Technology to
meet the needs of Mission Hospitals in China. Our Association would be prepared to make a definite statement as to what in its opinion such an Institute would involve but in the first instance the Executive Committee feels that the principle should be commended to the different Mission Boards in the hope that they will be prepared to consider it sympathetically.

It may be argued that this is not the time to embark on new enterprises in China and with this we should ourselves agree. But we feel very strongly that this is the time for reconsideration of our existing work and for planning how in the future when conditions again approach normality the present work may be strengthened and the splendid promise of the past in Medical Missions may not be lost.

We therefore earnestly request the careful consideration of the plea contained in this paper by the Mission Boards and Councils at home and on the field.

James L. Maxwell M.D.
Executive Secretary.

AN IMPROVISED CANDLESTICK

An ordinary penny—of any nationality—makes a wonderfully useful emergency candlestick. It provides the something for which we so often search in vain to which to stick the candle. And it provides a quite surprisingly stable base.

I was introduced to it by a Chinese gentleman on a launch. Since then I never travel without a paper-wrapped candle in my suitcase, and the penny wrapped up with it on general principles.
Editorials

HUA TO

We feel that a special word of thanks is due to Dr. K. C. Wong for the interesting excursions into Chinese medical history and tradition that he sends us from time to time. If there were such a post as medical historian to the Association we should have little difficulty in filling it while our distinguished Member in Hangchow still wields his pen.

In this issue we have from him a brief account of that eminent surgeon Hua To. The pre-eminence of indigenous Chinese surgery in those far off days was so striking that it throws into even more pitiful relief the extraordinary decline of the past centuries, and a great "Why?" is constantly in our minds when the names of the leading Chinese surgeons and physicians of bygone ages are mentioned.

The only explanation, and one that is equally applicable to the dark ages of medicine in Europe and the decline of knowledge anywhere at any time, is that the successors of the great investigators of the past have fallen back on tradition and refused to allow that investigation and an absolute adherence to the narrow way of truth are the only possible roads to progress. If this be a correct estimate we suggest to Dr. Wong that a paper in which he would trace the historical decline of Chinese medicine to its essential causes might be of no little value to us all at this time.

TABES DORSALIS

We include this month in our original articles a paper by Dr. Wei Yu Lin on this important subject. What interests us most are the remarks of Dr. Wei on the incidence of the disease in China. Dr. Wei takes a very judicial attitude on the matter but we gather that he leans rather to the opinion that lack of accurate diagnosis rather than rarity of the disease accounts for the prevailing opinion of the past that Tabes Dorsalis was a comparatively rare disease in this country.

While we would desire to follow Dr. Wei in the very wise attitude to which we have referred we lean ourselves to a different explanation. On the whole it seems to us that diagnosticians of the past were if anything more to be trusted than those of the present day who tend to rely too much on laboratory reports and X-ray examinations. Their powers of observation were probably keener than those of modern physicians and it seems to us hardly credible that marked cases of tabes would have escaped their notice.

Dr. Wei suggests the possibility of a different infection by a neurotropic strain of treponema and to disprove this contention would be impossible. It is however equally likely that other factors may have
been called into play. It is interesting at this point to call to mind the possibly parallel fact that amebic abscess of the liver occurs almost entirely in persons whose liver tissues have already been damaged especially by the use of alcohol. Is it not possible that central nervous system infections with syphilis occur in those whose central nervous systems are already damaged, it may be by alcohol, it may be by the rush and hurry of modern life which are being rapidly introduced into China, at least in some of the large cities? The strain of life must have been enormously added to of recent years even in the country districts where marauding hordes of soldiers have pillaged and ruined the villages.

Even now, what is the distribution of tabes in this land? Dr. Wei hardly makes this clear. We would ask is the incidence per thousand cases of syphilis the same in the cities and in the country districts? It is not so in men and in women which seems to tell against the argument for a special neurotropic strain of treponema.

We thank Dr. Wei for taking up this interesting subject and we hope that his paper will lead to further discussion of the problem.

I. H. T.

We would ask our readers to give special attention to the appeal for the Institute of Hospital Technology printed in the I. H. T. Section of the current issue.

We believe that they will be prepared to approve of the arguments that this paper contains. It will be noted that no details in regard to the curricula etc. of the Institute are given. These and other matters are frankly open to debate. With regard to the great importance of the existence of such an Institute however, we suggest that the actual need for this has passed the stage of discussion.

Despite this, the Institute has not received the support that it deserves in the past and that it must get in the future if it is to be able to accomplish any full measure of work. Whether it can get this support depends not a little on the Members of the Association who have the opportunity to press the importance of this matter on their Home Boards if they are willing to do this.

Reprints of this appeal will be sent from the Office, 23 Yuen Ming Yuen Road to any Members who are willing to use them in pushing home this appeal.

THE WUHAN RED CROSS UNIT

Our thanks are due to Dr. F. C. Yen for letting us have a brief account of this Unit and its work which we publish in the Journal. It is not unlikely that further units will have to be organised before the present fighting is over. It is therefore of some importance to know how a Unit is organised and what work it can accomplish.
FURTHER STUDIES ON THE BLOOD PRESSURE LOWERING EFFECT OF CUCURBOCITRIN IN MAN

A paper with this title by Dr. George R. Wilkinson M.D. of Greenville, S. C. has been put in our hands.

Dr. Wilkinson is the son of one of our most honoured and famous physicians here in China, Dr. J. R. Wilkinson of Soochow.

The subject is one of perennial interest and the paper an able one.

We must be content here to give the conclusions as follows:-

1. A series of 68 cases of hypertensive cardio-vascular disease treated with citrin or cucurbocitrin is reported.
2. 56 of the cases showed a sufficient reduction in the arterial tension to be of clinical importance.
3. The relief of symptoms was frequently out of proportion to the drop in the pressure, especially by the more disagreeable symptoms of increased irritability, palpitation, dizziness, insomnia, dyspnea, etc.
4. The lowering of the pressure was gradual and prolonged.
5. No toxicity whatever was noticed nor did any untoward symptoms appear.
6. The best results were obtained by persistent use of the drug, the dosage being 50, 100 or 150 mgms.

Cucurbocitrin we understand is a glucoside obtained from the seeds of the water-melon.

SOME OBSERVATIONS ON CHRONIC HYDROCEPHALUS WITH REPORT OF A CASE APPARENTLY ARRESTED

CHAS. K. FULLER, B.A., M.B., (Tor.), F.R.C.S.E. Yarmouth Clinic Infirmary

All cases of chronic hydrocephalus are the end result of an excess in the amount of cerebro-spinal fluid secreted over the amount absorbed. This end result is the same whether secretion is normal with lower than normal absorption, or whether it is abnormally increased while the absorption remains normal or nearly so. The results of surgical interference with the object of increasing absorption have not been very successful, and the procedures are often difficult and fraught with grave dangers for the little patients. Our surgical goal is to balance the secretion of cerebro-spinal fluid with its absorption.
contending with a condition of too much fluid in the ventricles, and we can greatly decrease the amount of cerebro-spinal fluid secreted by the choroid plexus by ligating the two common carotid arteries. The comparatively simple operation if carefully done should not be hard on the little patient and will do much to restore the desired balance. The only dangers of this operation are shock and cerebral degeneration.

**The Prevention of Shock**

After ligation of one artery ten days should elapse before the other common carotid is ligated. The closing of the second vessel should not be done abruptly but very slowly, taking at least two minutes to completely stop the flow of blood. If it is done too abruptly, a fatal syncope may be precipitated.

When the ligation is completed the apparent shock is tremendous. The colourless lips, the alabaster pallor of the face, the more or less dilated pupils, the formerly pulsating, bulging fontanelle now motionless and the momentary cessation of breathing, complete the truly startling picture. This tremendous shock very happily is only apparent, as the heart goes on undisturbed with practically no change in its rhythm, and the catch in the breath is but for a moment although the extreme pallor remains for many weeks.

**The Prevention of Cerebral Degeneration**

The cases of cerebral degeneration that have been reported following the ligation of a common carotid show it to have come on ten or twelve days after the operation. In these cases it could not have been due to the anaemia caused by the ligation (the period between ligation and onset is too long) but must have been due to an embolism from damaged endothelium in the artery.

Therefore, for a ligature use a good stout silk about No. 9 English (or if you prefer, a Perthe ligature) and tie it slowly, watching the distal pulsations in the artery, and tie it only tight enough to stop these pulsations. This will not damage the endothelium and any danger of embolism with its consequent cerebral degeneration is removed. To ensure the ligation tie another ligature one-quarter inch proximal to the first.

**Discussion**

Researches would seem to indicate that cerebro-spinal fluid is secreted by the endothelium of the spinal canal as well as by the choroid plexus. Some anatomists claim that in many normal individuals the foramen of Majendie does not exist. In view of this, is it not possible that we overestimate the importance of the circulation of the cerebro-spinal fluid via this foramen?
We are endeavouring to bring the ratio of secretion and absorption of cerebro-spinal fluid to its normal level, so in all cases of chronic hydrocephalus obstructive and communicative (in other words congenital and acquired) I would advocate decreasing the amount of secretion by ligation of both the common carotid arteries. This, combined with aspiration of the ventricles or lumbar puncture for its immediate effect, and pressure bandages when indicated, should be the best and simplest method of treatment of these cases. If, after the common carotids have been ligated, the intra-cranial pressure increases or remains the same and shows no permanent decrease following an aspiration, one would be perfectly justified in ligating one of the vertebral arteries.

In justice to this procedure, I feel I should not close without referring to two conditions which, surgically at least, are very closely allied to chronic hydrocephalus, namely, the various cephaloceles and the various spinae bifidae. The end results of surgical interference in these cases is notoriously unsatisfactory because of the subsequent hydrocephalus. All such cases should receive the benefit of ligation of the two common carotids as a pre-operative measure before any surgical procedure is undertaken on the lesion itself. This will greatly enhance the chance of a cure. If after operation hydrocephalus follows despite this measure, the amount of cerebro-spinal fluid secreted being still too great, one of the vertebral arteries should be ligated.

CASE REPORT

L. N., female, aged 9 months.

Family History.—Presents nothing of importance. Parents, two brothers and two sisters alive and perfectly normal.

Personal History.—Born in normal labour. Mother thinks the child had a large head at time of birth. Since that time it has been getting larger and the child at nine months cannot see, keeps rolling its eyes about and apparently does not hear well.

Physical Examination.—Fairly well nourished child with large head, twenty inches in circumference. Respiratory, digestive, cardiovascular systems, etc., apparently normal.

Special Examination.—The head is twenty inches in circumference: fontanelles bulging and pulsating. Sutures are separated one-quarter of an inch. Baby cannot sit up and pays no attention to its surroundings. Head rolls helplessly from side to side. Eyes continuously moving aimlessly about. Pupils react to light. Under chloroform anaesthesia the discs are found to be much swollen, the veins being
about four times as large as the arteries. Four c.c. of fluid were withdrawn from the left lateral ventricle by puncture through the anterior fontanelle and three c.c. of a 1 per cent solution of methylene blue were injected to replace it. One half-hour later a lumbar puncture drew off spinal fluid that was stained with methylene blue. Both blood and spinal fluid gave negative Wassermann and Kahn reactions.

Diagnosis.—Chronic obstructive hydrocephalus (congenital).

Treatment.—Ligation of the left common carotid artery was performed above the omo-hyoid muscle, and ten days later the right common carotid artery was ligated in a similar position.

Progress Notes.—Immediate recovery was uneventful. The pulsations of the bulging fontanelles stopped immediately. In 24 hours they were much softer and in 48 were not bulging at all. Nine months later the head was 20 inches in circumference and was held more or less erect. The fontanelles and sutures were closed. The eyes wandered at times but not at all to the extent they did before. The child saw objects placed three feet away and asked for articles of food such as cookies. It was able to crawl and could sit up alone. Eye grounds were apparently normal.

Two years later.—She is a well developed child whose head while it looks perhaps a little large (21 inches) seems perfectly normal. She is able to walk about by holding on to window sills and chairs, and takes a few steps alone. She sees and names objects placed before her, three or four feet away; for example, a knife, fork, spoon, apple, orange, etc., and the eyes very seldom wander. Mentally, for a child of two years and nine months she is more than normal in development. She can count up to twelve, repeat nursery rhymes such as "Rock-a-bye baby on the tree-top", "Jack and Jill went up the hill," etc.; she can also sing songs and not only has the words correct, but keeps the tune in a truly surprising way. She is full of childish questions; can spell several words, such as dog, cat, hen. In short she is an apparently normal child.

References

1. NELSON, L. L., Med., vi, 97.

2. ROLAND, WITTAKER, Anatomist, Royal College of Surgeons, Edin.

Canadian Medical Association Journal, June 1927.
Not the least interesting problem in leprosy, one that has become conspicuous of late years with the increased efficiency of treatment, is that of the "negative leper." By this term is meant a leper who, previously bacteriologically positive, has become negative so far as can be determined by careful examinations of skin and septum by the smear method.

It has long been recognized that such negative findings do not imply that the case has been freed of the bacillus of leprosy. It is recognition of this fact that leads leprologists scrupulously to avoid calling cases "cured." In the Philippines we say that they are negative, usually indicating for how long. Muir has proposed the term relative cure, since an absolute cure cannot be claimed in any given case. It is recognition of this fact that has led most authorities to require that patients should remain under close surveillance for some time after they have become negative. In the Philippines, since the first discharge, this negative period has been two years, a long term in comparison with some, but shown by experience to be necessary.

This opportunity for investigating the problem has been had at Culion. Not only is there a large negative list of patients awaiting parole or discharge, on most of whom it is practicable to make lymph-node punctures, but occasionally one of these dies of some intercurrent affection, which affords opportunity for an intensive examination.

Aspiration of lymph nodes.—It has been considered not worth while to subject all of those on the negative list to puncture or to do this early in the negative period. This inquiry has been limited to ascertaining whether cases that have completed their two-year negative period and are about to be discharged can be shown to be bacteriologically positive. Fifty-three cases were examined. Of these, nine (17 per cent) were found positive. The organisms found were generally few, rather short and small, mostly singly and occasionally in small groups of a few organisms; never in big masses or globi.

Autopsies.—In the period from March, 1923, to August, 1926, I have had the opportunity to perform autopsies on eleven cases that died while on the negative list. The time on that list ranged from five to seventeen months, with an average of eleven months. Ten were found to harbour the bacilli.
The facts that ten out of eleven cases on the negative list were found bacteriologically positive at autopsy in smears from deeper organs, and that in nine out of fifty-three cases smears of material aspirated from the femoral lymph nodes were positive are in accord with the generally recognized fact that lepers are not necessarily bacillus-free when they become negative by ordinary methods of examination. The skin and, apparently, the spleen and the liver become negative comparatively early; while in other sites, especially the nerves, lymph nodes, and testes, the infection tends to persist for a relatively long time.

It is particularly of interest that the cases examined by aspiration were at the end of the required two-year negative period. These cases, then, actually harbored the bacillus at the time of discharge, and in all probability others would have been positive could the examination have been made sufficiently intensive. So far as I am aware, this is the first time that this particular demonstration has actually been made, though the fact that some cases are positive when discharged is obvious from the occurrence of relapse well after the negative period.

It is not felt that this demonstration, which establishes as a fact what has heretofore been assumed to be the case, calls for any change in the regulations as regards the length of the negative period. Actual experience indicates that most of the cases that have developed sufficient resistance to become negative and to remain so for two years will continue to hold the organisms in check, if not overcome them entirely.

However, these findings do emphasize the desirability of the negative patient's continuing to take the treatment after the two-year period has expired and he has been discharged, and also the desirability of systematically following up such discharged cases. Certainly the cases paroled at six months require to be treated during the balance of the negative period.

Journal of the Philippine Islands Medical Association, June, 1927
The interest in pernicious anaemia is perennial and views based upon careful observations never fail to receive the close attention of the medical practitioner. Several such articles have appeared recently, and a review of their statements may prove of value. The etiology remains unknown, although Dr. Dorst asserts that the old conception that pernicious anaemia is chiefly a blood disease has changed, and compares the blood relationships of the changes in the disease with those of lead poisoning. Achlorhydria, constitutional, congenital and acquired by eliminating the normal bactericidal functions of the gastric secretions predisposes to anaemia. The writer contributes to the subject of the etiology reports on 11 cases of familial pernicious anaemia from his own practice.

The treatment of pernicious anaemia so long as the etiology of the condition is not known must remain more or less empirical. In this matter, however, practitioners should not despair for was not malaria treated with a large measure of success before its cause was determined? Diet, arsenic, and blood transfusion are advocated with varied enthusiasm according to the results observed by their persistent application. The pessimistic or the nihilistic therapeutist reading favourable reports explains the results on the basis of a disease whose normal course shows marked remissions.

Diet has its advocates generally from among those who have adopted quite recently one rich in proteins, as liver, lean meat, vegetables and fruit, with but little fat. Liver is of first importance and may be chosen from calves, oxen or chickens; fats, sugar and starchy food should be used sparingly; milk should be restricted to one half pint daily. At first, this diet is found distasteful to many but when persistently taken has been followed by remarkable results. It should be arranged to contain about 2,500 calories, and even after the blood examination shows a favourable result the patient should continue the diet. Generally all drugs are withheld.

Gulland in discussing Sir Humphry Rolleston's paper on Blood Transfusion in the Treatment of Disease, remarks concerning pernicious anaemia: "My own experience has convinced me that arsenie given by the mouth is so immensely superior to all the other methods of treatment put together, that every case should have a proper trial of that remedy; and, further, that cases that will not do with arsenic by
The China Medical Journal.

the mouth will seldom respond to arsenic given in any other way or to any other form of treatment."

- The real value of blood transfusion in pernicious anaemia is to help the patient round the critical corner, to raise his low vitality, exhausted by toxæmia, and give him a chance to recover himself. The condition rarely comes in the first attack but in the second, third or even fourth attacks this treatment is considered and used. A patient with 1,000,000 red blood cells per mm. and 25 per cent hæmoglobin was not, in Gulland's opinion, in immediate danger from anaemia.

In summarizing his views on this point, Dr. Gulland stated that transfusion is most useful in uncomplicated cases that are lagging. If a patient does not respond to one transfusion a second will rarely help him.

Grinker's views may be presented by simply making use of his conclusions. The article contains many references to the literature an abstract of which would be difficult.

1. Normal gastric acidity may be present in pernicious anaemia.

2. The rarity of achyilia preceding the anaemia by many years makes it improbable that achyilia is a predisposing cause. The fact that the anaemia may go unrecognized for some time may account for these cases.

3. There is no evidence that there is an intestinal infection in pernicious anaemia or that streptococci lying latent in the bowels of these patients are the producers of absorbable toxin.

4. Thirty per cent of pernicious anaemia patients develop definite signs of combined cord degeneration.

5. Combined cord degeneration may be caused by the hypothetic toxins producing the pernicious anaemia, or developing during the course of the disease, but may also be the result of numerous other toxic conditions such as Addison's disease, carcinoma of the bowel, pellagra and arteriosclerosis.

6. Eighty per cent of patients having pernicious paresthesia as the initial complaint developed cord degeneration, while only 20 per cent developed cord degeneration when paresthesia appeared during the course of the disease.

Canadian Medical Association Journal, May, 1927
RELATION OF CALCIUM AND BILIRUBINEMIA TO INTOXICATION WITH CARBON TETRACHLORIDE

The extensive employment of carbon tetrachloride in the treatment of persons harboring the hookworm has made it imperative to give careful consideration to the behavior of the anthelmintic substance itself in the body of the host. Tests made on experimental animals have revealed some discrepancies that were difficult to account for. In some groups of individuals enormous doses of the tetrachloride were tolerated, while others showed a considerable rate of morbidity and even of mortality as the result of a far smaller intake of the drug. These seemingly inexplicable variations appear likely now to be accounted for by the studies of Minot on behalf of the International Health Board at the Vanderbilt University Medical School, Nashville, Tenn. The most consistent change found in dogs after the oral administration of carbon tetrachloride was a marked increase in the concentration of bilirubin in the blood as shown by determination of the icteric index. This constituent, which is normally present only in traces in dog's blood, began to increase about twelve hours after the dose was given, and the more severe signs of intoxication appeared soon after the bilirubinemia reached a high level.

It has been known for some time that bile pigments readily combine with calcium in the blood. This protects the organism against the toxicity of bile pigments, but at the same time depletes the reserve of calcium in the tissues and causes an increased elimination. There may be an actual increase in the total calcium present in the blood; but much of it is combined with bilirubin, so that a decreased concentration of ionized calcium results. Minot's observations indicate that the unfavorable symptoms of carbon tetrachloride intoxication appear most commonly in cases in which there has been a deficiency of calcium in the diet. Indeed, experimentally the signs of intoxication can be prevented by the continued addition of calcium to the diet, or cured either by the intravenous injection of calcium chloride or the oral administration of ammonium chloride. The latter, which produces an acidosis, represents an indirect means of raising the level of the blood calcium.

According to Minot, therefore, the immediate cause of death following the administration of carbon tetrachloride may be attributed to the lack of ionized calcium in the blood, secondary to the bilirubinemia. Fortunately, few uncomplicated human deaths from carbon tetrachloride have been reported. The fact that convulsions have been observed in some cases is in harmony with the theory of calcium deficiency, the latter occasionally leading to symptoms of tetany,
particularly in children. Minot believes that the experiments indicate the advisability of an adequate calcium diet for a considerable period preceding carbon tetrachloride administration, and suggests the possibility of calcium therapy in cases of acute intoxication. The Nashville investigator has not overlooked the possibility that the production of serious symptoms by the lack of dietary calcium might occur as readily in any other jaundiced condition. This deserves serious clinical consideration.

J. A. M. A., June 25, 1927

NEWS AND COMMENTS

Dr. McCracken

Dr. J. 0. McCracken and family are due back in Shanghai at the beginning of September. A warm welcome awaits them.

Dr. Faust

Dr. E. C. Faust has been spending some weeks in Fokien and Formosa investigating the distribution of metazoal parasites.

We hope before long to be able to publish an article from him on the subject. His researches have given him some very interesting new information.

Miss Cora Simpson

Miss Simpson returned from furlough on Aug. 26th by the President Jefferson. She is resuming with Miss Hope Bell the joint secretarieship of the Nurses Association of China. The N. A. C. has succeeded in carrying on in a remarkable way despite the political disturbances. The temporary office is 44 Peking Road, Shanghai.

Tsinan Medical School

The Medical School of the Shan-tung Christian University reopened on 12th August to give an opportunity for special classes for students whose work had been interrupted by the political troubles in the earlier part of the year. The regular autumn session is to commence on 15th September.

Nomenclature of Diseases

We have received a copy of the Nomenclature of Diseases as used in the Union Medical College Hospital, Peking. A review of this valuable book will appear in our next issue. Copies can be obtained by those interested from the Hospital Director at cost price. Mex $3.00

Scarlet Fever Antitoxin

Messrs Burroughs Wellcome and Co. are now supplying a Concentrated Scarlet Fever Antitoxin. The preparation is supplied in hermetically sealed phials containing 10cc.

NEW MEMBERS ELECTED

Dr. Donald Farquharson    L. M. S.    Shanghai
Dr. Gordon King           B. M. S.    Peking
Dr. Mary King             B. M. S.    Peking