

The
China Medical Missionary Journal.

VOL. XI.

JUNE, 1897.

No. 2.

Original Communications.

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MEDICAL TEACHING IN CHINA.

By JAMES BOYD NEAL, M.D.

In the latter part of 1896 about one hundred and forty circulars were sent out by the writer to the various medical missionaries in China, asking for information in regard to the status of medical teaching in the stations where they were located. To these circulars sixty replies have been received, of which twenty-one report no regular teaching carried on. From the remaining thirty-nine answers the following table, showing the present state of medical teaching and what has so far been accomplished, has been compiled. The first point perhaps which strikes one in glancing over the table, is the pre-eminent position held by our veteran, Dr. Kerr, and his colleagues in Canton in the training of young men and women in medicine. The work of teaching in Canton was begun between 1835 and 1840, and the records are necessarily incomplete, so that the figures in the table are only approximate, more than one hundred in all, according to Dr. Kerr, having been trained. But with all its incompleteness, and taking the figures as found in the table, we see the Medical Missionary Society's Hospital in Canton has helped the Chinese, in the way of furnishing them with physicians trained in foreign methods, four times as much as any other hospital in China.

The next point to be noted is the smallness of the classes taught; there being only five places in all China, including Hongkong, where there is a class of more than ten students, the vast majority consisting of from two to six only. This would seem to indicate that in most instances, even where medical students are reported, the teaching consists in allowing the

students to pick up what they can in daily association with the physician in charge and from more or less desultory reading of medical books, without any very regular and systematic teaching. In other words, that scarcely half a dozen places in China have arrived at the point where they can be really considered to be medical schools. In this connection it is to be noted that no replies have been received from Shanghai, and so far as the writer knows no medical teaching is being carried on there. This seems the more strange when one thinks of the numerous and well-equipped hospitals in Shanghai and of its commanding position as the very centre of China, where one would naturally expect to see a strong central medical school.

It is gratifying to find that in several places the training of women in medicine is being pushed; especially is this so in Foochow, where Dr. Masters has a class of nine, and Dr. Goddard, a class of six. At Foochow and Canton too the women seem to form an integral part of the medical classes.

The general impression made by the returns I think is one of disappointment that so little has been accomplished so far, and yet at the same time of hopefulness for the future.

Interest in the training of the Chinese in Western medicine is evidently increasing rapidly among the physicians in China, and as that interest develops we may look for better methods, larger classes, and altogether more efficient work. The one great difficulty which seems to block the rapid advance of medical teaching is the scarcity of young men and women who have had the preliminary training necessary to the successful study of medicine. We in Shantung have no lack of applicants, but when after a year's sifting we eliminate those who are not able to keep up, we find our classes usually reduced from fourteen or fifteen to five or six. This difficulty of course can only be overcome by the steady growth in the numbers educated in our mission schools and colleges, or by our being willing to take our medical students at a younger age and put them through a preliminary course of physics, chemistry, etc., preparatory to medicine. This latter plan, however, would be quite impracticable in most places where medical teaching is carried on; the difficulty now being to find the time necessary to do the teaching of even the ordinary medical studies. It is the hope of the writer that the publication of these returns may lead to a full discussion in the pages of the *Journal* of the best methods to pursue, books to be used, length of course to be required, etc., in the training of our students. While we may feel gratified that there are to-day probably two hundred and fifty or three hundred students and assistants who are becoming more or less thoroughly trained in Western medicine in our various hospitals, and perhaps three hundred now in private practice, we should, I think, aim at much larger numbers and more thorough systematic teaching.

Location.	Physician.	Total number trained.	Number in Mission Em-ploy.	Number in Private Practice.	Men now in training.	Women now in training.	Total Number already trained and now in training.	Years re-quired.
Canton ...	Dr. Kerr ...	79	Not known	Not known	18	6	103	3or4
Tientsin-Vice-roy's Hospital	„ Houston ...	...	...	...	26	...	26	...
Soochow ...	„ Park ...	9	5	3	10	6	25	5
Hangchow ...	„ Main ...	12	7	5	8	3	23	5
Hongkong ...	„ Thomson ...	7	...	7	12	...	19	5
Foochow ...	„ Whitney ...	14	2	10	3	...	17	5
Chingchowfu	„ Watson ...	16	8	5*	None	None	16	...
Foochow ...	„ Masters ...	6	2	4	...	9	15	6
Moukden ...	„ Christie ...	9	2	7	6	...	15	5
+Chinanfu ...	„ Neal ...	10	3	7	5	...	15	4
Peking ...	„ Curtiss ...	4	2	2	9	...	13	4
Paotingfu ...	„ Atterbury ...	13	...	13	None	None	13	...
Foochow ...	„ Goddard ...	4†	None	None	...	6	10	6
Nanking ...	„ Stuart ...	4	1	2§	5	...	9	5
Changchow ...	„ Fahmy ...	3	...	3	6	...	9	5
Chungking ...	„ McCartney ...	3	3	...	5	...	8	5
Sioke... ...	„ Otte ...	4	...	4	4	...	8	5
Kinhwa ...	„ Barchet ...	2	1	1	4	...	6	5
Kakchieh ...	„ Scott ...	3	3	...	3	...	6	4
Ch'aochowfu	„ Cousland ...	...	...	...	4	...	4	5
Eng-chhun ...	„ Cross ...	...	...	...	4	...	4	5
Pingtu ...	„ Randle ...	...	...	...	3	1	4	4
Chinehow ...	„ Brander... ..	1	...	1	2	1	4	4
Chentu ...	„ Kilborn ...	...	...	...	3	...	3	4
Miscellaneous	15 places in all	65	22	41	21	1	87	...
		268	61	115	161	33	462	

* Three dead.

† Dr. Johnson, of Ichowfu, assisted in the training of one class of five students.

‡ All dead.

§ One dead.

SEVEN MORE YEARS OF MEDICAL MISSIONARY WORK.

By H. T. WHITNEY, M.D.

The American Board Mission in Foochow celebrated the fiftieth anniversary of mission work here on January 2nd, 1897. In connection with this anniversary the writer was asked to collect some of the more important facts relating to the medical work of the mission since it was established in 1870.

In the issue of this Journal, Vol. 2, No. 3, Sept., 1888, and Vol. 3, Nos. 3 and 4, Sept. and Dec., 1889, the writer briefly reviewed the early history of the medical work at Shao-wu and Foochow, bringing it down to 1889. So at this time we need not repeat, but refer to the beginnings sufficiently to enable the reader to get a connected idea, and then complete, in the same manner as before, the last seven years of our work. To complete, briefly, the first article on the work in Foochow in the September, 1889, issue, it should be added that Dr. White, of the M. E. Mission, was in Foochow from 1847 to 1853, and treated a good many Chinese and gained quite a reputation for curing

opium suicides. Also Dr., afterward Bishop Wiley, first came to Foochow in 1851, and remained until 1853. He was missionary physician, and also did some work for the Chinese. It is hoped the coming Jubilee of that mission will give further particulars of the work of these two gentlemen. This added information will also serve to correct the statement made in my first article that Dr. Welton, of the Church Missionary Society, was the first to begin work here. But it appears that some work had been done three years previous to his arrival in Foochow. From the end of the first decade of mission work until 1870, thirteen years, no medical missionary work as such seems to have been done in either of the three missions.

Dr. D. W. Osgood, of the American Board, arrived in January, 1870, and was the first to begin such work in our mission. He first intended to carry on work in the interior, and made a tour of observation to Yen-ping, 140 miles up the Min, but on his return began work in the city, and toward the end of the year he also started work at Po-na-sang, in the suburbs of Foochow. Here he gradually developed a good hospital work, and in connection with it a large dispensary practice at Ha-puo-ka (Har-poor-care), a densely populated part of the suburbs about fifteen minutes ride in sedan chair from the hospital. For ten and a half years he labored with unceasing energy for the benefit of the Chinese. He died at our sanitarium on Sharp Peak island, at the mouth of the Min, August 17th, 1880.

The last three years of his life he spent all his available time in translating Gray's Anatomy into Chinese Wên-li. He had just completed this work and taken it to the press, when he remarked to a friend, "It has been a question whether the Anatomy would finish me or I finish it, but I have finally completed it and sent it to the press." To accomplish this finishing work he had left the sanitarium and gone up to Foochow for a week, working hard in the extreme heat of summer, and when he made the above remark he was just starting back to Sharp Peak. When he arrived he had begun to be ill, and in a few days passed on to his reward. Thus the finishing of the Anatomy was the last of his earthly work.

March 26th, 1877, the writer arrived in Foochow, and after a month of preliminary arrangements went into the interior 250 miles to Shao-wu, the farthest prefectural city in the north-west of Fuhkien province. Several tours for preaching, book-selling, and dispensing of medicines had been made through this region since 1873, and in November, 1876, Messrs. Blakeley and Walker had moved there with their families and opened a station. Medical work there was first begun in a small way and with the usual difficulties and hindrances.

The first year 2,300 were treated, including those seen during two tours of 80 miles each in different parts of the field. In 1878 a small hospital to accommodate 30 or 40 patients was built, with a dispensary under the same roof.

The hospital was opened in 1879, and the first year 70 in-patients were treated, mostly for the cure of the opium habit. Afterwards through the ill-health of different members of the station the medical work was much broken up and the hospital was eventually converted into school use. The writer was there from 1877 to 1879, made a two months' tour in the autumn of 1881, spent the winter of 1886-7 there, and in the autumn of 1888 again removed there and labored till the last part of the summer of 1891. At the beginning of 1880 we were in Foochow, and relieved Dr. Osgood of a part of his work to enable him to give more time to finishing the Anatomy, and at his death took full charge of the Po-na-sang work and continued there, except during a furlough to America and one winter in Shao-wu, until the autumn of 1888.

In the autumn of 1884 Dr. Kate C. Woodhull and sister arrived in Foochow and began work among women and children in the city.

Native premises were used the first four years, in which time she had an opportunity to get a knowledge of the language and build up a good hospital, dispensary, and bedside practice.

We here begin the review of the last seven years of our work.

1. The American Board Woman's Hospital and Dispensary Work.

After using native premises for four years a site was secured adjoining the doctor's residence and a new hospital erected. It is a very convenient, well ventilated, one story structure, built around an open court, which also furnishes a "sky-roofed parlor" which the patients greatly enjoy. The various wards have 26 beds and a bath-room and hot-water kitchen are attached. There are also students' rooms, an operating room and a chapel. In front next to the street and connected by covered corridors are the dispensary and kitchen. Everything is handily arranged and neatly kept. The annual reports of the work from the first, not previously alluded to, are as follows: Hospital work was begun in January, 1886. During the year there were 40 in-patients and 400 out-patients, first visits. Fees for visits to homes, \$97.13.

In 1887 there were 70 in- and 1,050 out-patients. Fees, \$154.60.

In 1888 there were 70 in- and 1,063 out-patients, 342 return visits and 63 home visits. Fees, \$166.

In 1889 there were 82 in- and 3,161 out-patients, including 143 home-visits and 18 obstetrical cases requiring surgical aid. Fees, \$176.25. This was the year of change from the old to the new hospital, in which there was much better equipment and facilities for doing more satisfactory work.

In 1890 the total number reported was 3,179, of whom 84 were in- and 3,095 out-patients, including 160 home-visits and 15 obstetrical cases requiring surgical aid. Surgery, 57. Fees, \$150. Students, 5. In 1889 a new

kind of work for this region was started, namely, the curing of the opium habit through prayer and instruction in religious truth. The patients were required to attend regularly the evening services at the church and receive instruction in the truth and be taught to pray. After showing their sincerity by thus attending regularly for two weeks they were then taken to the woman's dispensary for some medicine. Some have been cured, and are holding out well, and five have been received into the church. The 1891 report gives a total of 4,595 patients, including 90 in-patients, 80 home-visits and 20 obstetrical cases. Fees, \$162.40. This year was the first to graduate students. Four received diplomas, or certificates, showing they had completed the required studies; one was too ill to attend the exercises, and died of phthisis soon after; one of the others remained to assist in the hospital, and the other two went out to engage in private practice. There was one student left, and others were received to fill the places of those who were graduated.

Early in 1892 Dr. Woodhull, having been failing in health, went to America for rest. The hospital had to be closed, but the dispensary was continued by the native assistant, until Dr. Woodhull's return in Nov., 1893, accompanied by Dr. Frances E. Nieberg, to be associated with her in this work. The 1894 report gives a total of 5,547, of whom 77 were in-patients and 323 home visits. Fees, \$157.97. Medical class, 5. This report includes three months of outside dispensing to 1,143 patients. Four out-station dispensaries were opened to extend the work in 1895. The report of 1895 gives a total of 6,481, including 119 in-patients, 2,241 out-station dispensary patients and 645 home-visits, of whom 18 were difficult obstetrical cases. Fees, \$304. The medical class continued with 5 students, with two native teachers to aid in their instruction. This report shows a perceptible advance in all the departments of the work. The 1896 report, bringing the work down to March 31st, 1897, gives a total of 7,565 made up as follows: at hospital dispensary, 5,636; at one out-station dispensary, 852; home visits, 839; foreign patients, 98; in-patients, 122; obstetrical cases, 18; surgery, 230; students, 6. This again shows an advance over 1895. In March, 1896, Dr. Woodhull and sister returned to America, leaving the work of this last year wholly in the care of Dr. Nieberg-Goddard (this last name was added Nov. 27th, 1895). The above gives a brief outline of the growth of this work for thirteen years. The regular routine work has been much the same as in other works of this kind. At the hospital dispensary four days were given to the clinical work and two days (Wednesdays and Fridays) were reserved for operations and special instruction of students. Daily religious services are held in the chapel, and besides special efforts are made in the wards and with dispensary patients to enlighten them in regard to divine truth and to seek to lead them to embrace this truth that they might enjoy its benefits.

Great good has been accomplished in this way over and above all the physical benefits. China thus owes a great debt of gratitude to lady physicians for the benefit they have been to her people.

2. Shao-wu Medical Work. (Continued.)

As before stated we removed to Shao-wu in November, 1888, and resumed medical work again, though in a very limited way, owing to the pressure of other duties made necessary by our small missionary force at this station.

Most of the work was at the dispensary, though many home-visits were made in the city and suburbs, and some were treated while on tours. The Third Report, to March 31st, 1890, gives 3,246, of whom 665 were return visits. Surgery, 132. Assistants, three. These were young men whom we had taken to Foochow in the spring of 1887 to keep them under instruction preparatory for future service in the Shao-wu field, and they returned with me in 1888. No systematic instruction could be given in 1889, owing to lack of time and constant interruptions. During 1889 the writer completed the revision of the Anatomy and the Vocabulary, and printed a second edition of 1,000 copies. A Primary Physiology was also prepared and printed in the Foochow colloquial for use in day-schools.

The Fourth Report gives 4,501 patients, of whom 547 were return visits. Surgery, 267. Assistants, three, and two students were added and regular instruction given a part of the year. This year was marked by having ten cases of obstetrics, some of them severe; one had convulsions and one required craniotomy. The mothers were all saved, but four of the children were lost, three being dead on our arrival and the other starved to death. The fifth and last report, while under my care, gives 2,000 in all, and surgery, 200. The increase of other duties compelled us to leave most of the medical work to the assistants, aiding them only in difficult cases. The work of this year was also broken up by a scare of rebellion from the Ko-lau-huei Society, and we were advised to return to Foochow, which we did at the end of summer (1891). As affairs turned we only returned for a tour through the field in the following spring and then went to America on furlough.

The medical work, except what was done by the assistants, thus came to a halt until the arrival of Dr. E. L. Bliss at the end of 1892.

In 1893 Dr. Bliss began the study of the Shao-wu colloquial, and from press of patients soon opened a dispensary in the lower room of his own residence. But this arrangement was unsatisfactory in several ways, and in 1894 a small room was fitted up for a dispensary in connection with a book-building. This was also unsatisfactory, but has had to be continued thus till now.

As yet Dr. Bliss has had no conveniences for receiving in-patients, and being obliged to be away from the station a good deal he has been unable to

make any considerable start in the medical work there. He, however, has made several dispensing tours through the Shao-wu field, and made quite a large number of home visits besides those treated at the dispensary. From the time of his arrival until the end of January, 1897, he has treated 10,309 patients, of whom 1,342 were return visits, 924 home visits, and 800 were treated on tours. Surgery, 229; assistant, one; and student, one. The average of dispensary patients has been 20 each clinic.

Shao-wu has always been a difficult place in which to build up a prosperous medical work, owing to the frequent interruptions by the physician having to leave the station for a longer or shorter period and by not having any resident physician for several years,—from 1880 to 1888. And yet a very commendable amount of useful medical work has been done under these trying and difficult circumstances.

3. Pagoda Anchorage Medical Work.

This place is the anchorage for foreign vessels to the port of Foochow. It is ten miles below Foochow and 15 miles from the mouth of the river (Min). It is the entrance to the very populous Chang-loh district, which has been worked by the American Board Mission since 1863. In 1891 a station was opened at the Anchorage, and in December, 1892, Dr. Kinnear began dispensary once a week at the village of Yang-seng near by. When the writer returned from America in November, 1893, he took over this work, and has continued it until the present time. Dispensing trips have been made to different parts of the field and irregular work has, also, been done at some of the out-stations.

But most of my time has been required in the religious and school work, and the medical has been done more to meet the immediate needs of those near at hand, the severe cases for lack of conveniences here being sent to Foochow to either the men's or woman's hospital, so that during the three years of this kind of work the total recorded is only 2,677 and surgery 330. This station has an estimated population of 500,000, and with sufficient means and a proper equipment a medical work might be developed here equal to any in Foochow.

4. The Po-na-sang Medical Work. (Continued.)

In the autumn of 1889 Dr. H. N. Kinnear arrived, and in January, 1890, took charge of the medical work in connection with the study of the language. This was not an easy undertaking for one to whom the language, the people, and work were all new, but with the aid of an efficient assistant he got on very well.

The Eighteenth Report, the first of Dr. Kinnear's, gives 9,772 patients, of whom 336 were in-patients and 5,290 return visits. Surgery, 627. The Chinese help was three assistants, three students and a hospital evangelist. Rev. G.

H. Hubbard assisted in teaching anatomy and physiology. The Ninteenth Report gives 8,456 patients; 4,414 were return visits and 234 in-patients. Surgery, 498. The number of students was the same, and the evangelist was continued. The Twentieth Report gives 11,675, of whom 7,321 were return visits and 284 in-patients. Surgery, 696. In the summer and autumn of this year (1891) occurred one of the severest and most prolonged cholera epidemics ever known in this region. And in November, as Dr. Kinnear and family with two other families, was moving to Shao-wu for a temporary sojourn, Mrs. Kinnear was taken ill with this dread disease, and succumbed after four days suffering, in a small "up river" boat. Dr. Kinnear and his little son were taken ill, but their attacks were much lighter, and they gradually recovered.

This year there was no evangelist, and the students were reduced to three, one having died and two unpaid students discontinued their stay at the hospital. During this year, also, Dr. Kinnear began the use of introductory letters. These were given to patients, leaving the hospital, to take to the preacher, of whatever denomination, located nearest to his home. This was a good plan, and some good came of it. The Twenty-first Report gives a total of 15,078, of whom 9,617 were return visits and 420 were in-patients. Surgery, 753. Two students had been added, making five in all, and a new evangelist had been secured. This year, also, Dr. Kinnear received two laudatory tablets. Probably all medical missionaries get their share of these tablets. The writer has long discouraged this waste and the giving of the money which could be used to benefit others. Others, also, have done the same, with good results.

The Twenty-second Report gives 14,776 patients, 9,567 of whom were return visits and 364 in-patients. Surgery, 871. Students, 5. One death in hospital. Dr. Kinnear was ill part of the time to which he attributes the decrease in attendance over that of the year previous.

The Twenty-third Report gives 14,384, of whom 9137 were return visits and 403 in-patients. Surgery, 820. Deaths, four. This report contains a new cut of the Po-na-sang hospital and a picture of the seven assistants and students, two of the latter having been received near the close of the hospital year. One of them was a graduate of our Boys' Boarding-school. The giving of the introductory letters to patients returning home has been continued, but the results were not what ought to be expected, owing perhaps to the preachers not understanding the design of them.

The Twenty-fourth and last Report by Dr. Kinnear before returning home on furlough, gives 14,614, of whom 9,790 were return visits and 205 in-patients. Surgery, 773. Death, 1. At the beginning of 1896 four of the students were dismissed for one cause or another, retaining one assistant and two students. At the close of this hospital year (March 31st, 1896), Dr. Kinnear

and family went to America, and the Po-na-sang medical work was put into the care of the writer.

The Twenty-fifth Report, yet to be printed, will bring the work down to March 31st, 1897. The total for the year is 14,130, of whom 9,195 were return visits and 325 in-patients. Surgery, 784. Deaths, 3. Chinese help is one teacher, one assistant, two students and an evangelist. Twenty of the in-patients had the opium-habit, and were cured of it at the same time as of their other complaints.

We have now given a cursory view of the various branches of our medical work for the past seven years, thus completing its history from the beginning in 1870. There are many items of interest that might be gathered from the reports of these twenty-seven years of labor, but the limits of this article will not allow of it.

The combined period of the four gentlemen and two lady physicians who have been appointed to this mission, amounts to nearly fifty-seven years, viz, Dr. Osgood, 1870 to 1880, ten and one-half years; Dr. Whitney, 1877 to 1897, twenty years; Dr. Woodhull, 1884 to 1896, twelve years; Dr. Kinneer, 1889 to 1896, six and one-half years; Dr. Bliss, 1892 to 1897, four and one-third years; and Dr. Nieberg (afterward Nieberg-Goddard), 1893 to 1897, three and one-third years. After deducting furloughs we still have over fifty years of continued service for one physician.

Statistics.—In the earlier years of the work no special attention was paid to keeping exact records of what was done. And in later years there have been many omissions under different headings, so we cannot give as complete statistics as we would like. But in general, combining the Po-na-sang, city, Shao-wu, and Pagoda Anchorage works there were over 291,000 cases since the beginning of the work in 1870. Of this number over 93,000 were return visits. Over 10,800 were in-patients, including 2,100 or more opium cases treated in the opium asylum. The out-patients also include several thousand visits to homes, several hundred cases of suicide, mostly with opium, and about 200 cases of obstetrics, mostly difficult ones. About half of these belong to the women's hospital work. In conclusion, to one who is familiar with all but the first seven years of the Po-na-sang work, these figures mean a great deal, even years of hard work, suffering, sickness, and to one of the number, death. But looking at the hundreds of lives that have been saved, the myriads that have been healed, and the many souls that have been saved, we could wish that even more could have been done to rescue and uplift this sin-cursed and down-trodden people.

CONGENITAL STENOSIS OF THE ŒSOPHAGUS.

By HORACE A. RANDLE, M.D.

On April 7th, at 3 a.m., a baby boy was born under our medical care. Presentation and delivery were normal, with the exception of the umbilical cord being tightly twisted round the neck of the fœtus. This pressure we lessened by a finger as soon as the head was born, until in a few minutes we were able to pass the funis over the head. When the birth was complete, we missed the vigorous first cry of the newly-born, which every accoucheur delights to hear; and in its place only a sorrowful little fretting was given, but faint attempts at crying. A considerable discharge of frothy mucus took place, from both mouth and nostrils, somewhat embarrassing respiration. In other respects the child seemed normal; the weight being 7 lbs., minus 2 oz.

During the second and third days he seemed hungry, and attempted with some little vigor to take his food, but always choked within the first minute. He only passed, in scanty motions, the greenish-black meconium from his bowels, and urinated but thrice. He now began to show marked signs of falling off, and I concluded that something was wrong with his power to feed. His breathing was shallow, between 40 and 50 in the minute, rough and bronchial in character, though there was considerable expansion of the upper part of the chest, especially antero-posteriorly. His pulse and heart sounds were normal, but becoming feeble.

On the morning of the 5th day I had reached no certain diagnosis, and felt anxious about him. We fed him with milk and Valentine's Meat Juice diluted with water, very slowly and gently by the mouth with a medicine dropper; still he choked and threatened to suffocate. We then gave a rectal injection of half a fluid ounce of his mother's milk with 4 and 5 drops of brandy. This last he retained, but an hour later he became cyanosed, and with a faint struggle respiration ceased. Putting him down on his back upon the carpet before the fire I restored breathing again by artificial respiration, applying *Liquor Ammonia Fort.* diluted with an equal quantity of water sprinkled over a handkerchief to his nostrils, but it was several minutes before I could hear the heart-sounds again. Upon staying my efforts respiration threatened to cease, so I continued to maintain, (or to assist), respiration by artificial action for about an hour; by which time both breathing and the heart's action were well established. He lived seven hours longer, and it was during this time that I confirmed my suspicions as to what was wrong.

I tried patiently and carefully to reach the stomach *viâ* the mouth, using five catheters of different sizes and of different degrees of firmness, but

they all stopped at the same place about half way down the œsophagus, and I could by no means induce any one of them to go further down than a point about $2\frac{1}{2}$ inches above the entrance to the stomach.

It seemed to us that the question of an operation offered no chance of saving his life, and he died at the age of 5 days and 15 hours. I am sorry I could not have a post mortem examination to demonstrate the diagnosis, but every symptom pointed to congenital stenosis of the œsophagus, and I am of opinion that the larynx or trachea was not normal.

Perhaps in view of the fact that such a case is happily extremely rare, I may be permitted to recapitulate the symptoms as I found them:—

1. Frothy mucus from mouth and nostrils, persistent and continuous; best removed by inverting the child.

[This of course would indicate inability to swallow].

2. Constant and almost immediate choking, when and however fed.

3. Total absence of vomiting, or attempt at vomiting, though all food *would be* returned by choking, or *could be* returned very readily by inversion.

4. Stools (of which there were 10 or 12) never deviated from the greenish-black meconium, though they became more and more scanty.

5. Urination rare, only three times in $5\frac{1}{2}$ days.

6. No probe could reach the stomach *viâ* the œsophagus.

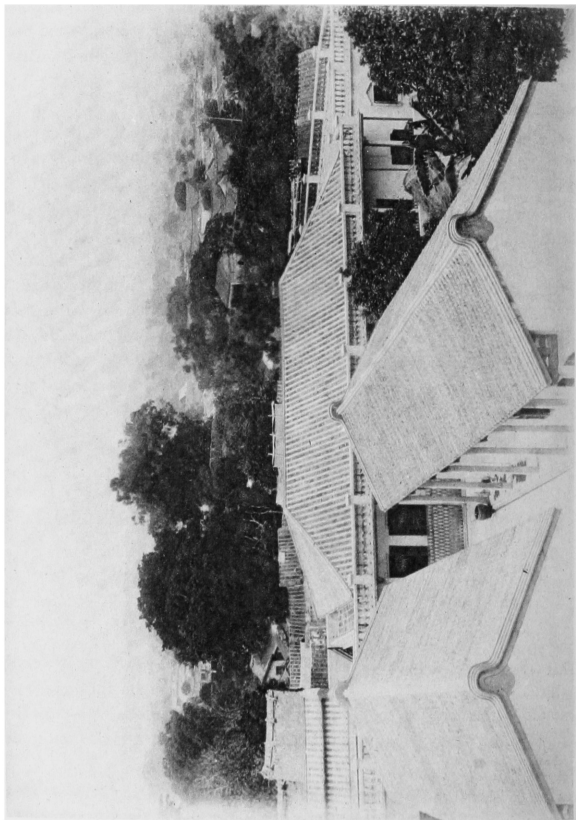


LIGATION OF THE RADIAL AND BRACHIAL ARTERIES FOR TRAUMATIC ARTERIO-VEINUS ANEURISM.

By J. H. McCARTNEY, M.D.

The patient was a man about middle age, a physician by occupation. Nineteen years ago he had his hand lacerated by the premature explosion of an anvil that he was loading to celebrate a marriage feast. The hand healed slowly, (as such wounds always do under native treatment). After it healed he had perfect use of his hand; but on the radial side involving the thumb, index, and middle fingers, extending from the tips of the fingers to about the middle of the forearm was an immense arterio-venous aneurism.

When he kept his hand elevated he suffered no inconvenience, but as soon as the hand was lowered a swelling of the superficial veins took place, attended by great pain. On elevating the hand again the pain and fullness disappeared. By compression of the brachial artery at the bend of the elbow all fullness disappeared.



BURNS' MEMORIAL HOSPITAL, CH'AO-CHOW-FU.

After consultation with Dr. Wolfendale, of the London Mission, we decided to first ligate the radial artery, as there would be less danger of gangrene than if we ligated the brachial. The patient was prepared in the usual way, after which we ligated the radial in the upper third near where it branches off from the brachial. This ligation unexpectedly produced no effect on the pulse at the wrist, this probably being due to the collateral circulation having been established almost as soon as the circulation had been cut off in the radial. In view of this fact we decided to ligate the radial in its lower third, which was quickly and easily done before the man had come from under the influence of the anæsthetic.

The wounds were closed and bandaged. The dressing was not changed for five days, at the end of which time we removed the stitches, the wounds having healed by first intention.

The condition of the aneurism was not materially changed by this operation, with the exception that the pulsations were less distinct than before. At the end of ten days we decided to ligate the brachial at the bend of the elbow. An incision two inches in length along the inner edge of biceps tendon was made; its centre corresponding to the fold of the elbow. The artery was ligated in two places with large-sized catgut, and the wound closed. The patient complained of a slight numbness of the fingers, which felt cold to the touch for a few days. These symptoms were treated with external heat, and they passed off in less than twenty-four hours. The patient made a good recovery, and left the hospital a few days after the operation.



THE BURNS' MEMORIAL HOSPITAL, CH'AO-CHOW-FU.

By PHILIP B. CUSLAND, *M. B. C. M.*

This hospital was built by the late Geo. Barbour, Esq., of Bonskeid, Scotland, in memory of his friend, the Rev. W. C. Burns, the first missionary of the Presbyterian Church of England, who was arrested at Ch'ao-chow-fu in 1856 while on a preaching tour, and sent from there overland to Canton as a prisoner.

As far back as 1883 attempts were made through native agents to rent a house for a dispensary, but few owners were willing, and of the few none dared. In 1888 I began dispensing in our tiny chapel to crowds of patients. In a fortnight one man plucked up courage to rent us a dilapidated tea ware-house in Tiger's Tail Lane, which, being in the immediate neighborhood, was taken possession of without trouble. Here we enjoyed great popularity. Patients

were seen daily, and the numbers had eventually to be limited to 100 a day to allow time for operations, etc. We were cheered too by sincere inquirers, and the two best local members of the Ch'ao chow-fu church were the first two then converted. After six months we were able, through a grateful patient, to rent a much better place, and although the neighbors raged and fumed at first, we took possession without serious trouble, and our most furious foe became our best friend.

But this situation did not prove a good one and any way the "boom" that so often attends the opening of a new place in China was passing off, and the attendance at the dispensary was a good deal lessened. We worked here for a year, when the place was sold over our heads. Thereafter until the hospital was built dispensing was carried on in rented Chinese houses, which served also as dwelling houses. It was not until 1890 that a suitable site, whose owners were willing and bold enough to sell, was found.

That year was spent in futile negotiations. In 1893 the price was agreed upon, but opposition arose, our enemies speaking through the authorities. Even the viceroy wired 萬萬不可.

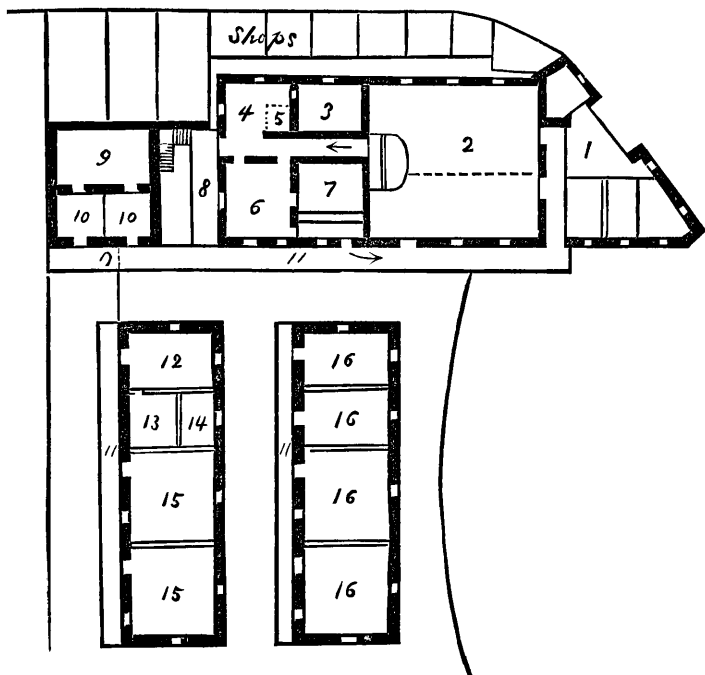
The owners proved their title to the land in the courts, and we refuted the objection that the people would not allow it, by dispensing on the spot for several months without hearing an angry word. For some time I was in daily medical attendance on Taotai Tseng, who proved friendly, but professed himself unable to remove the obstacles and have the deed stamped. A short piece of boundary wall built in January, 1894, was thrown down during the night, and when rebuilt was again partially thrown down, but boundary stones put up by us were not molested. That autumn we decided to risk building. All went on quietly, and when the roof was on the first block, victory was assured. Hospital and dwelling house were finished in the spring of 1896.

The situation is a capital one, being on the bank of the river facing the summer winds, and yet being quite near the South Gate of the city and easily found by both country and city people.

The plan annexed speaks for itself. The main door way opens on the embankment street. It is in the style of the native hong entrances. The decorations are thoroughly Chinese, and are in color relief. A sliding barred gate enables the porter to see who seeks admission and prevents the place being rushed by undesirable characters.

Two doors behind the pulpit allow the admission of men and women separately, so that there is no intermixing.

The walls of the building are all of lime and sand concrete, as customary in this region. The roofs are tiled and the floors laid with Portland cement. The courts are concreted. The drains are U shaped on section, and there are no corners in any of the rooms; the angles where floor and wall join, at the corners of the room and where the wall meets the ceiling, being all rounded off.



PLAN OF THE BURNS' MEMORIAL HOSPITAL, CH'AO-CHOW-FU.

1. Front hall with porter's, students', and reception rooms.
2. Chapel and waiting room divided by screen.
3. Store room.
4. Dressing and minor operation room.
5. Ophthalmoscopic room.
6. Consulting room.
7. Dispensary.
8. Dressing verandah, (ulcers, etc.)
9. Latrine.
10. Bath rooms.
11. Verandahs.
12. Kitchen.
13. ,, store room.
14. Cook and coolie.
15. Women's wards, 20 ft. x 20 ft.
16. Men's wards.
17. Door into women's side:

There is a second storey on the men's block containing 4 more wards.
 There is ample accommodation for 16 women and 50 men.

The walls are whitewashed; an attempt at hard finishing having failed to produce a non-absorbent surface.

The rooms are ceiled and the roof lofts ventilated through from end to end and also with lateral openings. This prevents decay in the wood work of the roof and keeps the rooms below cooler.

Fly gauze windows have recently been placed between the venetians and glass to allow ventilation and keep out the mosquitoes. It is hoped the need for mosquito curtains will thus be obviated. A second storey on the men's ward has recently been added. The wooden floors were oiled with raw hot nut oil, and then a second coat of cold boiled oil laid on. Simple ventilating holes were put near the ceiling. The hospital was planned with a view to the future. It is painfully evident in many mission buildings that the exigency of the time and not the growth of the future was in the designer's mind and so when the need for extension comes it is found that the edifice does not lend itself to enlargement, and additions have to be stuck on in the least objectionable way possible.

It is better to plan largely, and as the money allows and the need demands build bit by bit. Not that the plan of this hospital is my ideal. The shape of the ground forced it into the present form.



I. CONCERNING THE DECREASE OF MYOPIA BY THE REMOVAL OF THE CRYSTALLINE LENS.

By Prof. J. HIRSCHBERG, *Berlin, Germany.*

Translated by E. RUEL JELLISON, M.D., Chinkingang, China. After an address given at the Ophthalmological Society of Berlin, Germany.

If one removes the lens from an eye with myopia of 24 dioptries, and subsequently finds a myopia of 1.5 dioptries, then the difference (U) between the first or original condition of the refraction and the second or succeeding condition of the refraction amounts to

$$U = R_1 - R_2 = 24 - 1.5 = 22.5 \text{ D.}$$

It was a curious error of many colleagues to consider the size of U as fixed. The size of U is, according to its nature, necessarily a variable one, and increases in a lawful manner with the number of dioptries of the original myopia, even if we assume, for the sake of simplicity, that all strongly myopic eyes operated upon, possess exactly the same refractive media as an average emmetropic eye; that the increase of the myopia is solely and alone caused by the lengthening of the visual axis.

Under this hypothesis there accrues to the lens possessing eye by increase of the visual axis of one mm. constantly a myopic augmentation of 3 D; but to the aphakic eye one of some 1.5 D. If the visual axis is lengthened by a definite number of millimetres, for instance, of five mm., there is produced therefrom, in a lens possessing eye, a myopia of $5 \times 3 = 15$ D; in an aphakic eye only an increase of the refraction of $5 \times 1.5 = 7.5$ D. The greater, also, the original myopia, the greater the loss in efficaciousness of the increase of the visual axis in an eye which has become aphakic, the greater also the difference U. It is even so as if a man exchanged current money into foreign; the greater the amount exchanged the greater the loss.

We will ascribe an even 24 mm. (instead of exactly 23.8 mm.) as the visual axis of an average emmetropic eye; by removing the lens it acquires a hypermetropia of 10 D, if we bring the spectacles in the anterior focus of the corneal system, that is, $3 \times 7.75 = 23.25$ mm. in front of the cornea. If the normal emmetropic eye is increased in length 1 mm., then the length the visual axis is brought to 25 mm.; and thus the eye has acquired a myopia of 3 D. If one removes the lens from this eye, then it has $H = 10 - 1.5 = 8.5$ D, because in aphakic eyes an increase of the visual axis of 1 mm. brings about an increase of refractive power of 1.5 D. We obtain, therefore, according to my simple and approximate computation the following synoptical table:—

<i>Length of visual axis A.</i>	<i>Refractive condition of lens possessing eye R₁</i>	<i>Refractive condition of aphakic eye R₂</i>	<i>Difference between R₁ and R₂ U.</i>
24	E.	H 10 D	10 D
25	M 3 D	H 8.5 D	11.5 D
26	M 6 D	H 7. D	13. D
27	M 9 D	H 5.5 D	14.5 D
28	M 12 D	H 4. D	16 D
29	M 15 D	H 2.5 D	17.5 D
30	M 18 D	H 1. D	19. D
31	M 21 D	Almost E.	21. D
32	M 24 D	M 1.5 D	22.5 D
33	M 27 D	M 3. D	24 D
34	M 30 D	M 4.5 D	25.5 D

One perceives this simple law, which follows from the preceding:—

$$U_x = (10 + \frac{Mx}{2}) D,$$

that is, for an eye with myopia of x dioptries, the difference U, produced by the removal of the crystalline lens, will be equal to the sum of the difference

for the normal emmetropic eye ($U_0=10$ D) and the half of the original number of dioptres of myopia of the case.

Example: For an M 20 D will $U_{20}=\frac{20}{2}=10$ D. An eye with M=20 D will, by the removal of crystalline lens, become nearly emmetropic.

It is very important to first compute the R_2 and this may easily be done mentally. That is to say, the second condition of refraction which remains after the removal of the crystalline lens R_2 (x), for an eye with M=XD is found by subtracting from R_2 of the normal emmetropic eye (that is, of H 10 D) one-half the number of dioptres of myopia of the eye operated $\frac{Mx}{2}$.

$$R_2(x) = (+10 - \frac{Mx}{2}) \text{ D.}$$

Example: For M₂₀ will $R_2 = (+10 - \frac{20}{2}) = 0 = E$.

The approximate computation agrees satisfactorily with the actual experience.

My eight operations for decreasing myopia have yielded me the following

figures:—

No.*	Age	R_1	R_2	Vision	
				Before operation	After operation
1	7	M 15 D	H 2 D	1/10	1/4
2	8	M 16 D	H 3 D	1/5	1/3
3	13	M 16 D	H 2 D	1/6	5/9 to 5/6
4	22	M 18 D	Nearly E	1/12	1/4 (old leucoma)
5	28	M 20 D	„ „	1/10	1/4
6	29	M 20 D	„ „	1/12	1/5†
7	30	M 23 D	M 3.5 D	1/7	5/9 to 5/6
8	39	M 26 D	M 3. D	1/12	5/9 to 5/6

The agreement of the observation with the computation is so great that only a small value can be ascribed to the deep lying, or peculiarity of the lens (for instance a more spherical form), or even to the peculiarity of the entire refractive apparatus, in contrast to the elongation of the visual axis of high grade myopic eyes. More importance must be attached to the length of the visual axis than to the condition of the refractive media. Still it is far from my idea to detract from the influence of the depth of the lens as colleague Schön has done, when it lies unusually deep. I also acknowledge that the deviation of the corneal curvature from the average, has an influence. As practical results the following can be noted: M of 18—20 D will by removal of the lens, be nearly changed into emmetropia. In M 15—16 D a light hypermetropia of some 2 D is to be expected. In M 23—25 D there remains a moderate myopia of some 2—3 D. In M 30 D there remains behind an average myopia of about 5 D. That satisfied perfectly.

* This arrangement is not chronological, but according to the degree of myopia.

† Later had detachment of the retina.

Complete exactness cannot be attained by the spectacle test, as sometimes these patients, from the nature of their eyes, do not possess normal vision, and during repeated tests by no means always make exactly the same declarations, neither before nor after the operation, and especially not in the time immediately after the healing, following the operation.

I had certainly retained my simple computation for myself, if a marked obscurity did not still rule in the literature, so that when one speaks of the average size of U, there is no such, and it cannot be given; and if the profound discussion of colleague Schön, in the January number of the *Centralblatt*, had not unfortunately remained unconsidered by a very great number of colleagues. The above selected presentation impresses itself easily upon the memory, and can be made of use in text books.

In addition to my computation one may perhaps expect from me some clinical observations concerning the operative removal of myopia, above all a justification of the fact, that, I so far have performed only eight operations, when from my number of patients I could easily have performed 100. Now I do not belong to those, who, as colleague Cohn, are convinced that Vincenz Fukala should be grouped with those great benefactors of the eyes of men—Helmholtz and Albrecht von Graefe. Such extravagance works an injury to the very essence of the matter, although I acknowledge the actual services of Fukala which I value in the highest manner. I am unable, with other excellent colleagues, to place the operation for myopia above that for cataract or glaucoma. There will be much more accomplished by the last two mentioned operations in my hands than by the operation for myopia.

The matter was also not so new to me; for, looked at apart from the cases reported in the journals, I had in fact long before seen operated cases, which moreover were by no means always happily terminated for the patient. Then the later results were too unfortunate, as Fukala in the most meritorious manner fought down the prejudice against the operation.

The results of the operation on seeing eyes of young people were worse than the operation on eyes blind from cataract in old people. More cases of infection were published. All those which remained unpublished are withdrawn from critical review. Still cases of infection have fallen to the lot of the best operators. The declaration of colleague Cohn, that suppuration of the eye is withal excluded, is certainly incorrect. But it is exactly this danger that I fear the least myself. I have operated over 200 lamellar cataracts, where the procedure is exactly the same as against myopia, but never therefrom lost an eye, and never once experienced an infected wound, not even in earlier times when our treatment of wounds unfortunately had very much in it to be desired. Much worse for me is the danger from detachment of the retina. Such an excellent and careful operator as Sattler found it in 4 out of 65 cases, which is nearly 7%, and this is only our lowest margin,

because our time of observation is still short. I know also that other excellent operators have observed detachment of the retina in 10 % of their operations. This was the per cent. of loss by flap extraction in the beginning of our century. I have operated numerous highly myopic eyes for cataract (occasionally with only infinitesimal opacity, whereby the usefulness of the eye had been arrested) and never have seen a subsequent detachment of the retina. Therefore the detachment of the retina depends, according to my view, upon the incorrect methods of operating, *especially from the numerous dicissions into the vitrious*. Then the idea that the detachment of the retina, after the operation for myopia, stands in no causal connection with the operation, or that in some eyes operated for myopia the detachment of the retina would have occurred in the absence of the operation is too little scientific and practical to be seriously considered. What takes place in connection with our operation we must consider as a result of the same: only then we can learn to avoid it. I have selected, so far, only such cases for operation that on the one hand were perfectly helpless without the operation, for instance, children who were not in condition to go to school alone, a teacher who could not earn her bread, a doctor who was unable to do his work, people who on account of the excessive myopia had no enjoyment from life; and that on the other hand, offered me security that I could have them completely under observation until healing. Ambulant treatment seems to me reprehensible, even if the trial in several cases does not prove unsuccessful.

Also the enthusiastic delight of grateful patients over the successful results, which have been brought to me, both orally and written, have not been able to diminish my anxiety in regard to the subsequent cases. Since I have simplified the operation for myopia, and as I believe thereby improved it, I have determined to use it more frequently. I constantly seek to retain the round pupil, and in children complete with one, in adults with two operations. In children after dilatation of the pupil, I make an average laceration of the capsule and the superficial layers of the lens. Under the moderate use of atropine, complete absorption of the lens takes place. This procedure has become familiar to me from operating lamellar cataract. When the dicission is too small it leads rather to an irritation without perfect absorption. But if a severe swelling and increase of tension occur, then the lens masses must be removed by the lance incission. In adults I make a dicission and, after four or five days, before an increase of tension has occurred, a corneal flap incission, out of which the lens comes easily and completely. If one only makes the commonly described lance incission, large portions of the lens remain behind; if we lacerate the same, it leads to renewed swelling and highly annoying increase of tension, the continual employment of Physostigmine, yea, even iridectomy may be demanded; for the renewed evacuation of the lens fragments would now, where a dicission had already been made into

the vitrious, cause the danger of prolapse of the vitrious, which, in these eyes, by all means must be avoided. I have myself never seen vitrious in my operations for myopia, but still in a case where four operations were made, I unfortunately saw a subsequent detachment of the retina. I am convinced by a direct examination of several patients operated by others, that detachment of the retina cannot only ensue, as is known, through prolapse of the vitrious, but, *also through too numerously aggregated dicissions into the vitrious.*

THE TREATMENT OF CHOLERA BY INTRAVENOUS SALINE INJECTIONS.

By ROBERT H. COX, F.R.C.S.

It is doubtful whether the immediate treatment of cholera is any more successful now than it was sixty-five years ago, for, notwithstanding the advance made in the treatment of almost every other disease, the mortality of this remains the same—death still claims about one-half of those attacked.

The number of remedies recommended from time to time is legion, and forms a veritable museum of strange methods. Even a list of these would occupy too much space, but it would include most of the drugs of the pharmacopœia; insufflation of air; tight bandaging; injection of the bladder, of the large intestine, of the peritoneum, and of the veins; bleeding; scalding; removal of atmospheric pressure; homœopathy; ligature of limbs; massage; percussion; application of heat, and of cold; and vaccination. Curiously enough, as it may appear to us with our present knowledge of the disease, many of these have obtained a brief notoriety, but as intravenous injection, when properly employed, is the only treatment of the algid stage that produces an immediate and uniformly good result, it alone will be dealt with in this paper.

History of Intravenous Injection.

The origin of intravenous injection may be dated from the experiment of a German sportsman, who, early in the 17th century, injected a mixture of wine and brandy into the veins of his dogs as an amusement. These animals suffered no ill-effects as the result of this procedure other than a temporary state of intoxication.

In 1656 Sir Christopher Wren injected into the veins of a dog a solution of opium in sherry wine, in the presence of Boyle, who related that after a certain stupor the animal perfectly recovered. Boyle, some time later, in-

jected the crocus antimonii into the veins of a criminal, and recommended the trial of cordials, antidotes and diuretics in this manner.

In 1656 Dr. Lower succeeded in transferring the blood of one dog into the veins of a second, by connecting a cervical artery of the former with a jugular vein of the latter, while at the same time he bled the recipient of a quantity of blood equal to its own weight.

In 1667 Mr. Denis, in France, successfully transfused small quantities of the blood of calves and lambs into the veins of five human beings; one so treated was said to have died from the operation, but as the result of the legal proceedings which followed, this charge was not proved.

A year later Dr. King injected into the veins of a Cambridge student, reported to be mentally deficient, and who volunteered for the purpose, nearly 12 ounces of calf's blood. This operation caused no ill-effects; but, though repeated three weeks later, it failed to improve the mental condition.

At this time extraordinary ideas prevailed as to the effects expected from the use of this treatment. Suggestions were made that kings might have wisdom imparted to them through their veins, and that the mutual exchange of a few ounces of blood between husband and wife would cure and prevent matrimonial jars.

In 1691 Muller found that mercury injected into the veins of animals produced points of suppuration round the metallic globules in the lungs.

Baglivi, in Italy, first pointed out the production of rigors by the injection of cold water, and the fatal effect of air being admitted into the circulation.

In 1785 Fuller proposed intravenous injection for the restoration of persons apparently drowned, and, some time afterwards, Darwin proposed the same for stricture of the œsophagus.

Early in the present century MM. Percy and Laurent reported five recoveries out of eight cases of tetanus injected by them.

In 1820 Majendie injected a quart of tepid water in a case of hydrophobia. The injection was followed by a complete state of calm, which lasted a week, and although the patient afterwards died, such relief as this could not but stimulate to further trial. It showed the safety of large injections of liquid at the temperature of the blood. Henceforth it only remained to be learned that fluids of different densities could not safely be brought in contact with the blood corpuscles.

Treatment of Cholera by Intravenous Injection proposed.

During the first recognised visitation of cholera to the British Isles, the epidemic of 1831-32, Dr. O'Shaughnessy proposed to combat the collapse stage of that disease by means of intravenous injections; his idea being that the dark blood of cholera might be decarbonised by the addition of a solution of

salt containing a large proportion of oxygen, such as chlorate of potash. He also gave the following summary as the results of his analysis of the blood in cholera cases :—

“ 1. A material diminution of the water of the blood of the cholera patient, the specific gravity of the serum ranging from 1041 to 1054.

2. A notable decrease in the quantity of soluble salts, amounting, as far as regards the serum, to a mean loss of one-third of those substances.

3. That the solid constituents of the crassamentum, including its salts, retained their normal proportions, wanting merely water to restore it to the standard state; and

4. That the dejections were alkaline and albuminous, and contained the water and soluble salts in which the serum of the blood was deficient.”

Employment of Saline Intravenous Injections in Cholera.

Dr. Latta, of Edinburgh, influenced by the above suggestion and analysis, was the first to practice intravenous injection in the collapse stage of cholera. His object, however, was not to supply oxygen to the blood, but to replace the salines and water lost from it by the purging and vomiting. He accomplished this by the introduction into the veins of large quantities of warm water containing common salt and carbonate of soda in solution, by means of a large syringe. The details of such an important event as this are best told in the author's own words; he says: “As soon as I learned the result of Dr. O'Shaughnessy's analysis, I attempted to restore the blood to its natural state by injecting copiously into the larger intestines warm water, holding in solution the requisite salts, and also administered quantities from time to time by the mouth, trusting that the power of absorption might not be altogether lost, but by these means I produced in no case any permanent benefit, but, on the contrary, I thought the tormina, vomiting, and purging were much aggravated thereby, to the further reduction of the little remaining strength of the patient; finding thus, that such, in common with all the ordinary means in use, was either useless or hurtful, I at length resolved to throw the fluid immediately into the circulation. In this, having no precedent to direct me, I proceeded with much caution. The first subject of experiment was an aged female, on whom all the usual remedies had been fully tried, without producing one good symptom; the disease uninterrupted, holding steadily on its course. She had apparently reached the last moments of her earthly existence, and now nothing could injure her—indeed, so entirely was she reduced, that I feared I should be unable to get my apparatus ready ere she expired. Having inserted a tube into the basilic vein, cautiously—anxiously, I watched the effects; ounce after ounce was injected, but no visible change was produced. Still persevering I thought she began to breathe less laboriously; soon the sharpened features, and sunken

eye, and fallen jaw, pale and cold, bearing the manifest impress of death's signet, began to glow with returning animation; the pulse, which had long ceased, returned to the wrist; at first small and quick, by degrees it became more and more distinct, fuller, slower, and firmer, and in the short space of half an hour, when six pints had been injected, she expressed in a firm voice that she was free from all uneasiness, actually became jocular, and fancied all she needed was a little sleep; her extremities were warm, and every feature bore the aspect of comfort and health. This being my first case, I fancied my patient secure, and from my great need of a little repose, left her in charge of the hospital surgeon; but I had not been long gone, ere the vomiting and purging recurring soon reduced her to her former state of debility. I was not apprised of the event, and she sunk in five and a half hours after I left her. As she had previously been of a sound constitution, I have no doubt the case would have issued in complete reaction, had the remedy, which already had produced such effect, been repeated."

Out of fifteen cases of profound collapse thus treated by Dr. Latta, five recovered. Others followed in the path thus pointed out, and several were more successful than the pioneer.

In the next epidemic, that of 1848-49, the same method was employed at the London Hospital, where Dr. W. J. Little, who had practised the operation (under very unfavourable circumstances) in seven cases with one recovery in 1832, thus treated seven patients with three recoveries.

During the epidemic of 1866 Dr. L. S. Little (son of the former), at the London Hospital, injected twenty cases, six of which recovered. In four of these cases, however, the injection used was other than saline, in two blood and in two serum, all of which died, so that the number of recoveries after saline injection was six out of sixteen.

Since then this method of treatment has been employed on many occasions with varying success, but generally in a half-hearted manner, and always only after other means have failed and the patient is at death's door.

In August, 1896, I saw Dr. L. S. Little employ this procedure in an apparently hopeless case with success at the Shanghai General Hospital, and so impressed was I with the wonderful effects of the injections and the ultimate result, that I volunteered to assist him in any future cases it might be deemed necessary to inject, as such form of treatment entails unflagging attention on the part of the medical attendants. This offer was willingly accepted. During the three months, August, September and October, there were twenty-one cases of cholera admitted into the hospital, and of these eleven were treated by intravenous saline injections with seven recoveries and four deaths. Of the ten non-injected cases five recovered and five died. Taking both classes together the total mortality from cholera for the year 1896 was less than any year since the hospital was first established in 1864,

with the exception of the first year, when it might be safe to say that probably cases other than true cholera were included among the recoveries.* If the injected cases of 1896 alone be taken and contrasted with the average mortality for the thirty-three years, the figures show 59% as average for the previous years, and 36% for 1896—a gain of 23%. This large gain is, I believe, entirely due to the treatment by intravenous injection.

Action of Intravenous Injections in Cholera explained.

It is now universally recognised that cholera is caused by the comma bacillus located in the intestinal tract. Its presence there occasions a hypersecretion of the *succus entericus* which is poured out in such quantities as to drain the whole body of its fluids, the blood being the first and chief-sufferer. That it is this lack of fluid in the blood which causes most, if not all, of the symptoms of the algid stage of cholera, is proved by their disappearance on injection. Indeed, similar symptoms may even occur without the presence of the bacillus, as in excessive diarrhoea, the too free use of saline purgatives, or after excessive hæmorrhage. If the poisonous product of the bacilli is responsible for any of these phenomena, it is probable that the fluid injected has a double action; thus, in addition to restoring the bulk and fluidity of the blood, it may have also have either a direct antidotal effect towards this toxin, or, by reason of renewing and maintaining the normal condition of the blood, permit of the cells secreting the antitoxin necessary to neutralise such poisonous product.

If we examine these symptoms of the collapse stage, the following may be accepted as causes arising solely from the loss of the blood plasma and local irritation by the bacilli.

<i>Symptoms.</i>	<i>Causes.</i>
1. Weak heart.	} Diminished volume of blood in heart and vessels.
2. Feeble pulse.	
3. Shrivelled extremities.	} Do. and stasis of inspissated blood in capillaries and small vessels.
4. Cold breath.	
5. Shrunken eyeballs.	
6. Cramps.	
7. Great thirst.	Do. do. and by loss of body fluids.
8. Whispering voice.	Do. do. producing dryness of vocal cords.
9. Rapid, shallow breathing.	Do. do. producing venous blood supply to the respiratory centre.
10. Suppression of urine.	Diminished blood pressure and amount of blood plasma; also absorption by mucous membrane of bladder.

* See Tables I and II.

<i>Symptoms.</i>	<i>Causes.</i>
11. Cold sweat.	Stimulation of sympathetic by internal pyrexia.
12. Internal pyrexia.	Increased activity of intestinal glands from local presence of comma bacillus; also cramps of skeletal muscles.
13. Alvine flux.	} Reflex irritation from intestinal tract, produced by presence of comma bacillus and fluid accumulation.
14. Vomiting.	
15. Hiccough.	

It must, however, be remembered that no single cause can act without having that action modified by others also called into play.

As the function of absorption of the intestinal tract is almost entirely held in abeyance during collapse, all fluids or drugs administered by the mouth or lower bowel remain either unabsorbed or are ejected without giving any relief during this stage. How different is it when intravenous injection is resorted to! Any one who has ever seen or practised the operation is never likely to forget the wonderful change so almost invariably following. With very few exceptions, (those with clots in heart and vessels), all the symptoms of the algid stage enumerated above vanish, with the exception of the diarrhoea; the first nine in almost as many minutes; the internal pyrexia falls to normal, and a moist, warm skin replaces the cold sweat as soon as the peripheral circulation is restored; vomiting and hiccough, if present, are immediately relieved; urine probably at once begins to be secreted and may be voided in a few hours; even the alvine flux may be diminished. Nor is this all, for as vomiting is checked by the injections, it also permits of the exhibition of remedies by the mouth, with the possibility of their being absorbed by the stomach or, failing that, of being brought in direct contact with the bacilli in the intestinal canal. From a moribund condition the patient may be brought to one of ease and comfort, and during the passage of the fluid the most delightful feeling of relief is experienced—as though life were flowing in through the tube. After the good effects of one injection have worn off, patients eagerly beg for a repetition. There is no parallel in the whole practice of medicine for the wonderful change that takes place.

But this extraordinary revival is only temporary in many cases. After from two to six hours the condition of the patient may be as bad as ever, and he, if not injected again before too late, will die. The good effects are witnessed on re-injection as often as it is resorted to, unless the patient has sunk too low or collapsed too often, when the right heart becomes filled with blood clot—a hopeless condition. When a single injection is not sufficient to tide over the period of collapse till reaction is established,

the duration of the benefit afforded by injection usually decreases with the number of times the operation has been performed.

*The Collapse Stage the most Fatal Period in Cholera :
Danger of postponing Injection.*

Of the 227 deaths from cholera, occurring since 1864, at the Shanghai General Hospital, 182 were on or before the third day; this represents 80% during collapse, of the total number of deaths.* From this it is evident that this stage is by far the most dangerous period of the disease.

In 1896 the first ten injected cases were treated in the usual way; when a patient was so far gone that his case seemed hopeless, injection was resorted to, the quantity injected being regulated by the improvement produced. He was then watched, and if he sank to or near his former state, the injection was repeated as often as necessary.

That this plan is of great benefit is proved by the result, but it also has certain disadvantages; thus, the waiting for signs of improvement while other means are being tried, and postponing the injection till the pulse is absent, or nearly so, at the wrist, may result in the clotting of the inspissated blood in the heart and vessels from the stasis caused by peripheral failure. This condition was, I believe, present in three of the four fatal cases.† In the last it was very marked, the bed-card jottings of which I here reproduce:—

A. B., aged 39, French, admitted Sept. 14-15 (midnight). Died Sept. 15-16 (midnight). Taken ill after supper with vomiting, purging, and cramps; voice a whisper.

4 a.m. Collapse.

5 a.m. Pulse imperceptible. Left basilic found with difficulty. 50 ozs. injected.

9.30 a.m. Collapsed; pulseless; respiration hurried; injected 65 ozs. with obstructed slowness into right median-basilic.

12.15. Collapsed. Internal saphenous vein opened in both legs above the inner malleoli; 15 ozs. only was received into each. Large vein in fore-arm (posterior ulnar) opened, which only took up 20 ozs.; making injection 50 ozs. in all. Faint pulse came back. Was almost dead. Felt nothing of operations in three places.

3.30 p.m. Collapsed as before. Surface veins invisible. Cut down on and opened right basilic high up. Injected 160 ozs.

7 p.m. Very much better; would get up to stool; in good spirits.

9 p.m. Doing fairly well.

12 p.m. Collapsed suddenly about 11 p.m. Had passed enormous quantities of fluid into bed. Became very blue, almost black. Respiration very laboured, comatose. While preparing to inject left basilic vein death occurred.

* See Table VII.

† See Table VIII; cases 3, 4 and 10.

Though there was no *post mortem* I feel sure there was clotting of the blood in the heart and vessels in this case. The smallness of the quantities admitted at the noon injections strongly supports this conclusion ; later, where a vein deeper and nearer the heart was taken, the fluid flowed much better, but the sudden attack, which culminated in death, was, I think, due to embolism of one of the pulmonary arteries, from a clot dislodged from the right ventricle. The surface veins in this case were almost empty and, as a consequence, wonderfully small and difficult to find ; as the pulse was absent, the proximal ligature of the limb was of no assistance alone, but the further application of a bandage from the extremity to the point of operation helped to make them discernible.

There were six operations in all, making a total of 16 pints of saline fluid injected. No pain was experienced by the patient during any of the operations, as he was in a semi-comatose state during their performance.

Continuous Intravenous Injection employed successfully to abort Collapse.

It was through this case that I was led to the thought *that not only should injection be practised early but it should also be employed continuously for a period calculated to outlast the collapse stage.* I recognised in intravenous injection a means of counteracting the collapse, and that as long as the fluid was flowing collapse was impossible, the injected fluid taking the place of that drained by the intestines, thereby maintaining the normal volume of blood.

Dr. Little, approving of this idea, kindly promised me the treatment by this method of the next serious case ; but on its admission I was not at hand and, as the case did not permit of even a short delay, he injected in his usual way and had finished before my arrival, when he handed over charge to me. As this was the last case injected, (though there were three others admitted later, none of them exhibited marked collapse), and, therefore, the only one in which I had an opportunity of testing the continuous intravenous injection, I give the notes in full as they were written down at the time :—

Herbert Whitefare, aged 22, British, stoker, S. S. *Eldrichdale*, admitted September 29th, 11 a.m. Two days before admission had eaten some Chinese food in a native restaurant, including some fish which “smelt horribly” after which he had diarrhœa which continued till admission. Next day, (that previous to admission), he dived twice from the fore-castle of the steamer into the water, a distance of about 45 feet, and swam about for an hour ; after this he felt ill, which he attributed to striking the water with the back of his head at the first dive. Had bells ringing in his ears as if he got a heavy blow on each. On arrival at the hospital at 11 a.m. he lay down on the ground “doubled up with a lump in his stomach.” He was admitted at once and seen by Dr. Little, who made the following notes :—

11 a.m. Voice, a whisper; tongue, ice cold; *facies*, very marked choleraic; pulse, fair, weak, 100; legs, very cold; cramps in legs, very severe; began at 7 a.m.; cannot remain quiet; respiration, faint to occasional sighs; fingers shrivelled; temperature, axilla below 93°, rectum 98.4°.

11.30 a.m. Injected 70 ozs.; feels much better and cramps gone.

As Dr. Little was good enough to send for me I arrived at 12.30, took over charge and made the following notes:—

12.30 p.m. Saw patient, after injection by Dr. Little, with good reaction.

1.20 p.m. Condition still good, but vomiting tinged with blood (?) very frequent, and stools about every ten minutes, with occasional cramps, pulse weak, but fairly perceptible.

2 p.m. Opened left median basilic and introduced glass nozzle, capable of supplying 1 oz. a minute at a height of 2½ feet, put splint at back of elbow and fastened nozzle in position with adhesive plaster. 120 ozs. flowed in during the first two hours; afterwards the fluid ran slower; from 4 to 5:30 p.m. only 40 ozs. passed, and by 6 p.m. 10 ozs. more, making a total of 12 pints in all. From the time that the continuous injection was started the patient had no vomiting; his motions, of which he only had one during the first two hours but more frequently later, were passed into the bed as it was necessary to keep him lying down; the only cramps he had were slight ones, shortly after the beginning of the injection, affecting the muscles of the great toe of each foot, possibly due to exposure as they disappeared on covering the feet. Before the second injection he had well marked cold perspiration, which continued for the first twenty minutes and then ceased, the skin becoming and remaining naturally warm and moist. At 5.30 he said he could pass urine if allowed to sit up.

6 p.m. Allowed to sit on stool while bed is being made; passed copious rice-water discharge; commode bucket now half full (6 to 8 pts.); passed urine freely at stool; bed soaked through with alvine discharge; said he "would like slippers to walk about." During change of bed the vessel with saline fluid was held too low, and as the flow had stopped the cannula was removed and found to be full of clotted blood. Decided not to renew injection then.

7.30 p.m. Left patient well all round.

8.30 p.m. Pulse 100, full; respiration easy, 22; voice, which has been improving all along, is now a good chest one; feels "first-rate" and thinks he will be able to sleep. Has had two motions since 7.30; urine again with the first. Further injection considered unnecessary, but left orders to be sent for in case he had cramps, or vomiting, or became blue or restless.

30th, 9 a.m. Pulse 84, strong; respiration, normal; slept well; says he is as well as I am; feels very hungry. To get rice water *ad lib*.

4.15 p.m. Condition unchanged; to get milk and water.

8 p.m. Condition unchanged; feels very hungry and begs for food; sleeps in snatches. Temperature in axilla 97.4°, in mouth 97.8°, in rectum 98.4°. Has been six or eight times to stool to-day, discharge coloured with bile.

Oct. 1st, 9.30 a.m. Slept well during the night; had several motions, about three pints, of bile-stained fluid in which comma bacilli were plentifully found (Dr. Macleod). Is very hungry. To have beef juice. From this date there was uninterrupted convalescence, and ten days later he was transferred to the general wards, where he gained twelve pounds in weight during the first week. For a day or two he was occasionally troubled with slight hiccough, but a few drops of spirits of camphor on sugar, (which had the effect of making him vomit), always relieved him. This was the only medical treatment he received.

Though the case above narrated cannot strictly be called one of continuous injection, seeing that there were two injections with an interval of over two hours between them, yet it shows in a marked manner the advantage of the method—that of keeping the blood to or near its normal bulk. The first injection accomplished this for the time being, thereby giving relief of the distressing symptoms, but as the drain on the blood fluid still continued for the succeeding two hours without a compensatory augmentation by injection the former symptoms of collapse gradually came back, and had not re-injection been resorted to, the patient would, in all probability, have been in as sad a plight as before. Why, when the 120 ozs. had flowed in during the first two hours, only 50 ozs. should have passed during the second two hours, I can only explain by the supposition that the blood vessels became filled with the 120 ozs. and so raised the blood-pressure in them to or near the pressure of the column of water in the injection tube, and the slower flow afterwards was controlled and represented by the leakage from the veins to the intestines. Though this explanation would place the venous blood-pressure very high, and I did not notice any abnormal fullness of the veins, yet the incident that the blood from the vein found its way along the tube nearly as far as the reservoir while I thought I was holding it well above the level of the nozzle, and the fact that all injections flow slower towards the end than at the beginning, would seem to support this view. The patient suffered no inconvenience during this long injection other than that caused by the presence of the straight splint on his extended arm, from which he asked to be relieved.

The Operation of Continuous Intravenous Injection described.

I will now describe the operation of continuous intravenous injection, as employed in the above case, it being a modification of Dr. Little's method.

Apparatus :—

1. A graduated glass irrigator with three feet of small rubber tubing and glass nozzle capable of supplying 1 oz. a minute under pressure of $2\frac{1}{2}$ feet of water column, and covering lid.
2. Thermometer.
3. Scalpel, sharp pointed.
4. Dissecting forceps.
5. Probe.
6. Splint with padding.
7. Rubber adhesive plaster.
8. 1 doz. quarts distilled water.
9. 12 oz. bottle concentrated saline solution.
10. Bucket with hot water supply.
11. Dressing for wound.

The concentrated solution of salts is based (Dr. Little) on those contained in normal blood, and is prepared in a concentrated form for convenience. The formula is as follows:—

Chloride of sodium	...	...	...	...	60 grains.
Bicarbonate of sodium	...	...	...	...	20 „
Phosphate of sodium	...	...	...	...	3 „
Chloride of potassium	...	...	...	...	6 „

It should be freshly prepared, boiled, filtered and placed in a graduated 12 oz. bottle. The addition of an ounce of this solution to nineteen ounces of distilled water makes a suitable injection fluid. But common table salt of the above strength alone may be used prepared in the same way.

Distilled water should, if possible, be used in the injection, but carefully boiled and filtered water may be employed. The *silent*, thrice distilled, water of the Aquarius Company, that used at the Shanghai General Hospital, is quite reliable; the so-called quart contains about an imperial pint.

The preparation of the injection may be thus accomplished:—The corks are drawn from three of the “quart” bottles, and an ounce of the contents of each poured into a measuring glass, where its purity can be judged, and then discarded. An ounce of the concentrated solution is then added to each of the three bottles; two of these are then placed in the bucket half-full of warm water, not too hot lest the glass breaks, and hotter water is gradually added till a thermometer inserted into the bottles shows a temperature of 106 ° F. One bottle is then taken out, dried on the outside with a towel, and its contents poured into the reservoir of the irrigator, where a couple of degrees will be lost in warming the glass. A small quantity of the fluid is then allowed to run through the tube and nozzle to clear them of air and warm them. If the lid, with the thermometer projecting through it, be placed in position and the reservoir suspended from the cross-bar of the bed, or other suitable object at a height of $2\frac{1}{2}$ feet from the patient's arm, the apparatus will be ready for use. The fluid, in its passage from the reservoir to the nozzle, loses two or

three degrees of heat, so that it enters the vein at about 100° F. or a little higher, a couple of degrees one way or the other being of little consequence. The supply of fluid and heat is maintained by the addition of warmer solution from the second bottle in the warming bucket, and if during the performance of this the temperature is raised too high at any time, it may be reduced by the addition of cold solution from the third bottle. In adding fluid while the injection is running, it is safer to compress the tube lest a bubble of air be carried into the circulation.

Operation.—The patient is placed on his back in bed. A prominent vein is looked for, at the bend of the elbow for choice, where either the median-cephalic or median-basilic may be selected. The long saphenous just above the inner malleolus is also a suitable site. The part is then washed and a bandage applied round the limb above, as in the operation for venesection, tight enough to impede the venous but not the arterial supply. If the pulse is not altogether gone at the wrist, this will make the vein more prominent. With the scalpel an incision, half an inch long, is made through the skin, over and in the course of the vein. A little dissection is now necessary to clean the vein and permit of the probe being passed beneath. When this is accomplished, the injection apparatus being ready, the anterior wall of the exposed vein is opened by puncturing it with the sharp pointed scalpel (or better, a Symes' abscess knife) and cutting to the extent of about two lines. The ligature is then removed from the arm and, as the dark blood flows, the tapering nozzle of the injection apparatus, with the solution running, is inserted into the opening till it completely fills it. If the fluid is flowing, as shown by a fall in the reservoir, a padded splint is applied to the back of the arm and fastened above and below with two strips of rubber adhesive plaster, while a third strip is brought from the middle of the splint round the arm and glass nozzle, so as to fix the latter; this is best done by dividing up the free end of the plaster into three strips and then bringing one under and two over the nozzle. When the nozzle is securely placed and the injection satisfactorily flowing, the probe may be gently removed. The nozzle should be held perpendicular to the surface of the part in passing its tip into the vein, to avoid the possibility of passing it into the sheath or between the coats of the vein, and then directed upward along the course of the vessel. After removal of the tube the wound is dusted with iodoform and a pad and figure of 8 bandage applied.

The apparatus thus arranged can be used for hours with very little discomfort to the patient—in my case it was four hours—and its employment should be continued as long as the flow lasts, or till it is believed all danger from collapse is passed. Should the injection not have been continued long enough, as shown by a return of pulse failure and other collapse symptoms, the operation should be repeated in a new place.

Continuous Injection advocated as Free from Danger and of Lasting Benefit.

Whether it were known that, as I mentioned before, the addition of saline fluid to the choleraic blood simply makes it normal in fluidity and bulk, thereby allowing the circulatory, respiratory, digestive, and nervous systems to work smoothly, or, in addition to its loss of water and salts, this blood contains a toxin which the saline fluid directly neutralises, or permits of the leucocytes and tissue cells developing the necessary antitoxin to counteract this poison, is immaterial as far as the treatment is concerned. The fact remains that the introduction of normal saline solution into the veins at a moderate temperature and pressure is never followed by any evil effect; the argument that the relief obtainable is only temporary being the cause of its comparatively small employment, but with the continuous method here advocated, this argument can no longer be used. It may, therefore, be said that continuous intravenous injections practised as above described, is a harmless procedure, if employed early is certain to relieve the agonising symptoms of the algid stage, and, I believe, altogether prevent the continuance of this stage, in which three-fourths of the deaths occur. I would go further, though I do not feel on such safe ground, and express the opinion that this treatment also effects the reaction. That the amount of reaction depends on the degree and length of the previous collapse; by arresting the collapse the reaction is also modified. With the exception of the case injected by the continuous method which supports this view, no proof can be obtained by comparing the reaction in injected cases as heretofore practised with others not so treated, seeing that the injected cases are allowed to become very collapsed to begin with, which state may recur again and again, and the majority of such would not live to show reaction were it not for the injections.

If this plan of treatment was universally employed from an early period of the disease, I think it possible that the mortality of cholera would be reduced from fifty to fifteen in every hundred cases of this disease.

Continuous Saline Injections into the Intercellular Tissue, Peritoneum or Pluræ, suggested.

Continuous saline injection might also be employed into the intercellular tissue, the peritoneum, or the pluræ, with the same apparatus slightly modified, a hypodermic needle, or Southey's cannula being substituted for the glass nozzle; but in marked collapse a primary intravenous injection should first be practiced, at any rate in the case of intercellular injection, to restore the peripheral circulation, thereby permitting the more ready absorption of the fluid introduced and to give immediate relief from the distressing symptoms; the object aimed at being the same as in the continuous intravenous injection—that of keeping the blood at its normal volume. Were such a measure successful it would simplify the treatment and entail much less watchfulness on the part of the attendant.

Irrigation of the large intestine might also be employed in addition, with an O'Beirne's long tube and an anal speculum, the tube being passed, with the fluid flowing, as far as possible and the lower bowel thus washed out.

The following tables (with the exception of the last) have been compiled from the Register of the Shanghai General Hospital, and embrace the period from its first establishment in 1864 to the end of 1896. The following explanatory remarks may be of interest.

Cholera at Shanghai is more or less endemic, making an annual appearance generally towards the end of the summer.

Though the majority of foreigners attacked are seamen, the disease is nearly always acquired some days after arrival, and principally by those who have been on shore celebrating the end of a voyage in the usual sailor-like fashion.

The comparative immunity experienced by the foreign residents must be attributed to the hygienic precautions employed by this class with the better water, food, and houses used. It should be remembered that the cases here given do not represent the total number of foreigners attacked, there being no compulsory entrance to hospital enforced at Shanghai. Probably an additional number equal to about one-fourth of that here given have been treated outside the hospital.

Table I.

Showing the number of cases of cholera admitted during each year of outbreak from 1864 to 1895, inclusive, with the average mortality for that period.

YEAR.	NO. OF CASES.	RECOVERED.	DIED.	MORTALITY.
1864	16	11	5	31. per cent
1865	18	8	10	55.5 "
1866	1	...	1	100. "
1867	12	4	8	67. "
1875	15	6	9	60. "
1877	18	8	10	55.5 "
1878	17	7	10	59. "
1879	1	...	1	100. "
1880	2	...	2	100. "
1881	26	14	12	46. "
1882	25	13	12	48. "
1883	28	8	20	71. "
1884	1	...	1	100. "
1885	39	16	23	59. "
1886	25	8	17	68. "
1887	26	8	18	69. "
1888	7	1	6	86. "
1889	2	1	1	50. "
1890	26	9	17	65. "
1891	39	18	21	54. "
1893	1	1	...	...
1895	24	10	14	58. "
Total....	369	151	218	59. per cent

From this table it will be seen that for some years there were no cases admitted, including one period of seven consecutive years. This, however, does not exclude the possibility of the disease occurring among the Chinese during this time, of which no record is obtainable.

The average mortality—59 per cent.—is high, which may be accounted for by the practice of the late physician of the hospital, Dr. Little, of only entering well marked cases as cholera during the 28 years he officiated, while under the headings of “choleric,” “choleraic diarrhœa” and “cholera phobia” he placed some cases which another might include under the graver heading. His predecessor followed this latter course, judging from the absence of the milder designations in the hospital register and the fact that no less than five out of the eleven cases of recovery in 1864 were discharged cured on or before the fifth day, which explains the exceptionally low mortality of 31 per cent. for the first year; were these five excluded the mortality would become 45 per cent. which would still be lower than any year prior to 1896.

Table II.

Showing the number of cases of cholera admitted during 1896 with the mortality of those treated by injection and those by ordinary means.

	NO. OF CASES.	RECOVERED.	DIED.	MORTALITY.
Injected	11	7	4	36 %
Non-injected	10	5	5	50 „
Total 1896.....	21	12	9	43 %

This table hardly does justice to the saline injection treatment, for the two classes of cases were not of equal gravity, the more severe ones being chosen for injection while the others were expected to recover without its aid. Treatment by injection, however, was only begun with the fifth case, after three deaths had occurred in the first four.

Table III.

Showing the mortality of nationalities of which more than ten cases were admitted.

NATIONALITY.	NO. OF CASES.	RECOVERED.	DIED.	MORTALITY.
Irish	31	7	24	77 %
Japanese	16	4	12	70 „
American	30	10	20	66 „
Scotch	24	9	15	62 „
Norwegian	23	10	13	56 „
English	123	57	66	54 „
Manilamen	12	6	6	50 „
Swedes	19	11	8	42 „
German	24	15	9	37 „
French	48	33	15	31 „

In this table the Irish head the list of nations with the greatest mortality from this disease, while the French and German each exhibit a mortality of less than half that of the Irish. This may, to a certain extent, be explained by the partiality Irishmen show for intoxication when at liberty and with money in their pockets. The French and German patients were mostly admitted from men-of-war in harbour.

Table IV.

Showing the advent and duration of each outbreak according to the cases admitted, and the totals for each month.

YEAR.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	TOTAL.
1864	...	4	9	3	...	...	...	16
1865	7	11	...	...	18
1866	1	...	...	...	...	1
1867	2	6	3	1	...	12
1875	7	8	15
1877	13	5	...	18
1878	3	5	6	3	17
1879	1	...	...	...	1
1880	2	...	...	2
1881	1	13	10	2	26
1882	2	20	3	...	25
1883	1	1	12	5	7	2	...	28
1884	1	1
1885	9	14	15	1	39
1886	1	...	...	3	15	5	1	25
1887	6	14	6	...	26
1888	6	1	...	...	7
1889	2	...	...	...	...	2
1890	18	8	...	...	26
1891	4	24	6	4	1	39
1893	1	...	...	...	...	1
1895	15	8	1	...	24
1896	6	12	3	...	21
Total. ...	2	5	31	115	152	68	17	390

This table shows the three months, August, September and October, as the time of greatest prevalence of cholera. Cases, however, have been admitted as early as May, and none later than November.

Table V.

Showing the mortality of different stages of the outbreaks, based on the number (when sufficient) of cases admitted each year.

YEAR.	NO. OF CASES.	1ST QUARTER.		2ND QUARTER.		3RD QUARTER.		4TH QUARTER.	
		RECOVERED.	DIED.	RECOVERED.	DIED.	RECOVERED.	DIED.	RECOVERED.	DIED.
1864	16	2	2	4	..	3	1	2	2
1865	18	1	4	2	2	..	4	5	..
1867	12	2	1	..	3	..	3	2	1
1875	15	1	3	..	4	3	..	2	2
1877	18	2	3	3	1	2	2	1	4
1878	17	2	2	1	3	3	2	1	3
1881	26	2	5	5	1	3	3	4	3
1882	25	3	3	4	2	3	4	3	3
1883	28	1	6	2	5	3	4	2	5
1885	39	6	4	4	6	4	5	2	8
1886	25	1	5	1	5	3	4	3	3
1887	26	3	4	2	4	1	5	2	5
1888	7	..	2	1	1	..	1	..	2
1890	26	3	4	1	5	3	3	2	5
1891	39	6	4	6	4	4	5	2	8
1895	24	4	2	1	5	2	4	3	3
Total.....	361	39	54	37	51	37	50	36	57
Mortality.		58 %		58 %.		57.5 %.		61 %.	

This table shows that cholera at Shanghai does not follow the epidemic rule of this disease, viz., that the severity diminishes with the duration, in other words, that more fatal cases occur at the beginning than at the end of an epidemic. The cholera bacillus is probably always present at Shanghai and only requires favourable conditions for its spread. The Chinese habit of cooking everything they swallow (including water in the form of tea) except fruits, accounts both for the limited extent of the annual outbreaks and the time of year they occur.

Table VI.

Showing the number of cases admitted from each decennial age period, with the mortality for each.

AGE.	NO. OF CASES.	RECOVERED.	DIED.	MORTALITY.
1 to 10	4	1	3	75 %
11 " 20	26	11	15	58 "
21 " 30	184	87	97	47 "
31 " 40	105	42	63	60 "
41 " 50	53	14	39	74 "
51 " 60	15	8	7	47 "
61 " 70	3	..	3	100 "
Total.....	390	163	227	59 %.

Here it is seen that the majority of those attacked were in the prime of life and the mortality was greatest at the extremes of age.

Table VII.

Showing the periods on which death occurred in fatal cases, with the number for each day of the disease.

DAY OF DISEASE.	1st.	2nd.	3rd.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	14th.	21st.	27th.
No. of Deaths.	93	65	24	13	8	7	2	4	4	1	4	1	1

This table shows that 80 per cent. of the total mortality died on or before the third day, *i.e.*, during collapse.

For Table VIII see next page.



VIII.—Table of Cases treated by Intravenous Injection during 1896.

Case.	Age.	Condition before Injection.	Injections.		Condition after Injection.	Result.	Remarks.
			Time.	Number; Quantity.			
1	30	Marked collapse " " Moribund	1st day 10 a.m. " noon. " 4 p.m.	1st 35 ozs. 2nd 35 " 3rd 80 " 1st 45 "	All symptoms relieved each time	Recovery	Considered hopeless by all. Protracted "typhoid condition." [anaform rash. Ulcer of cornea and scarlatina.] Uninterrupted convalescence. Appeared to be dying before each injection; was very blue and restless throughout.
2	30	Cramps most marked	4 "	45 "	No cramps	"	"
3	20	Quite pulseless; almost voiceless; vomiting; purging in legs	5 p.m. 2nd day 5 a.m. " 4 p.m.	40 " 40 " 80 "	Pulse returned and all other symptoms relieved after each	Death	"
4	28	Extreme collapse No radial pulse	1st day 5 " 2nd day 7 a.m.	45 " 40 "	Improvement after first well marked	"	The second injection was too long delayed; the flow stopped at 40 ozs. Uninterrupted convalescence.
5	21	Profound collapse; impossible to keep him in bed	1st day 4 p.m.	75 "	Wonderfully improved; sleeps all the time	Recovery	"
6	39	Flickering pulse Severe cramps; vomiting most marked	" 8 a.m. " noon.	40 " 80 "	Pulse good; cramps and vomiting gone; no bad symptom	Death	After 24 hours bilious vomiting set in and continued to the end. On the 5th day became delirious and died on the 6th.
7	28	Collapsed; pulseless; vomiting	" 10 a.m.	70 "	Pulse and voice returned; no vomiting	Recovery	Rapid convalescence. Four hours after last injection was quite comfortable. Rapid convalescence.
8	29	Severe cramps; very feeble pulse; voice a faint whisper; very collapsed before last injection	" 10 " " 1 p.m. " 4:30 "	35 " 65 " 80 "	Marked improvement after each; urinated 8 hours after last	"	"
9	22	Limbs cold; cramps very severe; pulse scarcely perceptible	" 10 a.m. 2nd day 10:30 "	40 " 40 "	Great improvement after each; urinated 6 hours after last	"	Protracted convalescence with ulcer of one cornea.
10	39	Pulseless; vomiting; cramps; purging; laboured respiration	1st day 9:30 " " 12:15 p.m. " 12:15 " " 12:15 " " 3:30 " " 11:30 a.m. " 2:16 p.m.	50 " 65 " 15 " 15 " 20 " 160 " 70 " 170 "	Injection obstructed in all but last, when improvement was very marked	Death	History of case already given.
11	22	Whispering voice; ice-cold tongue; cramps in legs; vomiting, sighing respiration	"	"	During the second injection all the symptoms disappeared, and there was no recurrence	Recovery	History of case already given.

Selected Article.

REMARKS ON THE CLINICAL VALUE OF
EHRlich'S METHODS OF EXAMINATION
OF THE BLOOD.

By WILLIAM SYDNEY THAYER, M.D.,
*Resident Physician to the Johns Hopkins
Hospital, Baltimore.*
(Concluded.)

In considering now briefly the main diagnostic points which may be obtained from a morphological examination of the elements of the blood, let us first take up the so-called diseases of the blood itself.

Ehrlich, in his address last April before the Eleventh Congress for Internal Medicine, says: "With diseases of the blood, in contrast to most other affections, we find ourselves in a favorable position in that we are able to obtain during life, and not for the first time post-mortem, satisfactory information concerning the nature of the changes taking place." Here, perhaps, the examination of the blood is of the most positive advantage, but as I shall try to show later, there are many other conditions where it may be of considerable help.

First, then, let us consider schematically the characteristics of the various types of anæmias, noting how much may be determined from an examination of the dried specimens alone.

Before taking up the essential anæmias it may be well to consider the general features common to most secondary anæmias.

*Secondary Anæmias.**Oligocythæmia.*

Oligochromæmia. (The relative loss in hæmoglobin being considerably greater than in corpuscles.)

Variations in size of the red elements with perhaps slight average diminution in diameter.

Poikilocytosis.

Pallor of the individual elements, that is, the point of greatest biconcavity more marked than normally.

Degenerative forms.

Nucleated red corpuscles (normoblasts).

Leucocytes. There is a leucocytosis in acute cases. In old chronic secondary anæmias the leucocytes may be about normal or even sub-normal in number, and in these cases where the course is much less favorable, nucleated red corpuscles are not nearly as numerous, and an occasional megaloblast may be seen. The following case is a good example of a secondary anæmia.

D. Grave Secondary Anæmia following repeated Venesections (practised by the patient herself).

Red corpuscles . . .	1,775,000
Colorless corpuscles . . .	10,500
Hæmoglobin . . .	19%

Specimens of blood stained with the triple stain showed: considered difference in the size of the corpuscles; moderate poikilocytosis. Three typical normoblasts seen while making a differential count of over one thousand leucocytes. Differential count:

Small mononuclear . . .	10+ %
Large mononuclear . . .	1.5 %
Transitional forms . . .	1.1 %
Multinuclear neutrophiles . . .	85+ %
Eosinophiles . . .	2.1 %

It is easy to see that many of the most important points are to be obtained here from the examination of a dried specimen; only the actual count of the elements is lost.

Primary Pernicious Anæmia.

Oligocythæmia (more marked than in any other known condition).

Oligochromæmia, which is absolute but not relative: the relative proportion of hæmoglobin being higher than the number of corpuscles (a most characteristic point).

Great variation in the size of the elements with probably an average increase in size.

Poikilocytosis (marked).

Degenerative forms.

Nucleated red corpuscles in varying numbers, a most characteristic point being the presence of a distinct proportion of megaloblasts which, when present in a considerable proportion are almost diagnostic. Megaloblasts are to be found, as has been said above, in other "essential blood diseases," and sometimes in grave secondary anæmias. As Ehrlich has pointed out, an occasional megaloblast with a considerable number of normoblasts is a point of relatively little significance, while the presence of a small number of nucleated red corpuscles consisting largely of megaloblasts would be a grave sign. Nowhere does one see so large a proportion of megaloblasts as in pernicious anæmia, and nowhere are such typical large forms found.

Leucocytes: usually diminished in number, showing a relative increase in the small mononuclear elements (lymphocytes, small transparent forms), while the multinuclear elements are relatively diminished, sometimes being under 50 per cent.

The number of eosinophiles varies.

The following case is an example of this: The blood was from a case of pernicious anæmia with between one and two millions of red corpuscles in the cubic millimetre and a small number of leucocytes:—

Small mononuclear	38.4 %
Large mononuclear and transition forms	3.8 %
Multinuclear neutrophiles	54.3 %
Eosinophiles	3.1 %

Here the difference between the relative proportion of red corpuscles and hæmoglobin is an important diagnostic point, but with the presence of the marked poikilocytosis and megaloblasts, and in severe cases the changes in the relative percentage of the colorless corpuscles, the diagnosis

may be made with more certainty from a dried specimen than by the blood-counter.

That there are grave and even fatal anæmias which do not fall under this heading, which show deviations from this type of blood, is undoubted. Some of the anæmias associated with an enlarged spleen ("splenic anæmia,") as well as some of the anæmias with Hodgkin's disease do not fall into this class.

The great majority, however, of the cases which have been classed clinically as progressive pernicious anæmia show this type of blood; and in this brief summary we can only mention those definite types that have been so far made out.

Chlorosis.

Oligocythæmia (variable, usually moderate). In 64 cases in which I counted the blood and estimated the hæmoglobin, the average number of red corpuscles was 4,096,544, while the average per cent. of hæmoglobin was only 43.3 per cent.

Oligochromæmia (relatively very great).

Difference in size of the corpuscles with possibly a slight average diminution in the size in severe cases.

Poikilocytosis, considerable in severe cases.

Pallor of the individual elements.

Degenerative forms.

Nucleated red corpuscles in severe cases where there is marked oligocythæmia.

Leucocytes. There is little if any increase in leucocytes. In my 64 cases the average number of leucocytes was 8,467, a very slight increase. Thus it may be seen that while the morphological characteristics of the blood in chlorosis are nearly the same as in secondary anæmia, the essential characteristic, that of the great relative diminution in hæmoglobin, cannot be entirely denied, as v. Limbeck has attempted to do.

The so-called "simple anæmias," in my experience, show generally the same characteristics as the secondary

anæmias. This class, as a matter of fact, simply includes those anæmias for which we can find no cause, and which do not fall into the definite class of primary pernicious anæmia. They are probably usually examples of chronic secondary anæmia.

Leukæmia is generally met with in two forms:—

(1) *Spleno-Myelogenous Leukæmia*. The blood shows quite distinct characteristics.

Oligocythæmia, rarely under 2,000,000.

Oligochromæmia, relatively considerable.

Difference in size of the corpuscles with possibly a slight diminution in the average size.

Poikilocytosis, marked in severe cases.

Degenerative forms.

Nucleated red corpuscles: generally more numerous than in any other condition of the blood. Both normoblasts and megaloblasts may be found—numerous large elements in the process of division are not uncommon.

Leucocytes: generally increased in number more than under any other circumstances, while in their individual characteristics and the relative proportion of the different varieties one to another they show marked deviations from the normal.

(1) There is a very small relative proportion of the small mononuclear elements.

(2) The polynuclear neutrophilic elements are numerous, but in actual proportion often diminished. Great variations in size may be noted.

(3) The large mononuclear elements are very numerous, and among these are certain elements in which the protoplasm is filled with fine neutrophilic granules. Ehrlich has termed these elements.

(4) Myelocytes. These are found (in adults) barring an occasional unimportant exception, only in this form of leukæmia; on examining the blood-forming organs they are to be found alone in the marrow (Ehrlich),

hence the name. There is also a number of large mononuclear elements with protoplasm staining deeply like lymphocytes.

(5) The eosinophilic leucocytes are present in about a normal relative proportion, that is, are absolutely greatly increased. They, too, as in the case of the polynuclear neutrophils, show the greatest variations in size.

(Of certain amphophilic and basophilic leucocytes occurring in leukæmic blood it is not worth while to speak in this brief summary. Their practical diagnostic importance is not yet great.)

The proportion of these elements in an average case of leukæmia may be shown in the following count, from a case in Professor Osler's wards at the Johns Hopkins Hospital, in which the proportion of white to red corpuscles was as one to three.

Small mononuclear leucocytes	.96 %
Large mononuclear and transition forms	3.0 %
Multinuclear neutrophiles	70.0 %
Myelocytes	23.5 %
Eosinophiles	2.3 %

The diagnosis of this form of leukæmia depends then largely upon the histological examination of the blood. The most characteristic points are: (1) the presence of nucleated red corpuscles; (2) the relative diminution in the small mononuclear elements; (3) the great difference in size in the multinuclear elements; (4) the presence of myelocytes; and (5) the presence of a normal proportion of eosinophiles in so extensive an increase of leucocytes. The presence of a nearly normal percentage of eosinophiles I still consider a point of some value in the diagnosis of this form of leukæmia. Many authors have, I think, entirely misunderstood Ehrlich's original statements with regard to this point. He has, so far as I know, never asserted that the presence of eosinophilic cells in leukæmia was diagnostic; and he has not, as so many have assumed, asserted that

they were necessarily present in an increased relative proportion. Neither has he said that they are present in increased numbers in all forms of leukaemia. In twelve cases of typical spleno-myelogenous leukaemia, from which I have specimens of the blood, the presence of at least a normal percentage of eosinophiles has been in all a marked characteristic.

(II) *Lymphatic Leukaemia*. This form is much rarer. It is often the most acute and rapidly fatal of the so-called blood diseases. Here the oligocythæmia is often more marked than in the other forms, while the proportion of white to red elements is commonly not so great. Nucleated red corpuscles are rare, and when present are often megaloblasts. The colorless corpuscles here show a great increase in the small mononuclear elements. In a case, for the blood of I which am indebted to Dr. F. C. Shattuck, there were found:—

Small mononuclear elements (almost entirely lymphocytes)	97.9 %
Large mononuclear elements	0.4 %
Multinuclear neutrophils	1.4 %
Eosinophiles	0.1 %

That forms of leukaemia may occur where the blood does not answer to either of these types, is true, but they are probably uncommon. In 16 cases of leukaemia from which I have specimens of the blood, 12 corresponded exactly to the first type, three to the second; while in one case, which occurred at the Johns Hopkins Hospital, where all the lymphatic glands, the spleen and the marrow were markedly affected, the proportion of white to red corpuscles being as one to twenty-five, the blood contained but six per cent. of multinuclear elements, 5.4 per cent. of myelocytes, one per cent. of eosinophiles, the large mononuclear and small mononuclear leucocytes representing the rest of the elements, 87.6 per cent.; nucleated red corpuscles were scanty. (In this case karyokinetic figures were found in the nuclei of some large mononuclear leucocytes in the blood, and in a

great number of similar elements in the bone marrow; they were present, but less numerous, in the spleen, lymphatic glands, and lymphatic tissues generally. The case will be reported later.)

Some other conditions in which the examination of the blood may be of value.

All conditions associated with any inflammatory process, if it be of any extent, are accompanied by a leucocytosis; and, as has been before said, this leucocytosis in man consists generally in an increase in the relative proportion of the polynuclear neutrophils, the increase being at the expense of the small mononuclear elements. Such conditions are *abscess, phlegmon, erysipelatos processes, acute tonsillitis, inflammations of the serous membranes, pleurisy, peritonitis (appendicitis), meningitis*. This leucocytosis varies in extent in various conditions. It varies within certain limits, proportionally to the extent of the process. The following is an example of an excessive leucocytosis:—

K. Pneumonia, Acute Hæmorrhagic Nephritis.

Red corpuscles . . .	5,094,000	} 1: 44+
Colorless corpuscles .	114,750	

Differential count of the leucocytes:

Small mononuclear	0.32%
Large mononuclear	1.12%
Transitional forms	1.12%
Multinuclear neutrophils	97.44%

GENERAL DISEASES.

Tuberculosis.—In all forms of tuberculosis there is usually a relatively slight anæmia. The anæmia of tuberculosis is often more apparent than real. In the latest stages of pulmonary tuberculosis there may be a relatively high proportion of corpuscles and hæmoglobin, while on superficial examination there would appear to be grave anæmia. Leucocytosis is present to a greater or less extent in almost all forms of tuberculosis, particularly in chronic pulmonary tuberculosis. In acute general tuberculosis

this is probably usually the case; and several counts by Uskow show that in his cases the increase was simply in the multinuclear elements with a relative diminution in small mononuclear elements alone. One case, which I have observed was, however, a marked exception to this rule, the colorless corpuscles being present in diminished number.

Typhoid Fever.—Here the blood shows certain quite important changes. It has been shown by various authors that typhoid fever may be followed by a grave anæmia. In one case which I observed in Professor Osler's clinic at the Johns Hopkins Hospital, this amounted to 1,300,000. The colorless corpuscles on the other hand, have been shown not only to be present in a not increased number, but actually during the height of the fever to be somewhat diminished, a fact of considerable importance from a diagnostic standpoint. This point has been verified by Dr. J. S. Billings, Jr. and myself in nearly 200 counts of the blood in typhoid fever.

Furthermore, the careful analyses of the blood by Uskow and Chetagurow have shown that in patients suffering from typhoid fever (1) there is a sharp falling off in the relative number of multinuclear elements, it may be under 50 per cent.; (2) this fall begins usually in the first week, is more sharply expressed in the second or third or even fourth weeks; (3) the percentage of "over-ripe" elements begins to increase about three to twelve days after the disappearance of the fever. Chetagurow finds that it does not reach the normal until the tenth or eleventh weeks. (4) The percentage of the small mononuclear elements average only one and a half times as much as that of the large mononuclear, instead of being normally three times as great. (5) The decrease in the number of the multinuclear elements depends not so much on the parallel increase in the percentage of the small mononuclear leucocytes as on the increase in the percentage of the large mononuclear

cells. This point appears to be one of considerable importance, and on various occasions I have been able to make a probable diagnosis of typhoid fever when without the examination of the blood it would have been extremely difficult. In most of my counts in typhoid fever I have found the large mononuclear elements even more numerous than these authors.

Case: H. *Typhoid Fever*, 4th week:

Small mononuclear	18.1 %
Large mononuclear	22.4 %
Transitional forms	4.5 %
Multinuclear neutrophiles	53.1 %
Eosinophiles	1.9 %

The differential diagnosis thus between typhoid fever and tuberculosis in its various forms, or the various inflammatory conditions, and particularly pneumonia, of which we shall speak next, is made materially easier.

Pneumonia.—That a leucocytosis of considerable extent occurs in pneumonia has long been known. The researches of Uskow, Kikodse, and others have led to interesting results. Kikodse's conclusions are as follows: (1) The number of white blood corpuscles in the blood of a patient with pneumonia exceeds the normal one, two, or three times. (2) In severe cases which threaten a fatal result, there is no leucocytosis to be observed. This is therefore of great prognostic importance. (3) The number of colorless blood corpuscles increases largely through the increase in the multinuclear elements. (4) These changes in the blood appear at the beginning of the disease, and, indeed, before very important changes have developed in the lungs, remaining without marked variation until the crisis. (5) The most constant change in the number of leucocytes is observed on the day before the crisis when there is an increase in the percentage of the multinuclear elements. (6) The development of the leucocytes, as also the increase in the number of multinuclear elements in the blood, takes place *pari passu* with the increase of the temperature. (7) The morphological elements of

the blood during the fever of acute pneumonia seem to be delayed in their progress towards final destruction. (8) At the time of the crisis in the temperature there is a crisis in the number of the white blood corpuscles, which fall sharply to normal and often under normal, the percentage of multinuclear elements becoming at the same time less. (9) On the day of the crisis the colorless corpuscles show a special tendency to degeneration.

The most valuable point here shown is the fact that pneumonia is usually associated with an extensive leucocytosis, which is coincident with the fever. That in some fatal cases this leucocytosis has not been observed is of great interest, but of how much importance we cannot yet be sure.

Among other diseases which are generally associated with a leucocytosis, in which, however, no other important changes have been noticed, are *diphtheria*, *acute rheumatism*, *endocarditis*, and *small-pox*.

In *scarlet fever* Kotschetkoff found in an analysis of 20 cases, that there was a considerable anæmia coming on gradually, and there was an extensive leucocytosis: in several fatal cases, over 30,000. This leucocytosis appeared from two to three days before the eruption, and reached its maximum two or three days after its disappearance, where it remained for several days to fall gradually. The percentage of the polynuclear elements with the eosinophiles was at all times markedly increased, in some cases as high as 98%. All the cases which he observed, with over 95% of "over-ripe" elements, died. A leucocytosis of over 30,000 was a grave symptom. The behavior of the eosinophilic cells was particularly typical. In mild cases the number of eosinophilic cells was normal or even sub-normal in the beginning. From the second or third day it gradually increased until it reached its maximum (eight to fifteen per cent.) in the second or third week of the disease. It then gradually sank until it reached its normal point about the sixth week.

In severe cases the opposite took place, namely, the number of eosinophiles fell rapidly and disappeared perhaps in two or three days. The percentage of the small mononuclear elements fell in the first part of the disease to two or three per cent., and gradually returned to normal. The percentage of the large mononuclear elements showed nothing characteristic. These variations in percentage were so typical that the author believes that a prognosis may be based on their course.

New Growths.—In some rapidly growing tumors a considerable leucocytosis has been noticed.

In almost all neoplasms at an advanced stage there is a considerable degree of anæmia; the blood showing the changes typical of a secondary anæmia. In some cases of obscure abdominal trouble the evidences of a grave secondary anæmia may be of considerable value in differential diagnosis, particularly between tuberculosis, where the anæmia is usually slight, and carcinoma, where it is generally severe.

Parasites and Bacteria.—It is hardly within the scope of these remarks to enter particulars concerning the various organisms which may be found in the blood. Suffice it to say, that most of basic stains will demonstrate bacteria or the malarial parasite. For the malarial organism the various combinations of eosin and methylene blue give particularly good results, though the examination of fresh, unstained specimens is, I think, more satisfactory.

Returning then in conclusion to the original theme, the value of these methods of contrast staining, we may, I think, justly assert that, in the first place, the red corpuscles may be in almost all respects as satisfactorily studied as in the fresh specimen. Degenerative (?) and regenerative forms, which are difficult or impossible to demonstrate by other methods, are here easily studied.

The leucocytes we have been ena-

bled to analyze and classify in a manner heretofore impossible.

Well-prepared specimens can, as Mueller says, be subjected to every method of examination that has been applied to microtome sections. By the practising physician the blood-counter and the hæmometer are not easily carried about and applied at the bedside; a fresh specimen often spoils before one reaches the office; it is, however, easy to carry two small forceps, a few cover-glasses, and a small vial of alcohol in the pocket, and a dried specimen once made can be examined at leisure.

The classification of leucocytes may at first seem complicated, but a little study soon clears it up. That one cannot become familiar with such methods in a day or in a week is true, but few valuable clinical methods are introduced in medicine which do not require study and practice before one can appreciate them and apply them intelligently.

I believe that no one who devotes

himself for a time to acquiring proficiency in these methods of examination of the blood will fail to find them of considerable assistance in his daily work.

These particular methods have given us valuable hints as to the nature of some of the so-called diseases of the blood; they have given us the most reliable means of diagnosis in some of these processes which we now have; they have opened a large and hopeful field for observation in many other pathological processes. Here some may be disappointed to find few, if indeed any, changes in the blood pathognomic of any particular disease; but from the few examples I have cited in this short review of the subject, we may, I think, justly hope to add to our present knowledge more of these small points which, though they may not of themselves be diagnostic, form by their accumulation the symptom-complex, as the Germans call it, of a specific disease.



Medical and Surgical Progress.

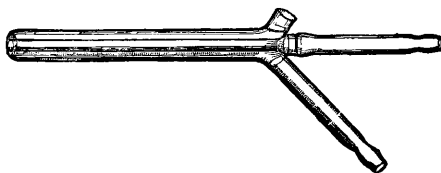
INDICATIONS FOR THE USE OF THE DOUBLE-CURRENT RECTAL IRRIGATOR, POSITION OF THE PATIENT, TEMPERATURE OF THE FLUID, SOLUTIONS EMPLOYED, ETC.

By ROBERT COLEMAN KEMP, M.D.

In the *New York Medical Journal* of March 13th, 1897.

A cut is shown in this article for the convenience of those who have not seen the instrument. The advantages of the present instrument are simplicity, cleanliness, and excellent results clinically. The irrigator is made on the principle of a tube within a tube—the central tube opening at the apex of the instrument, and there being two lateral openings in the

outer tube. In the cut the glass irrigator, with cork opening, above the oblique tube, is shown; also the hard-rubber irrigator, the upper tube. In this the cap unscrews, and also the central tube, which is to be withdrawn when the tube is cleaned. The soft-rubber rectal tubes and also the long colon tubes are made after nearly the same model. Some of the glass-tubes have no cork opening, and in these the return current should always be through the centre. The third tube shown, the longest in the cut, is the model of the soft-rubber irrigator, either stiff or flexible, and also of the colon tube. For further convenience a list is appended of the different tubes.



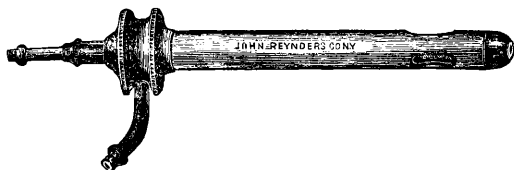
Glass Double-current Rectal Irrigators, five inches long.—No. 1; diameter, three-eighths of an inch—the best size for general

use. No. 1; diameter, half an inch. No. 2; diameter, five-eighths of an inch.



Hard-rubber Double-current Rectal Irrigator, five inches long.—No. 1; diameter, three-eighths of an inch—the best for general use. No. 1; diameter, half an inch,

No. 2; diameter, five-eighths of an inch. Infant size; diameter, one-fourth of an inch; four inches long.



Soft-rubber Double-current Rectal Irrigators, five inches long.—No. 1; Soft-rubber, hard-rubber centre (stiff); diameter, five-eighths of an inch. No. 2. Soft-rubber, metal centre; can be curved; diameter, five-eighths of an inch. No. 3. Soft-rubber, linen centre (flexible); diameter, five-eighths of an inch. No. 4. Infant sizes; diameter, three-eighths of an inch; four inches long; same as adult varieties.

Soft-rubber Colon Tubes (Flexible), Double-current.—Adults, soft-rubber, linen centre; diameter, five-eighths of an inch; length twelve to fourteen inches. Infant, soft-rubber, linen centre; diameter, three-eighths of an inch; length, eight inches, special lengths to order.

For general work, the number $\frac{1}{2}$, hard rubber, adult is the best, as it can be used safely on adults or infants.

The Rectal Irrigator.

Methods of Attachment.—1. The tube of the fountain syringe is attached to the curved tube, and the current enters by the lateral opening and returns directly through the central tube. A short soft-rubber tube is attached to the central tube. By alternately pinching this and the tube of the fountain syringe the quantity of fluid entering and escaping can be regulated.

2. If the fountain syringe is attached to the central tube and the carry-off tube to the lateral tube, the current seems more forcible, but method 1 is as a rule the better, except with the flexible tube.

Insertion of the Instrument.—1. The tube should be well lubricated and inserted with a gentle rotary movement, not forced in; this is especially the case with the hard tubes.

2. If the flow ceases, rotate the tube slightly, or withdraw it slightly and push it back. If the return tube seems plugged, attach the fountain syringe to it for an instant, and force the current in the opposite direction.

3. Insert the rectal tube about a third to half its length in prostatic cases, etc., and full length for high irrigation.

N. B.—*Clinically*, the rectal tube, inserted full length, and the patient with hips elevated, seems to be satisfactory, even in high irrigation, as in colitis etc., though some prefer the colon tube.

Position of Patient.—*a.* In low irrigation (prostatic cases, etc.); Patient sitting upright, or semi-oblique, or dorsal position, with shoulders higher than the hips.

B. In pelvic peritonitis, etc.; Position dorsal, or Sims's.

C. In high irrigation:

1. Dorsal position—hips elevated, shoulders at lower level.

2. Patient on right side—hips elevated, shoulders at lower level.

3. Patient on side—hips elevated, shoulders at lower level.

4. Method by rotation.

a. Patient on left side, hips elevated, descending colon irrigated freely.

b. Rotate gradually to dorsal position and then to right side, hips-elevated, return tube being pinched; about a pint and a-half being allowed to run in.

c. Shoulders then elevated to above level of hips, patient still on right side. This is to make the fluid gravitate into the caput coli.

d. Shoulders then depressed to below hip level, patient on right side, gradually

rotated to back and left side, etc. In other words, the process reversed. Return tube let go and fluid allowed to escape.

The dorsal position, hips elevated, will be found convenient as a rule. The position on the right side is also convenient.

Temperature.—Hot irrigation, 101° to 104° F., and cold irrigation, 60° to 90° F., are the average temperatures employed. The average patient prefers heat to cold by this method, and stands it better, and at about 101° F.

Solutions employed.—Solution A. Flax-seed tea. Formula; Two drachms of flax-seed to a quart of water, boiled and strained. Temperature, 101° F.

Solution B. Normal salt solution. A drachm of salt to a pint of water.

Solution C. Normal salt solution with oil of peppermint, five to fifteen minims, or oil of cinnamon, five to fifteen minims to a pint of water.

Solution D. Plain boiled water.

Solution E. Boric acid, half a drachm to one drachm to the quart; occasionally to the pint.

Solution F. Permanganate of potassium, three grains to two quarts.

Solution G, Bichloride of Mercury (1-10,000), two quarts.

Solutions A, B, C, and D have been used continuously for considerable periods of time, even to an hour. Solution E, two to four quarts, once or twice a day. Solution F, two quarts, once or twice a day. Solution G, two quarts, once a day for three successive days, as in croupous (membranous) colitis; thus reported with excellent results in cases following typhoid fever, etc.

Height of Douche Bag.—Generally about three feet above the patient is sufficient.

Quantity of Fluid.—This depends entirely upon the case in which it is employed. In colitis, etc., several ounces (4-6) should be allowed to flow in before escape is permitted. If it is deemed necessary to irrigate the caput coli, the method by

rotation and employing about a pint to a pint and a half at a time seems most satisfactory. In shock, uremia, intestinal paralysis, etc., about a pint to a pint and a half should be kept continuously in the intestines. In low irrigation, as in prostatic cases, etc., two to four ounces are sufficient to be kept in the bowel continuously. Dorsal position will be found most convenient as a rule.

This method of double-current irrigation has been reported as being successfully employed in the following classes of cases. In all these the five-inch tube was used.

Cases—1. *Simple Catarrhal Colitis.*—Solutions A, B, C or E; two quarts daily if necessary at about 101° F. Some prefer solutions B or C, two quarts, cold, at 60° to 90° F. daily, if necessary.

2. *Catarrhal Appendicitis*, in which, from history or from examination of the stool, there are evidences of colitis; solutions A, B, C, D, or E, two to four quarts once or twice a day, are recommended.

3. *Membranous (Croupous) Colitis* (such as follows typhoid fever, etc.)—Solution G, once a day, two quarts 101° F. for three days. Solutions A, B, C, D, at 101° F., can be employed once or twice a day until return is clear, or solution E or F, at 101° F., once or twice a day—two quarts.

4. *Acute Dysentery.*—Tenesmus, hæmorrhage, etc., prominent symptoms. Solutions A, B, C, or D once or twice a day, at 101° F., until return is clear. Some use it also after each movement in addition. Solutions E or F, two quarts once or twice a day at 101° F., suggested, or solution G, two quarts daily, at 101° F., in severe septic cases suggested for three days and then followed by milder solutions for several days.

In cases where there is considerable hæmorrhage several quarts of very hot solution, 110° to 120° F., have been suggested, or, on the other hand, cold at 60° F. or less, care being taken to avoid shock. Irriga-

tion with two-per-cent. tannin solutions and with 1 to 1,000 quinine in amœbic cases, as previously reported by many observers, could also be employed.

5. *Chronic Dysentery*.—Solutions A, B, C, or D daily once or twice or more, two quarts or more temperature 101° F. Solutions E or F two quarts once or twice a day at 101° F.

6. *Intestinal Dyspepsia*.—The following has been suggested: Solution B or D, two quarts once or twice a day, douche at 101° F., to wash out undigested products. If much fermentation use A, C, or E.

7. *Chronic Constipation*.—Solution B or D. (1) Hot douche, 102° to 120° F., two to four quarts, once or twice a day, rectal or high irrigation. If above 104° F., and especially if high irrigation, use with caution; or (2) cold douche, same method. Temperature from 80° F. to iced water. The method is somewhat more violent. Caution should be observed; or (3) alternate douche, two, quarts each, of hot and cold, at above temperatures once or twice a day. In this the glass Y is attached, as suggested by Dr. Minor. Injection intermittent, a few ounces at a time.

8. *Intestinal Paralysis*.—Solution A, B, or D, continuous irrigation at 102° to 104° F. for a considerable period; even half an hour or more. Solution A would suggest itself as excellent to promote peristalsis. About a pint of fluid should be kept continuously in the bowel.

9. *Fæcal Impaction*.—Solution B or D, at 101° F., continuous irrigation with five inch rectal tube, especially with one of large calibre.

10. *Gastro-enteritis in Infants and Children*.—Solution B, daily once or twice until return is clear at 101° F. employed successfully. Solutions A, C, D, E, and F have been suggested. In cholera morbus, cholera infantum, or in fact any diarrhœas where the lesions are in the small intestine, irrigation of the large intestine for

cleanliness, and to prevent self-infection is logical. Same solutions as in class 10.

11. *Typhoid Fever*.—Solution B, daily two quarts or more, at 101° F., to cleanse large intestine, relieve tympanites and prevent self-infection. Result excellent. Used when indicated.

12. *Jaundice (Duodenal)*.—Solution B or D, two to four quarts once or twice a day, at 101° F., occasionally at 104° F. Others do better at 60° to 80° F. Results excellent. Solutions C or E suggested if there is much intestinal fermentation.

13. *Shock*.—Solution B or D, (B is the better). In general the temperature of saline solution should be at 101° to 104° F. and the irrigation continued for a considerable period of time. About one to two pints should be kept continuously in the intestine. If the temperature is subnormal, irrigation at 110° to 120° F. can be employed until it rises to normal; thereafter, if necessary, employ it at 101° to 104° F. This method can be employed during an operation. The short tube gives satisfaction.

14. *Uræmia* (suppression of urine or insufficiency, with symptoms progressing in that direction).—Solution B or D, (B is the better.) Temperature 101° to 104° F. Continuous irrigation for a considerable period, as in shock, from half an hour to even an hour. As much as fifteen to twenty gallons has been employed.

15. *Hæmorrhage* (loss of blood during an operation, etc.).—Solution B, at 101° to 104° F., same method as in shock, is suggested.

16. *In Gynecology*.—In many conditions heat or cold can be applied to the uterus and its appendages better per rectum than per vaginam, as can be seen from observation of the anatomy of the parts; also in unmarried women the advantages are self-evident.

a. *Ovarian Neuralgia*: Solution B or D, daily rectal irrigation once or twice at 101° to 104° F., two to four quarts.

Position dorsal and level, two-thirds length of tube inserted.

b. Pelvic Peritonitis: Solution A at 120° F. one hour three times daily for ten days. Position dorsal or Sim's. Solution A is the best to promote absorption. Rectal irrigation also suggested (1) during menstruation, when insufficient (by Dr. Gaudin), (2) dysmenorrhœa, (3) menorrhagia, (4) hæmorrhage, (5) inflammatory conditions of the uterus and adnexa, etc.

17. Rectum.—a. Congestive condition of the rectum, with ulcers following operation for hæmorrhoids. Cold irrigation forty-five minutes morning and night.

Solution B or D can be employed either cold or hot, as 60° to 80° F., or even iced water; or 102° to 120° F., morning and night, depending on the patient, and from ten to forty-five minutes; four ounces to the pint, kept in rectum continuously, depending on the case; or solution E or F, two to four quarts morning and night, hot or cold, as above, if much disinfection is necessary.

b. Proctatitis, ulcers, fissures, etc., (four ounces to half a pint, kept in bowel continuously). Solution A, B, C, or D, two to four quarts, once or twice a day at 101° to 104° F., suggested. Solution E. or F, two quarts daily at 101° to 104° F. Solution G. suggested every few days, two quarts at 101° F. in syphilitic ulcers; milder solutions during interim.

c. Internal hæmorrhoids (four ounces to half a pint, kept in bowel continuously): Solution B or D two to four quarts or more at 102° to 104° F., or even to 120° F., once or twice a day; or cold, 60° to 80° F., or even iced water.

18. Genito-urinary.—In most of these cases a few ounces (from two to six), kept in the bowel continually, are sufficient.

a. Prostate: (1) congestion, (2) acute inflammation, (3) chronic enlargement, (4) prostatorrhœa. Solution B or D, two quarts or more from fifteen minutes to an hour's irrigation.

b. Seminal Vesicles—Inflammation: Solution A suggested, two to six quarts once or twice a day, even to half an hour at 102° to 120° F., to aid absorption, or solution B or D suggested.

c. Bladder: (1) acute cystitis, (2) chronic cystitis, (3) tuberculous cystitis, (4) nocturnal irritability, (5) incontinence of urine, (6) retention of urine.

(1) Acute cystitis: Solution A, temperature 104° to 120° F., once or more a day, from five to forty-five minutes, suggested. Higher degree of heat seems the best. Solution B or D the same. Chronic cystitis, tubercular cystitis, nocturnal irritability; same irrigation, A, B, or D, hot as above, to relieve bladder irritability. (5) Incontinence of urine; Solution A, temperature 104° to 120° F., once a day or oftener, five to forty minutes, suggested, or solution B or D. 1. Hot,—104° to 120° F., five to forty minutes once or more a day. 2. Cold,—iced water to 80° F., fifteen to twenty minutes, once or more a day. 3. Alternate douche (hot or cold) Y attachment, two to six quarts, once or twice a day.

19. Penis.—Diminution or loss of erectile power. Solution B or D. 1. Hot,—104° to 120° F., five to thirty minutes once or twice a day. 2. Cold,—iced water to 80° F., the same. 3. Alternate hot and cold douche, two to six quarts each, once or twice a day.

20. Nervous Conditions.—(1) Some cases of melancholia, etc., are judged to be due in part to absorption of poisons from undigested food, etc. Solution B or D, daily irrigation at 101° F., once or twice. Two quarts or more to prevent self-infection. Solution C or E, the same if there is much fermentation. Two quarts once or twice a day. (2) The possibility of influencing the circulation, secretions, and nervous system through the abdominal plexuses, Solution B or D. 1. Hot douche—101° to 120° F. 2. Cold douche—90° to iced water. 3. Alternate douches (hot and cold) are worthy of experiment.

When the rectum is irritable I generally inject half an ounce of salt solution, and in it an eighth to a quarter of a grain of cocaine, before inserting the rectal tube.

Solution B is physiologically superior to solution D.

In many of the cases cited irrigation is only a palliative or an adjunct to other methods. Like any other therapeutic agent, it will be a success in some cases, a failure in others. The advantages alleged for the tube are simplicity and cleanliness. The caput coli and colon are a "sink for refuse," so to speak, and in diarrhœas of the small intestine there would certainly be a tendency to accumulations below and more or less septic absorption. The good results obtained by intestinal irrigation seem to be the clearing out of such products. Cleanliness of the large intestine may often prevent or mitigate many complications.

E. H. H.

TYPHOID FEVER.

If one were to judge from the great number of papers and journal articles written upon this subject within the last few months, one might be led to think that we are about to reach some very definite conclusions in regard to the etiology, diagnosis, and treatment of this hitherto intractable disease.

Bracken, (*N. Y. Medical Journal*, April 24th, 1897) gives an analysis of forty-seven cases in which Widal's serum test was used. Sixty-seven examinations in all were made, ranging from the second day of the disease to the one hundred and second. Forty-seven tests were made in twenty-nine cases clinically diagnosed as typhoid. In these the reaction was found present thirty-eight times and absent nine. In only four cases among these was the reaction not found at all, and in each of these only one test was made. Of these four cases, in three the day of the disease was not known, while in one the test was made on the tenth day. In two there had been "poor technique in

collecting the blood serum," and another was regarded to be "a typhoid without [rise of] temperature." So that in the remaining twenty-four cases clinically diagnosed as typhoid the reaction was present thirty-eight times and absent five times. Of these, in one case the reaction was not present on the second and fourth days, but appeared on the eighth. In another in which seven tests were made it was present from the fourth to the thirty-eighth day. In another it was not present on the eighth and twelfth, but was present on the sixteenth, twenty-seventh, and thirty-first days. And in still another it was not present on the twelfth day but was subsequently.

Of the remaining eighteen cases, in two the clinical diagnosis was not given, but one was a case of "high temperature some weeks after resection of the hip," and the other was a "surgical case." In eleven cases other diseases, all infectious in character, were diagnosed. In the remaining five cases the clinical diagnosis is marked with an interrogation point, but the note states that they were "not typhoid fever." In none of these eighteen cases, in which twenty tests were made, did the reaction take place. One case of doubtful diagnosis was tested three times on the fifth, sixth, and eighth days, (see XXII below,) while the others received one test each.

The author details the following five cases in which the serum failed to react, and in which the subsequent history proved the disease to have been something other than typhoid:—

"CASE I.—With this case were symptoms which closely resembled those of typhoid fever. The clinical diagnosis was made accordingly. The serum test was used, however, and the absence of the characteristic reaction from this test threw doubt upon the clinical diagnosis. More careful inquiry into the history of the case developed the fact that a few days previous to the appear-

ance of the typhoid symptoms the patient had had his nose cauterized. The diagnosis was now changed to that of sepsis, and this was demonstrated by the subsequent history of the case to be the correct diagnosis.

CASE V.—A specimen of blood was sent to the bacteriological laboratory for examination as an aid to diagnosis. The absence of the serum reaction made the existence of typhoid fever doubtful. No full history could be obtained of this case, but the statement was made that the later symptoms did not bear out the first impression as to the presence of typhoid fever. Thus the laboratory diagnosis strengthened the clinical diagnosis.

CASE XXI.—The clinical diagnosis in this case was typhoid fever. The disease was mild in character and of short duration. The attending physician classed it among the cases of aborted or cured typhoid fever, and emphasized his ability to treat such cases successfully by remarking that he had had four such cases of typhoid fever during the fall. The history of this case, briefly, is as follows: At the outset there were symptoms closely resembling those of the early stage of typhoid fever—a coated tongue, pain, abdominal tenderness, an elevation of temperature, etc.—but these symptoms quickly subsided. After but a few days' illness the patient was placed in a hospital. During her stay of one week in the hospital, her temperature was normal. A specimen of blood examined gave no serum reaction. The diagnosis of typhoid fever was undoubtedly wrong.

CASE XXII.—Here, again, is a case that might be classed with aborted or cured typhoid fever. Unfortunately, however, for any such position, repeated serum tests gave no reaction. The typhoid symptoms quickly subsided, the temperature became normal, and the patient made a rapid recovery. The diagnosis of typhoid fever was promptly abandoned by her attending physician.

CASE XXXVIII.—When first seen, this

patient had a temperature of 103° F., and other symptoms of typhoid fever. The serum test gave no reaction, however, and the subsequent clinical history did not favor the diagnosis of typhoid fever.

These four cases (V, XXI, XXII, XXXVIII), with the histories belonging to each case, would certainly point to some form of intestinal infection. At the same time they emphasize the importance of being guarded in making a diagnosis of typhoid fever. They would also suggest at least the probability that many of the so-called cases of aborted typhoid were rather cases of mistaken diagnosis."

"In all of these cases reported the blood serum was collected by the dry method (I am responsible for this). Criticism as to results may possibly be based by some upon this fact. But Dr. Wyatt Johnston has shown (*British Medical Journal*, December 5, 1896, p. 1629) that the dry method compares very favorably in accuracy with the use of fresh serum in the diagnostic application of this test. In fact, he states that 'when a negative result was obtained by the dry method the result by the fluid serum was also negative, and where on re-examination the positive result was obtained with the fluid serum, without exception the duplicate sample of dried blood also gave a positive result.'"*

In those cases where the clinical diagnosis had been abandoned, repeated examinations of the serum failed to give the typhoid reaction.

It is worthy of note that the blood specimens were submitted to the laboratory for investigation without any clinical history, and the laboratory diagnosis was based solely upon the serum reaction.

De Grandmaison reports two cases in *La*

* N. B.—In a circular issued January 7, 1897, Dr. Wyatt Johnston states that "solutions of the entire blood react more intensely to the test than solutions of blood serum alone . . . the reverse of what we had anticipated."

Médecine Moderne in which the disease was recognised only by sero-diagnosis. In both cases the test was made with but little expectation of getting the reaction, but it gave precise indications and the diagnosis was afterwards confirmed by the clinical history. The first case, that of a child nine years old, became convalescent on the thirty-first day. The second case, a man aged forty-three, succumbed on the seventeenth day to "two very abundant intestinal hemorrhages, during which the peripheral temperature was not lowered in the least. The diagnosis was fully confirmed at the autopsy, when characteristic lesions of enteric fever were revealed."

Brannan, (*N. Y. Med. Jour.*, Mar. 27th 1897), reports tests made on three groups of cases: Group I including fourteen cases of individuals suffering from typhoid fever or recently convalescent from the disease; Group II including forty-eight cases of individuals either in good health or suffering from diseases other than typhoid fever, and Group III including thirty to forty cases of persons whose clinical history was unknown to the observer. Of Group I, in nine of the cases the blood was tested during the active period of the disease, in one case as early as the eighth day. The reaction was marked in all but one of the nine cases. A case in which the test proved of value was that of a patient who had been in the hospital for eight days without our having been able to arrive at a positive diagnosis. The patient entered the hospital on the 2nd of November with a history of a three weeks' illness, sudden in its onset. His condition on the day of entrance suggested typhoid fever, but his symptoms during the next few days were not what one would look for in the fourth week of the disease. On the 10th of November some of the blood was sent to the board of health for examination, and a marked reaction was reported. The further course of the disease sustained the diagnosis of typhoid fever, and repeated

tests of the blood gave uniformly a positive result.

One case only of the nine, has given an absolutely negative reaction, though the blood has been examined four times from the tenth to the twenty-second day of the disease. The other six of the nine active cases were well advanced when the blood examination was made, and the positive result of the test simply confirmed the previous diagnosis. The dried blood of two of these cases, taken from the finger some seven weeks ago, still gives a marked reaction.

In the remaining five cases of Group I the test was not made until convalescence was established. In three the result was positive, the interval since recovery from the fever being two months in two cases and ten months in the third. The two negative cases were examined some time after convalescence was established.

In Group II the great majority of the cases failed to react at all to the serum test. In three, however—all patients in Bellevue Hospital—there was a partial reaction, never complete and unmistakable, but still as marked as is sometimes obtained in typhoid fever. The first of these doubtful cases was that of a negro with cirrhosis of the liver and ascites. He stated that he had had no fever of any kind during his twenty years' residence in New York. His blood has been examined repeatedly, sometimes with negative result, at others with a doubtful reaction. The two other patients were also of the African race, one with nephritis, the other, in a woman, with puerperal sepsis. Only one test was made in each case. Three other negroes in the hospital gave no reaction.

"Thinking that perhaps negroes were more or less immune to typhoid fever, I went last week to the Colored Home and Hospital, and with the kind assistance of the superintendent, Dr. Bickerton, I obtained blood from twelve of the patients. One only, however, of the twelve gave a

moderate reaction, a patient with diabetes. I was told by Dr. Bickerton that they had not had a case of typhoid fever for fifteen years. But this may be partly due to the fact that patients with acute disease are rarely brought to the hospital, owing to the lack of an ambulance service. In my own experience in New York I do not recall a case of typhoid fever in a negro of pure blood. I have consulted the United States Census tables, as well as the reports of the Charity Hospital in New Orleans, and have found a somewhat lower rate of mortality from typhoid fever in the colored race than among the white population."

In Group I we have seen that one patient out of nine with typhoid fever failed to respond to the Widal test as late as the twenty-second day of the disease. In Group II, of forty-eight cases which were not typhoid in nature four gave a partial reaction. In Group III, in the main, the clinical and the bacteriological diagnosis were in agreement. In addition to several instances of doubtful reaction there are three cases in which the result of the serum test has not supported the clinical diagnosis. One case of well-marked typhoid fever repeatedly failed to react to the test although made throughout five weeks of the disease. Daily examinations of the blood were made, and the reaction was negative or doubtful throughout. Another case, which had not a single typhoid symptom, gave a marked reaction from day to day for two weeks, although it was absent the previous week.

Brannan sums up his conclusions as follows:—

1. In the large majority of cases of typhoid fever the blood serum will give the so-called typhoid reaction at some time during the active period of the disease. In a small proportion of cases, perhaps ten per cent., the reaction will not be obtained, if at all, until the diagnosis has already been made from the clinical evidence.

2. In cases apparently non-typhoid in

nature, a positive reaction may occasionally occur, but probably not oftener than in one or two per cent. of the cases. This pseudo-reaction is to be attributed to the protective bodies which, as we have seen, are present to a greater or less extent in normal blood serum.

3. In a varying proportion of cases, both typhoid and non-typhoid, a partial or doubtful reaction takes place. Repeated tests are then required in order to determine whether the reaction is due to the normal protective bodies or to the specific properties of typhoid blood.

4. The serum test of Widal is a most valuable aid in the diagnosis of typhoid fever. With greater experience and improved technique its value will in all probability become even greater and more clearly defined. For the present, however, the test should not be relied upon alone, but should be taken together with the clinical signs of the disease.

Craig, (*N. Y. Med. Jour.*, Feb. 6th, 1897), gives a systematic account of Widal's method. In speaking of the value of the test he states that Widal had tried it with a great number of diseases, finding the reaction invariably present in typhoid fever, the results being negative in all other affections. Green and Ritchie gave a list of twenty-seven cases of typhoid in which the reaction was present and in many was marked. In a large number of other diseases it was not found, and in normal, healthy blood the reaction never occurs.

At the Boston City Hospital the test has been made in fifty cases of undoubted typhoid, of doubtful typhoid, and some other diseases, and in all the response "has accorded with the diagnosis as previously made, or reached later with a clearer view of the conditions."

Park states that of thirty-four cases of typhoid examined at the New York Health Department Laboratory, thirty-three showed the characteristic clumping. In the case

which failed to give it the patient had been convalescent for forty days. He concludes: "If there is no specific reaction in a case sick over a week the diagnosis of typhoid fever may be excluded. If a marked reaction occur, then, unless the patient has had an attack of typhoid fever within at farthest ten years, the case is typhoid fever."

Craig's own experience was with tests in twelve cases of disease other than typhoid fever in which the blood did not react to the test, in eight cases of undoubted typhoid in which the reaction was uniformly present, and one doubtful case in which no reaction occurred, and in which pneumonia subsequently developed.

He gives the following methods for applying the test. The method used by Widal, was as follows: Blood was drawn from a vein in the forearm with a syringe, the serum decanted, and mixed with ten to fifteen times its volume of a fresh bouillon culture of typhoid bacilli. This was left in the thermostat, at 37° C., for twenty-four hours. Later in his work, however, he found that as good results could be obtained by the use of a few drops of blood from the ear or finger of the patient. A drop of the serum of this blood was added to ten to fifteen drops of the bouillon culture, and a drop of the mixture examined at once between a slide and cover glass with a one-twelfth-inch immersion objective. If the case was one of typhoid, the bacilli were seen to lose their motility and clump together in from two to sixty minutes. He found this reaction present in no other disease. The modification of the test by Wyatt Johnston consists in using dried instead of fresh blood, thus making the transportation of specimens of blood from suspicious cases possible. Widal had noticed that dried serum and blood gave the reaction, but Johnston was the first to make practical application of the fact. He found that blood dried for from two to four weeks still gave the reaction. He describes his method

as follows: "I use a dry lens of about one-fourth-inch focal distance. The dry blood drop is partly dissolved in germ-free water, and a drop of the solution obtained is placed upon a cover glass which has just been passed through a flame and mixed with a drop of a typhoid bouillon. This is placed over a hollow cell sealed by vaselina. Uniformity of temperature is the chief detail to be attended to, as the agglutination does not take place so well if the movements are sluggish. A hot-water dish filled with warm water forms a cheap and convenient substitute for an incubator, and a simple warm stage made of a sheet of copper is also useful. In a well-warmed laboratory, however, the use of these adjuncts is unnecessary."

Where the reaction is doubtful he advises watching of the preparations for some hours, or even a day or two, when an increase of motion is noted in non-typhoid cases, and a more perfect agglutination in genuine ones.

Craig has used the following method with entire satisfaction: Upon a well-warmed glass slide, as used in microscopic work, place a small drop of distilled water. With the platinum needle take a very minute portion of a typhoid culture on agar and mix thoroughly with the distilled water upon the slide. Now moisten the dried blood drop and add a small portion to the drop of culture upon the slide and cover gently with a cover glass, being careful not to press it forcibly down upon the preparation. Examine with a one-fifth to one-eighth-inch dry objective.

Upon watching such a prepared specimen, supposing that typhoid is not present, the bacilli are seen to be in active motion, darting here and there over the field, and nowhere joined together in any number. Often two will be seen to be attached, but groups of them are not to be seen.

On the other hand, if the blood has come from a typhoid patient, in the course of from five to fifteen minutes if the disease

be well advanced—longer, if earlier in the disease—the bacilli will be seen to become sluggish in their movements, gradually collect in small groups, and finally become agglutinated in clumps containing numerous bacilli, all movement having ceased.

As above indicated, Wyatt Johnston has demonstrated that dried blood will react to the test sufficiently well to make it useful as a routine clinical method. In collaboration with MacTinggart he has presented an able article in the *Montreal Medical Journal*, "On the Difference between Serum and Blood Solutions the Condition of the Test Culture, and the Significance of Bacterium Coli Infection in Relation to Typhoid Diagnosis." They give some interesting observations in regard to the reaction of the serum and blood solution to cultures of the *Bacillus coli*, of which the following is a digest:—

Very little attention has as yet been paid to the clinical significance of serum reactions with the colon bacillus. Courmont and Rodet have stated that typhoid blood serum reacts with colon cultures, while Achard and Chantemesse state that it does not. Widal states that he has studied quantitatively the intensity of reaction of typhoid serum with the *Bacillus coli*, but has been unable to draw any important diagnostic conclusions from the results.

Various observers have reported colon reaction as being present occasionally in different chronic and acute diseases. This can readily be understood in the light of our present knowledge of terminal infections. One case, which at first strongly resembled typhoid fever, but gave no serum reaction, has been recorded by Vedel, who found a marked colon reaction and looked upon it as only colon infection; this opinion has been confirmed by the subsequent events. The authors themselves found that reactions with the colon bacillus were rare with typhoid blood or serum (even in cases in which perforative peritonitis had occurred), provided the typhoid reaction was

well marked. On the other hand, they were struck by the large proportion of positive colon reactions obtained in cases having step-ladder temperature and other symptoms strongly resembling typhoid, but without the typhoid serum reaction. They think that under these circumstances the colon reaction may have a real diagnostic importance, and indicate that the colon infection, whether occurring alone or as a secondary complication of typhoid, may be playing an important part in the production of the patient's condition. The whole question of associated colon infection deserves further study.

The reaction can be tested with ease by placing a duplicate drop of blood solution or serum on the cover slip with the drop to be tested by typhoid culture and mixing with a drop of the colon bacillus culture. False reactions can be avoided by using stock cultures kept at room temperature and transplanted infrequently. Test cultures grown in bouillon from the stock at room temperature for twenty-four hours are free from scum or sediment and give reliable results. The conflicting results just mentioned may have been due to false reactions having been taken seriously.

In the case previously mentioned of apparently genuine typhoid without serum reaction (in which the test was first applied during the third week), the blood reacted very decidedly to the *Bacillus coli*, and produced typical clumping. The same held good of four other blood samples referred to the authors for examination as from a case having a clinical course like that of typhoid, but with negative serum reaction. A complete colon reaction they find to be exceptional in ordinary typhoid, and its presence would indicate a condition of *Bacillus coli* intoxication sufficient to explain the existence of many symptoms giving to typhoid its ordinary clinical features. Whether this excludes typhoid, is another question. Dr. W. H. Park has observed a case of fever with no typhoid

serum reaction in which he was able to cultivate the typhoid bacillus by spleen puncture. Later on in the case, however, a relapse occurred and the reaction appeared. The possibility of a latent typhoid infection overshadowed by toxic phenomena due to concurrent action of the colon bacillus is quite consistent with the generally accepted opinion that many of the symptoms in typhoid, and especially the intestinal ones, are due to secondary infection by the *Bacillus coli*. It follows that in severe cases of a typhoid type, with no typhoid reaction, the blood should be tested with a culture of the *Bacillus coli*, and a bacteriological study made by examination of the stools or by spleen puncture.

The conclusions reached by Johnston and MacTaggart are as follows:—

The difference in reaction between typhoid blood solution and blood serum is not simply due to varying intensity, but to an alteration in the relative prominence of the agglutinative, paralytic, and disintegrative phenomena which constitute the reaction. The extent of this difference also varies with the virulence of the culture, but the difference probably depends also on the presence of part of the specific substances elsewhere than in the blood serum.

Blood solution has a greater capacity than blood serum for producing the disintegrative (bacteriolytic) changes described by Pfeiffer. Descriptions of this phenomenon are conspicuously absent from the many recent accounts of the reactions with typhoid serum as observed in hanging drops.

The paralytic effect is relatively more marked with serum than with blood solutions.

Agglutination without stoppage of motion is more readily occasioned in virulent cultures by blood solution than by serum, and does not indicate existing typhoid.

It appears preferable that for the dried-blood method only attenuated cultures should be used. These have the advantage

of being more easily kept in readiness than virulent cultures, and are less sensitive to changes of temperature. With the serum method virulent cultures give prompt results. Dried blood serum can be readily obtained by pushing aside the edge of a blood drop which has clotted for a few minutes, but has not dried, and collecting the serum beneath it on the tip of an ivory vaccine point, or the like. This does not, however, give a quantitative result.

For ordinary diagnostic purposes, the simplicity of the method as originally described does not require modification, provided attenuated cultures are used.

A drop of the solution obtained from a dried typhoid blood drop, mixed with a drop of the culture, will give the reaction promptly, without any special attention to the degree of dilution. In order, however, to obtain the best results, it is well to dilute freely and especially to avoid having a sticky solution of syruplike consistence.

In cases in which the clinical type strongly resembles typhoid, in which the serum does not give the typhoid reaction, a decided reaction with cultures of the colon bacillus may explain the symptoms.

The results with the dried-blood test have been very satisfactory, giving uniformly positive results with genuine and well-marked typhoid cases, and not reacting with non-typhoid blood when attenuated cultures were employed.

Although the use of serum undoubtedly enables the results to be recorded and compared with greater scientific precision, the dried blood answers just as well for routine diagnostic work.

The alterations in reaction, induced by very slight modifications of the manner of testing, help to explain differences in the results reported by experienced and careful observers. With the same blood and culture, the amount of dilution possible largely depends on whether plain bouillon, bouillon culture, or water is used for diluting. Opinions also vary as to what should be

regarded as constituting a reaction. Anything less than complete clumping and total arrest of motion obtainable by the dry as well as the moist test in a young attenuated culture should not be regarded as typical.

In addition to those referred to above, excellent articles on the same subject have appeared from Gruber, of Vienna; Durham, of London; Haedke, of Berlin; Jemma, of Genoa; Pick, of Prague; Rodet, of Lyons; Block, of Baltimore; Biggs and Park, of New York; Thomas, of Brooklyn; and a host of others, the general concensus of opinion being that as a diagnostic test for typhoid fever it is of great value, and should be used in all cases in which the clinical history, while suggesting typhoid, does not otherwise allow of a certain diagnosis. As a general summary of the present status of the test, the following statements may be made:—

(a) That the blood or blood-serum, and very frequently the urine, of a typhoid patient, by virtue of a specific antitoxin, causes, when added to an emulsion of the pure culture of Eberth's bacillus in hanging-drop or ordinary cover-glass preparations, a characteristic loss of motility, with agglutination and grouping, of the bacilli.

(b) That this reaction may, and generally does, occur as early as the fourth or fifth day and is variable on the eighth or ninth, lasting generally throughout convalescence, and very often for many months after complete recovery. (Widal thinks for years in some cases.)

(c) That the antitoxin of a typhoid patient acts thus only upon the bacillus of typhoid. (This has been denied as to the colon bacillus, but the denial is immaterial from a clinical stand-point.)

(d) That the blood-serum or urine of patients suffering from diseases other than typhoid does not so affect the typhoid bacilli.

(e) That dried blood retains the antitoxin unchanged and may be used when the fresh blood or serum is unobtainable. The an-

titoxin remains unchanged in dried specimens for weeks, and probably for several months.

(f) That the test is, therefore, pathognomonic of typhoid and easily applicable to the use of public laboratories.

Flexner, in a meeting of the Medical and Surgical Faculty of Maryland, stated that, while we have every reason to believe that the disease comes from the germ—the bacillus—in the anatomical tract, there is no ground for believing that it gets into the body in any other way than through the intestines. This fact is based not only on the pathological anatomy, but on experiments as well; we cannot produce the disease in animals. Not all parts of the intestines are alike prone to infection to the same extent. Infection takes place where the lymphatic follicles are in aggregation, but not all the lymphatic aggregations are affected to the same extent. There is a general distribution of these lymphatic follicles throughout the whole tract of the intestines, but not all are affected in typhoid fever. The agminated glands are more susceptible to the poison than the solitary ones, and those nearer the lower part of the small intestine are especially affected. Here the infectious material of typhoid fever is kept a long time, owing to the anatomical character of the parts. The ulceration produced by the bacilli may be very superficial, affecting only the mucous membrane, or the whole thickness of the intestinal coats may be affected, causing perforation.

Many epidemics are from an infected water-supply. The organism of this disease is not particular as to where it lives, and can thrive in water a long time, as well as in milk. It is difficult to discover and separate it from other organisms. The growth is often invisible and causes no change in the color or taste of the milk infected, nor does it cause coagulation. This fact helps in its recognition, because the organisms with which it is confused grow visibly, and re-

cent methods allow the typhoid germ to be discovered in the intestines. By the use of the differentiation method of Elsner, (see below, p 150) in culture-media of varying acidities, the growth of the typhoid organism in plate culture may easily be separated.

Wilson of Montreal presents a case, in the *Canada Medical Record*, of what he calls "Afebrile Typhoid Fever." He admits that in this case Ehrlich's test of the urine was not made, Widal's serum test had not yet been brought to his attention, and the stools were not examined microscopically. The case, however, presented such a clinical picture of a typical typhoid attack of moderate severity, that he reported it.

The man, aged thirty, a brass finisher, was taken sick on October 4, with headache, lassitude, pains in the back and side, stomach felt upset, appetite failed, and sight of food was repulsive. When seen on the 13th Oct., the appearance was typically typhoid. Face dull, eyes heavy, forehead drawn, tongue coated white with raw red edges, but large and moist. Abdomen tympanitic on right side, duller on left side, gurgling distinct in right iliac fossa, with marked tenderness on pressure with flat hand. Spleen enlarged and felt at margin of ribs, dullness extending up to 8th rib, axillary line tender to pressure. There was a profuse eruption of raised papules, discrete, from a mere point to a little larger than a pin head, bright rose-red, inclined in places to be semi-pustular, disappearing on pressure (except latter), coming out in successive crops (marked). Patient says they were there two days previous to first call (*i. e.*, October 11th, 1896). Particularly profuse on abdomen, tapering off towards flanks and upper chest. Temperature 98.6° (two thermometers), pulse 61, respiration not counted, but apparently normal. Examination of lungs and heart negative, no cough, never felt feverish or hot, but simply dull and stupid, with the pains in right iliac region and left side.

Bowels constipated. Placed the patient on liquid diet for four days, and gave no medication, anxious to watch the case. The temperature and pulse did not vary a fifth of a degree. The patient returned to his work on the 10th of November,—four weeks and six days from onset. At no time did the temperature vary more than .2 of a degree F., although at one time three thermometers was used as controls. Whether the case was one of genuine typhoid, or one of those obscure cases of gastrointestinal disturbances associated with obstinate constipation, in the absence of bacteriological proof, is hard to say; the clinical condition was that of typhoid, whether induced by the poison of Eberth's bacillus, is another matter. Absence of proof does not necessarily negative the possibility, although it invalidates it for statistical purposes."

Curtis, of Albany, read a paper before the Medical Society of the State of New York, on "The Life History of the Typhoid Bacillus outside of the Body," in which he said that the typhoid germs remained indefinitely in the soil, but probably did not retain their vitality for many days in sewers, cesspools, and privy vaults. These bacilli retained life for a long time in running water, and were not destroyed by freezing. Aerial transmission of the disease was possible only when the germs were taken into the digestive tract.

At the same meeting, Northrup, of New York, said that not a single case of typhoid fever had been known to occur among the many thousand children that had been under the care of the New York Foundling Asylum during twenty-five years, and he had never met with the lesions of this disease in two thousand autopsies made upon children under three years of age. Out of the four hundred cases of typhoid fever in the epidemic at Stamford, there had been only four among little children.

In the *Annales de la Polyclinique de Bordeaux* for March there is a long and

comprehensive article on the "Clinical Peculiarities of Typhoid Fever in very Young Children," by Rocaz, of which the following is the substance:—

The onset of typhoid fever in young children is more frequently sudden than in adults, and its appearance is often marked by a sudden elevation of temperature, the thermometer rising in a few hours from normal to 104° F. and more. Rillet and Barthez think this sudden onset indicates an altogether peculiar gravity of the disease.

The intestinal symptoms are generally less marked in children than in adults. There is a rather exact relation between the number and extent of the ulcerations on the one hand and the age of the patients on the other hand. The younger the children the fewer and smaller the ulcerations. Constipation is the rule during the early days of the disease; it is obstinate and does not yield sometimes until after the administration of several purgatives. When it does not continue during the course of the disease, it is replaced by a slight diarrhoea which presents nothing characteristic. Hence it may be readily understood that intestinal perforation and hæmorrhage are excessively rare in very young children. Enteritis, on the contrary, is a more frequent complication in children, and it is characterized by the persistence of the diarrhoea after defervescence; this diarrhoea is rebellious and sometimes requires energetic treatment and a strict diet. Vomiting is frequent enough in children to be regarded as a part of the regular train of symptoms of the disease. Lack of appetite in young children is so pronounced as to become almost a veritable danger. M. Mousous has cited two cases in which the children refused everything, except a few mouthfuls of pure water, for twelve days.

With regard to the appearance of the tongue, the author states that in many cases observed by him in very young children, in which the temperature rose to

102.6° and 104.5° F., the tongue remained moist.

The temperature is very nearly like that observed in adults, although it often assumes a less regular progress in children. This irregularity has led to much discussion in regard to its prognostic value. The only fact that seems to the author worthy of mention, concerning the temperature in young children, is the very frequent occurrence of hyperthermia and the facility with which it is borne by the patient.

Dicrotism of the pulse has never been observed in very young children. During the height of the disease the pulse is generally regular, ranging from 100 to 140 pulsations a minute. During defervescence and convalescence, however, it may present a peculiar characteristic which has been fully dwelt upon by de Gassicourt and Revilliot, who occasionally saw the pulse become slower and present irregularities which caused it to resemble the pulse in certain stages of meningitis. This peculiarity, which lasted from eight to fifteen days, did not seem to have any unfavorable significance. The irregularity of the pulse in the febrile period is more serious, for it indicates then a cardiac exhaustion which often presages death. The heart, however, is rarely seriously involved in typhoid fever in young children; myocarditis is exceptional and always slight, and sudden death has been observed only two or three times.

Thoracic symptoms are in the normal forms less marked than in adults, although broncho-pneumonia is a very grave complication in abdominal typhus in children under five years of age.

Lenticular rose-colored spots are the only pathognomonic symptom of typhoid fever in young children; they present no peculiar characteristics either in their frequency, their time of appearance, or their prognostic importance. Epistaxis is considered by the author as being altogether exceptional in young children. Sudamina are frequently

observed, and they generally appear shortly after the red spots. Livid streaks near the articulations, particularly the knees, are peculiar to infancy, and they are due to an increase in growth which is sometimes surprisingly rapid. The frequency of desquamation is also a peculiarity of infancy.

With regard to the possible complications of typhoid fever in young children, the author mentions those of the nervous system, which, he says, are seldom observed in children under five years of age.

Other complications, such as arthritis, otitis, thrush, torticollis, stomatitis, and phlegmasia alba dolens, are also frequent in very young children. Abnormal eruptions are more frequent in children than in adults.

The duration of the fever is shorter in infancy. According to some authors, relapses occur more frequently, but they are usually less serious than the first attack.

Convalescence is, therefore, rather rapid, and the child recovers with a rapidity that is sometimes astonishing. The aphasia of convalescence, which is very frequent in children, is nearly always curable.

The prognosis of typhoid fever in young children is dependent upon their age. It is very grave in children under three years of age, not so serious at four years, and nearly always favorable at five years and over.

Ubiquity of Typhoid Bacilli.

Elsner's method of differentiating and isolating typhoid bacilli (*Zeitschrift für Hygiene* xxi, 25) has been tested, practically verified, and approved by Remlinger and Schneider (*Annales de l'Institut Pasteur*, January 25, 1897, p. 55) as well as by others, and therefore his article seems one of the most important of the seven hundred or more that have appeared upon this vexed subject. His simple method appears to be the only reliable one for the almost certain recognition of typhoid bacilli living in water or elsewhere among various other bacteria. Making a thorough and systematic research with hundreds of chemical agents,

from resins and oils to animal products and alkaloids, and trying carbolic acid and naphthol, of course, he found that by the addition of one per cent. of iodide of potassium to potato gelatin other bacteria than the typhoid and colon varieties were almost entirely suppressed. The colon bacteria appear and develop into brownish colonies on the second day after they are introduced. Typhoid colonies come more slowly and are small, water-droplike, very finely granular, clear, and transparent. This culture medium is prepared by cooking gelatin with potato maceration (*Auszug*) of one pound of potato to a quart of water. Then normal caustic-soda solution is added till only slight acidity is revealed to litmus tincture. After filtering and sterilizing it receives one per cent. of potassium iodide.

Remlinger and Schneider note that certain other bacteria may develop in this excellent medium, and that some of the colon-bacilli colonies may simulate the typhoid ones. Hence always checked their tests by use of the microscope and the familiar means of distinguishing typhoid from other varieties, typhoid characteristics being (1) appearance of gelatin cultures, (2) active mobility, (3) many cilia, (4) non-coloration by Gram's method, (5) gas not produced by bacilli cultivated in sugary media, (6) non-coagulation of milk in which they are cultivated, (7) absence of indol in cultures, (8) acid reaction of whey cultures, (9) peculiar growth on potato, (10) tardy in Maasse's solution (asparagin, common salt, malic acid), to which glycerin is added, (11) inability to develop on a culture medium in which typhoid bacillus has already grown, (12) clumping or agglutination seen when typhoid bacilli are added to serum of a horse immunized against typhoid (Widal's procedure). If a bacillus presents all the typical biological and morphological qualities of the Eberth bacillus and is pathogenic toward animals, but ceases to be so when the animal experimented upon has

received a weak dose of the Widal serum, it nowadays seems safe to call the bacillus typhoid.

Employing all these checks upon the bacteria developed on the Elsner medium, these observers detected typhoid bacilli in nine out of thirty-six samples of drinking water from various places, two being from towns where the disease was prevailing at the time. Six were from places where the fever had disappeared. The carbolic-acid test failed to detect any, but the Elsner method showed the presence of a few characteristic bacilli in the water for three months after the last case. In two cases the bacilli disappeared from the water promptly upon the cessation of the epidemics. In the cases where typhoid bacilli were found there were not many other bacteria and the water was chemically very pure.

Thirteen samples of earth and of dust taken from different localities were examined. In seven of these the typhoid bacillus was found. One was from the bacteriological laboratory where these experiments were pursued. Another was from the sweepings of barracks where typhoid had occurred. Out of six general hospital cases that had not ever had typhoid fever or its symptoms the feces showed the typhoid bacillus in five of the cases. In many other cases bacilli were detected identical with the typhoid bacillus, except as regards their virulence upon animals and their reaction to the specific serum of Widal. Remlinger and Schneider accordingly feel disposed to question the absolute value of the serum test in all cases of typhoid bacilli, reasoning, by analogy, that not all virulent cholera vibrios react to Pfeiffer's serum test. A fair inference is that both these important disease-causing bacilli have several varieties. The more we study bacteria the less evidence exists to support the theory of the invariability of types. This being so, it is reasonable to consider that the typhoid germ is more or less widely diffused throughout Nature. This helps us to ex-

plain cases regarded as of doubtful origin, where the usual factor of contaminated drinking water is not demonstrable.

HOW LONG CAN TYPHOID AND OTHER
PATHOGENIC BACTERIA REMAIN
ALIVE IN WATER?

Klein (*Annual Report of the Local Government Board for 1894-'95*; and *Centralblatt für Bakteriologie*, etc., November 5, 1896) gives the results of experiments made to determine this question. In sterilized distilled water cholera germs died within two weeks. Typhoid seemed to increase at first, then to decrease; but some typhoid bacteria remained alive in distilled water for more than three months. In London water, from the rivers Thames and Lea, sterilized simply by filtration through porcelain, typhoid bacilli disappeared entirely within eighty-five days. In similarly filtered hard spring water they survived somewhat longer than in the river water. Cholera bacilli survived less than half as long as the typhoid in these waters. When only a few bacteria were introduced, they perished sooner than if many were introduced. Very notable is the finding of this distinguished worker: that bacilli of cholera remained alive in unsterilized common London hydrant water for more than forty-two days, in spite of the antagonistic action of the usual water bacteria present! Typhoid bacilli survived only from thirty-six to forty-two days; in hard water from a certain spring, these lived less than five days, while in rain water and well water they lived longer. The *Bacillus coli communis* did not show any greater vitality than typhoid. Klein states that by filtering considerable quantities of various waters and then examining the resultant slime, he has in a number of cases been able to detect typhoid bacilli.

PROTECTIVE INOCULATION AGAINST TYPHOID
FEVER.

In the *Edinburgh Medical Journal*, Pfeiffer and Kolle have recorded the

results of researches upon this subject. Following the analogy of Haffkine's investigations into the protective inoculation against cholera, they decided to investigate the effects of the introduction of a small quantity of killed typhoid bacilli in man. The authors used a typhoid culture which had been made from a spleen two months previously, and the genuine character of which was proved by the specific reaction with the blood serum of typhoid convalescents. The virulence of the culture was very marked. Individuals were selected who were either in good health or at least free from febrile symptoms, and who were known not to have enteric fever. One c. cm. of a bouillon preparation, so completely sterilized at 56° C. that it contained no living micro-organisms, was injected. A few hours after the inoculation the first symptoms appeared of shivering, vertigo, etc. The evening temperature rose to 38.5° but it fell to normal during the following day. From their experiments with it on animals it became obvious that a single injection of a minimum dose of killed typhoid cultures induced in man a specific change in the blood, which was apparent six days after the injection, and which attained at least the same degree as is visible in typhoid convalescents. It is more than probable that the appearance of specific bactericidal substances in the blood of individuals who have had typhoid fever represents the chief cause of the immunity possessed by them. If this is correct, then it is to be expected that these prophylactic inoculations with killed typhoid cultures can produce an immunity of equal intensity and duration as that found after an attack of typhoid fever. Haffkine's analogous, very numerous, successful, and practical investigations lend support to the same view. The authors hope that these protective inoculations against typhoid fever will be of practical service under certain circumstances, such as the prevalence of a severe epidemic, etc. The material for inocula-

tion can be provided with comparative ease. They refer especially to its possible value in cases of sieges when enteric fever often decimates an army. Baiezer, Wassermann, E. Fraenkel have used killed typhoid cultures in the treatment of enteric fever, but not for its prevention. Individuals with typhoid fever react quite differently from healthy persons, but even in the developed disease such injections have been known to produce a beneficial even though temporary effect.

At the same time, and apparently independently of these observers, Wright and Semple, of Netley, have made investigations in the same direction, and have recorded their observation in the *British Medical Journal* of Jan. 30th, 1897. They report that with large doses of the culture the symptoms are severe; in two or three hours after injection there is a certain amount of local tenderness which gradually increases in severity and extent. A patch of congestion, two or three inches in diameter, develops around the site of the inoculation. Red lines of inflamed lymphatics may be traced upwards towards the armpits. Local tenderness is most marked twelve hours after and disappears forty-eight hours after the injection. The constitutional symptoms consist of some degree of faintness and collapse which make their appearance in two or three hours. There are also nausea, vomiting, anorexia, fever, and insomnia. These symptoms disappear in from twenty-four to forty-eight hours and take place even in patients who have received from forty-five to sixty grains of calcium-chloride crystals which are administered to prevent the occurrence of decrease in blood coagulability and edema. Eighteen inoculations were made, and examination of the blood of these patients at different times shows that that fluid has become in some measure poisonous to the typhoid bacillus, since it agglutinates the bacillus. Experiment shows, however, that patients whose blood possesses a sedimentat-

ing power upon the bacilli are not absolutely protected against typhoid, although the possession of a sedimentation power denotes the possession of a certain measure of "bacteria proofness" against the bacterium in question. The injection of small and measured quantities of these dead bacterial cultures involves no more risk to life or health than the injection of a medicinal dose of morphine. The duration of the immunity is not definitely known, but the serum diagnosis ought to give an indication when the immunity is lost. The authors claim that since the symptoms can be controlled by calcium chloride, and since the adequacy of the inoculation can always be controlled by a blood examination, it will be expedient for every one who is likely to be exposed to the risk of typhoid infection to undergo the inoculation.

THERAPEUTICS OF TYPHOID FEVER.

Whenever treatment has been referred to in the papers reviewed, balneotherapeutics has seemed to be the most in favor, the method of Brand, or some modification of it, being the one usually employed. Injection of sterile solutions of dead typhoid bacilli were made in a few cases with variable results. If the commonly accepted theory of toxins and antitoxins be correct, this latter procedure would seem to be an irrational one, as only adding the toxins of typhoid to a system that was already suffering from their effects. Unfortunately, the manufacture of the antitoxin of typhoid fever on a large scale, as is done in the case of diphtheria antitoxin, is not possible, owing to the apparent immunity of most animals to this disease.

Ely, in a paper read before the Medical Society of the State of New York, calls attention to the uselessness, and frequent harmful effects, of antipyretics, as well as that of the antiseptics which are given internally, such as guaiacal, salol, and the like. He pleads for greater attention to hygienic conditions and dietetic treatment;

and above all things, fresh air and pure water. Careful handling of the patient on the part of the nurse, in order to prevent excoriations and bedsores, is much to be desired. Frequent cleansing of the mouth and teeth, and in cases of vigil, the moving of the eyelids frequently to prevent drying and consequent ulcer of the cornea, will all be seen to by a good nurse, and should be suggested by the physician. In short, making the patient as comfortable as possible, and preventing, as far as may be, the arising of any irritating or exhausting condition, will husband his strength to carry him through the self-limited term of this disease. Milk is the article of diet relied upon, and "two quarts a day is a minimum amount for the average case." It should be given by night as well as by day, and where it is rejected, should be given in smaller quantities more frequently. An amount of milk given every three hours and rejected, can be given in divided portions every hour, or half hour, and be retained. "I once saved a patient's life by slipping one half ounce of nourishment into the stomach every fifteen minutes—ninety-six times each twenty-four hours—for several days; large amounts at longer intervals invariably caused vomiting. As nervous force is rapidly consumed by persistent high temperature, its duration must determine the amount of food given. Milk may often be supplemented by beef-juice and eggs. In exceptional cases where exhaustion has been marked, I have given twenty whole eggs, or the whites of forty eggs, every twenty-four hours, with benefit."

In the *British Medical Journal* for Jan. 16th, Barrs pleads for a less restricted diet in typhoid fever. He has adopted a new method of alimentation in this disease which includes the giving of more or less of certain solid foods throughout the disease, and especially from the beginning of the stage of convalescence. He has not yet used it upon a sufficiently large number of cases to warrant any positive con-

clusions upon all aspects of the question. He states that out of thirty-one cases of typhoid fever only three patients died, and in these three cases no solid food could be given. He does not believe that it will have any influence in causing relapse, remarking that if the disease is caused by a specific infection, a little bread and butter or meat could scarcely precipitate a second attack. He believes that the increased alimentation will hasten the healing of the ulcers, and thereby lessen the liability to perforation. He lays it down as a principle that, "whether a patient likes a thing or not, depends upon his appetite for that particular thing, and as a rule an appetite for any particular thing is a pretty sure indication that it will agree; that is, it will be digested, absorbed, and assimilated in due and normal course, and will tend to the well-being and not to the undoing of the patient;" and he states that his rule, then, in typhoid fever, is to give the patient such wholesome food, solid or fluid, as he can take, using the word take to mean that he likes it, and wishes for it, and enjoys it.

By this he does not mean "forced feeding," but allows the tastes and desires of the patient to more or less determine the kind and quantity of food taken. Dr. Barrs' suggestion is certainly in line with the thought of the profession in regard to the treatment of this disease. The points upon which others might differ from him are: 1st, the danger of perforation, and 2nd, the power of the system to digest and assimilate the kinds of food he suggests. For instance, the digestion of beef, even though chopped fine as he recommends, could scarcely go on in the almost entire absence of hydrochloric acid in the stomach found in this disease. Whether giving hydrochloric acid with the beef would supply the deficiency could alone be determined by experiment. Predigested foods naturally suggest themselves in this connection. S.

THE MODERN METHOD OF TREATMENT OF
DISEASE OF THE INTESTINES.

By FENTON B. TURCK, M.D., Chicago,
In the *New York Medical Journal* of
March 13th and 20th, 1897.

Most intestinal diseases present the same pathological conditions as are found in diseases of the stomach. The same etiological factors that induce gastritis may continue down the alimentary tube, causing an irritation resulting in enteritis. The etiological factors of enteritis comprise a long list, among which are found diseases of other organs, acute diseases, errors of diet, fevers, and nervous diseases of central and peripheral origin. Under certain conditions in which the functions of the intestines and colon are disturbed, micro-organisms develop upon the walls of the intestinal tube. Toxines are formed by the development of these micro-organisms in the rich soil adhering to the mucous membrane and affect the cells beneath, causing a disturbance of the glandular functions, with marked circulatory changes and derangement of the muscular mechanism. The ordinary treatment in vogue is the attempt at antiseptics, which frequently fails, as an infected tube twenty feet long, like the intestines, cannot be sterilized by a few grains of any antiseptic. Most antiseptics are systemic poisons, and increased doses sufficient to produce antiseptics are contraindicated. The study of infection of the intestines shows two conditions: First, the food may become a medium for growing micro-organisms, the toxines of which, on absorption, produce a systemic poisoning. Second, the mucous membrane of the intestines becomes coated with thick mucus, similar to that which I have found adherent to the mucous membrane of the stomach in cases of gastritis,—gland cells, leucocytes, and remnants of food.

The protoplasm of the exfoliated cells and the partly digested food furnishes a rich soil for the rapid development of

micro-organisms. The indications for treatment are to remove the media in which the micro-organisms develop and thus deprive the pathogenic germs of the material in which they produce their toxins, and not simply to disinfect the food that passes down the tube. The first indication is to begin treatment at the upper end—the stomach. As errors of diet are the most important factors in the ætiology of gastro-intestinal diseases, the most rational therapeutica would be the correction of these errors.

If fermentation and putrefaction arise in the intestines they are due only to two factors: First, the presence of a soil for the development of micro-organisms. Second, the micro-organisms. In four to twenty-four hours after the birth of an infant its entire alimentary tract is swarming with bacteria, such as the *Bacillus coli communis*, *Bacillus, pyocyaneus*, streptococci, staphylococci, and saprophytic germs. Germs are found in every intestinal tract. All that is necessary for infection is that the conditions be made favorable for their rapid development and the proper medium best suited for the production of toxins.

After the correction of the errors of diet the intestines must be rendered aseptic to a certain extent by the removal of the culture media and by the restoration of the secretory and muscular functions. The indications are: (1) to lessen or remove the ætiological factors; (2) to remove the adherent material from the walls of the intestines and render the tube as aseptic as possible; (3) to restore the muscular functions; (4) to reduce the congestion of the viscera.

Correction of Errors of Diet.—It is impossible to formulate rules of diet that will be applicable to all cases. Prescribe no food that undergoes fermentation or putrefaction. The use of chopped meat in the beginning of treatment, with diabetic flour and bran has met with the most brilliant suc-

cess. The methods of preparing the chopped meat must be varied, as the patient soon tires of so simple a diet. It may be made into patties one by three inches, broiled, frequently turned. Scotch collops are made by covering the meat with water and allowing it to stand for a few hours on the stove (at a temperature below boiling point, so as not to coagulate the albumin). It makes a semi-solid mass, and is served in little China dishes (cachets). A lump of fresh butter and, when not contraindicated, salt and pepper are used. Raw meat is also much used. Patients soon learn to relish it. Raw meat sandwiches are recommended by Thompson (quoted from *Food*). Three ounces of raw beef or mutton, one ounce of very fine bread crumbs, and one teaspoonful of sugar are used. Cut the meat very fine; rub it through a hair sieve. Then pound it in the mortar to a paste; mix it with bread crumbs and sugar and a little salt and pepper; spread it between the slices of either brown or white bread. My custom is to vary the preparation of the food with every meal. In a large number of cases I find that patients do better on two meals a day. The increase in diet must be regulated by the physician.

Use of Bran.—The use of bran in gastrointestinal diseases, while not new, is not appreciated by the general profession as it should be.

Preparation of Bran.—Procure coarse bran taken from the feed store. Heat it in the oven at 150° C. in order, first, to sterilize and, second, to transform the starch granules present into dextrin.

I use bran gems by mixing the bran with water, adding a small amount of Graham flour to make it adherent, then a little salt, and baking in iron gem forms, the same as are used in baking Graham gems. Serve at once with pure fresh butter. Most patients relish the gems as prepared. Another method is to combine bran with flour, usually using gluten flour, making bread the same

as ordinary bread, seventy-five parts flour and twenty-five parts bran. Bran gems should be eaten in the morning, and are sometimes useful two or three times a day.

Action of Bran.—The bran particles being insoluble and indigestible, assist in grinding the food. The bran particles mixed with the food, passing between the food particles allow the gastro-intestinal fluid to come in closer contact with the food to be digested. The sharp edges of the bran, as it makes the excursion through the gastro-intestinal tract, have a marked mechanical effect. First, it helps to remove the adherent mucus, with the other material mentioned, from the walls of the tube. In examining fecal matter after a liberal diet of bran, thick, glue-like mucus will often be found with gland cells from the walls. The mechanical action of the bran is similar to that of sand or shot with water used in cleaning bottles. In this way the bran acts as an aseptic agent, assisting in the removal of the nutrient media from the intestinal wall in which bacteria flourish.

The bran, while hastening the digestion and absorption, is not digested and absorbed itself. Therefore it furnishes the necessary bulk to assist in carrying off the food and any other material that is not utilized in the process of digestion. The presence of bran is not harmful, as it does not furnish a medium for the development of micro-organisms. The fecal matter is often retarded along the transverse colon, which is frequently dilated and prolapsed. The bran acts here also as a muscular stimulant, increasing the secretion and facilitating the passage of fecal matter through even a dilated colon.

It will be noticed that in many cases where putrefactive conditions are present (often indicated by offensive stools) the use of bran treatment results in a marked improvement in the character of the stools. The offensive odor of the stools disappears in from twenty-four to thirty-six hours.

In the treatment of infants, where the

infection of the alimentary tract is present with undigested milk food and offensive stools, a marked improvement has been noticeable in a short time by the use of the bran treatment. The bran mixing with the milk produces a flocculent mass instead of caseous lumps, which latter are powerful gastric irritants; moreover as they are large and insoluble, the ferments are incapable of dissolving and digesting them.

Methods of administering Bran to Infants.—For an infant five to ten months old a half teaspoonful to one teaspoonful of very finely sifted, sterilized bran is mixed with four or five ounces of milk and injected into the stomach once or twice daily. The amount of the bran may be increased with the age of the infant.

Method of Injection.—A small catheter, No. 11 or 12 with the opening at the extreme end, is attached to a syringe filled with a mixture of the milk and bran in the proportion stated. The tube is then passed rapidly into the stomach. It is not a difficult matter to feed infants in this way; it is easier to pass the tube in infants than in adults.

When the passage of the tube is impracticable the mixture may be fed with a nipple having a large opening. The nurse holds the bottle in a high position and shakes it to prevent the settling of the bran particles into a mass. Or the infant may be fed by a spoon. The best plan is to use the tube and syringe, as the particles of bran often irritate the larynx.

The injection of the bran can be accomplished at the same time that the stomach is washed out, which is often necessary in the treatment of such cases.

Use of Cloves and Cinnamon.—To further assist in rendering the tube aseptic I have used a coated pill of oil of cloves and cinnamon. The pill consists of hard soap, three grains; oil of cloves and cinnamon, one drop each, made into a pill mass and placed in gelatin capsules. These capsules are thinly coated with Plaster of Paris. After

being hardened it is dipped into a mixture of shalac dissolved in alcohol mixed with betol. About four coats will suffice. One pill may be given every hour or every two hours according to circumstances.

Treatment of Sigmoid and Colon by Direct Methods.—The most common pathological condition found is chronic colitis simplex, chronic membranous colitis associated with symptoms of diarrhoea and constipation. The colon may become dilated, most generally the transverse colon. With prolapse the sigmoid is frequently found dilated with elongated meso-colon. In the treatment of the stomach and colon it will be found that the intestines are also affected, especially by some of the following methods: First, by the introduction of ice water with massage of the colon; second, by the method of irrigation by the use of the needle douche, with alternating hot and cold water; third, by the use of the hot-water bag with double tube within the stomach or colon; fourth, by application of oil of cloves and cinnamon through a double tube with a nebulizer; fifth, by the use of the geyromele.

Ice water is introduced into the colon through a single tube. The patient is placed with the hips elevated, so that the water will run up the colon. Then it is massaged downward until it reaches the cæcum. The water in the colon can be traced, first, by percussion; second, by succussion; third, by Benedict's method of auscultatory percussion. When the water has reached the cæcum the hips are lowered and the cold water is massaged out of the colon through the rectal tube and runs into a receptacle placed beneath the operating table. The amount of water introduced each time is from four hundred to six hundred cubic centimetres. This alternating injection and expulsion is continued until three to four litres have been used. The introduction of ice water directly into the colon stimulates the congested vessels in a marked degree. No chilling or depress-

ing effects are produced, as when ice water is applied externally. Another valuable factor is that it does not remove the secretions of the colon to the same extent as warm water. Secretions are essential for lubricating and facilitating the passage of faecal matter through the colon. Warm water is a vaso-dilator, and, when rectal injections are taken in the usual manner, harm results, producing weakness and inducing the injection habit, and also increasing the symptoms of constipation. In the ice-water treatment with massage, pressure should be exerted on the abdomen with the patient's knees flexed. In this way the colon can be reached by massage. It is necessary to use both hands, the left hand being placed over the right, and pressure should be gradually exerted until it is made directly on the colon and its contents.

The Use of the Double-Tube Needle Douche for the Sigmoid.—The stomach needle douche consists of two single tubes of different calibre arranged side by side, the large tube projecting beyond the smaller tube. At the end of the smaller tube is attached a small perforated bulb for producing a shower. The smaller tube is also made with perforations along its side and over the blind extremity. The water is forced into the smaller tube under pressure by the compressed-air irrigator. The effect is to produce a fine shower or needle douche, hence its name.

In cases where the sigmoid and lower colon become markedly dilated and atony is present, with congestion of vessels (which can be diagnosed by direct observation), the use of alternating hot and cold water by the "needle douche" is of great value.

For general purposes I have not found it necessary to use a force pump to compress the air, and have simply used a small rubber bulb similar to that used with an atomizer. When hot and cold water are used alternately two irrigators are necessary. The irrigators are made in the usual way.

A bottle, through the cork of which a glass tube passes, is connected with a rubber bulb. By compression of the rubber bulb the air is compressed over the water in the bottle. This compression forces the water out of the bottle into the irrigating tube. Thus a forced shower is produced under pressure by compressing a single bulb. By using a glass Y-tube, connected with a single bulb attached to the stem of the Y, the ends of the glass tube being attached to the rubber tube, which again leads to each bottle—namely, the hot and cold water—the air is compressed in both bottles. The outflow tubes from the irrigators are connected with another glass Y-tube, the stem of the Y-tube being connected with a single rubber tube. Hot and cold water can be used alternately by having a simple cut-off snap on the tube leading from each bottle. A mechanical stimulation is produced by the impact of the small needle-like streams emanating from the perforated tube, and the circulation of the whole pelvic viscera is affected and the tone increased.

Use of the Nebulizer with Double Tube.—This apparatus was first described and shown before the American Medical Association, May, 1885, in which attention was called to the use of nebulized oil of cloves and cinnamon and other oils for the treatment of the walls of the stomach. The nebulized oil of cloves passes down one side of the double tube, in the form of a cloud, into the cavity of the stomach. The entire walls are thus coated, and as the stomach becomes distended by the air introduced the contraction forces the cloud out through the other side of the double tube. I have discovered that the introduction of air with the nebulized oil of cloves and the resulting contraction forcing the air out of the stomach produces a pneumatic gymnastic, giving strength and tone to the weakened muscles of the stomach.

I use this method of treatment in diseases of the colon, especially when it is

dilated with a lack of peristaltic movement. I also use this for diagnostic purposes in both the stomach and colon, as the degree of distensibility and expulsive force can be readily determined. The double tube is passed through the rectum into the sigmoid, the nebulized oil of cloves and cinnamon passes upward, and as the colon becomes distended the air forced into the colon carries with it a cloud of essential oils reaching the cæcum. The cloud of oils forms a thin coating on the mucous membrane, and this thin coating remains for a long period of time. Besides retarding or preventing the development of micro-organisms upon the wall of the mucous membrane the essential oils named are vasomotor stimulants.

It will be seen these oils act as antiseptic agents and vasomotor stimulants, overcoming the congestion found in these cases, and, in combination with the pneumatic gymnastics, providing a simple and effective method of treatment of the colon.

In cases of membranous colitis, atony of the colon, dilatation of the sigmoid, with symptoms of constipation, the gyromele has been found to be of great value. The instrument was described and shown by me at the International Medical Congress, Rome, 1894, and was first used in gastric diseases in the treatment of inflammation (chronic) with symptoms of myasthenia (muscle weakness). A sponge attached to the end of a cable is passed into the organ through the rubber tube, at the end of which is an apparatus for the purpose of revolving the sponge.

Method of Use.—The sponge is passed through the rectum up into the sigmoid and rapid revolutions are produced. In some cases I have been able to pass through the sigmoid into the colon, which was demonstrated by the palpation of the revolving sponge upon the abdominal wall.

The principal value of the use of the gyromele in the colon is: (1) Removal of adherent material, such as scybala. It is

effectual in membranous colitis used with liquid soap. Liquid soap helps to loosen the glue-like substances. The agitation caused by the rotary movement, together with the effect of winding off the adherent material from the walls, cleanses the surface. The loose material can then be easily removed by the use of the double-tube needle douche used with the pneumatic-force irrigator.

(2) The use of the gyromele in the colon has a similar mechanical massage effect as in the treatment of stomach diseases. This is especially valuable in dilatation with myasthenia or "muscle weakness." The vibratory effect of the revolving sponge and cable shows itself in increasing peristaltic movements of the intestines. The vibratory effect can be felt upon the abdominal wall, and in thin subjects the vibratory waves can be readily observed. Since vibratory movements have been shown to have a marked effect upon the circulation, stimulating the dormant muscle cells into activity and thus aiding cellular nutrition, this treatment has been recognized as a method of considerable value. It is especially valuable in dilatation and atony of the sigmoid.

(3) When it is desired to apply medications by topical application they can be injected through an opening made for that purpose at the upper end of the gyromele. Antiseptics, astringents, or medicaments may be used in any menstruum, thick or thin, as deemed best.

(4) The gyromele is also used in the application of electrical treatment. The moist sponge acts as an electrode. I have used electrical treatment by introducing one gyromele into the stomach and another into the colon, using intra-electrization with the faradic or galvanic and also the sinusoidal current, as the latter is alleged to produce painless contractions.

In general treatment, such as hydrotherapy and exercise, when good results are

obtained we cannot always give a scientific rationale.

The bath that I will here describe has for its objects (1) the reduction of the congestion of viscera by causing a distribution of the blood over the surface of the body; (2) the elimination of toxins; (3) increase of the autitoxic and antiseptic effect of the blood (the defensive proteids), called alexins, derived from the leucocytes.

The Technique of the Bath.—The patient should be placed in a bath tub filled with water at the temperature of 100° F. The temperature is then rapidly raised to 110° F. The patient is instructed to lie quiet, as movements, like throwing the arms out of the water, will give a burning sensation by contrast of the air with the hot water. The temperature is increased to 112°, 114° or 115° F., until the whole surface shows a crimson red, indicating arterial injection of the peripheral vessels. The temperature of the body will show a rise of 1° or 2° F. As soon as the surface assumes a scarlet hue, which will require ten or fifteen minutes, the patient is removed from the water and seated on a board placed across the bath tub, the feet resting upon the end of the tub; then the patient is rubbed over the entire surface with a block of ice weighing a pound or two. This is repeated four or five times. No shock is experienced even by delicate patients, as the high temperature of the water produces a modified anæsthesia of the skin. It acts as a powerful stimulant, without shock and without the enervating after-effects of hot-water baths. The temperature of the body is quickly reduced to normal by the ice massage.

In cases of great vasomotor weakness, and in the functional disturbances known as "weak heart," lying down for an hour after the bath may be resorted to if found necessary. It reduces the congestion of the veins of the viscera, as I have found in experiments upon animals.

There is an increase in both the red

corpuscles and leucocytes which is shown immediately after the bath, and indicates that certain anæmias are due to congestion rather than to reduction in the number of corpuscles. As the bath stimulates excretion by the increased blood current, the skin, kidneys, and liver are bathed with arterial blood. I find the bath also of use for diagnostic purposes in determining the condition of the circulatory system. The promptness or delay of the response to the stimulation while in the bath, the condition of the patient after the bath, the character of the pulse, and other symptoms which may develop that were not shown before, are all useful as diagnostic aids. Then, again, the difference between true anæmia and the anæmia of the surface, due to the congestion of the blood within the viscera, may be mentioned.

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THE PRESENT STATUS OF SURGERY OF
THE KIDNEY.

Professor Obalinski delivered a lecture on this subject at the Eighth Congress of Polish Surgeons in Cracow, and basing himself upon a close examination of the literature and upon his own cases, formulated the following conclusions:—

1. The most frequent symptoms, *i.e.*, pain, enlargement and displacement of the kidney—show us which kidney is affected. When there is hæmaturia, it is only in exceptional cases that this cannot be decided, and here only an examination of the bladder with the cystoscope will prove from which ureter the blood or pus flows.

2. It is only in distinct and developed cases of affections of the kidneys that we can fully make out a diagnosis and the consequent therapeutic indications by external examination only; most frequently, especially in the beginning, we must have recourse to exposure of the kidney or even incision of the same. If there is difficulty in deciding whether the kidney or some other organ (gall-bladder, for instance) is affected, it is necessary in grave and

urgent cases to decide the question by laparotomy. Where, however, we are sure that the kidney is affected, and the only question is the severity of the affection, we should expose the kidney by an extraperitoneal incision.

3. To-day the conservative tendency prevails, and our endeavors are to preserve as much as possible such an important organ as the kidney. We only sacrifice it, therefore, when we have concluded that it contains within itself a focus that may be injurious to the remainder of the organism, or when the parenchyma has become so degenerated that its function is rendered impossible. Thus, there are only two absolute indications for nephrectomy,—namely, when in the greatly enlarged kidney a malignant growth or primary tuberculosis are positively diagnosed. The other indications will be only relative,—that is to say, will have their significance only when, after exposing the kidney or even after its incision, we have convinced ourselves of its useless function.

4. The experience so far gained by the practice of nephrectomy teaches us that, when a considerably enlarged and hard kidney can be felt before the operation, it is already or almost deprived of its natural function, and is also usually a proof of the capacity of the other kidney to perform the functions of both.

5. In view of this and the frequently demonstrated fact that even a seriously affected kidney, remaining after the extirpation of the other, may fulfill the functions of both, the requirement of an examination of the urine of each kidney separately should be considered as unnecessary and as impeding the development of surgery of the kidney. This is especially the case since Sawlik's method of catheterization of the ureters (the only one known and employed) is troublesome and unreliable, and may even be dangerous in some cases,—namely, if there are morbid microbes in the bladder, which are

transferred by the catheter into the ureters or even the renal calices.

6. When, in the kidney to be operated upon, we suspect that there is still a certain functional capacity, we should never sacrifice it, but act conservatively and resort to nephrotomy, which best facilitates the examination of the condition of the other kidney.—*Gazeta Lekarska*.

A NEW METHOD OF TREATING STRICTURE OF THE RECTUM.

Bacon, in *Mathews' Medical Quarterly*, proposes the method given below in strictures of the rectum. In January, 1895, this author published a method for stricture which consisted of a plastic operation, using the sigmoid flexure to form a new channel around the strictured portion of the canal, and claimed it was a sure means of relieving all non-malignant strictures of the rectum located above the levator ani muscle; but for that class of strictures located just above the internal sphincter ani, no plastic operation can be done that will give fecal continence afterward. These strictures have been unsuccessfully treated for ages by various methods, such as gradual dilatation with bougies, forcible divulsion, internal and complete proctotomy, and later by means of electrolysis; they cannot be dissected out and the ends of the bowel united without leaving a circular cicatrix that will reform another stricture of the gut.

Complete proctotomy gives temporary relief by severing the stricture band, but the wound soon fills up with granulation tissue that reforms fibrous tissue, and the stricture is worse than before operation was done. Then, again, in making the complete proctotomy the sphincter muscles are severed, and often do not unite perfectly, and incontinence results. Bacon has successfully tried his present method and found that it does not interfere with the sphincter muscles, yet accomplishes permanently what complete proctotomy only does temporarily.

The wound made by a complete proctotomy—that is, when an incision is made, beginning with the rectum and cutting through the stricture band back to the coccyx and sphincter muscles—is the shape of a letter V after the ends of the stricture retract.

If we can prevent this triangle from filling up with fibrous tissue, the severed stricture band must disappear by absorption. In order to accomplish this the author produces a mucous fistula between the stricture and the coccyx, so that after the proctotomy is made the mucous tract will be at the bottom of the wound and prevent the union of the severed stricture bands.

The operation is simple and quickly done, and practically free from danger. The patient having been thoroughly anesthetized, the operator takes a blunt-pointed aneurismal needle, threaded with a very heavy silk ligature, and at a point just above the internal sphincter on the posterior rectal wall in the median line punctures the gut and carries the needle point well back into the perirectal tissue to the coccyx, and up behind the stricture above the upper limit, when the needle is forced through the rectal wall into the rectum. The ligature is now seized with a blunt hook or dressing forceps, and one end drawn down through the stricture opening, and the needle withdrawn. The two ends of the seton are now securely tied, and left hanging outside the anus. The loop of thread is left long so as to avoid severing the stricture, as it is necessary to have the seton in place for about three months to get a continuous mucous tract. There is practically no pain following the operation if the thread is tied outside of the anus and a loose loop left. Out of eighteen cases there has been no infection from the ligature or abscess, as the drainage is complete. At the end of three months the patient is again anesthetized and the seton withdrawn; a grooved director is passed through the fistulous tract behind the stricture, and the intervening stricture band severed with a

Paquelin cautery. The patient is kept in bed one week after the seton is inserted, and again one week when the stricture is divided. For two weeks after each operation the bowel is irrigated daily with solution of boracic acid.

The writer reports three failures, which he believes due to not taking in more tissue above and below the stricture band, so as to catch all the scar tissue above and below the real constriction,

CARIOUS TEETH AND TUBERCULOSIS.

Strack (*American Journal of the Medical Sciences*) has investigated the possible relation of carious teeth to tuberculosis, with valuable and suggestive results. Among 113 children with enlarged cervical glands none of the ordinarily accepted causes could be traced in forty-one per cent., and attention was called to the co-existence of carious teeth. The enlarged glands nearly always correspond in position to the affected teeth. In many cases toothache had preceded the enlargement, or the caries was evidently primary. In two cases positive evidence of the relationship of the disease was adduced. These were a boy of eighteen years and a girl of fourteen years, both healthy previously, and with no family history of tuberculosis. Enlargement of the cervical glands followed toothache. In the first case tubercle bacilli were found in the carious molar teeth; in the other a suspicious-looking granulation was found between the roots of a molar, which, on section, showed tubercles with giant cells.

FORMALIN.

For some time a need has been felt among physicians for some substance having the antiseptic powers of carbolic acid and bichloride of mercury, but which must neither be caustic nor corrosive. If the same substance could in a measure replace the clumsy heat and steam sterilizing processes, so much the better. All

this the water solution of formic aldehyde, known as formalin, will do, if present reports are true. When an alcohol is gently oxidized an aldehyde is produced. This in turn may be oxidized to an acid. Formaldehyde ($C H_2 O$) is the oxidation product of methyl alcohol, or wood spirit, and gets its name from the fact that its oxidation product is formic acid. Formaldehyde may be produced experimentally by passing the vapor of methyl alcohol, mixed with air, over a hot platinum spiral when the odor will become noticeable. It is a very volatile liquid which is quite soluble in water, and the usual commercial solution is of about 40 per cent. One of the characteristics of aldehyde is its property of uniting directly with other substances. It unites with hydrogen to form alcohol, with oxygen to form an acid, with ammonia to form aldehyde ammonia, and with other substances in the same way. Indeed, if it can find nothing else it will unite with itself to form more complex substances.

The disinfecting power of formalin is very great, and this gives it its great value. A $\frac{1}{100000}$ solution will prevent the development of bacteria while a $\frac{1}{75000}$ solution is germicidal. A 5 per cent solution gives better results than a $2\frac{1}{2}$ per cent solution of carbolic acid or a $\frac{2}{1000}$ bichloride solution. The effect of a concentrated solution on living skin is like that of tanning, and prolonged application will cause necrosis. It has no detrimental action on metal or rubber. Uses for this substance will at once suggest themselves. It may be used for cleansing the hands, the seat of an operation or infected wounds and cavities. It is an ideal substance for sterilizing instruments and keeping them sterile. In fact it may be used in every case in place of the bi-chloride.

Dr. W. S. Alexander, of Oxford, Ohio, has given formalin considerable attention, and has used it in infectious diseases with good results. In diphtheria the air of the

room was kept saturated with the vapor of formalin from a spray, and it was applied locally once or twice by means of cotton swabs. The false membrane entirely exfoliated in twelve hours. Whooping cough was treated by spraying with a 1 per cent solution. A $\frac{1}{2}$ per cent solution used as a spray, and inhalation of a 2 per cent solution worked well in catarrhal troubles and in hay fever. By using a 40 per cent solution chancreoid and chancre healed rapidly after one application with no bad results except the temporary pain. The doctor has tried it in many other troubles with equally good results.

Outside of the fields of medicine proper a need of a good disinfectant has long been felt. Especially has this been true of our large public libraries. Books cannot be treated with heat or with steam, so it has been practically impossible to do anything with infected books but destroy them. Happily formalin comes to the rescue here also. It vaporizes easily and has great penetrating powers. Elmer G. Horton, of the University of Pennsylvania, has experimented with formalin as a disinfectant for books, and has found that one cubic centimeter of formalin in three hundred cubic centimeters of air will perfectly sterilize a book in fifteen minutes. A longer time will not allow the admission of more air. In his experiments he used the bacilli of typhoid and of diphtheria, as being likely to occur in books. Some books containing papers smeared with cultures were placed *closed* in a bell jar of known capacity, and a measured amount of formalin was allowed to evaporate spontaneously under the jar. It was allowed to stand some time, and then the papers and books were examined with the results stated above. This would be of easy application in a library. All that would be needed is a box of known capacity and a bottle of formalin. There is no action on the books.

Formalin has been in use for several

years as a hardening and preserving agent for tissues, and its action in this line is much more satisfactory than that of alcohol. I have had an eye in a 2 per cent formalin solution since June, 1896, which was enucleated by my father on account of a tumor within the ball. The eye is now firm and hard; there is not a wrinkle or any sign of shrinkage; and it is so clear that when held in front of an electric lamp, one can look through the pupil and see the tumor *in situ*.

With the facts before him one can hardly help feeling that at last an ideal antiseptic and disinfectant has been found, and that the use of formalin in place of heat, steam, carbolic acid, and bi-chloride will in future have great use in all places where complete disinfection is desired.—Southard in *Pacific Medical Journal*.

DISCOVERY OF THE GERM OF YELLOW FEVER.

“There appears to be no doubt that Dr. Guiseppe Sanarelli has discovered the bacillus of yellow fever,” says the Rome correspondent of *The British Medical Journal* (February 13). “He will publish an account of his discovery in the next number of a leading Italian hygienic publication which will be issued in the course of the next few weeks. Dr. Sanarelli is a native of Arezzo, and is now thirty-five. He studied medicine at Siena, and later experimental hygiene under Celli in Rome, Roux in Paris, and Bering in Berlin. In July, 1893, while *libero docente* in Siena, he was appointed director of the Institute of Hygiene of Montevideo. During the summer of 1896, he went to study yellow fever at the lazaretto in the Island of Flores, where he performed a large number of necropsies, and was himself stricken with the disease. When he recovered he pursued his investigations at Rio Janeiro, where the disease was very prevalent. He remained there about two months, and succeeded in discovering the

bacillus. *La Nazione*, of Florence, has published an article sent by a correspondent in Montevideo, which states that for some little time Sanarelli's modesty did not permit him to believe in his success, but in August his experiments were so clear that he was certain of the discovery of the microbe, and he then occupied himself with the preparation of the serum, in which he encountered many difficulties. Professor Sanarelli himself says that 'the microbe of yellow fever now splendidly presents itself, and is the strangest of all the microbes that are known.' His experiments are very extensive; he has vaccinated more than 2,000 animals, including rabbits, goats, sheep, monkeys and a few horses, and he did all this himself because he did not wish his discovery to leak out. The results of the treatment are definitely reassuring, and in October, 1896, he decided to announce confidentially to the President of the Republic of Uruguay the splendid results that have crowned his studies in the origin and cure of yellow fever. If this remedy be truly efficacious, Dr. Sanarelli will obtain the reward of 150,000 scudi [\$150,000] offered by the Brazilian Government for the discovery of such a remedy."

THE STERILIZATION OF SYRINGES BY

BOILING.

In a communication to the *Centralblatt für Chirurgie*, 1896, No. 27, Hofmeister claims to have solved the question of the sterilization of syringes. Although much time and thought have been expended in the effort to devise means by which syringes for surgical and bacteriological purposes could be easily and quickly rendered sterile, no satisfactory method has been proposed heretofore. Of all the new patterns of syringes that have been recommended, none has sufficient merit to displace the old form with the leather packing, and yet it has not been possible to make the latter aseptic.

The observation, by the author, of the fact that catgut could be boiled without injury after first hardening in formalin solution, led him to apply the same process to leather. It was found that common leather which was allowed to stand for twenty-four hours in a two- to four-per-cent. solution of formalin could be boiled in water without losing its softness, durability, or elasticity. Leather so prepared has been boiled for ten hours without damaging it; a slight deepening of the color was the only change to be observed. On the contrary, leather not so treated becomes, soon after boiling, so soft as to be useless, and can be torn easily; after drying, it makes a mass as hard as stone, which can be crushed into powder.

The experiments brought out the fact that the formalin leather which was boiled one hour each day for several days, and dried each time, retained its natural and useful qualities better if subjected to the formalin solution before each boiling than if macerated once only.

These experiments led him to adopt the following process for sterilizing syringes:

1. Only such syringes as consist of glass, metal and leather are suitable. The metal parts should not be fastened by putty, but should be screwed to the cylinder.

2. The piston with the leather packing is taken out and placed in ether or benzine to remove the oil.

3. It is then transferred, for twenty-four to forty-eight hours, to a two- to four-per-cent. formalin solution.

4. After rinsing thoroughly, the syringe may be put together and is ready to be boiled.

5. When ready for boiling, the air is to be driven out of the cylinder by filling with water. Glass syringes should be put in cold water and gradually heated.

6. From time to time the piston with the leather packing is to be placed again in the formalin solution. After removing the oil the leather should be examined to see that it has not shrunken. If the piston fits closely,

then it will not shrink in the subsequent steps of the process.

After two months' trial the method has proved itself to be practical.—*American Journal of the Medical Sciences.*

TREATMENT OF SYPHILODERMATA.

After a careful consideration and trial of the various methods of treating the syphilo-dermata, W. S. Gottheil, of New York, reached the following conclusions:—

1. In the primary stage, when only the chancre is present, no general treatment; calomel locally.

2. As soon as the secondary period sets in, as shown by the general adenopathy, angina, cephalalgia, and eruption, the internal treatment for mild cases should be $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.16 or 0.50 gramme) of the proto-iodide of mercury three times a day, continued for three months, or until the symptoms disappear. In severer cases, with pustular eruptions, severe anginas, persistent headaches, etc., a course of six to ten intramuscular injections of 10-per-cent. calomel-albolene suspension (5 to 10 minims—0.33 to 0.66 cubic centimetre), at intervals of five to fifteen days, should be employed.

3. After completion of the course and cessation of the symptoms, apply tonics, etc., without specific treatment, for three months.

4. Then a second calomel course, as above, plus a small dose (15 grains—1 gramme) of iodide of potassium in milk after meals. This to be given whether later secondary symptoms of the skin and mucosæ appear or not.

5. Second intermission of treatment lasting three to six months, according to the presence or absence of symptoms.

6. In the second year, if tertiary lesions marked by deeper and more localized ulceration are present, give the iodide of potassium in increasing doses (60 to 600 grains—4 to 40 grammes—daily), as may be necessary. Combine with it occasional courses

of calomel injections. If no lesions appear give a mild course of both.

The best local treatment of the syphilo-dermata is with the mercurial plaster-mull.—*Clinical Medicine.*

TREATMENT OF FRACTURES.

In an interesting paper on this subject, G. G. Davis, in the *Annals of Surgery* for December, 1896, reaches the following conclusions: 1. Massage and passive motion are not used to the extent that they should be in the treatment of fractures. 2. Im-mobility of the fractured ends favors quick union with little deformity. 3. There are some cases in which, owing either to pec-uliarities of the fracture or to impaired constitution of the individual, the tendency to the formation of callus is marked; motion in these tends to the formation of exuberant callus and deformity. 4. There are others in which bony union is unduly delayed; disturbance of the fractured ends in these hinders union. 5. It is wise to wait until the fractured parts are glued together, usually eight or ten days, before attempting any except the lightest mas-sage, and any extensive passive motion after that time should be used carefully but diligently. 6. Passive motion and massage when first attempted should be of the most gentle character, and not so violent as to disturb the relation of the broken bones. 7. Marked pain and inflam-matory reaction following passive motion and massage are evidences that it has been too violent. 8. The limb should receive massage and manipulation at each inspec-tion or change of dressing, often daily. 9. In some cases it is advisable to adminis-ter such massage as is possible without removing the splints. 10. Persistent stiff-ness, particularly in fractures or injuries of the wrist, is often due to a rheumatoid affection locating itself in the injured region. Massage is valuable in the treat-ment of such a condition. 11. Massage should be given to the parts of the limb

that lie beyond the seat of the fracture, to keep them in a normal condition. 12. Such dressings and methods of treatment should be adopted as will allow of the greatest use of massage and passive and active movements consistent with proper retention of the fragments.

PROGRESS IN HYGIENE IN THE LAST
HALF-CENTURY.

Dr. Dezarttière has prepared a memorial on the progress in hygiene in the town of Nièvre in France during the past fifty years. The streets were not paved, fifty years ago; there were no gutters, sewers or removal of refuse. Children and animals played about a central stream which was muddy and infected. A few old wells supplied the drinking water and were the receptacles for old shoes, dead animals and what not. Butchers slaughtered food animals in the streets; every household killed its own pigs and the blood and offal were left to putrefy in the sun. Closets did not exist save in very luxurious quarters. Every wall was a urinal. The houses of the peasants were dark and low with only one opening which served for door and window alike. The floor was of well-trodden earth impregnated with organic waste; men lived in contact with animals. The torch or candle served to light the dwellings, which were cold in winter, and stifling with the smoke and gases from the chimney. One walked abroad at night preceded by a torch-bearer.

To-day, the streets are paved; there are sidewalks and gutters. There are public water-works, the town is supplied with gas and electricity. The whole place is clean, wholesome, bright. Vaccination is accepted by all. Prophylactic measures against contagious diseases are sedulously enforced. Such a contrast is instructive to the present generation. Many towns are still in a hygienic condition as distressing as that of Nièvre fifty years ago.—
Dietetic and Hygienic Gazette.

CLARIFICATION OF WATER BY ALUM.

We find in the January number of *Public Health* a very interesting and practical paper on the above-named subject, from the pen of Henry Leffman, M.D., which we reproduce in part—believing that our readers will be greatly benefited by it. He says:—

“This is so useful a method of dealing with temporary turbidity in water that the proper manner of employing it should be widely known. The chemistry of its action is quite simple. The active ingredient of alum is the aluminum sulphate, and this in contact with a solution of the carbonate is broken up, aluminum hydroxide being precipitated as a flocculent or gelatinous mass. Almost all natural waters contain carbonates, generally sodium carbonate with some calcium and magnesium carbonates. Waters that do not contain these are often not satisfactorily cleared by alum.

Aluminum hydroxide has a strong affinity for many forms of organic matter, even removing them from solution. The flocculent precipitant thus entangles the great majority of the bacilli, and the whole mass is carried to the bottom of the vessel as a slimy deposit. Ordinarily about an hour is required for settlement. The water is usually beautifully clear after its subsidence, and much purer. It may be decanted, filtered, or syphoned off from its sediment.

“The quantity of alum is small, about one grain to the gallon of water. This amount should not be exceeded. For the householder the simplest plan is to have the druggist make up a quart of alum solution containing 256 grains, which is of such strength that one teaspoonful contains one grain. This solution can be added in the proportion of one teaspoonful to each gallon, and well stirred. The alum should always be added in a dissolved condition and stirred in the water. The water should not be boiled.

As regards the question of wholesomeness, it may be said that when the alum is used in the small amount above noted, very little or none remains in the water, and, therefore, no danger exists. If used in excess it may do harm, but probably its occasional use even in excess is of little moment—but the continued use of water surcharged with alum cannot be advised. It is rather as a means of tidying over a temporary turbidity, not as a regular purifying agent, that it is suggested.—*Iowa Health Bulletin*.

TWO EASY AND DELICATE TESTS FOR ALBUMIN IN URINE.

Dr. C. Fouchlos (*Progres Medical*) recommends two new tests for albumin in urine, for which he claims utmost delicacy and absence of any possible fallacy:—

1. Add to the suspected urine a few drops of a 1 per cent solution of corrosive sublimate; in case of turbidity, add some drops of acetic acid. If the turbidity persists, it is due to the presence of albumin.

2. Take 100 c.c. of a 10 per cent solution of sulpho-cyanide of potassium, and mix with it 20 c.c. of acetic acid. Add a few drops of this mixture to the urine. If albumin is present in small quantities, an immediate turbidity will ensue; if in large quantities, a heavy white precipitate will appear.

PASTE USED BY DENTISTS TO DESTROY THE NERVE OF A TOOTH.

Menthol, } ãã 1 drachm.
 Carbolic acid, }
 Cocaine (pure), ½ drachm.
 Rectified spirit, 2 drachms.

Rub up together, and add—

Collodion (meth.) to make 3 ounces.—
Chemist and Druggist.

THE TIME AND TEMPERATURE REQUIRED TO DESTROY THE MICRO-ORGANISMS OF MILK.

Dr. J. Forster, of Amsterdam, has prepared the following table as the result of a large number of experiments:—

131° F.	for	4 hours.
140°	,,	1 hour.
149°	,,	15 minutes.
158°	,,	10 "
176°	,,	5 "
194°	,,	2 "
203°	,,	1 minute.

SPIRITS OF TURPENTINE IN THE TREATMENT OF BURNS.

M. L. M'Innis (*New York Medical Record*) says that spirits of turpentine applied to a burn of either the first, second, or third degree will almost at once relieve the pain. The burn will heal much more rapidly than by any other treatment in the author's experience. He applies the turpentine as follows:—After wrapping a thin layer of absorbent cotton over the burn, he saturates it with the common commercial turpentine, which is generally found in every house, and then bandages. Being volatile, the turpentine evaporates, and it is therefore necessary to keep the cotton moistened with it. When there are large blebs, he opens them on the second or third day. It is best to keep the spirits off the healthy skin if possible, as sometimes pain is produced by its action.

THE SURGICAL RELIEF OF OBSTRUCTION OF THE COMMON DUCT BY BILIARY CALCULI.

H. O. Marcy, of Boston, described the operation which he had been the first to do for the removal of calculus situated in the common duct. The original operation had been done on October 20, 1839, according to the following method:—The walls of the common duct were divided with scissors and their edges everted from over the calculus, the abdominal cavity having been previously shut off from the field of operation by sponges. With a fully-curved needle armed with selected tendon-suture, the divided edges of the thickened mucous membrane of the duct and gall-bladder were united by a continuous suture. Over

this the peritoneal edges were coaptated by a layer of continuous suture, and then a third layer of continuous sutures was applied, the sutures being taken parallel to the long axis of the wound, and through the peritoneum. Tension on this suture buried not it alone, but also the uninjured peritoneum. After the removal of the sponges, the peritoneum was closed with a continuous double tendon-suture. The divided muscular structures were united in a similar manner in separate layers, and the skin was coaptated by a layer of buried tendon-sutures. The wound was sealed with collodion. Convalescence was rapid. The calculus, when dried, weighed fifty-nine grains.

HYPERPYREXIA.

Mr. Newton reports a recent case, in which the patient, a girl aged 14 years, a pupil at a large school, complained during the evening of a general feeling of malaise. On awaking next morning she appeared to be very ill and was removed to the school hospital. Here the nurse was struck by her strange manner and appearance, and on taking her temperature was amazed to find that the thermometer registered 110° F. Thinking that there must be some mistake she shook the mercury down and again took the temperature in the mouth, and found that the instrument again registered 110°. Another thermometer was tried with the same result. The patient was put to

bed and a large dose of antipyrin administered; and when seen by the physician, about three quarters of an hour later, the temperature was below 101°, and the delirium had nearly passed off. The nurse had, however, kept the thermometer for the doctor to see. During the day the patient developed a slight attack of pharyngeal tonsillitis, and in forty-eight hours she was quite convalescent. About a month before this same child was attacked with the same complaint, the temperature on that occasion reaching 107°.—*Lancet.*

BEEF ESSENCE.

Take a cube of beefsteak free from fat, sear it over an alcohol lamp that has a large flame, put it in a large lemon squeezer and squeeze out all the juice; this fluid contains five to ten per cent. albuminoids, a large quantity of the salts, to which may be added a little new sweet milk and pepsin. Prepare the milk by curdling it with a few drops of dilute hydrochloric acid, then beat the eggs with an egg-beater, and add twenty to thirty grains of pure crystal pepsin. Milk and beef-juice thus prepared make an admirable invalid food. I frequently rub the yolk of a hen's egg with half its bulk of glycerin, twenty to forty or sixty drops of which given every thirty to sixty minutes is a strong food, quickly absorbed, and one that may be mixed with milk, beef essence, or both.—*Georgia Electric.*

The China Medical Missionary Journal.

VOL. XI.

JUNE, 1897.

No. 2.

Editorial.

Decorations and honors have been freely distributed by Her Majesty on the occasion of the diamond jubilee. We have not yet heard of any having been bestowed upon members of the medical profession. There are a number of men in Great Britain to whom, in recognition of their great services in the alleviation of suffering and the prevention of disease, thus increasing the sum of human happiness, such honors are due. It may be that when we have the full list of those who have received Her Majesty's gracious favor we will find the names of some of these men. Speaking of the way in which the world often fails to recognise those who in the peaceful avocations of life are constantly labouring to prolong life and make it happier and more useful to society at large, we can not forbear quoting the following from the address of Dr. William W. Keen before the American Surgical Association and the Alumni Association of Jefferson Medical College, on the occasion of the unveiling of the bronze statue of the late Professor Samuel D. Gross, in Washington, D. C. "It is strange that the human race has failed so grievously to recognise publicly its great medical benefactors. Mr. Lecky, in his last remarkable book, in speaking of the rewards of genius in Great Britain, after enumerating the chief of the extraordinary and beneficent achievements of medical men in the present century, says, 'England may justly claim a foremost place in this noble work, and many of her finest intellects have been enlisted in its service. In no single instance has this kind of eminence been recognised by a peerage. It is clearly understood that another and a lower dignity is the stamp of honor which the State accords to the very highest eminence in medicine and surgery—as if to show in the clearest light how inferior in its eyes are the professions which do most to mitigate the great sum of human agony to the professions which talk and quarrel and kill.' (*Democracy and Liberty*, i. 429.) And yet Jenner almost saved England from extinction, and Simpson and Lister have done far more to mitigate the

terrors of surgery and the pangs of maternity, to save life, and to bring health and happiness to the human race than Marlborough and Wellington and Nelson have done to destroy life and bring sorrow and pain and rapine and misery.

“It is pleasant to record that England has atoned, with the opening of this year, for such long continued neglect. In making Sir Joseph Lister the first medical peer she has conferred less honor upon Lord Lister than upon herself.

“The statue of Marion Sims, not long since erected in New York, and this one of Samuel D. Gross, let us hope, are the beginning of a similar recognition of beneficent genius in our own land. Go through the broad streets of this beautiful city, and in its circles and parks and squares you will find, with singular exceptions, only the statues of statesmen and warriors—men who deserve, we all agree, their well-won honors and immortality. But, truly, ‘Peace hath her victories no less renowned than those of war.’ Though its heroes are not, it may be, portrayed in marble or in bronze, they are enshrined in the grateful hearts of mankind, immortal in literature, even the humblest of such toilers as the Gideon Grays and the Weelum Maclures that cheer and brighten the world.

“Yonder statue of Joseph Henry has stood alone for too many years. We have to-day unveiled its worthy companion. Both of them are memorials of men great in science, whose lives were devoted to the good of their fellow-creatures, to saving life, adding to human comfort, lessening pain, promoting knowledge, cheering the sick, and assuaging even the very pangs of the dying. We do well to honor thus in imperishable bronze the men who have won these victories of peace! To no one can the words of the blessed Master apply with greater force than to the kind surgeon whose time and thought and talents are given to humanity, and, above all, to the poor, with no payment but the grateful look of returning health and rescued life and that inward satisfaction which far surpasses all the wealth of the Orient—‘Inasmuch as ye have done it unto one of the least of these, my brethren, ye have done it unto Me.’”

The plague, famine, and earthquake have been devastating India. The former continues apparently with unabated violence, although Reuter rarely refers to it. It is dying out at Bombay, but continues with marked severity in the Cutch district, north of that city. It seems to be traveling westward, as it has appeared at Jeddah on the eastern

shore of the Red Sea. The important problem is to keep it out of Europe. Quarantine against infected ports has been practiced in all of the principal sea-ports of Europe. The great danger is that as the epidemic continues vigilance will relax. "Familiarity breeds contempt," and more frequently carelessness. One source of danger is the conveyance of this disease from infected ports by means of ship's rats. The rat is as susceptible to this difficulty as is the Guinea pig to tuberculosis or the mouse to mouse-septicæmia. It is very probable that the infection is largely carried by rats and mice. Being constant inhabitants of dark and filthy holes and water drains, they come out at night and help themselves to articles of food that have been left within their reach, running about over tables and cooking utensils, spreading infection wherever they tread. Direct contagion from person to person, in this disease, is highly improbable. Aoyama, we believe it is, who claims that it is taken into the system only by the digestive tract or by a solution of continuity in some of the exposed tissues of the body. Therefore if the respiratory mucous membrane is perfect, infection can not take place by inhalation. Overcrowding, foul air, *sewage-soaked soil*, and defective drainage appear to most greatly favor the spread of the disease. Better attention to sanitation, improved drainage, the making it impossible for vermin to exist about a house; these things will go far toward preventing the spread of infection.

It is a popular fallacy to suppose that this disease, like yellow fever, is peculiar to tropical latitudes and "heated terms." This is a mistake. While its natural habitat is more or less one with Asiatic cholera, it is not all confined to warm climates or warm seasons. It has several times been known as far north as Norway. In this connection the following quotation from Hecker may be of interest: "The inhabitants of Iceland and Greenland found in the coldness of their inhospitable climate no protection against the southern enemy who had penetrated to them from happier countries. The plague caused great havoc among them. Nature made no allowance for their constant warfare with the elements and the parsimony with which she meted out to them the enjoyments of life. In Denmark and Norway, however, people were so occupied with their own misery that the accustomed voyages to Greenland ceased. Towering icebergs formed at the same time on the coast of east Greenland, in consequence of the general concussion of the earth's organism, and no mortal from that time forward has ever seen that shore or its inhabitants." Climate and season seem to have no causal relationship. Epidemics have followed prolonged drouths, and have prevailed during

rainy seasons. The epidemic at Hongkong in 1894 appeared after a prolonged season of dry weather. Rain was anxiously looked for—probably prayed for. It was said, All will be well when the rain comes. At last the rain did come, and with it the disease seemed to be refreshed and the number of deaths was multiplied.

The discovery of the plague bacillus by Kitasato and Yersin in 1894 has not only cleared up the etiology and pathology of this disease, but has made possible the line of experimentation which has resulted in the adoption of serum therapy and protective inoculation in its treatment and prevention. This bacillus, which is a short, rounded one, is destroyed by drying, and very rapidly so by exposure to direct sunlight. Boiling water or steam destroys it very quickly, while one-per-cent carbolic acid will kill it in an hour. A good culture medium for the bacillus is a two-per-cent alkaline peptone bouillon, to which two-per-cent of gelatine has been added. The antitoxic serum is best produced in horses and rabbits. This serum-therapy as demonstrated by Yersin is highly efficacious. Of the 26 cases at Canton (3) and Amoy (23) only two died, and these were injected on the fifth day of the disease, and were desperate from the outset. In India, Yersin and Haffkine have been inoculating large numbers with their respective curative and prophylactic serums. No extended report has yet been published, but up to March 17th Haffkine had inoculated 2,790 persons with his serum. It is said that none of those inoculated while free of plague have died of the disease and but few have been attacked, and that all attacked subsequent to inoculation except three have recovered. Dr. Yersin is reported to be very successful with his curative serum, failure occurring only in those who were moribund when inoculated. The doctors sent to India by the Austrian government have reported to the Academy of Sciences at Vienna that neither Yersin's nor Haffkine's serum has been successful in the treatment of bubonic plague. This seems to be at variance with all the reports from other sources. It has been suggested that jealousy, or diversity of opinion in regard to the definition of what constitutes success, may be accountable for this report.

The following prescription, which if it did no good, would certainly do no harm, is taken from a seventeenth century book entitled, *A Treatise of the Pestilence*, by Thomas Phayer, and will be of interest from the point of view of medical history:—

“A very good preseruatiue for the common people, ready at all times and of small coste: Take an ounce of leaves of rue, half an ounce of good figges, one ounce of Jenuper berries, two ounces of walnuttes

piked, iiii ounces of vinegar, and a good quantitye of saffron ; stampe all the foresaide thynges together and reserue them in an earthen cuppe or a glasse faste stopped that no ayre yssue, whereof yf ye receyue in the mornynge upon a knifes poynte, the quantity of a beane or more ye shalbe sure by the grace of God not to be infected in four and twenty hours after."

That which strikes one most, upon perusal of Dr. Neal's article in this issue of the Journal, is that in the many decades medical missionary work has been established in China, so little has been done in the way of medical education. Aside from the work done by our senior missionary and his colleagues, the result is almost nil. A moment's reflection will explain why this is so. The medical missionary has always had his hands more than full with the clinical work he has had to attend to, and often, aside from his medical duties, he holds positions of responsibility in the mission with which he is connected. So that the training of medical students has been with him quite a secondary matter, has been rendered necessary by his need for medical assistants in his work, his teaching has been done at such times as he could snatch from his multifarious duties, and has therefore been of the most desultory and superficial character. Small wonder then that the results have been meager and unsatisfactory. The only wonder is that so much has been accomplished as there has. One of our number, whose students rank up with the best yet trained in China, will serve as an illustration of how difficult it is for the missionary physician to find time for this work. He is Customs and community physician, has care of the members of his own mission for the province in which he resides, has charge of a large hospital and dispensary, and without neglecting these must endeavor to do justice to his students. The medical missionary, *pur et simple*, can not, for many reasons, carry on this work successfully. The chief of these is that most medical missionaries feel the urgent call of duty in other directions; either to the direct relief of suffering, or to that of more directly preaching the Gospel. Opinions differ as to the value of medical teaching as *missionary* work. If done with any great degree of efficiency the work is exacting as to time, and few feel the call of duty in this direction to such a degree as to warrant them in devoting the requisite amount of time and attention to the subject. This is a work for the broader sympathies of the whole medical profession. Our profession has always been marked by its great sympathy with human suffering, and with intense interest in its

alleviation. Surely no wider field of human philanthropy can be found than that of giving rational medicine to the many miserable millions of China. Irrespective of creed or no creed, this is a work that should appeal to all. Some will give themselves entirely to this work; all should give it their heartiest sympathy and co-öperation.

There is some difference of opinion as to the best and most practicable *method* of giving medical instruction. Without doubt a medical school should be a *school*, in which genuine class and laboratory work is carried on; and should *not* consist in a number of boys, with little or no knowledge of elementary principles, wandering more or less aimlessly about hospital wards and dispensaries, picking up here and there a few "shot-gun" formulæ and a smattering of medical and surgical lore. If a thorough knowledge of the elementary principles of medical science is necessary for the medical student of the West, it is doubly so for the student in China. The apprenticeship system is the one in use with Chinese doctors in training their pupils, and has been largely adopted by medical missionaries. But with the great advances in medical science, and with the improved methods of medical instruction, this system is no longer practicable. School methods must therefore be adopted. The great difficulty in carrying out this latter plan is the lack of outfit and teaching force. The outfit will come, if the work is well started and an appeal is made in the proper quarter. For the teaching, we cannot depend upon the foreigner. He is too expensive and hard to get. Natives must be trained for the work of tutors and demonstrators.

In this connection, and at the request of two members of the Association, one in south and one in north China, we give an outline of the plan adopted by the Nanking University School of Medicine, which plan has received the approval of the mission board at home. In the establishing of this school we have largely been guided by the principles laid down in two papers, one published in this Journal, (Vol. VIII, p. 91), and one in the *Chinese Recorder*, (October, 1896). The course covers four years, two and a half of which are devoted to class and laboratory work, and one and a half to clinical work in hospital and dispensary. To this course, an entrance examination is required in the following subjects:—Chinese Language and Composition; Arithmetic; Political and Physical Geography; Experimental Physics; General Chemistry; Elements of Biology; Rudiments of English Language. Those who are not prepared in these subjects are required to take them in a preliminary year in the Academical Department. The following outlines the course of instruction for the four years:—

- 1st Year.—Anatomy : Bones, Joints, Muscles, and Blood Vessels.
 Histology : Lectures and Laboratory.
 Chemistry : Analysis.
 Physiology : Lectures and Laboratory.
 Bacteriology : „ „
- 2nd Year.—Anatomy : complete, including Regional Anatomy.
 Medical Chemistry, including Urinalysis and Toxicology.
 Materia Medica.
 Therapeutics.
 Pathology : Lectures and Laboratory.
- 3rd Year.—Obstetrics : Lectures.
 Physical Diagnosis.
 Medicine : Lectures.
 Surgery : „
 Minor Surgery and Surgical Dressings.
- 4th Year.—Clinical Medicine.
 „ Surgery.
 „ Obstetrics.
 Operative Surgery.
 Ambulance Drill. (Elective.)

Students pay all their own expenses, including breakage on apparatus, and tuition as follows : Preliminary year, \$12; First and Second Years, \$25 per year; Third and Fourth Years, \$20 per year. The plan is working very well. The students, including those now in the course and those preparing for it, number eleven, with the prospect of a large increase next year.

The attention of the members of the Association is called to the lists at the close of this number. It is very desirable that a correct list of the members of the Association be prepared at the present time. We can not find out whether any register of members was ever kept. Nothing appears upon the subject in the books in the Secretary's hands. Of course, a list of the names of those who were then members was published in 1890, and those who have been elected since were officially announced in the JOURNAL from time to time. But there have been so many changes, and the names have been written on no definite plan, so that a list prepared from these sources would be very unsatisfactory. Let each member see to it, not only that the facts in his own case, but also in that of the members of his mission, his colleagues in the city in

which he resides, or of any other case with which he may be familiar, are sent to the Secretary at once. Do not be afraid of overstocking that officer with information.

The Editor particularly desires that the proper qualification shall be attached to each name. In the March number of the JOURNAL one contributor's qualification was wholly omitted, mainly because no information on that point was at hand. The omission was due primarily to the Doctor's modesty in not attaching his proper qualification to the manuscript, and secondarily to the fact that when both copy and proof were read the list was not at hand to refer to for the proper title, and afterwards it was by an oversight entirely omitted. The Editor will consider it a great favor if each contributor will write the proper qualification after his name in the proper place on the manuscript.



Evangelistic.

We extract the following from the report of the Executive Committee of the Medical Missionary Association of Great Britain:—

“The Church has been slow to realise her own possessions in her Lord, and it is not wonderful if she has been somewhat laggard in inviting others to share in them. Happily this time of a narrower vision is passing away, and she is learning to present her Master to the world in more of the fulness which He claims at her hands. The medical element in missions is essential to this fulness.

“Medical missions are progressing. The Churches are recognising their necessity and developing them in larger numbers and with fuller equipment. In January, 1890, when we first began to issue a list of medical missionaries holding British degrees or diplomas, there were 125 such missionaries. This year there are 239. This is good, but there is room for a vast advance. The rate of increase is indeed largely dependent on the enthusiasm of our Christian women. It was in 1880 that the late Dr. Fanny Butler went out to India as the first representative of women’s medical missions from this country. Now there are fifty-four such missionaries, and last year they added eighteen to their list as against sixteen added by the men. This is most certainly not as it should be. However much we prize the noble work wrought by our sisters, it is a shame to our profession that they should have to point the way in the matter of loyalty and devotion to Christ.”

Mr. Robert E. Speer, one of the Corresponding Secretaries of the Board of Missions of the American Presbyterian Church, who is now visiting their work in China, writing in regard to their work in Teheran, says:—

“Medical and educational methods of evangelization are sometimes spoken of as indirect methods of missionary work, while the immediate oral presentation of the Gospel is regarded as the direct method. Medical and educational work may be so carried on as to give force to this distinction, and in times of financial limitation they may be provided for at the expense of aggressive widespread preaching, arriving at the immediate conversion of souls without the subsidiary aims and aids of hospital, dispensary or school. On the other hand, medical and educational work may be made more positively and fruitfully evangelistic than much oral proclamation of the Gospel. In a good station the supreme end of each department will be direct evangelization. General beneficence, enlightenment or enlarged intelligence will not be satisfactory fruits if they fall short of positive evangelization of the most

wide-reaching kind. The Teheran station has the right ends in view, at least. As Mr. Ward expressed it in some long discussions we had together at a station, over the aims of our work, our plan of action, our limitations and the conditions of the specific field assigned to Teheran, "Evangelistic preaching, evangelistic teaching, and evangelistic healing, are the methods we attempt to pursue."

"Some time ago while in temporary charge of the hospital at Swatow, so well known in connection with the work of Drs. Gauld and Lyall, I had as careful a search as feasible made for the former in-patients who had applied for baptism while under treatment in the wards. The recent appointment of a colporteur and Bible reader who was to devote his whole time to the patients made this extensive visitation possible. He was accompanied in almost all of his visitations by the preacher stationed at the chapel nearest the district visited. The result was distinctly encouraging.

"It is a common experience in asking the preachers (who are quite alive to the value of medical missionary work) to visit ex-patients, for them to say that while people are in the hospital they are willing enough to worship, but it is a very different matter when they are at home again, and one feels somewhat depressed at the apparent meagreness of definite results. Certainly I was not prepared for such a good showing as the tabulated results. From 1888 to 1893 inclusive 425 in-patients were enrolled as applicants for baptism, some of whom had already applied in previous years. An attempt was made to trace 259 of these, with the following results:—

22 had died.

85 had received baptism.

68 could not be found.

75 were still on probation (not giving entire satisfaction.)

17 were unsatisfactory or afraid.

40 had apparently quite gone back.

"Eighty-five baptisms represents one in five of the applicants, and it must be kept in mind that perhaps many of those on probation may yet be received, and that *out-patients* are not included.

"This is merely a bald record of figures. It takes no account of secret believers, of the parents, husbands, wives, children, friends of these inquirers who have been led by them to know God, of the thousands who in these inquirers who have been led by them to know God, of the thousands who in these same six years have had their eyes opened to the folly of their superstitions.

"It is not an attempt to estimate spiritual work statistically. But it is a partial record of the after history of hospital inquirers, and as such is devoid of neither interest nor encouragement."

PHILIP B. COUSLAND.

The following from a private letter to the Editor is published with Dr. Kilborn's consent :—

“Regular medical work was begun in this city first after the riots by Dr. Gifford Kilborn. Her hospital for women and children was opened November 23rd, 1896. Patients are seen every Monday, Wednesday, and Friday,—besides those who are visited at their homes. Both classes have increased rapidly in number since Chinese New Year; from 40 to 50 is the usual attendance just now.

“Our hospital for general work, but more especially for men, will open Monday, 29th instant. Everything was destroyed in the riots, so all our buildings are new now; they are nearly finished, except parts of the wards. We can carry on dispensary work now, and in-patients in a week or two.

“Dr. Smith, just arrived in January from Canada, is deep in the language. He will be ready for the medical work by and by.

“Dr. Canright, of the M. E. Mission here, will begin his medical work soon.

“The C. I. M. have no doctor in Chen-tu at present. Dr. Parry used to be here, you will remember.

“Every department of mission work seems encouraging in this city at the present time. Preaching services are remarkably well attended, both those on Sunday, and the street-chapel services. Congregations of 200 are ordinary, while those of 350 and even 400 are not uncommon. The people listen attentively, and regular attendants on all services are growing more numerous. Numbers are putting their names down as enquirers, and we believe a great ingathering of souls will mark the present year.”

Chen-tu, March 26, 1897.

O. L. KILBORN.

The following extracts from an article written for the *Gospel in All Lands*, by Rev. Moses C. White, M.D., one of the pioneer missionaries, and pioneer medical missionary of the Methodist Episcopal Church to China, will be read with interest in connection with Dr. Whitney's article in this number of the Journal. Dr. White's health did not permit him to remain long on the field, but he has always manifested the greatest interest in medical missionary work, and particularly in medical education among the Chinese. He has for many years held the position of Professor of Pathology in the Medical Department of Yale College :—

“On April 13, 1847, the first missionaries of the Methodist Episcopal Church to China, Rev. Judson D. Collins and Rev. Moses C. White and wife, bade farewell to friends in New York, and at 5 p.m. went on board the steamer *Oregon en route* for Boston. As the steamer sailed out East River they went on deck and sang—

“ Yes, my native land, I love thee ;
 Far away ye billows bear me.
 Pleased, I leave thee ;
 Native land, farewell, farewell.”

They arrived in Boston on the fourteenth, and at 11 a. m., April 15, went aboard the ship *Heber*, Captain Patterson commanding. With them as fellow-passengers were Mr. and Mrs. Doty and Mr. Talmadge, missionaries of the American Board to China.

At 11 : 30 a. m. Bishop Janes gave out the hymn:—

“ Ye Christian heralds, go proclaim
 Salvation in Immanuel’s name ;
 To distant climes the tidings bear,
 And plant the Rose of Sharon there.”

After singing the hymn the doxology was sung, and Rev. Dr. Anderson, Secretary of the American Board, pronounced the benediction. Good-byes were said. The ship started on its way, and at 4 : 30 p. m. land disappeared.

Not a ship was spoken on the way, and but few sails were seen. A heavy storm of wind was encountered halfway between Rio Janeiro and the Cape of Good Hope. The ship stopped a few hours at Anger in the Strait of Sunda on July 20, arrived at Macao August 5, Canton August 7, one hundred and fourteen days from Boston. They left Canton in a Chinese sail boat August 13, and arrived at Hongkong the next day. They sailed from Hong-kong August 21 in a Portuguese *lorcha* or schooner of about seventy tons burden, arriving at Amoy August 23, and the Foochow anchorage September 6, 1847.

In the special instructions to our first missionaries was the following:—

It is expected that each member of the mission will strive to master the language at the earliest period, and will omit neither opportunity nor effort for securing that important end. Preaching the Gospel of Jesus Christ to few or many, as God may give you occasion, you will consider your one great work. As subordinate and auxiliary to this, other things may require your attention; for example, healing the sick and the establishment of schools. Brother White, having given some attention to the study of medicine, is instructed to spend so much of his time distributing medicines and healing the sick as may be conducive to the best interests of the mission.

In February, 1848, I rented and opened a dispensary adjoining my house at Tong-chiu and continued to labor there as health and other duties would permit till the arrival of Dr. Wiley in 1851, when I relinquished the medical work to him as soon as he learned enough of the language to take my place. This gave me time for direct missionary labor. In all my medical work, in my own house, in the dispensary, and in the houses of the Chinese, I talked about Jesus and distributed Christian books.

Calls for medical work were plentiful. In one night I had three calls to treat persons who were poisoned by opium. Hundreds were treated, and the great majority were rescued from death. I often went alone with entire strangers into unfrequented parts of the city to rescue those who had taken opium to end their existence. People would sometimes cry out, “ Kill the foreign devil,” but those who had called on me to go with them would cry, “ Hush ! He goes to save life.” To the credit of the people be it said, I was never molested, and generally succeeded in saving the life of the patient.

Many a person in high life opened his doors to the foreign doctor, and received his tracts and portions of Scripture. Once a crowd of men high in rank knelt as I prayed to God to save a beloved daughter when no human skill seemed to avail. The missionary’s wife went [with her husband when making medical visits to women of rank. The son of a high officer at Peking was cured of insanity by this first medical missionary at Foochow.

Our mission desired very much to secure a foothold inside the walls of Foochow. Once I presented a petition to the Ming Kaing (Mayor) of the Min District, asking permission to rent a room for a dispensary within his portion of the city. He received me politely, took my petition, and after a few days answered in writing that he highly appreciated my good will, and that my skill and charity were known far and wide; it was therefore unnecessary for me to take the trouble to keep a public room inside the city as those who needed my services could easily repair to my residence at the middle island in the southern suburb.

"Why do you English and American people force our country to admit opium?" was often asked as we tried to tell them that our religion was better than the worship of idols. "Stop the opium trade," said the people, "and then we will be glad to hear about your religion." Sad, indeed, is the heart of the missionary as he hears the Chinese deplore the introduction of opium in a way that has baffled the most sincere and earnest efforts of the Chinese government to exclude.

On January 29, 1849, I was called to see a woman dying with consumption in one of the finest houses I ever visited in Chiua. The father-in-law, a man of rank, called the male members of his family and friends—some twenty persons, richly dressed in silks and satins—to hear me tell of the Saviour of sinners. He gave me permission to talk and pray, which I did with a throbbing and overflowing heart. The men listened with seriousness, and all knelt while I prayed—partly in Chinese and partly in English, as my knowledge of Chinese was then very limited. Afterward I sent them some Christian books, which I doubt not were carefully read. I believe the seed was not sown in vain.

My own missionary work, outside of my dispensary, was to a great extent that of a colporteur street preacher. My heart was full as I went from place to place distributing Christian books and telling the story of Jesus and His love. In the streets, in the temples, in stores, and in public places, I talked about the Father in heaven and the Saviour of sinners.

In a great open court, 400 feet wide and 1,000 feet long, in front of the Provincial Treasury, was a large pavilion, through which was a public thoroughfare. Here, on one side of the way, on a stone, about eighteen inches high, I frequently stood to speak to the people. At first I was insulted, hooted at, and bits of tile and pieces of fruit were thrown at me, and one man came and blew tobacco smoke in my face. Week after week, for two years, I went to that station with a good degree of regularity. Very soon all molestation was stopped. The man who had blown the smoke in my face took pains to keep order and rebuke any who offered to interrupt me. Often I would talk till weary, and then go to the tea tables on the opposite side of the pavilion for refreshment. There the old men gathered around, and told the young men and boys to stand aside and keep quiet while they talked with the foreigner about Western people and their religion, generally bringing up the subject of the opium trade.

One day, as I was pressing my way through a dense crowd to reach this station, an old man, with flowing beard as white as wool, took me by the arm, and said: "Are you going yonder to talk the Jesus doctrine to-day? I have heard you speak there. That is a good doctrine." My heart was melted at such a salutation. Many a hearty welcome and encouraging word did I receive from the Chinese. I do not remember ever feeling a doubt or fear as to the result of my labors. I expect to meet in heaven many to whom I told, as best I could, the story of the cross and the love of my Saviour.

In February, 1850, I had typhoid fever, and was brought to the very gates of death, but, through the care of kind friends and the aid of an English army surgeon from India, I was restored to health after being seven months an invalid. During the acute stage of

the fever I, like Brother Collins, longed for the mountain water. I remember saying, "I will have it." I lived alone with my two Chinese servants and my teacher. I sent for a coolie, and asked him to take two porcelain jars, holding nearly two gallons each, and go to the mountain and bring them filled with water. These two jars of water lasted me two weeks. As a result of my experience I always remember to give patients with fever good, sparkling water.

Other missionaries have been sick and have returned home. Some have died. Better houses, better food, and other improved surroundings make Foochow to compare favorably with places of the same latitude in almost any part of the world. The drinking water is poor. The water from the rivers of China is generally contaminated with sewage and rendered more or less unhealthy from the nature of the soil and the rocks through which it percolates. I am satisfied that drinking tea is more conducive to health on the coast of China than the use of water from rivers and wells.

Owing to the great difficulty of procuring suitable houses on account of the opposition of the people, it was decided to rent a house in a desirable locality and take possession quickly, hoping that the people would acquiesce in a fact accomplished.

By quiet negotiation we obtained a lease of a house at Quantow, halfway between the river and the walled city. With what we could carry in our satchels Mrs. White and myself went to the house, stepped in, and shut the doors. Then a message was sent back to the other brethren, who forwarded quickly our beds, bedding, cooking utensils, etc., and the removal was effected in one afternoon. The village constable appeared, and, learning the condition of affairs, asked if we would subscribe something to pay the village watchman. This we were glad to do, and, the bargain being made, that official was bound to see that we were not molested.

The new compound was about 40 feet wide and 150 feet deep, and surrounded with a high wall; but our sleeping room had no light save from a few bull's-eye lights in the roof of tiling over our heads. We expected to make some repairs, and hoped to build a small chapel and school-room in the part near the street, but when the wet weather set in Mrs. White was in such poor health that Dr. Wiley said she could not possibly live if she remained at Foochow. My own health had also been much impaired by exposure.

With much reluctance we started for America the last of December, 1852. We sailed from Canton for New York on the ship *N. B. Palmer*, and reached New York in August 1853.

SURGERY UNDER DIFFICULTIES.

Dr. J. Hunter Wells, Pyeng Yang, Korea, in the last year, cut off an arm in the dining-room, performed an operation for cataract of the eye in the bedroom, cut off a leg in the shed, made use of the kitchen for many minor operations, and had patients lying all over the neighborhood in every available shed or room. Notwithstanding the lack of accommodations, he treated some 4,000 patients, contributing much to the advancement of the growing work of that station. Friends living in Indiana have provided the funds, and a new dispensary and hospital on a small scale have just been completed.

The American Tract Society publishes in a little leaflet the following sweet stanzas :—

HE CARETH.

What can it mean? Is it aught to him
That the nights are long and the days are dim?
Can he be touched by the griefs I bear,
Which sadden the heart and whiten the hair?
Around his throne are eternal calms,
And strong, glad music of happy psalms,
And bliss unruffled by any strife.
How can he care for my little life?

And yet I want him to care for me
While I live in this world where the sorrows be.
When the lights die down from the path I take,
When strength is feeble and friends forsake,
When love and music, that once did bless,
Have left me to silence and loneliness,
And my life-song changes to sobbing prayers,
Then my heart cries out for a God who cares.

When shadows hang o'er me the whole day long
And my spirit is bowed with shame and wrong;
When I am not good, and the deeper shade
Of conscious sin makes my heart afraid,
And the busy world has too much to do
To stay in its course to help me through,
And I long for a Saviour—can it be
That the God of the universe cares for me?

Oh, wonderful story of deathless love!
Each child is dear to that heart above.
He fights for me when I cannot fight,
He comforts me in the gloom of night,
He lifts the burden, for he is strong,
He stills the sigh and awakens the song;
The sorrow that bowed me down he bears,
And loves and pardons *because he cares*.

Let all who are sad take heart again;
We are not alone in our hours of pain;
Our Father stoops from his throne above
To soothe and quiet us with his love.
He leaves us not when the storm is high
And we have safety, for he is nigh.
Can it be trouble which he doth share?
Oh, rest in peace, for the Lord *does care*.

VALUE OF MEDICAL WORK.

An incident illustrating the value of the medical arm of the missionary service is given by Dr. Waples, of Kalgan, North China, who reports the case of an intelligent man who, by a comparatively simple surgical operation, was relieved from a most distressing difficulty in his throat, which rendered his speech almost unintelligible. Accompanying the patient's cure was a glad reception of the Gospel, and the healed man went to his own village praising the doctrine which healed both body and soul. A few weeks later, Dr. Waples visited this man's village, where he was very warmly received by all the people, and already there are three families in the place which have accepted the Christian faith.—*The Missionary Herald.*

We are sorry to have to record that the Queen of Madagascar has, under the order of the French General Gallieni, served upon the joint committee of the London Missionary Society and the Society of Friends an order to vacate the Antananarivo Hospital, a cut of which appeared in the March number of the JOURNAL. Communications on the subject have been made by the committees to Lord Salisbury and to the French government. No reason for the eviction has been made public.

In Memoriam.

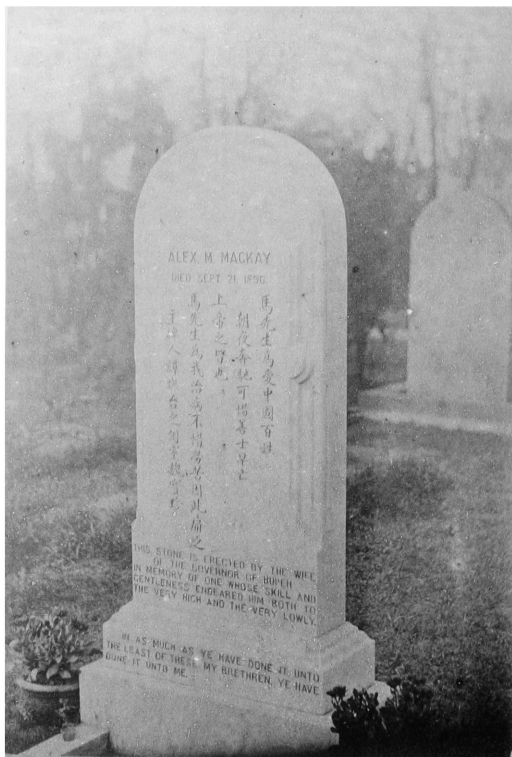
It is some six years ago that I was introduced to Alex. Mackay, a sturdy little Scotchman with a smiling face and a warm grip of the hand. I little thought then what a great influence he was to have in the city of Wuchang, or how much we should work together in the years to come.

A quiet little man, with a fund of humour and a curious knack of humming to himself whilst at work, you did not all at once learn to know Mackay. He hailed from Caithness, in the north of Scotland, where, in Halkirk he spent his youth. Bereft of his father when he was but three years old he was brought up by a godly mother, with several brothers and sisters, on plain fare and plenty of fresh air. He seems to have been (as are not all true Scots?) of a serious turn of mind, and "turned preacher before he could read"—though I warrant his conscience was easy to him on many an innocent prank. He worked his way up, as many a Scotch lad before him has done, and his first prize was "a History of China." This we are told laid hold on his imagination and doubtless formed a factor in his after life. He chose medicine as his profession and graduated with credit at Edinburgh. Here he came under the influence of Studd and Prof. Drummond, and was one of the converts in that remarkable wave of holy influence which swept over the University at that time. Thence he went to London for post-graduate work, and the Rev. Reid Howett, who knew him well, tells "of his rare influence on the young." This influence he never lost, but was always a favourite with the boys and girls and young men, even among the Chinese. Later on he gained further experience as a ship's doctor, and then joined the L. M. S. in Hankow. After working for some time in connexion with them, first at Hankow and later at Wuchang, he started in private practice for himself in Wuchang. He still considered himself as a missionary, though unattached, and there was no possibility of doubt in the minds of either natives or foreigners as to his aims in life. He voluntarily conducted the dispensary of the Wesleyan Mission in that city and did a large benevolent work himself amongst the poor. As private medical attendant to the Fu Tai and to the Viceroy's Secretary, as well as to many other officials, he got an entrance into many influential families—an influence he always used for the glory of God. A friend in Wuchang writes: "There was no one in Wuchang so well known and so universally beloved as Dr. Mackay. High mandarins, impecunious and expectant officials, government employés, missionaries, shop-keepers, soldiers, and the very poorest of the poor were amongst his patients, and more numerous than his patients were his friends, both Chinese and foreign." "One most noticeable feature of Dr.

Mackay's work was the intimacy that existed between him and some of the highest officials in the city. It was not only that he was their doctor, but he was their friend, always welcome." Wherever he went the Gospel went. One who worked with him says he made it a point to tell of Jesus in every home he went, and through him many a one in high places heard the truth, and more than one found the light. He was one of the most humble, gentle and unselfish of men. Said a mandarin's son of him, "He was always willing to listen to what we have to say, and that is what is necessary in a doctor. It is very necessary that a doctor should be gentle and not brusque." He was not only the private physician of the governor of the province, but the friend of the family. "In the governor's Yamèn hangs a large portrait of 'the beloved physician,' and all who go into that room are taken to look at it and are told of many loving words and deeds of the one so much honoured."

Unselfish, unsparing of himself, and overworked he fell an easy victim to cholera in the epidemic of last year. All through the epidemic he had been hard at work amongst both foreigners and natives, and saved many a life. "Only a few days before he was taken ill one of his patients was seized with the terrible disease. Dr. Mackay was with her nearly all day until danger was over, not only doing the work of a doctor but that of a nurse as well. He was seeing patients until late on Sunday, September 20th, and was seized with his fatal illness about 2 o'clock on Monday morning—knowing there was no doctor in the city he did not send to any one to come to him; his native assistants and the servants got him such medicines as were in the house, and it was not until 9 o'clock in the morning that any one knew of it and came to nurse him. Dr. Gillison, of the L. M. S., Hankow, was at once sent for, but arrived too late to save the life of his old colleague and friend." For him there was no rebellion to the call, it was all right; he was glad that Dr. Davenport would soon be here, and that Wuchang would not be left. Quietly and calmly he gave his last directions, bore his simple testimony to his readiness to go to his Master and fell asleep early on Monday afternoon, having been ill only 12 short hours, during the most painful of which his unselfish thought for others had left him all alone. Part of his last message to his mother was, "Tell her I'm glad I came to China."

So passed away, all too soon it seems to us, one of the most loveable and loved workers in Central China, worthy to be placed by the side of such men as Roberts and Mackenzie. It has seemed right to specially refer to him, because, though comparatively unknown, he was, in every respect, an ideal medical missionary. In the first place he was an earnest evangelist, loving the Lord with all his heart and telling out the good tidings everywhere. In the next he was an earnest and capable doctor who had no sympathy with slipshod work. Lastly his Christian love was shown in his wonderful patience



DR. MACKAY'S TOMB.

and gentleness, as one writes of him—his sympathy and kindness “got to be connected with his love to God and God’s love to them, and so led the more thoughtful ones to read the Bible and perhaps to pray to and believe in the Heavenly Father.”

His simple child-like faith was shown in the way he cut himself loose from any recognised society that he might more fully carry on work amongst the upper classes *in their own homes*, in his own way, trusting in the Lord to supply his wants. Into those homes he got as no missionary doctor before had done, amongst rich and poor as a loved and trusted friend, and there he carried the Gospel of love.

Mackay’s death is one of those permissive acts of God which to us appear so strange. A unique man, doing a unique work, in a unique sphere! Yet taken away just when he seemed most needed! It is only *seemingly* that the enemy has gained an advantage, and we wait with faith to see how the Lord will overrule this loss to the glory of God! The seed has fallen into the ground and died, and it *must* bear fruit. In our little Hankow cemetery stands a beautiful marble tomb, erected by the wife of the governor, a photograph of which accompanies this memoir. But Alex. Mackay himself lives and will live in the hearts of all classes of the Chinese in Wuchang, and only the day will declare how nobly and faithfully he served his Master. “Go thou, and do likewise.”

S. R. H.

IN MEMORIAM*

A. M. MACKAY.

Æt. 32.

1. “Go home content, the evening falls,
Day’s tired sinews are unbent;
No more the thrush or linnet calls,
The twilight fades, go home content.”
2. “Father, the field is but half-turned
And yet the Spring is well-nigh spent.”
“My son, the hour of rest is earned,
The day’s work done, go home content.”
3. “Father, the field is rough and bare,
Its sullen surface scarcely rent
I’ll plough but one more furrow there.”
“Not now, my son, go home content.”
4. “Father, the wheat will never root,
The sun has sunk the hills anent,
My weary labour will not boot,
With work half done, how be content?”

* [The writer of these lines was also called to “go home content” on the 27th of June, just before this memoir was sent to press.—ED.]

5. "My child, the sun hath seen thee toil
With sturdy back and brown arms bent,
Tho' other hands should till this soil
Thy work is done, go home content."

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6. "LORD, I have worked a little day
On the long task that Thou hast sent ;
The evening falls, my homeward way
I go to Thee ; I am content."

L. F. W.

Wuchang.

In the March number of the JOURNAL we sent the notice of Dr. J. J. Gregory's death, which occurred at Maquoketa, Iowa, U. S. A., October 16th, 1896. We have been waiting, hoping for more data in order to write more fully, but as none have been received, we will add a few words from personal acquaintance.

Dr. Gregory was first appointed to Peking, by the Methodist Board, in 1889, but before he reached the field was transferred to Foochow. He taught for a while in the Anglo-Chinese college. But being very anxious to have a hospital in connection with his work, and it not being convenient to have one at Foochow, it was finally decided that he go to Kucheng, an interior station about 100 miles from Foochow. There he built and equipped one of the best hospitals and dispensaries in China. The Society also sent out a trained nurse, a luxury for China, who was a valuable help to him, especially as he was isolated from the help of other physicians. His work at Kucheng was of a pioneer nature, and attended with the usual difficulties in establishing a new medical work. But Dr. Gregory was successful from the first, and did a great deal toward removing prejudice and winning the good will of the people. His departure was felt to be a great loss to that station.

In the autumn of 1894 Mrs. Gregory and the two children returned to the States, preceding him by one year. Dr. Gregory thought a great deal of his family, and the separation, even for a year, was very hard for him in his isolated condition. But he worked on patiently, attending faithfully to the duties of his post. August 1st, 1895, came that awful thunder-bolt out of a clear sky, in the shape of the Hwasang massacre. Dr. Gregory was the only physician within a hundred miles, and it was necessary for him to go and render the needed help. This experience was particularly sad and trying to him, as he had been the physician to all those who were massacred. It was most heart-sickening for him to go and treat the mangled victims who were still alive; and gather up the mangled remains of his

associates in the Kucheng field, and get them conveyed to Foochow for burial. It was a heavy strain even upon a physician's nerves. Then followed the long tedious trial and execution of the murderers, most exasperating to him, as many of the guilty were known to him, and probably some of them had received medical favors from him.

Soon after this trying affair he started for home by way of Germany, intending to spend a year in post-graduate study, to compensate for what he had lost by several years of isolation. But on the way, hearing of his father's severe illness, he hastened home to see him once more before his death. Not long after the death of his father Mrs. Gregory took ill of spinal meningitis, and after a short illness, she passed on before, leaving him and the two little children all alone, with all his hopes for the future crushed.

Mrs. Gregory was one of the most estimable ladies that ever entered the mission field, and her death was a great loss. After these sad and disappointing experiences, Dr. Gregory removed to Maquoketa, Iowa, to engage in general practice, and in a short time he took diphtheria from one of his patients, and after a brief illness, went on to receive his reward, just two months after Mrs. Gregory's death.

Dr. Gregory was a perfect gentleman, devoid of all sham, generous hearted, straightforward, conscientious, and thoroughly upright. He was a skillful physician, quite above the ordinary practitioner. It is seldom in the history of missions that we find recorded such a rapid, unbroken series of sad experiences. It is sad also to think of the two little orphaned children, left alone in the world, but it is hoped they will find kind friends to care for them and give them a proper Christian training. The thought of these things should draw us nearer to God, and make us more appreciative of the daily blessings we are permitted to enjoy.

We are fully conscious of the many defects and incompleteness of this tribute to our professional brother, but missionaries, and particularly medical missionaries, are not so plenty that we can afford to let their decease pass without paying some tribute to their memory.

H. T. W.

Correspondence.

DEAR DR. STUART.

In my paper, published in the March number of this Journal, I passed over the solitary actively mobile free corpuscles which abound in culture fluids with the remark, "Some of them are tubular, with an opening at each end." I find, however, that these are very rarely to be seen; the vast majority have but one opening, and are identical in all respects with bodies often to be found in human blood infested with this parasite. After a period of solitary existence, of variable duration, two or more conjugate, become immobile, and start on a cycle of development of a most interesting nature. This is described in detail in my Customs' Medical Report for the half-year ending March 31st, 1897.

As regards the zoological position of this parasite, the same Report contains my reasons for considering it a Corticate Protozoon, probably belonging to the genus *Trichomonas*, to which belong the parasites found by sundry observers in *healthy* rats and hamsters, in certain fish, and also associated with the Indian cattle plague "*Surra*," a disease the symptoms of which correspond precisely with those of a cattle plague which devastated Shantung, as well as other provinces, in the summer of 1895. Its nature was not then recognised, so far as I have heard.

If this conjecture prove correct, and the *surra* parasites be identical with the human ones lately described, it is obvious that the widespread human infection must be attributed to those of the affected cattle which recovered from the plague, but in whose blood the parasites persisted. Their milk must have been the channel of infection.

Provisionally, *i.e.*, until experts have investigated and decided the matter, I propose the name *TRICHOMONAS HÆMATOIDES* for this parasite; *hæmatoides* (*αἷμα, εἶδος*), on the analogy of the French *hæmatidé*=blood corpuscle, on account of the strange mimicry of the red corpuscles by the adult free blood forms.

It may be of service to intending investigators to describe what I have found to be the best means of recognising and isolating the above mentioned corpuscles from the other formed elements of infested human blood. Smear two cover slips in the usual way; let dry spontaneously; fix in absolute alcohol for 3 minutes; let dry; float face downwards on a 1 % watery solution of methyl green, containing also 1 % of acetic acid, for $\frac{1}{2}$ -1 hour. Wash quickly in distilled water; let dry; mount dry.

The acetic acid causes all the normal formed blood elements, and many of the abnormal ones, to swell up and become invisible. The bodies referred to are unaffected by the acid, and take the stain well, as do the various vegetable growths which result from their sprouting and union.

E. W. VON TUNZELMAN.

[In Dr. von Tunzelman's article in the March number of the JOURNAL in the note at bottom of page 15, the parenthesis in the sixth line should read, "*or*, by exposure to Osmic Acid vapour for 15 seconds," (not minutes).

In the last line the proper name is Chenzinsky.

Also, on page 9, last line, "On Sang" should be "Le Sang."—ED.]

Hospital Reports.

HOSPITAL REPORTS.

Modken Medical Mission,	By DUGALD CHRISTIE.
Medical Missionary Society in China,	„ J. G. KERR.
Lao Ling Medical Mission,	„ F. W. MARSHALL.
Tai Yuen Fu Medical Mission,	„ E. H. EDWARDS.
Chi-nan-fu Medical Work,	„ J. B. NEAL.
Dispensary and Hospital, Taiku, Shansi,	„ W. L. HALL.
Hangchow Medical Mission,	„ D. D. MAIN.
Church of England Medical Mission at Peking,	„ Miss MARSTON.
Pakhoi Hospital	„ L. S. HILL.
London Mission Hospital, Tientsin.	
Hospital and Dispensary, Tengchowfu,	„ W. F. SEYMOUR.

The above Reports received by the Editor since the publication of the last number of this Journal suggest the far-reaching influences of the humane work of medical missions. From the north-eastern province, Manchuria, Dr. Christie reports that his work suffered no cessation during the Japanese war, although for a time it was removed to Newchwang, where a Red Cross Hospital was established and more than 1,300 patients seen during nine months. The extreme south of China, Pakhoi, 430 miles west of Hongkong, and the centre of a large foreign trade, has been able to treat 15,000 patients in its Dispensary work during the last year and to treat 547 persons in the wards of the Hospital. This small place is visited by "men from nearly every town in Kwang-si and also from many places in Kwang-tung, besides a few from the remoter provinces of Kwei-chow and Yun-nan." Inland cities such as Tai-ku and Tai-yuen-fu in Shansi

province and Chi-nan-fu in Shantung, which are out of the track of any traveller, except such intrepid ones as Mrs. Bishop, send tidings of a large amount of relief. New places are being opened with great success, while older work, such as that in Canton, which has been in operation since 1838, has never enjoyed so much prosperity as at present. The work of the medical missionary in Japan and India soon passed away on account of the rise of native practitioners, but it will be long before such a time comes in China. The foreign physician is still often obliged to spend much of his time undoing the bad work of the "native miscreants who are supposed to practice the healing art" as Dr. Marshall characterizes the native doctors—and yet these same men are greatly trusted by the people. He is a missionary of new methods of alleviating suffering as well as of the good tidings of the Gospel. The demand for his presence seems to be rather increasing than passing away, both among the common people and among the higher classes. A vast mass of unrelieved suffering still lies before him.

Dispensary.—The work of the Dispensary continues to increase in all of the places reporting. About 100,000 cases were treated, giving an increase on the whole of more than ten per cent. This means a great deal of time consumed, even if the doctor "did nothing more to the patients than feel their pulses and look at their tongues," but this is insufficient, for "many of them have long and sad stories to tell which must be listened to with interest and sympathy." Dr. Main remarks that "this kind of work is most exhausting, especially in the hot weather, when the patients are numerous and when the odours from wounds and putrifying sores are thick enough to cut with a

knife." Along with these difficulties come also other "annoyances, such as patients asking for treatment for friends or relatives who cannot come," mentioned by Dr. Hall. It is encouraging also to note that nearly all speak of improvement in the class of cases that come for treatment. Previously they were often old chronic cases that could not be cared for outside of long hospital treatment or of surgical operations, but now it is noted that the number of cases that come when the first symptoms of disease appear is gradually increasing. Still cases do come asking to be admitted if only they can die in the Hospital, as it is more comfortable there than at home, but they are becoming fewer. One report says that the patients "follow instructions better, put themselves more completely in our hands and show more gratitude for what is done for them." In nearly all of the Hospitals a small charge is made for registration of dispensary patients, but in Chi-nan-fu Dr. Neal says that he "tried charging a small entrance fee to all patients able to pay at the city dispensary, but it did not seem to work well. We have not yet been convinced that the charging of fees in what is supposed to be a purely benevolent work is calculated to produce a favorable impression for Christianity." The general practice seems, however, to be the charging of a small fee to ensure that cases are *bona fide*. Even in the old Canton work we find that \$287 was collected last year from registration fees. Religious work is always conducted in connection with the dispensaries, and the patients are preached to usually by a native assistant before the clinic is opened. However patients are not obliged to listen, for they can come and go at their own pleasure, but often it is found that they do "listen with rapt attention." Although the religious side of the work is emphasized yet we find one Report maintaining stoutly that a "dispensary is not a place where powders are given rolled up in tracts and where

bottles are labeled with Scripture quotations and where so much preaching has to be listened to for so much medicine dispensed."

Hospitals.—The number of in-patients has increased in every instance, and often wards have been overcrowded because patients would take no refusal. In one city a man threatened to take opium and commit suicide if he were not admitted, as he had come several hundred miles to be treated and had spent fourteen days on the journey. Compared with home hospitals the wards of all China hospitals would appear to a visitor to be much overcrowded, but even the congested wards are often not large enough, and verandahs, outhouses and hallways are filled. The popular dread of the foreigner and the suspicion of his wily ways gradually give way as the sufferer finds his wounds healing and health returning. In many places difficult operations were once impossible on account of the fear of riotous demonstrations in case of resultant death, but now in older places not even bonds from the interested family are required. A few demonstrated cases of success soon clear away all doubts and overcome prejudice. In many places all kinds of surgery are attempted with as much freedom as in a home land. Many interesting instances are given of the gratitude of patients which speak far more clearly than the meritorious board hanging on the wall. In one place more than Tls. 120.00 was received as free-will offerings from patients who were nearly all exceedingly poor. In another place several poor patients have put their cash together in order to make up a sum worth giving. A heroic instance is also mentioned of a young man in Manchuria, who hired himself out as a laborer before leaving, in order to repay the money expended on him while in the hospital. So many cures have been accomplished which seemed impossible to the native doctors that in an instance mentioned by Dr. Edwards miraculous powers were attributed

to him and his assistants, for they were summoned to restore life to a child already dead from drowning. Although instances of ingratitude and suspicion are mentioned the whole tenor of these reports is full of hopefulness and kindly spirit toward the afflicted Chinese.

Many contributions have been made by medical missionaries in China toward the progress of general medical science, and in these reports many important items are mentioned which would interest the profession at home. As an example we quote the opinion of Dr. Kerr concerning the Bubonic Plague: "The city of Canton was again visited by the plague in 1896. During 1895 the disease was not seen, and there were very few if any cases. The epidemic of 1896 was not so violent as that of 1894, but it ran its course in the same way, beginning in the early spring and ending in mid-summer. In the absence of statistics, any estimate of the number of deaths is mere guess-work, and where a fatal disease is prevailing there is sure to be exaggeration. There is no doubt great exaggeration in the historical accounts of the terrible fatality of this disease, for they are made up often during times of panic. In Hong-kong, where careful records were kept, the total number of cases brought to notice was 1,204, of which 1,097 were fatal. The largest number of cases in one week was 100." In Canton the usual large number of cases of Lithotomy and Litholapaxy was treated with splendid success. In all 79 cases were operated on, of which only 4 proved fatal. One-half of these patients were under 20 years of age. The success of Dr. Kerr and his associates in these operations has given them an international reputation. We do not notice in other places the prevalence of any one particular disease calling for surgical aid unless in the cases of the Chinanfu and Moukden hospitals, which have a very large list of eye operations.

The most discouraging and unsatisfactory reports are given concerning *opium patients*.

They are difficult to manage, and resort to all sorts of devices to secretly obtain opium. "They hide the opium in the toes of their shoes, in their pigtails, under the lining of their clothes; the bottom of a match box is a favorite place with the matches all beautifully arranged on top." They try to escape from the Hospital by threatening the gate keeper, by giving tips to the care-taker, or forging letters from home summoning them at once on important business. In one case in Pakhoi several patients even scaled the walls so as to be able to get at the very thing from which they were supposed to be fleeing. It seems to be the common opinion that very few opium smokers are really cured so that they never return to the habit. All that mention the subject agree in denouncing it as an unmitigated curse and one of the greatest hindrances to the advancement of Christian work. Although the results are so meagre it is the opinion of all that the work of rescuing these unfortunates cannot be abandoned. Something must be done to relieve special cases, and there must be a steady struggle against the general evil. All agree in denying the common assertion that the habit is a comparatively harmless one.

One of these Reports is that of a Mission to women and children exclusively, but in all the other reports special mention is made of this department. In some places there are special lady doctors who attend wholly to the women, in other places a foreign trained nurse attends the wards under the supervision of the physician, while in some places no such assistance is at hand, and the one physician is obliged to attend both men and women. The special growth of this work is referred to in several instances, and in one case it is said that it is now larger than the whole general clinic was a few years ago. Where Chinese buildings are used two courts are provided, one for men and the other for women. In some cases large foreign buildings have

been specially erected for the woman's wards, but in others all are accommodated in a common building separated as well as possible by hall ways into distinct wards. A wail of distress comes from one city, because after the completion of a beautiful hospital for women the lady doctor was married to a clerical missionary in another city, and now the work has to wait for another arrival.

Evangelistic.—Much direct preaching of the Gospel is done not only in the daily clinic, but at the daily prayers and the regular Sunday services. This is in addition to the work done in the wards at the bed-sides. One of the best organized plans seems to be that in use at the Moukden Hospital, where more than one evangelist is employed. In addition to the regular work done in the Hospital, tours are made to the homes of patients. On one such trip the evangelist "met not a few old patients who are now members of the Christian Church. There are several instances where former patients gathered around them small bands of believers and inquirers. One man, who was formerly in the Hospital and professed faith in Christ, has just returned from his home a hundred miles away. He says that there are now twenty enquirers in his village who meet regularly in the room which he has provided and fitted up. None of them are yet baptized, nor is he, but he has taught them as best he can. He has come back to seek baptism for himself and to ask if a pastor or evangelist can be sent to instruct and baptize the others." As a result of this systematic and efficient work 105 applicants for church membership were received during the year. In another instance mentioned by Dr. Marshall a man who had been blind for many years, but by operations had had his sight restored, was the means of gathering a number of others in his village home into the church. In Tai-yuen Fu eighteen men and eleven women have given their names as enquirers. In the London Mission

Hospital, Tientsin, an interesting case is given of a "man Chia, who after being baptized was afraid to go home, as he feared his elder brother. We all prayed that courage might be given him, and then he decided to go home. About a fortnight later one morning I found him standing at the Dispensary door; he said he had come to tell me that his brother, whom he so much feared, was now too a believer. One day as Mr. Pyke was holding a service in his West Gate chapel a man came up asking to be received into the church, and he proved to be this very brother. His old mother also was touched by the testimony and died believing; also some twelve people in his village were influenced by him." In addition to those who openly profess Christianity there are many who return to their homes confident of the truth of Christianity, who are prevented from believing by fear of the opposition of their friends.

Lepers Work.—This is mentioned in the reports from Hangchow and Pakhoi Hospitals of the Church of England Missions. The work at Hangchow has only been recently started by special contributions toward which the Shanghai community subscribed no small sum. In the Home are 24 lepers, some of them in the City Home and others at the Lake Home. They are all comfortably housed, and their needs are well provided for. Some remain until they die, but others finding that their disease becomes no better return to their homes. In Pakhoi more than 100 are in the Leper Hospital as permanent residents. There are two large compounds, one for men and the other for women, four large wards, a chapel, a dispensary, a printing-room, a work shop and cook room with 100 fire places, for each Chinese likes to cook his own food. There is also a large garden where those who can cultivate vegetables for their own use. All patients are expected to learn both the native and the Romanized system of reading and writing. Whereas not many can be cured all are

cleansed and relieved. Nearly all become Christians, and many of them give good testimony, both in life and death.

Medical Training Classes.—At Canton, Hangchow, Chi-nan Fu, and Moukden special attention is given to this branch of work. Dr. Main considers this work all important, as foreigners cannot do all the work that needs to be done, and as the ordinary native doctors are such a “pack of quacks and impostors.” Dr. Neal has a class of five students, who have two recitations daily and assist each afternoon in the dispensary. These students, after spending a time under Dr. Neal, are sent to another station, where under Dr. Johnson they pursue a course of study on other subjects. This co-operative method of teaching is highly spoken of by Dr. Neal, who thinks it the solution of the problem of teaching medical students. Without wishing to criticize, it seems to the writer that with the press of daily clinics and hospital duties a physician would not be able to put much force in his teaching, and that it would be best in all instances to set a man apart whose sole duty would be to teach and let the other doctors of his district co-operate with him in such instruction as they have leisure for and in the practice of medicine and surgery. In Moukden Dr. Christie seems able to retain his pupils after they have completed their course, even though they are able to obtain much higher

salaries elsewhere. One of his assistants had a button of the fifth rank conferred upon him by the Governor-General in recognition of his services to the soldiers during the war. The chief work on this line is done at Canton, where 23 young men and 6 young women were connected last year with the Medical School. The junior students take instruction in lectures and text-books while the senior students have daily opportunities of seeing and examining disease in the wards. Quite a large staff of instructors is provided. One instructor was called to a professorship in the Imperial Medical College at Tientsin. Two graduates of the school were examined by the Medical Board of Honolulu, and were given license to practice medicine in the Hawaiian Islands. A large sale of medical text-books, amounting to 8,070 volumes, is also reported, which shows that foreign methods of medical science are being closely studied by the Chinese. This medical school is a decided success, and ought to be multiplied in many parts of China.

There are many other points in these Reports which space does not permit us to mention, such as the subscription lists from foreigners and Chinese and the special cases of professional treatment. These can best be read in the words of the physician himself as given in the Reports.

J. C. F.



Notes and Items.

“One of the highest uses of a monarch is his ability to recognize individually, appreciate and reward signal services in any of the lines of the world's progress, as has lately been shown by the King of Italy in giving the Grand Cordon of the Crown of Italy to Dr. Behring for his discovery of the antitoxin of diphtheria.”

Sir Joseph Lister says that if bacteriologists had done nothing more for mankind than to discover the comma bacillus of cholera, they would well deserve universal gratitude; for, although other conditions than the presence of the bacillus are necessary for the production of an epidemic of the disease, it is through the certain diagnosis of the essential cause that the invasions of the scourge have been so successfully expelled of late years from England.

The earliest known bacteria have been found on fossil vegetation of the Devonian age; they are two species referred by Renault to the genus *Micrococcus*.

The two items following came to the Editor from some place in the north of China, in the shape of a racy little mission sheet, apparently edited, mimeographed, and published by some enterprising medical missionary, the interest of whose work is only surpassed by his exceeding modesty:—

“An example of one of China's many absurd and superstitious customs came under our notice a few days ago. A very sick patient had been carried over one hundred *li* on a stretcher, to be treated by the foreign physician, but as it was so near the Feast of Lanterns and in

the first half of the first Chinese moon, the people objected to having the patient enter our hospital gate, as he would first require to be carried through a common gateway, and would spoil the luck of the place. Earnest appeals were made to them asking if human life was not more important than custom, but of no avail. The result was that the patient had to be carried to an inn, where he was examined, only to find that he was in a dying condition, quite beyond treatment.”

“The most interesting case that has been in the hospital here, for some time, is that of a boy of thirteen, who was operated on last Saturday for stone. The stone weighed over two and a half ounces. The lad had scarcely known what it was to be without pain since he was two years old, seems very grateful, and is apparently doing well.”

The party of the other part is determined to be heard in this world, apparently to the end of time. Dr. Holmes somewhere speaks of a sort of *pica* in some minds, which seems to set them against any generally received belief, so that we are apt to find an anti-vaccinator to be also an anti-vegetable eater, an anti-vivisectionist, etc., all rolled into one; and it would certainly seem that one well-known New York physician has the same squint-eyed crook in his make-up; for otherwise he could not keep up his persistent battle against the plain testimony of facts in favor of the beneficent efforts of the diphtheria antitoxin, as testified to by Dr. J. Lewis Smith, who has kept a record of cases in the New York Foundling Asylum for seven years, and finds, where in 1890 the deaths were a little

more than one-half of those attacked, and an almost equally large proportion till this last year, in which antitoxin has been used. Under this treatment there were in July, 10 cases, with 9 recoveries; in August, 6 cases, with 6 recoveries; in September, 5 cases, with 5 recoveries; in October, 19 cases, with 18 recoveries; in November, 25 cases, with 24 recoveries. It should be remembered that in an asylum or a hospital, where experience has taught the value of early recourse to the remedy, it is found that next to no deaths occur where it is used within 27 hours of the attack. Here they regularly expected the membrane to loosen in 24 hours, and sometimes it came off in 8 hours after using the antitoxin. These statistics were brought forward in a session of the section of Pediatrics and of course adult experiences were left out. Dr. E. Rosenthal, of Philadelphia, said that out of 166 severe cases of diphtheria, that he had treated with antitoxin, only 4 had died. Formerly he had lost 68 out of 100 cases, and before the use of this agent he had seen no case that followed measles recover; but now death was rare in such cases. Dr. Biggs had collected a large mass of statistics from Paris, Berlin, New York, and from all the towns in France with population exceeding 20,000, and in Germany with more than 15,000 population; and all show a great and steady decrease in the absolute number of deaths, and all tell the same encouraging story of man's mastery over one of the greatest of scourges. All these swell the chorus of testimony to the value of early use of antitoxin. Virchow has probably seen many rosy hopes of the benefits to come from various specifics perish unfulfilled in his long life, and he early adopted a skeptical attitude and tone against the serum treatment; but more than two years ago he said that so many figures were favourable to its value it would be a neglect of duty for a physician not to

use it; and now, with the cumulative experience of the last two years, he says: "Theoretical considerations must yield to the brute force of statistics." Dr. Koester had seen much of diphtheria in connection with the Health Department, and had injected ninety-three patients; only two of the number had died; and to him it seemed that "the physician who had a case of severe diphtheria and did not use antitoxin committed a criminal offense."—*The Independent*.

AWFUL ARMENIAN PRESCRIPTIONS.

For some weeks past the *Daily Graphic* has been publishing an account of a journey through Armenia, and there is one paragraph, from the issue of March 11, which will interest most of our readers: 'The people here—and in the Orient generally—always take it for granted that a European is a doctor, and our advice has been asked upon every kind of malady. One patient was a man who had had dysentery for several years. He had been recommended by a wise man from Persia to shoot a hare and burn its skull to ashes, which were then to be swallowed in water. This prescription had not cured him, though a friend of his, suffering from ague, had derived great benefit from it. The conversation turned on the advantage of having good doctors, and one man related how his wife had been treated for a headache. Several old women took her in hand. They bound a towel about her forehead, placed a brass pot on her head, filled the pot with boiling water, and for about two hours kept up the temperature by lading out the cooling water and lading in boiling water in its place. At the end of two hours the patient had lost her pain: she was dead. This gives some idea of the awful suffering that people in the East have to undergo, whether they be Christian, Mohammedan, or Heathen, and it is easy to understand that a medical missionary will often

be received with open arms, and will soon gain such influence that he has opportunities of preaching the Gospel which do not occur to others. It also illustrates the fact that Easterns believe often that Europeans can help them in their times of suffering, and if they do not it is because they won't, and they will not believe when they are told that they don't only because they can't.—*Missionary Herald*.

HYGIENISTS TO BLAME.

A witty article in the *Revue Médicale de Paris* laments the growing scarcity of sickness, and the increasing number of physicians (*Jour. Amer. Med. Ass'n.*) It denounces Jenner, Pasteur, etc., as guilty of depriving their colleagues of their daily bread, and wrecking the profession. Especially is this the case in cities where prophylactic and hygienic measures are most strictly enforced and the sick number less in proportion. It adds a few figures in confirmation from the death record of Paris during the last ten years, stating that the figures to date for 1896 show even more marked reduction:—

Deaths caused by	1885 to 1890	1890 to 1895
Small-pox.....	1,271	655
Scarlet fever.....	1,225	946
Measles.....	6,671	5,192
Diphtheria.....	8,383	7,588
Typhoid fever.....	5,903	3,493

The following appeared in the *Bristol Medical and Chirurgical Journal* in a review of a late English work in Bacteriology:—

The chapter on the composition and morphology of bacteria is not one of the happiest efforts. Nencki is credited with the discovery that "the chemical analysis of bacteria in the active state consists of 82.42 per cent. of water," and that mycoprotein "has the composition C 52.32, H 7.55, N 14.75." Whether this observer is in the habit of calculating his results on a basis of 74.62 parts, or cautiously leaves a margin of more than 25 per

cent. for undiscovered elements, does not appear. But a still more striking instance of the danger of incorporating interesting pieces of information without due consideration occurs a page or two later. After being told that the weight of an average bacterium is $\frac{1}{10,000,000,000}$ milligramme (Nägeli), and that, doubling hourly, one germ will, under ideal circumstances, become in three days four thousand, seven hundred and seventy-two billions (Cohn), both of which statements are sufficiently near the truth, we learn that the "demnition total" would, according to a most eminent writer on the subject, "weigh no less than seventy-five hundred tons." At first sight it would seem that an explanation has at last been given of the exorbitant prices charged by scientific instrument makers for incubators. A broth culture measuring 10 c.c. often contains ten thousand million bacteria, weighing on this basis of calculation about thirty-five pounds. On a moderate computation the cotton wool plug will weigh as much, and the tube and culture medium a thousand (more probably twenty thousand) times as much as the bacteria. A pressure, therefore, of about fifteen tons will be brought to bear on the thin sheet metal of the incubator by each culture tube; and though it is true that in general the former is shielded by the bottom of a thin glass beaker supporting the tubes, it is not surprising that the effects of their enormous weight have to be counteracted by a subtle system of struts and stays at prodigious expense. On closer inspection, unfortunately, this explanation is found to be scarcely consistent with hard facts. If a bacterium weighs the one ten-thousand-millionth of a milligramme, the weight of ten thousand million will be one milligramme; of a billion, one decigramme; and the weight of four thousand, seven hundred and seventy-two billion bacteria will be 477.2 grammes, or slightly more than one pound. It is apparently impossible to deny the

British origin of this poetic flight; but it seems a thousand pities that the story of the prolific germ did not find a more appropriate birth-place in the land of tall tales.

A MALIGNANT MUNICIPAL MALADY.

We have noticed for several years, in various parts of the country, particularly in cities and towns of larger size, an infectious malady, vulgarly called "boodle," that is both sporadic and epidemic in character.

Persons known to be entirely free from, and supposed to be immune against this infection, when they get into municipal rooms, because of a lack of previous efficient disinfection, are soon attacked, and so malignant is the type of the disease that often many others brought in contact with them "break out" with it, in an aggravated form.

The disease is somewhat unique in character. The powers of locomotion are not only affected, but are often greatly quickened; the appetite is somewhat depressed; the speech is somewhat unreliable; and toward the last there is often marked insomnia. The will power is more or less perverted, and there is a tendency to what is known as the "evil eye." A prominent symptom is a "light-fingered" condition, that manifests itself in a digital adhesiveness, with itching palms, and a wonderful affinity for *aurum* and *argentum*—two well known precious metals. A marked peculiarity of the human family is that although the dangers referred to are well known, as well as the direful results, there are always persons willing and apparently anxious to expose themselves to the contagion.

The failure of the Hahnemann theory of practice, "*similia similibus curantur*," is admirably and incontrovertibly demonstrated in the treatment of this disease; for the more these "similia" remedies are administered the more malignant and incurable the disease becomes. Perhaps

the use of *Aurum* and *Argentum* in infinitesimal doses might, in some cases, be somewhat helpful.

The best remedies we have known, and which if vigorously, faithfully, and promptly administered in allopathic doses, would measurably if not entirely stamp out the disease, are rigid inspection, detection, prolonged isolation, the wearing of striped clothing, and short-cut hair. Sulphur fumigation, *a la Lucifer*, with intense heat, would effectively destroy the auriferous and argentiferous germs.

In some places the disease has become so alarming, and the disastrous results so aggravating that the subjects of it have been suspended by hempen cords. This cure, which is said to be very effectual, has not the sanction of the law, and is un-Christian.

It is proper to state that persons in municipal positions are not the only ones subject to this malady. Bankers even, and public officers of various grades have been badly affected. The symptoms and progress of the disease are the same, however, in all cases, and the treatment is the same.—*Iowa Board of Health Bulletin*.

NOT ON THE MAP.

A gentleman who was traveling through one of the most insalubrious districts of India found living there an Irishman of very contented appearance.

"I don't see how you can live in a place," said the traveller, "where people die so thick and fast."

"Tell me the place, sir," said the man, "where people never die—tell me the place, and I'll go there myself to end my days."—*Daily Lancet*, Philadelphia.

A REASON FOR PRIDE.

"I got my picter in the paper," he said to his neighbor. "Did you see it?"

"I reckon I did."

"Purty good likeness, wa'n't it?"

"First rate. Only I don't see why a man should be so proud o' medicine, ez ter go an' hev it wrote up. It don't indicate no special superiority over the rest o' the human race."

"Oh, yes, it does. That jes' shows you ain't studied it out. It shows what a wonderful good constitution he's got."—*Washington Star*.

A HALCYON TIME FOR DOCTORS.

Physician of the New School (after turning X rays on the patient)—"Your case is a somewhat complicated one. There is a slight trouble with your left lung, and I observe enlargement of the liver and fatty degeneration of the heart. Kindly hand me that \$2.54 in your right-hand trousers pocket and I will prescribe for you."—*Puck*.

NEWSPAPER WIT.

An item is going the rounds of the press, both medical and general, to the effect that a man constantly in fear of becoming unconscious, of being carried to a hospital, and operated upon before diagnosis has been made, carries in a conspicuous place in his clothing the inscription: "My appendix has been cut out."

This is undoubtedly the invention of some would-be newspaper wit. Nevertheless it carries with it a moral. It is notorious that operations for diagnosis are entirely too frequent, consequently it behooves every medical man to "go slow," and if of the younger rank to await the advice of counsel and the result of careful deliberation.

Paul Louis Couriera, Frenchman, is a true philosopher. Having been recently assailed with great bitterness by a French professor, he quietly remarked: "I fancy he must be vexed. He called me Jacobin, rebel, plagiarist,

thief, poisoner, forger, leper, madman, impostor, libeller, a grimacing rag picker. I gather what he wants to say. He means that he and I are not of the same opinion, and this is his only way of putting it."—*New York Tribune*.

MARRIAGES.

At the Cathedral, Shaughai, on 22nd May, by the Rev. H. C. Hodges, M.A., ALBERT GEORGE PARROTT, M.R.C.S., Eng.; L.R.C.P., Lond, to CONSTANCE MARY, second daughter of F. W. Reynolds, M.A., Redland, Bristol, Eng.

At Tientsin, May 31st, Rev. JAS. MENZIES, M.D., to Miss DAVINA G. ROBB, both of the Canadian Presbyterian Mission, Hunan.

At the Cathedral, Shanghai, on the 23rd of June, by the Rev. H. C. Hodges, M.A., MARIE EMMA, eldest daughter of Dr. and Mrs. S. P. Barchet, of Kin-hwa, to JOHN TREVOR SMITH, of the British and Foreign Bible Society.

DEATHS.

At Ching-chow Fu, Shantung, on February 16th and 18th, STANFORD, aged 9½ years, and RUSSELL, aged 8 years, the dearly beloved sons of Dr. and Mrs. J. B. WATSON.

At Tungechow, Shantung, 31st May, the wife of Dr. LEWIS, American Presbyterian Mission.

At Chang-poo, Amoy, on 10th June, JANE MUIR, infant daughter of Muir Sandeman, M.A., M.B., C.M., aged three months.

DEPARTURES.

From Shanghai, 10th April, Dr. ETHEL GOUGH, Hankow, for England.

From Shanghai, 17th April, Dr. and Mrs. D. CHRISTIE and family, Moukden, for Scotland.

From Shanghai, 26th April, Dr. and Mrs. B. C. ATTERBURY and family, Peking, for U. S. A.

To the Members of

THE MEDICAL MISSIONARY ASSOCIATION OF CHINA.

DEAR FRIENDS :—

I desire to make out a correct list of the members of the Association with the address of each, but this cannot be accomplished without your assistance. The following list is made up of one found with the records that were turned over to me when I assumed the duties of Secretary, and of names secured from back numbers of the Journal. I am aware that it is not correct in several particulars, and perhaps some names are omitted that should appear. Kindly send me whatever corrections you know should be made, so that a full and correct list can be published later.

Please do not wait for a convenient time, but do it now.

Address,

ROBERT C. BEEBE, M.D.,

Nanking.

<i>Name.</i>	<i>Qualification.</i>	<i>Station.</i>	<i>Post Office Address.</i>
Anderson, P.	L.R.C.S. & P., Ed.	Tai-wan Fu.	Tai-wan Fu, Formosa.
Atterbury, B. C.	M.D.	P'ao-ting Fu.	Tientsin.
Barchet, S. P., Rev.	"	Kin-hwa.	Ningpo.
Beattie, D. A.	"	Yuen-kong.	Canton.
Beebe, R. C., Rev.	"	Nanking.	Nanking.
Bennett, J. H.	M. R. C. S., L. R. C. P.	Tientsin.	Tientsin.
Bergin, G. F.	M. B., M. R. C. S.	Lao-ho-k'ou.	Hankow.
Bliss, E. L.	M. D.	Shao-wu.	Foochow.
Bliss, R. C., Miss } (Mrs. Noyes)	"	Canton.	Canton.
Boone, H. W.	"	Shanghai.	Shanghai.
Brander, T. L.	M. B., C. M.	Chin-chow Fu.	Newchwang.
Brown, H. M.	M. D.	Fu-san.	Fu-san, Korea.
Browning, F. W.	L. R. C. S. & P., Ed.	Ningpo.	Ningpo.
Cairns, W. M.	M. B.	Tai-wan Fu.	Tai-wan Fu, Formosa.
Campbell, R. M.	M. D.	Soochow.	Soochow.
Canright, H. L.	"	Chen-tu.	Hankow.
Carlton, M. E., Miss	"	Foochow.	Foochow.
Case, J. N.	"	Wei-hai-wei.	c/o Mrs. Price, Chefoo.
Chestnut, E., Miss	"	Lien-chow.	Canton.
Christie, Dugald	L. R. C. P. & S., Ed.	Moukden.	Newchwang.
Coltman, R. J., Jr.	M. D.	Peking.	Peking.
Cousland, P. B.	M. B., C. M.	Ch'ao-chow Fu.	Swatow.
Cox, G. A.	L. R. C. P. & S.	Chinkiang.	Chinkiang. [ver, Col.
Crows, G. B., Rev.	M. D.	Peking.	334 Gallup Av., Den.
Cross, S. J.	M. B., C. M.	Eng-chhun.	Amoy.
Curwen, Eliot	{ M. B., B. C., L. R. } { C. P., M. R. C. S. }	Peking.	Peking.
Dalziel, J. M.	M. B., C. M.	.....	Swatow.
Davenport, C. J.	F. R. C. S., M. R. C. P.	Chungking.	Chungking.
Deas, W. A.	M. D.	Wuchang.	.....
Donahue, J. M., Miss	"	Hing-hwa.	Foochow.
Douthwaite, A. W., } Rev.	"	Chefoo.	Chefoo.
Fahmy, A.	M. B., C. M.	Chang-chiu.	Amoy.
Faries, W. R.	M. D.	Wei-hien.	Chefoo.
Fulton, M. H., Miss	"	Canton.	Canton.

Name.	Qualification.	Station.	Post Office Address.
Gale, Mary, Miss	M.D.	Shanghai.	Shanghai.
Gaynor, L. A., Miss	"	Nanking.	Nanking.
Gifford, M. A., Miss } (Mrs. Kilborn)	"	Chentu.	Chentu.
Gillison, Thos.	M.B., C.M.	Hankow.	Hankow.
Gough, E. M., Miss	L.S.A.	Hankow.	Hankow.
Grant, D.	M.B., C.M.	Ching-chew.	Amoy.
Grant, J. S.	M.D.	Ningpo.	Ningpo.
Gray, D. C.	M.B., C.M.	Liao-yang.	Newchwang.
Greig, J. A.	F.R.C.S., (M.B.)	Kirin.	Newchwang.
Griffith, E. M.	M.D.	Shanghai.	.....
Hagar, C. R., Rev.	"	Canton.	Canton.
Halverson, S. L.	.....	.....	Canton.
Hare, H. M.	M.D.	Kia-ting.	Hankow.
Hart, E. H.	"	Wuhu.	Wuhu.
Haslep, Marie, Miss	"	Shanghai.	.....
Hickin, H.	M.B., C.M.	Hangchow.	{ c/o Mrs. J. Whilty Davies, Colwyn Home, Colwyn, N. Wales.
Hoag, L. H., Miss	M.D.	Chinkingang.	Chinkingang.
Hodge, S. R., Rev.	M.R.C.S., L.R.C.P.	Hankow.	Hankow.
Hogg, Alfred	M.B.	Wenchow.	Wenchow.
Hopkins, N. S., Rev.	M.D.	Tsun-hwa.	Tientsin.
Horder, E. G.	L.R.C.P. & S., Ed.	Pakhoi.	Hongkong.
Houston, A. R., Miss } (Mrs. Patterson)	M.D.	Ching-chow Fu.	{ c/o Ferguson & Co., Chefoo.
Howie, (T. M.), (Jas.)	{ (M.B., C.M.), (L.) { R.C.S. & P.E. }	Chang-pu.	Amoy.
Hunter, S. A. D., Rev.	M.D.	Tsi-ning.	.....
Jellison, E. R.	"	Chinkingang.	Chinkingang.
Johnson, C. F.	"	I-chow Fu.	Mission Press, S'hai.
Kahn, Ida, Miss	"	Kiukiang.	Kiukiang.
Kerr, J. G.	"	Canton.	Canton.
Kilborn, O. L.	"	Chen-tu.	Hankow.
Kinnear, H. N.	"	Foochow.	Foochow.
Kühne, J. E.	M.B., C.M., (M.D.)	Sung-kun.	Hongkong.
Lang, J. C. R.	{ L.R.C.P. & S., } { Ed., (M.D.) }	Ching-chew.	Amoy.
Larsen, Anna, Miss	M.D.	I-chow Fu.	Mission Press, S'hai.
Leitch, M. D., (Miss) Phillips)	"	Wu-sieh.	10 Woosung Rd. S'hai.
Learmouth, B. L. L.	M.B., C.M.	.....	.....
Ludlow, W. L.	M.D.	Wuchang.	Hankow.
Lyall, A.	M.B., C.M.	Swatow.	Swatow.
MacDonald, R. J. J., } Rev.	M.D., C.M.	Fatshan.	Canton.
Mackle, E. C.	M.D.	Lien-chow.	"
Macklin, W. E.	"	Nanking.	Nanking.
Main, D. D.	{ M.B., L.R.C.P. } { & S., Ed. }	Hangchow.	Hangchow.
Marshall, F. W.	.....	Lao-ling.	Tientsin.
Marston, A., Miss	L.R.C.P.L., (M.D.)	Peking.	Peking.
Masters, L. M., Miss	M.D.	Foochow.	Foochow.
Mathews, Percy	M.D., LL.D.	Shanghai.	Shanghai.
McCandliss, H. M.	M.D.	Kiung-chow.	Kiung-chow, Hainan.
McCartney, J. H.	"	Chungking.	Chungking.
McClure, Wm.	"	Ch'u-wang.	{ c/o H. J. Bostwick, Tientsin.
McFarlane, S. S.	L.R.C.P. & S., Ed.	Hsiao-chang.	Tientsin.
McLeish, A. L., Rev.	M.D., C.M.	Amoy.	Amoy.
McPhun, J. F.	M.B., C.M.	Wu-king Fu.	Swatow.
Merrins, E. M.	M.D.	Wuchang.	Hankow.
Merritt, C. P. W., Rev.	"	Pao-ting Fu.	Tientsin.
Morley, Arthur	M.R.C.S., L.R.C.P.	Teh-ngan.	Hankow.
Murdock, V. C., Miss	M.D.	Peking.	Peking.

List of Members.

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Name.	Qualification.	Station.	Post Office Address.
Neal, Jas. B.	M.D.	Chi-nan Fu.	Chefoo.
Nieberg, F. E., Miss } (Mrs. Goddard)	"	Foochow.	Foochow.
Niles, M. W., Miss	"	Canton.	Canton.
Noble, W. C.	"	Pao-ting Fu.	Tientsin.
Park, W. H.	"	Soochow.	Soochow.
Parrott, A. G.	M.R.C.S., L.R.C.P.	Lao-ho-k'ou.	Hankow.
Parry, Herbert	M.R.C.S., L.R.C.P.	Chen-tu.	C. I. M., Hankow.
Patterson, T. C.	M.B.	Ch'ing-chow Fu.	{ c/o Ferguson & Co., Chefoo.
Peck, A. P.	M.D.	Pang-chwang.	{ c/o H. J. Bostwick, Tientsin.
Poindexter, S. A., } Miss, (Mrs. Bent)	"	Chi-nan Fu.	Chefoo.
Porter, H. D., Rev.	"	Pang-chwang.	{ c/o H. J. Bostwick, Tientsin.
Pray, S. R., Miss	"	Foochow.	{ 65 Morton St., Brook- lyn, N. Y.
Pritchard, E. T.	M.B., C.M.	Peking.	Peking.
Rankine, David	M.D., (M.B., C.M.)	Ichang.	Ichang.
Reed, C. E.	M.D.	.....	.....
Reifsnnyder, E., Miss	"	Shanghai.	Shanghai.
Riddel, Wm., Rev.	M.D., (M.B., C.M.)	Wu-king Fu.	Swatow.
Rigg, J.	M.B., C.M.	Nang-wa.	Foochow.
Scott, A. K., Mrs.	M.D.	Swatow.	Swatow.
Scranton, W. B., Rev.	"	Seoul.	Seoul, Korea.
Seymour, W. F.	"	Teng-chow.	Chefoo.
Shrubshall, W. W.	{ L.R.C.P. & S. E., } { L.F.P.G. }	Tang-san.	Tientsin.
Sinclair, M. E., Miss	M.D.	Peking.	Peking.
Smith, G. P.	M.B., C.M., (M.D.)	Tientsin.	Tientsin.
Smith, J. F., Rev.	M.D.	Hsin-chen.	{ c/o H. J. Bostwick, Tientsin.
Smyth, R.	M.B., B. Ch.	Ningpo.	Ningpo.
Stevenson, D. W.	M.D.	Chen-tu.	Chen-tu.
Stewart, J. C.	"	Tientsin.	Tientsin.
Stone, Mary, Miss	"	Kiukiang.	Kiukiang.
Stuart, Geo. A., Rev.	"	Nanking.	Nanking.
Swan, J. M.	"	Canton.	Canton.
Swinney, E. F., Miss	"	Shanghai.	Shanghai.
Taylor, G. Y.	"	Pao-ting Fu.	Tientsin.
Taylor, B. von S.	M.D., (M.B.)	Hing-hwa.	Foochow.
Taylor, F. H.	M.D., F.R.C.S.E.	.....	Hankow.
Thomson, J. C., Rev.	M.D.	Hongkong.	Hongkong.
Toy, W. B.	"	Bangkok.	Bangkok, Siam.
Tribe, E. N., Miss	"	Hui-an.	Amoy.
Vanderburgh, E. D.	"	No-doa.	Kjung-chow, Hainan.
Van Schoick, I. L.	"	Chi-ning-chow.	Mission Press, S'hai.
Wagner, E. R.	M.D.	Sin-ching.	Tientsin.
Watson, A. R., Mrs.	L.K.Q.C.P. & S. Ir.	Ch'ing-chow Fu.	{ c/o Ferguson & Co., Chefoo.
Watson, J. R.	{ M.B., M.R.C.S., } { (M.D.) }	Ch'ing-chow Fu.	{ c/o Ferguson & Co., Chefoo.
Wenyon, C., Rev.	M.D., M.Ch.	Fatshan.	Canton.
Whitney, H. T.	M.D.	Foochow.	Pagoda Anchorage.
Wittenberg, H. A. H.	"	Ka-yin-chow.	Hongkong.
Woodhull, K. C., Miss	"	Foochow.	Foochow.
Woods, E., Jr.,	"	Ts'ing-kiang-pu.	{ c/o Mr. C. N. Cald- well, Shanghai.
Wyckoff, L. J., Miss	"	Huchow.	{ c/o 1 Seward Road, Shanghai.
Young, T. M.	B.M., C.M.	Moukden.	Newchwang.

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R. A. Jamieson, M. A., M.D.	Shanghai.
L. Pichon, D.M.P.	Shanghai.
Neil McLeod, M.D.	Shanghai.
W. J. Milles, F.R.C.S.	Shanghai.
Cawas Lalca, M.D.	Shanghai.
W. Burnes Thomson, F.R.C.S.E.	46 Endell St., St. Gilles, London.
Wm. N. Thompson, M.D., LL.D.	118 E. 45 St., New York, U. S. A.
Geo. D. Dowkott, M.D.	118 E. 45 St., New York, U. S. A.
Wm. Lockhart, F.R.C.S.E.	Deceased.
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T. Rennie, M.D., C.M.	Foochow.
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F. J. Burge, L.R.C.P., M.R.C.S., L.M., A.K.C.	Shanghai.
John D. Thomson, M.B., C.M.	Hankow.
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A. Irwin	Tientsin.
C. Zedelius, M.D.	Shanghai.
Chas. A. Oliver, A.M., M.D.	Philadelphia, Pa., U. S. A.

Corresponding Members.

Rev. Wm. Muirhead, D.D.	Shanghai.
The Ven. Archdeacon Thompson	Shanghai.
Rev. J. M. W. Farnham, D.D.	Shanghai.
Rt. Rev. G. E. Moule, D.D.	Hangchow.
Rev. H. C. Hodges, M.A.	Shanghai.
John Fryer, LL.D.	Shanghai.
Rev. E. Faber, Dr. Theol.	Shanghai.
Rev. Wm. S. Langford, D.D.	22 Bible House, New York, U. S. A.
Rev. V. C. Hart, D.D.	Chen-tu.
Rev. Y. J. Allen, D.D.	Shanghai.
Rev. C. F. Reid, D.D.	Seoul, Korea.
Rev. D. H. Davis, A.M.	Shanghai.
Rev. C. C. Baldwin, D.D.	Foochow.

Official Notices.

The following persons have been duly elected members of the Medical Missionary Association:—

JAS. BUTCHART, *M.D.*, Nanking.

ARTHUR DAVIE PEILL, *M.B., C.M.*, Hsiao-chang, Chih-li.

FREDERICK H. JUDD, *B.A., M.B., B.C.*, Chefoo.

E. D. VANDERBERG, *M.B.*, Nodoo, Hainan.