

The China Medical Journal.

VOL. XLII.

MAY, 1928

No. 5

SOME CHEMICAL AND BIOLOGICAL STUDIES OF THE MUNG BEAN, PHASEOLUS AUREUS ROXBURGH*

CHANG SEI KIM, M.D., DR. P. H.

Field Director, Council on Health Education, Shanghai, China

INTRODUCTION

The mung bean (*Phaseolus Aureus* Roxburgh) is green in color, ovoid to globose in shape and about $3/8$ of an inch in length. It is cultivated extensively throughout Korea, China, Philippine Islands, Malay Islands, India and eastern portions of Africa where it is used mainly as human food. In the northern part of Korea almost every farmer who does not grow the mung bean for market raises it in sufficient quantities to supply his home requirements.

As a human food the mung bean is generally used in the sprouted or germinated condition, which is produced by keeping it moistened with water until rootlets about two inches long have developed. This requires a period of five or six days. In the winter season the sprouted bean serves as an excellent and economical substitute for green vegetables. In being prepared for the table the sprouted beans are simply given a gentle heat treatment consisting of either a slight frying in grease or else a scalding with hot water. They are then served either in a hot or cold condition, according to the customs of different localities. The mung bean in the sprouted state has also gained a considerable popularity as a human food in the United States judging by the amount of it consumed in the Chinese-American restaurants.

According to Johns and Waterman¹ the mung bean has been cultivated with some success in various places in the Middle and Southern parts of the United States. These investigators also state

*This thesis was submitted to the Advisory Board of the School of Hygiene and Public Health of the Johns Hopkins University in conformity with the requirements of the Degree of Doctor of Public Health.—*January 1925.*



Ovarian cysts of 67 and 96 pounds weight

see page 379

that the bean has been grown as a forage crop and as a green manure for wheat in America.

Johns and Waterman isolated two globulins from the mung bean, which were found to differ markedly from one another in their basic amino acids, as determined by the Van Slyke method. The composition of these two globulins in terms of Van Slyke units is as follows :

	<i>A—Globulin</i>	<i>B—Globulin</i>
	%	%
Amide N	9.42	11.76
Humin N absorbed by lime	2.56	1.84
Humin in amyl alcohol extract	0.00	0.17
Cystine N	1.12	0.00
Arginine N	10.54	14.48
Histidine N	5.72	3.25
Lysine N	7.46	10.60
Amino N of filtrate	61.05	55.89
Non-amino of filtrate	2.10	2.32
Total Nitrogen recovered	99.97	100.31

The above globulins were extracted most efficiently by 5% NaCl solutions. The yields were 0.35% for the A globulin and 5.75% for the B globulin. They reported a protein content of 21.74% (N x 6.25) for the particular sample which they studied.

Kuriyama,² in a chemical examination of the mung bean, found a small amount of the ferment Raffinase.

A review of the literature will show that no one has reported investigations or studies of the chemical changes which the mung bean undergoes as a result of germination for table purposes. Inasmuch as the mung bean is used most extensively in the sprouted or germinated condition, it seemed worth while to investigate and ascertain some of the changes which the bean undergoes in the germinating process, particularly such changes as may affect the dietary properties or qualities of the bean. An investigation of some of these changes was the purpose of this study.

EXPERIMENTAL

1. Chemical

Three hundred grams of the beans accurately weighed were sprouted in the following manner :

The beans were first allowed to stand under water in a large dish for about 15 hours. The material was next spread over a wide tray to a depth of about $\frac{3}{4}$ of an inch. This tray was supported in a slightly inclined position so that surplus water would drain off readily. In this condition and at room temperature the beans were treated with water twice a day for a period of 7 days. During this period the beans were covered with a wet cheesecloth which served to keep them uniformly moist.

At the end of this 7-day period the beans had sprouted to the condition in which they are ordinarily used for table purposes. The product was then transferred to an electric oven maintained at a temperature of about 45° C. where it remained for a period of 5 days, at the end of which it showed no further loss in weight. At this point the product weighed 211 grams and was found to contain 5.71 of moisture, as indicated in Table I.

Portions of the sprouted and unsprouted beans were ground to pass through an 80-mesh sieve. On these two ground preparations the following determinations were made by the methods of the Association of Official Agricultural Chemists :

Moisture,
Ash,
Total nitrogens,
Ether extract,
Starch,
Sugars,
Crude fiber.

In addition to the above determinations fat was also determined by a special unpublished procedure which will be described later.

Moisture was determined by the loss of weight of a 2-gram sample as a result of drying at 98-100° C. at atmospheric pressure for about 18 hours.

Ash was determined by incinerating 2 grams of the sample to a light gray residue in a tared silica dish, using the electric muffle.

Total protein was determined by the Kjeldahl, Gunning-Arnold method, the details of which are as follows :

“Place 1 gram of the material in a 500 cc. Kjeldahl flask with approximately 0.7 gram of mercuric acid, and add 20 cc. of sulphuric acid. Place the flask in an inclined position and heat below the boiling point of the acid until frothing has ceased. Then increase the heat

until the acid boils briskly and digest for a time after the mixture is colorless or nearly so, or until oxidation is complete.

"After cooling dilute with about 200 cc. of water, add a few pieces of granulated zinc, if necessary to prevent bumping, and 25 cc. of potassium sulphid solution with slaking. Next, add sufficient sodium hydroxid solution to make the reaction strongly alkaline—50 cc. are usually enough, pouring it down the side of the flask so that it does not mix at once with the acid solution. Connect the flask with the condenser, mix the contents by shaking, distil until all ammonia has passed over into a measured quantity of the standard acid and titrate with the standard alkali."[†]

Fat: Ether extract was determined by the use of Soxhlet's extractor and anhydrous ethyl ether, the details of which are as follows:

Weigh 20 grams of material in an "extraction thimble" and place in the tube of extractor, which is now ready to connect with the condenser. Then place about 50 cc. of anhydrous ethyl ether in the weighed flask which is joined to the apparatus. Heat the flask on an electric plate for a period of about 16 hours, adding more solvent during the period of heating if necessary. After the extraction is completed, disconnect the flask from the apparatus and evaporate the remainder to almost dryness on a water bath and finally dry the contents to constant weight in an electric oven.[‡]

Fat: Determined by a special unpublished method, the details of which are as follows:

"Treat 5 g. of the sample in 200 cc. Erlenmeyer flask with a mixture of 10 cc. of alcohol (95%), 2 cc. of concentrated ammonium hydroxid, and 3 cc. of water, keeping the contents of the flask at the boiling point for 2 minutes, preferably on the steam bath. After cooling extract the contents of the flask with 3 successive 25 cc. portions of ethyl ether, mixing and tamping the material thoroughly each time with a glass rod flattened at the end and pouring the extracts off by decantation into a 250 cc. beaker. The last 25 cc. portion of ether should be drained out as completely as possible, after which another 15 cc. portion of the same ammoniacal alcohol solution is added to the flask and the matted material disintegrated as thoroughly as possible by means of the flattened glass rod which should be left in the flask for this purpose. The flask is then returned to the steam bath

[†]Methods of Analysis, A. O. A. C., 1920.

[‡]Food Analysis, Woodman, 1924. p. 22.

and the entire procedure repeated, the second set of ether extracts being poured into the beaker containing the first set. The second treatment with the ammoniacal alcohol mixture should be more gradual and somewhat longer than the first, so that the ether remaining in the flask may be evaporated off and the ammoniacal alcohol brought to the required boiling point without results disastrous to the determination.

“Evaporate the combined extracts to dryness on the steam bath and extract the fat from the residue left in the beaker with successive portions (5 or 6 treatments, using about 15 cc. each time) of a mixture of equal volumes of ethyl ether and petroleum ether. Collect the extracts in a tared platinum dish (do not try to filter), and evaporate to dryness on the steam bath. Dry the residue in a water jacketed oven at the temperature of boiling water for 30 to 45 minutes, cool in a dessicator, and weigh.”*

Total sugars were determined by the following method :

Preparation of Sugar Solution: “Place 12 grams of the material in a 300 cc. graduated flask with 150 cc. of 50% alcohol by volume and boil on a steam bath for one hour, using a small funnel in the neck of the flask to condense the vapor. Cool and allow the mixture to stand several hours, preferably over night. Make up to volume with neutral 95% alcohol, mix thoroughly, allow to settle, transfer 200 cc. to the beaker with a pipette and evaporate on a steam bath to a volume of 20—30 cc.

“Transfer to a 100 cc. graduated flask and rinse the beaker thoroughly with water, adding the rinsings to the contents of the flask. Add enough saturated neutral lead acetate solution to produce a flocculent precipitate, shake thoroughly and allow to stand 15 minutes. Make up to the mark with water, mix thoroughly and filter through a dry filter. Add sufficient anhydrous sodium carbonate to the filtrate to precipitate all the lead. Again filter through a dry filter and test the filtrate with a little anhydrous sodium carbonate to make sure that all the lead has been removed.

“Introduce 50 cc. of the solution into a 100 cc. graduated flask, and add a piece of litmus paper, neutralize with hydrochloric acid, and add 5 cc. of concentrated hydrochloric acid. Heat in a water bath kept at 70° C. for 10 minutes, remove the flask and cool the contents rapidly to 20° C. Dilute to the mark with water, filter if necessary and determine reducing sugars in 50 cc. of the solution (representing 2 grams of the sample).

*Bureau of Chemistry Information Sheet, Noodles, etc., B.R. Jacobs and O.S. Rask.

"Precipitation of Cuprous Oxid. Transfer 25 cc. each of the copper sulphate and alkaline titrate solutions to a 400 cc. beaker and add 50 cc. of reducing sugar solution. Heat the beaker upon an asbestos gauze over a Bunsen burner, regulate the flame so that boiling begins in 4 minutes, and continue the boiling for exactly 2 minutes. Keep the beaker covered with a watch glass during the heating. Filter the cuprous oxid at once on an asbestos mat in a porcelain Gooch crucible, using suction. Wash the cuprous oxid thoroughly with water at a temperature of about 60° C., then with 10 cc. of alcohol and finally with 10 cc. of ether. Dry the precipitate for 30 minutes in a water oven at the temperature of boiling water.

"By using the weight of cuprous oxid thus found the weight of invert sugar present is obtained from the Munsen and Walker's table."*

Starch: Starch was determined by the Diastase method with subsequent acid hydrolysis. The details of the method are as follows:

"Extract 4 grams of the substance on a hardened filter with 5 successive portions of ether; wash with 150 cc. of 10% alcohol and then with a little strong alcohol. Place the residue in a beaker with 50 cc. of water, and stir constantly for 15 minutes or until all the starch is gelatinized. Cool to 55° C., add 20 cc. of malt extract and hold at 55° C. for an hour. Heat again to boiling for a few minutes, cool to 55° C., add 20 cc. of malt extract and maintain at this temperature for an hour, or until the residue treated with iodine shows no blue color upon microscopic examination. Cool, make up directly to 250 cc. and filter. Place 200 cc. of the filtrate in a flask with 20 cc. of hydrochloric acid (Sp. Gr. 1.125). Connect with the reflex condenser and heat in a boiling water bath for 2.5 hours. Cool, nearly neutralize with sodium hydroxid solution, finish the neutralization with sodium carbonate solution and make up to 500 cc. Mix the solution well, pour through a dry filter and determine the dextrose in an aliquot as directed in the method for determining total sugars.

"Conduct a blank determination upon the same volume of the malt extract as used with the sample and correct the weight of reduced copper accordingly. The weight of the dextrose obtained multiplied by 0.90 gives the weight of starch."†

Crude Fiber was determined by the following method:

"Extract 2 grams of the dry material with ordinary ether. To this residue in a 500 cc. flask add 200 cc. of the boiling dilute

*Methods of Analysis, A.O.A.C., p. 94.

†Methods of Analysis, A.O.A.C., 1920, p. 95.

sulphuric acid solution. Connect the flask with a reflex condenser, the tube of which passes only a short distance beyond the rubber stopper into the flask. Boil at once and continue boiling gently for 30 minutes. Filter through linen and wash with boiling water until the washings are no longer acid. Rinse the substance back into the flask with 200 cc. of the boiling dilute sodium hydroxid solution, boil at once, and continue boiling gently for 30 minutes as directed above for the treatment with acid. filter at once rapidly and wash with boiling water until the washings are neutral. The last filtration may be performed upon a Gooch crucible, dry to constant weight at 110° C. Weigh, incinerate completely and weigh again. The loss in weight is considered to be the crude fiber.”*

The results of these determinations are contained in Tables I and II.

TABLE I
Composition of the Mung Bean Unsprouted

	Sample No. 1	Sample No. 2	Average Percent
Moisture	14.10	12.55	12.33
Ash	3.30	3.10	3.20
Protein (N. x 6.25)	22.82	22.63	22.72
Fat (Ether Ext.)	0.947	0.929	0.938
Fat (Amm. Alc. Ext.)	2.73	2.66	2.69
Total Sugars	3.59	3.59	3.59
Starch	46.10	44.40	44.25
Crude fiber	4.96	4.66	4.81
Undetermined (Pentosans, Gums, Ddxtrins)			5.472
Total			100.00

*Methods of Analysis, A.O.C.A , 1929, p. 98.

TABLE II
Composition of the Germinated Mung Bean

	Sample No. 3	Sample No. 2	Average Percent
Moisture	5.66	5.76	5.71
Ash	3.82	4.14	3.98
Protein	30.35	30.28	30.31
Fat (Ether Ext.)... ..	1.3	1.29	1.29
Fat (Amm. Alc. Ext.)	1.9	1.94	1.92
Total sugars	13.6	13.66	13.63
Starch	23.40	23.14	23.27
Crude fiber	9.11	9.14	9.13
Undetermined (Pentosans, Gums, Dextrins)			10.76
Total			100.00

The averaged values of Tables I and II computed to a moisture-free basis are contained in Table III.

TABLE III
*Composition of the Natural and Germinated Beans on the
Moisture Free Basis*

	Natural %	Germinated %
Moisture	00.00	00.00
Ash	3.65	4.22
Protein	25.91	32.18
Fat (Ether Ext.)	1.07	1.36
Fat (Amm. Alc. Ext.)	3.07	2.03
Total sugars	4.09	14.45
Starch	50.44	24.68
Crude fiber.	5.49	9.68
Sugars and starch	54.53	39.13

As has already been stated, 300 grams of natural air-dried beans yielded 211 grams of sprouted material dried at 45° C. Correcting for the 12.33% moisture contained in the sprouted material, 267.01 grams of natural beans on the moisture-free basis yielded 199 grams of moisture-free sprouted material. The latter value is 74.5% of the former. Accordingly, this germination involved or resulted in a loss of 100—74.5 or 25.5% of the original natural beans on the moisture-free basis.

TABLE IV
Effect of Germination

	74.5 x {	Percentages of Germina- ted Bean	Percentages of Original Constituents Present in the Germi- nated Bean
Ash	3.14	86.00	
Protein... ..	23.95	92.40	
Fat (Ether Ext.)	1.01	94.76	
Fat (Amm. Alc. Ext.)	1.51	49.18	
Total sugars	10.76	238.60	
Starch	18.37	36.41	
Crude fiber	7.21	131.30	
Sugars and Starch	29.14	53.45	

Multiplying the percentage values in the germinated beans by 0.745 will give the percentages which those constituents represent of the natural or unsprouted bean. These values are given above in column 1, table IV. From the values given in column 1, table III and those in column 1, table IV can be calculated the percentages of the several original constituents in the natural beans which remain in the germinated product as a result of germination. These percentages are given in column 2, table IV. This column brings out the outstanding results of the chemical part of this investigation.

A brief consideration will now be given to each constituent individually. Beginning with ash, it will be noticed that this constituent has not been greatly affected by germination. Eighty-six percent of the original ash contained in the natural bean is present in the germinated product. The disappearance of 14% is probably due to the leaching effect of the water applied during the germination process.

The proteins have suffered a still smaller reduction, as 92.4% of the total protein in the natural bean is present due to hydrolysis of proteins into amino acids which were then leached out by the water applied during germination, or it may be due to leaching out of proteins like albumins which were originally water soluble.

A comparison of the values for ether extract and fat as given in Table III shows that direct ether extraction is inadequate for the removal of all fat soluble material of this kind. This is probably due

to occlusion of fats by proteins which are impermeable to ether. For these reasons the values for ether extract may be regarded as meaningless and need therefore not be given any further consideration.

Passing on to the values for lipoids as determined by the ammoniacal alcohol digestion process, it will be noticed that approximately half of the substances are destroyed or consumed during the germinating process.

The disappearance of approximately two-thirds of the starch contained in the natural beans combined with a large increase in sugars as a result of the germinating process, shows, as one might expect, the mobilization of carbohydrates, obviously for nourishment of the young seedling. The high rise in sugars shows that the rate of their oxidation is not equal to the rate at which starch is hydrolyzed.

The increase in crude fiber as a result of germination can only indicate the development or formation of new plant structure. It is rather interesting to note that plant structure is formed at such an early stage of plant growth.

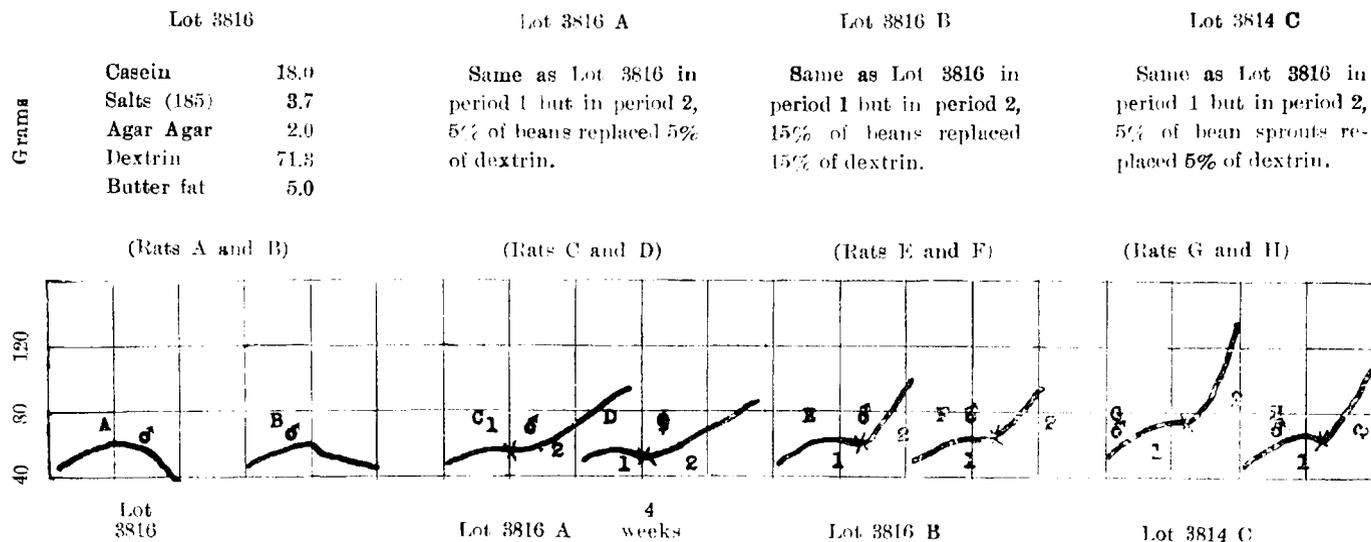
2. *Biological*

In addition to the above chemical studies, tests were made by the biological method for the relative amount of vitamin B in the natural and germinated beans.

When little rats are placed upon a diet which is satisfactory in every respect except for the absence of the dietary factor vitamin B, a small gain in weight usually takes place during the first three to four weeks. This does not always happen, but with vigorous rats it frequently does. After the third or fourth week on the experimental diet there is no further increase in weight and either a brief period of maintenance is followed by a rapid decline, or a steady loss of weight begins and death follows after a variable period unless the missing dietary essential is supplied.

When the diet is lacking in the vitamin B but is properly constituted in other respects, typical poly-neuritis results in many of the experimental animals. In conducting the work reported in this chart, the plan of feeding a diet of purified food substance, together with 5% of butter fat to supply an abundance of vitamin A, was followed. This diet is complete except for the absence of vitamin B. The rats were confined to this food mixture until they had either become stationary in weight or were declining. About the fifth week they were either stationary in weight or were failing, and they almost invariably showed signs of paralysis, the mung bean which was to be tested for the vitamin B was put into the diet in the percentages noted in the chart.

CHART DEMONSTRATING PRESENCE OF VITAMIN B IN MUNG BEAN AND MUNG BEAN SPROUTS



In interpreting this chart it should be remembered that at the point of marking the beginning of the second period the animals were at or near the point of showing loss of muscular control, and that response, with even a slow rate of growth on the administration of a preparation is conclusive evidence of the presence of the vitamin B.

The diet of period 1 consisted of purified food stuffs plus 5% of butter fat, as is illustrated by lot 3816, rats A and B. This diet is complete for growth in the rat except for the decrease of vitamin B. Lot 3816, rats A and B, are the control animals for the experiment.

Lot 3816 A, Rats C and D: The diet of period 1 was the same as that of lot 3816, the control animals. In period 2, 5% of powdered mung beans replaced 5% of dextrin. The growth of the animals in period 2 demonstrates the presence of vitamin B in the natural mung bean.

Lot 3816 B: The diet in period 1 was the same as that of lot 3816. In period 2, rats E and F were given 15% of mung bean in place of 15% of dextrin. Although lot 3816 A demonstrated the presence of vitamin B in the mung bean, 15% of the mung bean produced a greater response in the growth of the animals, due to the addition of more vitamin B in the larger amount of beans.

Lot 3814 C was fed the same diet as lot 3816 during period 1. In period 2, 5% of mung bean sprouts replaced 5% of dextrin. The very prompt response of rats G and H in period 2 demonstrated that the bean sprouts contain liberal amounts of vitamin B.

It is interesting to note that the growth curves of rats G and H receiving 5% of mung bean sprouts, are very superior to the growth curves of lot 3816 A, rats C and D, the latter being fed 5% of the mung bean.

Tests were not made for the presence of vitamin C in these sprouts since it has been well demonstrated by various investigators that the sprouting of grains or legume seeds increase their vitamin C content. Fürst (1912),³ working in Holst's laboratory, found that whereas dry cereals or pulses did not prevent scurvy, they acquire anti-scorbutic properties when allowed to germinate. He was the first to point out the possibility of producing the anti-scorbutic principle at will by the germination of seeds. This work has been abundantly confirmed by Chick⁴ and Delf (1919).

CONCLUSIONS

In conclusion it may be stated that the germination of the mung bean for table purposes results in a loss of approximately one-fourth of its original mass. The greater part of this loss is due to the utilization of carbohydrates and fats by the growing seedling during the germination process.

In times of famine or under other conditions of food scarcity when fuel food should be conserved, it would be decidedly wiser to utilize the mung bean in its natural condition than to germinate it. However, under ordinary circumstances, germination is a commendable and desirable practice, since the germinated product possesses certain dietary properties and qualities of palatability which are absent in the natural bean. These are higher content of vitamins B and C, a higher content of roughage, and more pronounced characteristics of greens.

ACKNOWLEDGMENT

This investigation was carried out under the direction of Dr. O. S. Rask. The author wishes to express his gratitude and appreciation for the inspiration and help extended during the progress of the work and for the keen interest evidenced at all times. The author also desires to express his sincere appreciation for the help and counsel so kindly given by Dr. E. V. McCollum, and finally, to Dr. Nina Simmonds, without whose assistance the biological tests would have been impossible.

BIBLIOGRAPHY

1. John Waterman: Jour. Biological Chemistry, 1920, Vol. 44, p. 803.
2. Kuriyama, S.: J. Biol. Chemistry, 1918, 34, 321.
3. Fürst (1912) Zietsch, Hyg., 72, 121.
4. Chick, H. and Deli, E. M.: The Biological Journal, Vol. 18, 1919, p. 149.

**THE PROBLEM OF VOLATILE GENERAL ANAESTHETICS
IN CHINA**

JOHN CAMERON, Ph.C., F.C.S.

Member Pharmaceutical Society of Great Britain,
Member American Pharmaceutical Association,
Pharmacist, Peking Union Medical College, China.

During our term of service in China we have received many communications from institutions, hospitals and medical men (Chinese and Foreign) concerning the use of ether and chloroform in general anaesthesia which has been stored for one year or a number of years in this country. We gathered from some of these communications that there is an idea about that ether stored in tin containers is not so safe to use as ether stored in amber glass bottles. This idea may have developed from the fact that during the late war a large consignment of chloroform was shipped to France in metallic containers—this chloroform was found to have broken down to various dangerous and toxic decomposition products when the tin containers were opened at the General Hospitals in France. We have never seen chloroform intended for general anaesthesia shipped to China in tins. We would issue a warning to smaller hospitals in China who perhaps have not our facilities for testing chemicals as they arrive from abroad or during storage that chloroform intended for anaesthetic purposes should be stored only in well-stoppered amber glass bottles, in a cool place, protected from light. Chloroform should not be allowed to come in contact with ordinary cork stoppers—see the U.S.P.X¹ monograph. We have always stored our anaesthetic chloroform in amber glass bottles of $\frac{1}{4}$, $\frac{1}{2}$ and 1 lb. capacity—these bottles have been fitted with glass stoppers and we have found that no decomposition has occurred during two years storage. The problem of how long chloroform remains pure enough to be used for anaesthesia in China is one which is at present engaging our attention.

If there is any doubt as to the purity of chloroform many tests (U.S.P.X. seven) (B.P. 1914 eleven) are available. We have found the following test however easily carried out and would suggest its use in medical institutions in China. This test will accurately indicate the presence of phosgene, chlorine and free hydrochloric acid. It was proposed originally by Budde² and a modification of this test has been incorporated in the *Deutsches Urzneibuch* 1926³.

If 10 c.c. of chloroform are shaken with 0.05 benzidine and protected from the light, no turbidity or color should develop within 12 hours.

Anaesthetic Ether: Mendenhall⁴ and Connolly have been working on the effects of impurities in anaesthetic ether—Cilia of an oyster were

exposed to ether and the effects observed by reflected light. If the ether is pure and applied for a short time the cilia are stopped for a short time but soon resume their activity. If the ether is contaminated with small amounts of aldehyde or peroxides or both, the ciliary activity is abolished permanently or for long periods. They suggest that this may be a factor in the development of post-ether pneumonia or bronchitis. It has long been recognised that ether intended for anaesthesia should be of a very high standard of purity and monographs will be found in all pharmacopoeias under 'æther' or 'ether purificatus' which list many tests which may be applied to ether intended for inducing anaesthesia.

During the past few months we have conducted many series of experiments on ether labelled anaesthetic ether or "Ether pro narcosi" and purchased as such from well known and reliable chemical houses in Europe and the United States. Elsewhere⁷ we have discussed our findings in detail but for the benefit of many medical men in China who are using anaesthetic ether daily in their practice we will state a few of the results of our experiments.

- Q. Does ether deteriorate more rapidly when stored in tin containers than in amber glass bottles in China?
- A. We have found that ether (anaesthetic) does not deteriorate (oxidize) more rapidly when stored in $\frac{1}{4}$ lb. $\frac{1}{2}$ lb. or 1 lb. tin containers.
- Q. How long does ether remain safe for anaesthesia if stored in a dark basement where no ice is used during the summer months?
- A. We have found that ether stored in a basement for three years in amber glass 1 lb. and 4 oz. bottles was safe for anaesthetic administration—judged by the tests for the presence of aldehydes and peroxides.

We have found that one sample which had been stored under similar conditions for four years was unfit for use.

- Q. Is there any rapid test which will detect dangerous impurities in anaesthetic ether?
- A. We would suggest the following for use in hospitals in China. "To 10 c.c. of ether add 1 c.c. of a one per cent solution of potassium thiocyanate and one drop of a freshly prepared 5 per cent solution of ferrous ammonium sulphate.

A pink colour indicates traces of peroxide.

A red colour indicates more than traces of peroxide.

Potassium Thiocyanate, KCNS (m. w. 97.2). is also known as Potassium Sulphocyanate and Potassium Rhodanide.

Q. When a bottle or tin of ether has been opened, how long does the ether remain pure enough for anaesthesia?

A. According to the U.S.P.X⁶ if the container has been opened for twenty four hours the ether should not be used for anaesthesia. We have found that ether exposed to the sun for twelve hours gave a very red colour with a specially delicate test for the presence of peroxide.

Q. Does ether oxidize in patent gas machines?

A. We have found that ether was rapidly oxidized in the metallic container of a new gas machine during the first two months of use only. After this no oxidation took place. Ether which had lain in this machine for twelve hours gave a dark red coloration when tested for peroxides.

Q. How does ether deteriorate?

A. Ether absorbs Oxygen from the air, forming ether peroxide, very slowly at first, then more rapidly owing to the catalytic influence of the acetaldehyde formed by the decomposition of the peroxide.

Caution: Care should be exercised in pouring ether from one vessel to another near a naked light. The vapour is heavy, two and a half times as heavy as air—and it will at once take fire with explosive force on contact with flame.

For the benefit of smaller hospitals in China who do not have facilities for analysing their ether and chloroform stocks we will be pleased to undertake this analysis for them. Please let us have full particulars as to how long the anaesthetic has been in your stock and state the approximate temperature of your storage accommodation during the summer months.

REFERENCES:

1. U. S. P. X. P. 106.
2. Budde—Ber. deutsch. pharm. Gesellsch 1917, V. 27, P. 164.
3. Deutsches Urzneibuch 1926, P. 155-157.
4. Mendenhall, W.L. and Connolly, R.—J. Pharm. and Exp. Therap., 25 (1925), 145.
5. Jl. Amer. Phar. Assoc. in press. Feb. & Mar. 1928.
6. U. S. P. X. 1926, P. 84.

ON POST-VACCINIAL ENCEPHALITIS*

ERNST DE VRIES, M.D.

During the last five years cases of encephalitis have occurred, closely following small-pox vaccination, and the idea of a relation between these two processes naturally suggested itself to several investigators. This relation became the more probable, since these cases of post-vaccinial encephalitis form a clinical unity, differing in some points from the picture that we usually see in the form of encephalitis which has occurred during recent years. These cases also show some characteristic features in their pathology.

The importance of any damage caused by our therapeutic efforts justifies in my opinion a discussion of the question in this Journal, although up till the present no cases of the disease seem to have been noted in China.

It was especially through the work of Lucksch in Prague, and Bastiaanse in Holland, that general interest in this problem has been aroused. In dealing with it now I will first give the clinical, pathological and epidemiological data without any theoretical discussion, and in a short second part put forward the theoretical side and the possible explanations which present themselves to us.

The first cases probably occurred in England in 1922, but these were not published until four years later. Early cases also occurred in Holland and Czecho-Slovakia, but the first publication by Lucksch appeared in 1925, reporting seven cases in the latter country. From then on a number of cases were published from various countries of Europe; Holland having the disagreeable privilege of seeing more than 135 cases. We know that, outside of those countries mentioned already, cases occurred in Germany, Switzerland and France, probably also in Greece. On the other hand Spain has been free until now, and as far as I know, no proven cases have been recorded outside of Europe, with the exception, however, of two cases in Baltimore (Ford) of which no full reports are as yet published.

I. *Clinically* these cases have many important points in common, but they differ in several other respects. The *age* of the patients in Holland was always below eight years, because practically the whole population is vaccinated before that age. In England, however, where vaccination is not compulsory, cases have been observed in adults also.

*From the Department of Neurology, Peking Union Medical College.

Read before the Faculty Medical Society of the P. U. M. C. on February 22nd, 1928.

The incubation time, here taken as the time passing between the vaccination and the first symptoms, ranges around ten days, 90% of the cases having an incubation period of 7-13 days. The mortality is high, in Holland 30%; in England, in a small series, even 70%; death coming on mostly within the first week of the disease. Fever is a frequent symptom, which may be rather high (40°C., Wiersma).

The onset is very acute, marked *drowsiness* being nearly always the first symptom. Long periods of sleep are gradually followed by *coma*, out of which the patients awake when the disease runs a favorable course, but during which in other cases death comes on. *Twitching* of individual muscles is often seen, *convulsions* also are rather common, but this may find its explanation in the fact that most patients are young children. Hemiplegia, clearing up soon is not uncommon.

Eye muscle paralysis, so common in the epidemic form of encephalitis, has only been seen once (a Dutch case). On the contrary *Babinski's toe phenomenon* is very common, and noted by most authors, whereas in epidemic encephalitis this sign is not often present.

Sequelae as a rule do not occur, and especially the post-encephalitic parkinsonism, so common in the epidemic cases, was not seen in nearly a hundred cases observed for at least one year after onset.

The spinal fluid has the same characteristics as in the epidemic form of encephalitis. The pressure is often increased, the fluid is clear, the cell count normal or slightly high and the proteins also do not show any marked increase. Signs of *meningeal irritation* are present only in a few cases and never form a prominent part in the clinical picture.

So far for the general clinical picture. There are, however, some local and individual variations worth noting. Lucksch observed in his series of seven cases in Czecho-Slovakia *trismus* as a common symptom, which was also present in two Dutch cases (both occurring in the same month, and in the same province). Two patients surviving of the three reported in Germany by Fiedler, showed afterwards *sequelae*: one child remained an idiot, the other hemiplegic. In England *nystagmus* was often noted by Turnbull and McIntosh, a symptom not described in any other case. These authors saw pupillary changes, which were also present in some of Wiersma's Dutch cases.

As was first pointed out by Bastiaanse, the clinical picture of post-vaccinal encephalitis in Holland has been remarkably constant during the four years that the disease has now occurred. Most authors especially emphasize the fact that the post vaccinal cases they see form a group in themselves, differing from the picture of epidemic encephalitis as seen by the same observers (Bastiaanse, Turnbull and McIntosh, Wiersma, Lucksch).

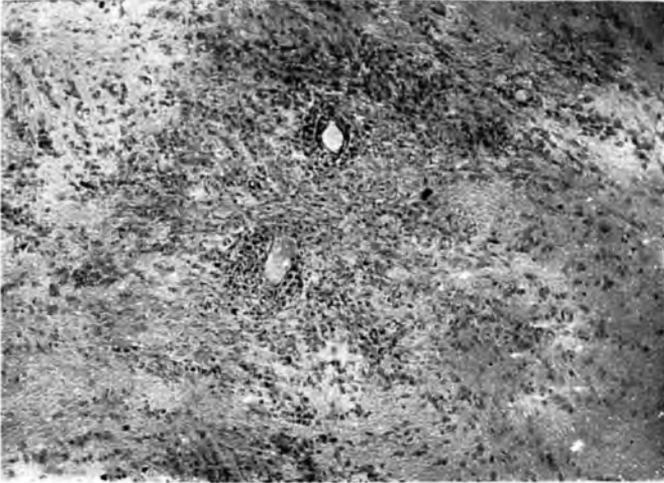


Fig. 1.

Post-vaccinal encephalitis. Glia cells in the nervous tissue around bloodvessels. Typical lesion.



Fig. 2.

Epidemic encephalitis. Small lymphocytes in the adventitial spaces. Nervous tissue around the vessel not infiltrated (from McIneny's paper.)

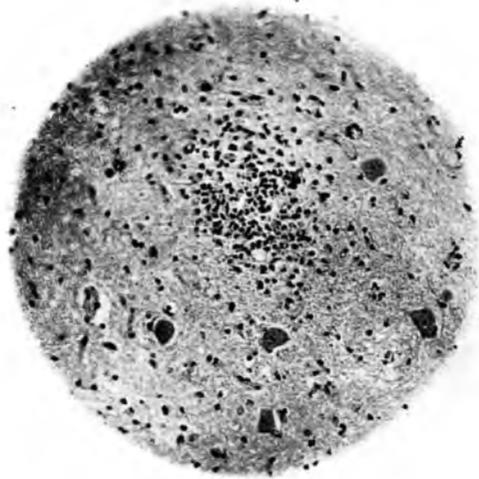


Fig. 3.

Epidemic encephalitis. Focus in the anterior horn: no relation to bloodvessels; infiltration with small lymphocytes and cells (from Meloney's paper.)

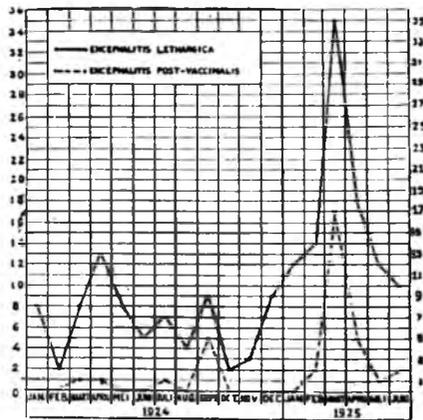


Fig. 4.

Occurrence of epidemic and post-vaccinal encephalitis:

Pette on the other hand states that in recent years he has seen the same type of encephalitis after measles.

From this short clinical survey we can draw the following conclusions :

1. Post-vaccinial encephalitis forms a clinical unit, which can be separated from other types of encephalitis.
2. This disease has some symptoms characteristic for the locality (country) in which it occurs, and at the same time the cases in each local group vary only very little.

II. *Pathological examination* of several cases of post-vaccinial encephalitis reveals some interesting facts. The principle finding is that the focal lesions in this disease are as a rule (a) larger than in epidemic encephalitis; (b) that they are localized mainly in the white matter, and (c) that they are always perivascular. These three points were noted by all investigators in various countries and form a striking contrast to the epidemic encephalitis, in which disease the grey matter is always more affected than the white, in addition to which the focal lesions are as a rule small and the foci are not only found around the vessels but also in the tissue, often around degenerated nerve cells.

These foci consist mainly of glia cells of the *microglia* type. Some polynuclear leucocytes are often present, as an indication that we have to do with an acute process. All these cells lie in the nervous tissue around the bloodvessels, whereas the vessel-sheaths are either empty, as in the Dutch cases, or contain some lymphocytes, as in the English and Czecho-Slovakian cases. The sleeves, however, never acquire the same size as in ordinary epidemic encephalitis.

Often the cortical and deep grey substances show severe *degeneration of ganglion cells* with proliferation of satellite glia-cells, and in one case I also found a diffuse proliferation of the glia in the superficial cortical layer.

The *meninges* are normal, or show a mild lymphocytic infiltration. Turnbull and McIntosh mention thrombosis of pial veins in a number of their cases, an observation not made by other investigators. The hemorrhagic type of encephalitis has never been observed.

From these pathological data we get, therefore, the same impression which we already had from our study of the clinical picture; viz: that all cases of post-vaccinial encephalitis show enough differences from epidemic encephalitis to place them in a separate group, but that they also form local groups with closer resemblance to one another.

Bacteriological and experimental research has been done by a certain number of authors. Pondmann, emphasising that hemorrhagic lesions

were found in the body by Turnbull and McIntosh and others, thinks that a microbe of the *pasteurella* group (causing hemorrhagic septicemia in animals) can be the cause. The toxin of these microbes often has neurotropic properties. He was able to isolate this parasite from samples of vaccine which had caused encephalitis in children. Pette thinks of a *bacillus bipolaris*, probably the same as a *pasteurella*, possibly activated by the vaccination, as the cause of the encephalitis. I do not think that these investigations are of much value, because other experimentors never got the same results.

The vaccine, portions of which had given rise to cases of post-vaccinial encephalitis, was used by some authors for inoculation experiments. Lucksch, Bastiaanse and Levaditi got practically the same result; in none of their cases was this vaccine found to be neurotropic for animals, although neurotropism was sometimes found in other vaccines which had been used for human inoculation without any harmful effect. As we know, Levaditi defines as neurotropic those strains of vaccine which give rise in rabbits after cerebral inoculation to death from encephalitis. Passage through the testicles of rabbits increases these neurotropic properties, which are seldom encountered in normal cow-lymph.

Negative inoculation results with the spinal fluid and brain material from post-vaccinial encephalitis cases are described by Lucksch (rabbits), Bastiaanse, Levaditi, Turnbull and McIntosh (rabbits and monkeys). The English authors found the virus of vaccinia present in the nervous system, but only after repeated inoculations in rabbits did they get a typical infection (vaccinia). Levaditi does not consider this as proving the vaccinal origin of the encephalitis, because the virus is present in all the organs of the body some time after vaccination.

The experiments on monkeys are especially interesting, as we know that the virus of poliomyelitis is easily transferable to these animals, whereas it has not been possible up till now to transfer epidemic encephalitis to animals.

Serological work is still rare; Kraus and Takaki from their complement-fixation experiments came to the conclusion that the virus of "post-vaccinial encephalitis" has near relationship to the virus of epidemic encephalitis and that of herpes, but is widely different from the vaccinia virus itself.

III. I will now give some *epidemiological data* taken from Dutch publications. A small country has the advantage of an easier administration, and a much easier follow-up service. Every vaccination in Holland is reported and the health officers can trace back the vaccine which gave rise to the eruption of a case of encephalitis to a certain

stable and animal as donor. Up to 1909 only calves were used for the production of vaccine; after that period alternately calves and rabbits were used for continuation of the strain, whereas only calf lymph was used for human inoculation. In 1921, in one institution, and in 1926 in the others, after a number of encephalitis cases had occurred and the passage of the virus through rabbits was thought by some authors to be the cause of this, we went back to the exclusive use of calves for the production of the lymph. But in August, 1927, the procedure was changed again, when it became known that in Spain no cases of post-vaccinal encephalitis had occurred, and vaccination had been done in that country for several years only with lapine, that is lymph passed only through rabbits by way of intracerebral inoculation. In November last, this measure was cancelled again, as fresh cases of post-vaccinal encephalitis kept on occurring.

The following list traces the encephalitis cases to the vaccine used:

The vaccine of fifty-seven calves, from three different institutions was used for approximately 800,000 vaccinations, and was in 121 cases followed by encephalitis.

The rabbit vaccine was used in nearly 40,000 vaccinations, 5 patients afterwards developing encephalitis.

Vaccine from Brussels caused one case of encephalitis.

Vaccine from the Dutch East Indies (after animal passage in Holland) caused two cases.

No case is reported of unsuccessful vaccination followed by encephalitis, and no cases have been seen following revaccination.

A relation between the *virulence of the vaccine* used and the outbreak of encephalitis has never been observed. Cases of this disease occurred as well after a mild as after a heavy pock eruption. The sterile (for ordinary bacteria) vaccine applied in the last months, since only rabbits were used for the production, had the same untoward effects as the former non-sterile vaccine from calves, so that it could not be any kind of common bacteria from the vaccine that caused the encephalitis.

Occurrence. The first case in Holland was seen in June, 1923, and the next years yielded 9, 37, 35, 56 cases respectively. This makes a total of 137 cases in Holland. It is very improbable that earlier cases should have been overlooked, because a certain number of anti-vaccination propagandists are always ready to point out the slightest untoward effects of the vaccination.

Distribution. The cases of post-vaccinial encephalitis are not distributed at random, but are often grouped together as well in time as in locality. The distribution over the year runs parallel to that of epidemic encephalitis, as is shown in fig. 2. This may mean a relationship between the two types, or simply that climatic influences act in the same way on both diseases.

There exists, of course, a relation between the number of vaccinations and the number of encephalitis cases following this procedure, but this correlation is not as exact as we should expect if the vaccine was the only cause. The months of November and December have been nearly free up till the present, and with the exception of March, the other months do not show a correlation.

There is a wide variation in the number of cases as we find them distributed over the eleven provinces of our country, ranging from 2 to 52 per million inhabitants. The number of vaccinations done varies only from 19 to 27; the province with two encephalitis cases having 26 for its vaccination number.

The country villages give a figure for post-vaccinial encephalitis cases per million inhabitants three times as high as that for the towns, and very often 3 or 4 cases are seen as a kind of explosion in one village. These cases then can mostly be traced back to one lot of vaccine, but in some instances vaccines of different origin were used by two doctors. There are three instances on record in which two children in one family, or neighbours, got the disease with an interval of one to three years, without other cases occurring in the same village. The chances that this should occur without any special cause are very small as compared with the chances that some local influence plays a role in the production of these twin cases.

A relation in the occurrence of the epidemic encephalitis and the post-vaccinial form probably exists, but it is certainly not simple. Most authors state that their cases of the latter disease occurred in places and at times when no epidemic encephalitis was seen (Lucksch, Turnbull and McIntosh). Wiersma, in 1925, saw five cases, and at the same time several cases of the epidemic form, but in 1926 and 1927 he observed six post-vaccinial cases, when no epidemic encephalitis occurred in the province. An interesting incidence is given by Brouwer who in 1925 saw within five weeks two cases of post-vaccinial encephalitis, two cases of epidemic encephalitis without vaccination and two cases of influenza. One of the former patients died, but autopsy was not performed. This author lays especial stress upon the great resemblance of three of these encephalitis cases to one another.

IV. *Vaccination and nervous diseases.* In the preceding discussion, I mentioned a number of encephalitis cases following vaccination, which seem to form a group by themselves. Nervous complications following vaccination were, however, not unknown before the last four years. Many of these are evidently not encephalitis; but are due to thrombosis or meningitis, but in others the clinical picture does not differ much from what we see in encephalitis following infectious disease.

Freud and Rie mention vaccination in the etiology list in their study on infantile cerebral paralysis. Myelitis was reported by Thaning in 1911; a case in 1903 in Holland probably was poliomyelitis. Turnbull and McIntosh's case I, occurring in 1912, and showing a high cell-count in the spinal fluid (25% of which were polynuclears) probably also has to be excluded from our series. Gomme described hemichorea after vaccination. Glaser, encephalitis with meningeal symptoms, recovering within three days.

The frequency of nervous complications after vaccination gives us another argument to group the recent cases apart from the stray cases reported earlier. A report on the results of vaccination published in Holland in 1902 contains the result of a general investigation into this subject. Ninety per cent of the doctors answered the questions put to them; on 2.5 million vaccination six deaths were reported, of which two probably were due to tuberculous meningitis. No other nervous complications are on record for that period. Therefore we cannot say that the 137 cases occurring in Holland in the last four years are mere accidental concomitants as were seen before, but we have to put them in a separate class or group. The earlier cases (those having occurred before 1922), then, belong to the large and still undetermined group of encephalitis, occurring in the course of acute inflammatory diseases.

V. Much more complicated is the *relationship between post-vaccinial and epidemic encephalitis*; and this brings us at once into a more or less theoretical discussion of our problem. Epidemic encephalitis was practically unknown before 1917; then, at the same time that the influenza swept over Europe, the encephalitis appeared, but it was autumn, 1922, when the first cases of the post-vaccinial form came on record. Since then, their occurrence runs somewhat parallel with the epidemic form. But most authors especially mention that cases do not occur promiscuously, but that they observe several cases of one form or of the other at a time.

Matters are more complicated because epidemic encephalitis does not show a uniform clinical picture. Before discussing this interesting but difficult point, let us look at the various hypotheses put

forward for the explanation of the massed occurrence of encephalitis after vaccination.

If we admit that there is some relation between these two diseases, and I think it is impossible to deny it, there present themselves to us three main possibilities :

- A. The vaccinia virus is the causative agent.
- B. The vaccination lymph is contaminated with another virus, which causes the encephalitis.
- C. The vaccination activates a virus, already present but latent in the patient.

The first of these three theories is very improbable and has practically no adherents. We are unable to explain by it why no cases of post-vaccinial encephalitis seem to have occurred during all the years, more than a century, that vaccination has been performed. A change in the preparation of the lymph was not the cause ; on the contrary several other ways of preparation have been used in the last two years without any effect. It would be difficult to explain how the vaccinia of a greater part of Europe could at once have changed its properties and become neurotropic for human beings. Vaccinia is not a disease of cattle that spreads when not purposely inoculated, so we cannot imagine any new form of this disease spreading spontaneously.

Furthermore, Kraus and Takaki proved that vaccination pocks and the human encephalitis (epidemic as well as post-vaccinial) show different serological reactions. And lastly we have the inoculations of Levaditi and Nicolau, who got positive results with lapine inoculation (rabbit vaccine) in chimpanzee and other higher monkeys, but who were able to show that the disease was caused by a local hemorrhagic encephalitis at the place of injection, without further diffuse extension of encephalitis. Such diffuse extension is seen, as is well known, in intracerebral inoculation of rabbits with herpes virus, where the local reaction is slight but the generalized encephalitis is the cause of death.

From this we draw the conclusion *that the post-vaccinial encephalitis is not caused by the virus of vaccinia.*

B. The vaccination lymph may be contaminated with another virus. This hypothesis has not many adherents. When the first cases of post-vaccinial disease began to occur, it was thought possible by many authors that it might be caused by the virus of spontaneous rabbit encephalitis, which could easily have contaminated the vaccination lymph during the passage through a rabbit's brain, and persisted in the lymph during the cow-inoculation and eruption. This argument was refuted, however, when experiments showed that neither the brain,

nor the spinal fluid of recent human cases were infectious for rabbits. Furthermore the fact that Spain has used lapine for a good many years with no record of a case of encephalitis speaks strongly against the rabbit-encephalitis virus being the cause of the human cases. The change back to the exclusive use of cow-lymph in Holland has not checked the appearance of new human cases. Another argument lies in the fact that unsuccessful vaccination never gave rise to encephalitis

The possibility, that the virus of epidemic encephalitis is present in some cases in the lymph used for vaccination, seems highly improbable in view of the fact that this disease appeared at nearly the same period in many countries; that it did not come at the same time as epidemic encephalitis, but five years later; and that the graphs of its geographical and chronological distribution do not run parallel with those of epidemic encephalitis. We would have to assume that virus carriers infected the lymph either during actual vaccination, or during some stage in its production. This hypothesis would fit in well with the occasional massed appearance of cases, but not with those observations of infection of two members of a family or two neighbours with respectively 1-3 years between the outburst (three instances of this type are given by de Haas).

Thus we can reach the conclusion *that it is very improbable that the vaccine used in human inoculation should contain in some instances a second virus, causing the outburst of encephalitis.*

C. It is therefore most likely that vaccination activates a virus already present, but latent in the patient.

This virus then must be present in a large part of the population of Europe (and possibly also of America) and not be able to give its typical clinical picture, unless activated by the vaccination.

1. Is this virus the same as that causing epidemic encephalitis?
2. Or is it a manifestation of this, modified by the presence of the ultravirus of vaccinia?
3. Or is it a new strain, derived from the old one, but become specific, and which can remain saprophytic for years, until activated again by vaccination?
4. Or, lastly, is it a new, independent virus?

These four questions seem to me to cover the possibilities, but the character of the changes of certain strains of bacteria is still not well understood, so other theories may turn up when our knowledge on this point increases.

The last hypothesis seems to me least attractive because it is difficult to understand how a microbe which has no pathogenic properties when acting alone, can spread in one or two years over Europe, causing a total of perhaps 200-300 cases of disease, if combined with vaccination.

Referring to our first proposition, we can state that the epidemic and the post-vaccinial encephalitis have the following *points in common*:

They are diseases caused by filtrable virus.

They are not transmittable to animals.*

Their serological reactions could, up till now, not be distinguished. Sleepiness and coma are often the first and most prevalent symptoms.

The spinal fluid changes are the same in both types.

Both belong to the non-hemorrhagic type of encephalitis.

Perivascular changes form an important part in the pathological picture.

On the other hand, they *differ in the following points*:

In distribution: no cases of post-vaccinial encephalitis are known from Spain, Australia, China, the Dutch East-Indies, and very few from America whereas in all these countries the epidemic form is frequent.

The onset is acute in the post-vaccinial cases, undetermined in the epidemic cases.

The death-rate is higher in the first mentioned type.

No sequelae follow this type (with rare exceptions).

Eye muscle paralysis does not belong to the clinical picture of the post-vaccinial form.

Microscopically the post-vaccinial form shows only perivascular foci, never free foci in the nervous tissue as in the epidemic form.

Microscopically the post-vaccinial form has mostly glia reaction; lymphocytes are absent or few in number, whereas they form a typical feature in the epidemic form.

In my opinion this enumeration is sufficient to show *that epidemic and post-vaccinial encephalitis are not the same, but very nearly related diseases.*

*There are some positive inoculation experiments, but in my opinion this is of no importance in the present discussion, because the results are not constant.

Referring to the second and third points: Can we give an accurate clinical picture of epidemic encephalitis? This is very difficult when we compare the symptomatology of the earliest cases with that seen today. This difference is best shown by the names the disease got in various places. Von Economo first introduced the name "lethargica", the sleepiness being the symptom which struck him most. Others, however, saw groups of cases in which other symptoms predominated in the picture, and spoke of myoclonic, hemiplegic, fulminating, meningitic, delirious, choreic and other forms. Very often one author saw many cases of one type, whereas in another locality another type predominated. Even groups of cases of hiccup, lasting for several days, occurred which seemed to have some relation with encephalitis. In later years the polymorphism of the disease is less than at the time of its first appearance. We see now mostly the lethargic or the fulminating form, which latter was described in Australia as a separate disease, and cases of which are frequently seen here in China, where Meleney described several of them two years ago.

It seems to me most probable that the post-vaccinal encephalitis is one of the forms under which epidemic encephalitis can occur.

The polymorphism of the clinical picture of epidemic encephalitis is probably not the same type as that of poliomyelitis acuta anterior. In this latter disease the clinical picture also varies widely, but we think that here the individual disposition of the host is the cause of these differences. In other diseases however we speak of the *genius epidemicus*, to lay stress upon the individuality in clinical aspect of one epidemic as compared with another. Scarlet fever, for instance, may sometimes be accompanied by nephritis, whereas another epidemic of the same disease shows many cases with otitis as complications, and so on. It is still under discussion whether those syphilitic infections that give rise to tabes and general paresis form a separate group caused by a neurotropic strain of spirochetes, which can be mixed with the normal form.

One hypothesis to explain these facts is that the causative agent is not one pure strain of microbes, but a mixture of a certain number of slightly different strains, a so-called population*. We know, for instance, that most species of wild plants and animals are not pure but are composed of a great many elementary species (sometimes even a hundred or more). Perhaps this holds true for the phenomena we know of in tetanus, in which Tenbroeck and others could isolate six

*I need not discuss the biological aspect of these questions, but can refer the reader to Dr. Fortuyn's articles on heredity in the last volume of this Journal.

constant types, and in pneumococcus with four types, in meningococcus and probably in many other bacteria. Selection could then act on this group, eliminating one or more types, with the result of a slightly different clinical picture.

Vaccination itself could then act as a strong selecting principle, so that the resulting encephalitis takes a special aspect. This explanation, however, cannot explain the epidemiological differences between the two forms of encephalitis.

But we can also explain the phenomena on the basis of variation and adaptation of bacteria, phenomena known for a long time. Van Loghem points out that in microbes, where no copulation takes place, and no mitotic cell division is known, we may not speak of hereditary changes, but of variations and adaptations in a clone. Such a clone is formed by all the descendants of one parent. Variation is here possible, as the leaves of one tree may vary in size and shape, or as potatoes or other plants can vary, in which only vegetative multiplication is used.

Many experiments have been done to show that sometimes these adaptations can result in loss of a character, which afterwards cannot manifest itself again in the same strain. Sometimes no apparent cause for this change in character can be found, so that we can use the term variation here, but in other instances a change in environmental conditions seems to bring about the change in the culture. We can then speak of adaptation. Van Loghem found that as a rule variation is wider in the saprophytic forms than in the parasitic forms, so for instance, more marked in bacillus coli than in typhoid bacillus, and more in Flexner's and allied types of less pathogenic dysentery bacilli than in the Shiga type. I cannot estimate the value of this hypothesis, but under this aspect it is alluring to consider the encephalitis as a disease caused by a virus which developed its pathogenic tendencies only recently and still is showing the great variability of the wild, or perhaps saprophytic species.

It is not probable that what has once been split off from the common stem will fall back again. That would mean in the case now under discussion that post-vaccinal encephalitis, if it should be contagious in man, would not cause common epidemic encephalitis but would remain latent as long as it is not activated by vaccination.

If we look at our problem with these things in mind we see that it is impossible to come to a solution right now. On the basis of the facts hitherto known, we can admit as well that the changes from epidemic encephalitis into post-vaccinal encephalitis should occur only once, and will not occur any more, as that this change in character can

occur many times and at many places. I am aware that this question is eminently important for tracing out our conduct in regard to vaccination in the future, and needs an early solution.

I also would not dare to give any prophecy about the future. Will the number of cases gradually diminish and the disease disappear as it came? Or will the post-vaccinal encephalitis spread over the whole world and remain with us as the epidemic encephalitis seems to do? Will it be possible by changing our vaccination technique or by some other measure to prevent the encephalitic manifestations? It will be difficult to draw conclusions as long as experiments with animals are negative. Time will teach us how to look on these epidemiologically complicated diseases.

In Holland the result of this outburst of disease has been that vaccination, which was thought to be one of the most settled procedures in the fields of medicine and public health, has again come into the stage of experimentation. In determining our future conduct we must keep in mind that there still is a danger of small-pox becoming endemic again, as it has been for several years in England, and that the death toll in that case would be much larger than from post-vaccinal encephalitis. Vaccination therefore has to be carried on, but can perhaps be done mostly in those months in which encephalitis occurs least. The only advice with a sound background which just now can be given, seems to be not to vaccinate the children of a family in which a case of post-vaccinal encephalitis has occurred during the last three years or even longer.

REFERENCES

- Lucksch*, Die Vakzine-encephalitis. *Medic. Klinik* 21, 1925, p. 1377.
- Bastiaanse*, Encephalitis na koepokinenting, *Ned. Tyds. v. Geneesk.* 1925 I, p. 86.
- Bastiaanse, Byl, Terburgh*, Post vaccinale encephalitis, *Ned. Tyds. v. Geneesk.* 1926, II, p. 1267.
- Turnbull and McIntosh*, Encephalo-myelitis following vaccination. *Brit. J. experim. Pathol.* 7, 1926, p. 181.
- Fiedler*, Vakzinationserkrankungen des zentr. Nervensystems. *Z. f. Kindhk.* 42, 1926, p. 336.
- Levaditi et Nicolau*, L'etiologie de l'encephalite post-vaccinale. *La Presse Med.* 35, 1927, I, p. 161.
- Terburgh*, De epidemiologie v. d. post-vaccinale enceph. in Nederland. *Ned. Tyds. v. Geneesk.* 1927, II, p. 1810.
- Wiersma*, Encephalitis after vaccination. *Acta psych. et neurol.* 2, 1927, p. 167.

REMOVAL OF THE CAUSE**A sound Therapeutic Principle, unreasoningly limited in Practice**

ANDREW H. WOODS, M.D.,
Peking Union Medical College, Peking

The door-plate "John Doe, Physician and Surgeon." as ordinarily interpreted, means "physician and surgeon for scientific practice as respects diseases due to material causes. For the remaining disabilities of mankind, I go it blind."

Our theoretical truism is: All symptoms have definite causes. But to the causes of one large and important group of symptoms we close our eyes, as scientists of the mid-nineteenth century did to germs. We are interested in tumors, bullets, poisons and parasites, which interfere with vegetative processes. But we have a tri-quadrant-anopsia to the etiologic factors which interfere with those higher coordinations, that are the basis of our patient's most important functioning—albeit we acknowledge that he gets his best satisfactions and draws his highest pay from those very functions.

Emotional factors cause mental disability. Emotional factors cause disease in the vegetative organs. Two well established truths, just as scientifically demonstrable as that atropin dilates the pupils. But, at present, the corresponding therapeutic field is almost unentered by physicians, and is pre-empted largely by quacks and theorists. However, Scientific Medicine is beginning to get its eyes partly open, and feels faint stirrings of an ambition to get at the data and formulate the laws that operate in this rich mine of research.

Soon after starting into medical practice, I was jolted into a desire to understand Neurology by an apparently incurable invalid being rapidly restored to activity by the hearty laugh of my rival practitioner, to whom she had appealed. I had been looking for germs and chemical causes, and had failed to see the real cause of her paresis. Unluckily for my reputation, it happened to be of such a nature that his laugh removed it, while my solemn face and bitter tonics did not.

A young Chinese mechanic recently was referred to this Hospital for advice because he had been forced by ill-health to give up a paying position. He complained of dizziness, headache, insomnia and dyspepsia. Fatigue overcame him upon even a half-hour's exertion. He had been placed on a limited diet and was taking bromides, soporifics and tonics. Examination of his organs by all appropriate methods showed no evidence of tumor, parasites, inflammation, intoxication or metabolic disturbance. His former physician was expert in diagnosis and treatment within the range of disabilities that are produced by material causes. Moreover he knew, by what he called "common sense," that disappointed lovers and strong men hit hard by fate become physically sick. But, as a scientist, the etiology of disease

was limited for him, by an intellectual fiat, to factors that could make observable changes in test-tube, culture-medium or X-ray plate. None other need apply. Let patients unguarded enough to be sick from other causes go elsewhere.

And yet, in spite of our preferences as to causation, we find that a considerable number of our patients have thoughtlessly selected non-material etiologic factors for their disabilities. Some of these causes are revealed in conversation with the patients. In other cases the trouble is in the home-life and we find the skill of a Medical Social Service worker is needed to discover it. That department is a necessary part of the diagnostic equipment of a hospital.

We were curious as to the cause of this young mechanic's illness. He, his young wife and son could live together peacefully and happily; but, by an edict of his mother, they had been forced to combine family life with his older brother. This brother was married to a Xantippe, whose steady occupation was pregnancy; her recreation, scolding. The old mother ruled the Bedlam with a rod of iron, in so far as holding together the *status quo* was concerned, but was as wax in the hands of the daughter-in-law. Our patient, his mother and his wife were in various stages of mental and physical disability; and the patient's son was distraught with all the confusion. We wrote in the blank form after ETIOLOGY, "*Intolerable domestic situation.*"

As to TREATMENT: Drugs were eliminated and the man was advised to remove his family to another house. Merely to utter such advice and then dismiss the patient would be useless. It would be like pasting a belladonna plaster over a bullet in his frontal sinus. In this case, as often happens, a reasoning and sympathetic conversation about the whole problem produced results. The pointing out of the disaster that impended for the wife and child, and for his own health and career, finally led the man to resolve to make the change. Filial obedience had to yield to vital obligations. In situations like this, again, we get valuable assistance from a Social Service agent, who is socially and intellectually fitted for the delicate task of getting into contact with the families, explaining our plans and convincing patients and their relatives. The Social Service is a necessary part also of the therapeutic paraphernalia of a hospital.

Since the startling effects upon the medical world of the first demonstrations, by pathologic and bacteriologic technique, of palpable, verifiable causes of disease, we have riveted attention upon *material* causes. It was a relief to be done with demons, witches and arm-chair reasoning. So we easily came to feel that "material" and "verifiable" were synonymous and necessarily concomitant. A thrill of satisfaction

comes when we have demonstrated a tumor as the cause of headache or paralysis. Indeed, a tumor is a most satisfying thing. By refined blacksmithery we sometimes manage to get it out. Now and then the patient even lives after its removal. One can see it and handle it. Drop it on the floor, and it makes a noise. It is a real thing. No wonder we want to limit our practice to worthy diseases that are based upon ponderable etiologic entities. We are weary of Freudian speculation and the mystery that goes with hysteria and other "functional" maladies,

But, unfortunately, the measure of a physician's fatigue is not the measure of his obligation. Otherwise few would undertake to do the radical operation for trigeminal neuralgia. Whether the cause of a disability is obscure, or is easily demonstrable, we must try to find it. Whether it is a simple bullet, or a complex domestic situation, we would like to discover and remove it, so as to get the patient back into his former wage-earning efficiency, or fix him so that he can function still more profitably.

An automobile mechanic has a simpler attitude than that of physicians, as he faces his scientific problems of cause and effect. He does not allow his prejudices to exclude from consideration any one class of causes of engine trouble. A car stalled by a functional fault in the high tension system or in the generator, is just as stationary as though a piston were broken. He doesn't care what the cause may be. He wants to get the car going. But a doctor sees a man who is unable to sleep, digest or think; and, after physical tests fail to uncover a cause for the stoppage, he loses interest, stops hunting for a cause, and thereafter treats the patient by medieval methods of opportunistic pharmacology.

When we thus narrow our field of diagnostic and therapeutic efforts, we miss many of the most interesting problems of scientific medicine, and its most gratifying therapeutic successes. To remove a misapprehension from a man's brain is harder than to remove a bullet; but it is a higher class job and gives both patient and doctor more satisfaction. To discover malarial parasites in the blood and to inject quinine is a procedure at once precise and simple. A non-medical technician can do it. To discover the basis of a patient's emotional derangement and to persuade and enable him to make the appropriate change in his mode of life, is often neither simple nor easy. It calls for deeper knowledge of human nature and of physiology. But when accomplished, it is well worth the effort.

**MERCUROCHROME IN THE TREATMENT OF
TYPHOID FEVER***

H. H. MORRIS, M.D., SHANGHAI

It is not my intention to go into an exhaustive study of the good or ill effects of mercurochrome when administered intravenously in Typhoid Fever. I wish rather to report briefly a few cases in which it has been used, showing the results and not attempting to draw any elaborate conclusions from such a brief series.

Mercurochrome "220" soluble has now been used for a number of years in a variety of conditions, in some of which it seems to have established its usefulness very soundly. There is no need to touch on these various conditions, or on the differing results obtained by various workers, as there are plenty of references to be found in medical literature of the last few years. Possibly one of the most comprehensive is the one by Young in S.G.O. for January, 1925, p. 97. or Young, Hill and Scott in Arch. Surg. May, 1925, p. 813. In these a few cases of typhoid fever are mentioned with rather indefinite results. The only paper concerned solely with typhoid, to which I can find reference, is by Hall in the West Virginia Med. Jour. for April, 1925, and to this I have not been able to gain access.

Our work therefore has been done more or less as an experiment, in order to determine how much of an aid it might be in the treatment of typhoid fever. The cases I am reporting here have been those solely on my own service at St. Luke's Hospital, and are simply presented as rather brief clinical observations.

After the first few cases, when slightly smaller doses were given, we have tried to approximate a uniform dosage of 5 mgms. per kilo of body weight, i.e. 23 cc. of a 1% solution per 100 lbs. We think it is safer to have this solution recently prepared, not more than one day old at the outside. It has not always been possible to determine accurately the weight of the patient, so that in some cases the dose has only been approximate. If there is only a very slight effect produced by the injection, or if the temperature does come down to normal and then begins to rise again, a second dose the same as the first, is given, as close as four days later.

Here is a Table showing the date of injections, 1st and 2nd (when given) and the results occurring in 14 cases which had either a positive blood culture or a positive agglutination test. I have listed the injections as given on the day of disease, as of course that is one

*Read before the Shanghai Branch of the China Medical Association.

feature of it that is interesting, the difference in effect if given early or late, as well as the rapidity of action.

Hospitals No.	Date of Injection		Temp. remains normal	Temp. before injection	Result
	1st	2nd			
20047	7th day	---	16th day	101-103	G.
20851	8th "	---	14th "	101-102	V.G.
20436	8th "	---	14th "	102-103	V.G.
20302	10th "	14th day	22nd "	101-102	G.
23786	13th "	---	15th "	101-103	V.G.
20711	13th "	16th day	23rd "	101-102 +	G.
20138	13th "	19th day	32nd "	102-104	neg.
20845	14th "	---	18th "	101-102	V.G.
21169	16th "	---	for 1 day only,	developed	broncho-
				pneumonia	neg.
20075	19th "	25th day	32nd day	101-103	neg.
20100	31st "	(small dose)	40th "	100-103	neg.
20839	31st "	35th day	39th "	102	neg.
20896	20cc only, ill for 5 weeks, condition		very poor	lived only 3	
			days	after admission	D.
21302	24th day	28th day	37th day	101-102	neg.

V.G. = very good. G. = good. D. = death Neg. = no result.

SECOND GROUP

Cases clinically typhoid but Widal negative.

These cases occurred in the middle of a fairly severe epidemic of typhoid fever and presented the same clinical features, including a leucopenia, as the cases in Group 1, which had positive blood cultures or Widal tests. One of these in particular, No. 21040, showed a large crop of as typical rose spots as I have ever seen.

Hospital No.	Date of Injection		Temp. remains normal	Temp. before injection	Result
	1st	2nd			
20912	9th day	13th day	17th day	101-103	G.
21040	10th "	—	11th "	101-102	V.G.
20961	12th "	18th day	19th "	102+ (see note*)	G.
20963	16th "	—	22nd "	101-102	G.

* (No. 20961) Temp. rose again on 23rd day, was irregular, and was brought down to normal in 2 days by 2½ grs Quinine, t.i.d.

In both of these groups of patients, either with or without a positive Widal test we were careful to exclude other infective fevers, more particularly malaria. Even in this last case where small doses of quinine were used to bring down a slight rise of temperature after it had been normal for 4 days, there had been earlier an examination of the blood for parasites with negative results, though no such examination was made at this later period of fever.

From a brief examination of the first table it can be seen that we obtained some very variable results. Omitting possibly case no. 21169, where no result either way could be determined on account of the development of the broncho-pneumonia, we find there were 5 cases in which I have put down the result as negative, that is the course of the disease was apparently unaffected by the injections, although two injections were given in 4 of these cases. It will be further observed that in 4 of these cases the 1st injection was given fairly late in the disease, 19th day in one, 24th day in one, and 31st day in two cases, the 5th one having received his first injection as early as the 13th day and a 2nd injection on the 19th day. The one case that died need not be blamed on the mercurochrome, I think, as his condition was very bad when he entered the hospital; he had been ill for 5 weeks, and lived only 3 days after admission, and the dose was quite small.

I have put down the results in 3 cases as "good" and I think it will be agreed that to use a treatment which brings a typhoid patient's temperature down to normal to stay, on the 16th, 22nd or even 33rd day of the disease is a result quite worth while.

Finally I have recorded the result in 3 cases as being "very good". These 4 required only one injection each and the normal point was reached as early as 2 days later in one of them, 4 days and 6 days (2 cases), in the others. Here it may be noted that these were all treated with the mercurochrome fairly early in the disease, 8th day (2 cases) 13th and 14th days. Our second group with "good" results, also received their 1st injections fairly early, 7th day, 10th and 13th.

Taking the whole series we find that we have a "very good" result in 4 cases, a "good" result in 3 cases, no result in 5 cases, not counting the one case which developed broncho-pneumonia, which case we might discard as inconclusive, and one case in which death resulted, where the result would have been the same even if mercurochrome had not been used.

I have arranged these cases according to the day on which the 1st injection was given, and here we find that in all the cases where we have a "good" or "very good" result, the 1st injection was never

given later than the 14th day, whereas those cases in which no effect was produced came late, with the exception of one case who received his 1st injection on the 13th day and a 2nd one on the 19th day.

Let us now look at our smaller 2nd group of only 4 cases, who were clinically typical cases of typhoid, coming in the middle of an epidemic of typhoid but who did not show a positive blood culture or agglutination test.

In this group we find one where the result was "very good", his temperature coming down to normal and staying there, one day after a single injection of mercurochrome given on the 10th day. In the three others the result was "good" temperature reaching normal on the 17th, 19th and 22nd days, two of them requiring 2 injections.

Effect on the leucocyte count.

In a number of cases we have made leucocyte counts both before and after the injections and the results are shown in Table 3.

TABLE III.

Before	After	Before	After
6800	6000	5600	5200
4800	6200	2800	4000
4800	6700	9000	14100
5200	7100	6200	18000
3500	6400	8500	3000
5800	5700		

In most of these cases it will be seen that there is no noteworthy change, a very slight decrease in 3, a fairly marked decrease in one, a slight increase in 5, between 1200 to 2900 increase, while in 2 others there was quite a marked increase, 5100 in one case and nearly 13000 in the other. This latter was No. 21040 who received his injection on the 10th day and his temperature came down to normal 2 days later. There does not seem then to be any very pronounced effect on the leucocyte count, except in 2 cases, the others remaining practically the same, with the exception of the one which dropped from 8500 to 3000.

In a very few cases we have made differential leucocyte counts before and after the injections, but have not found any special change taking place, except in one case which I quote herewith because of the remarkable change which was produced, though I am afraid I can offer no explanation of it. The count was:

	Polynuclear	Lymph.	Large mono.	Transitional
Before Injection	57%	2%	41%	
After Injection	43%	50%	5%	2%

These two counts were made by the same individual, so there was very evidently a marked change in the character of the cells.

The leucocyte counts were made some little time after the injection, as we did not want to have them affected by any special reaction the patient might have showed at the time. We were rather interested in a possible permanent effect.

ILL EFFECTS FROM THE USE OF MERCUROCHROME

In using a chemical of this sort one of course wonders if there may not be some ill effects produced by it. I think in every case with this dosage, the injection has been followed by chilly feelings or a decided chill, accompanied by a variable rise in temperature and then usually quite a drop. In a short while these unpleasant symptoms pass off, but they have never been extreme. During 24-36 hours afterwards there has very frequently been a diarrhoea, but except in one case we have never had any difficulty with this, as it has yielded quite easily to treatment. We have also not observed any ill effects upon the kidneys, even in those cases which showed the fairly common febrile urine,—a trace of albumin and sometimes a few casts.

We have noticed in a few cases that patients whose circulatory system was in poor shape, with a fairly rapid pulse, did not do very well, and although I do not know whether this is an actual contraindication to its use, yet we feel rather wary in giving it in such cases. Otherwise it appears to be a fairly safe form of treatment.

As noted at the beginning of this paper the number of cases is too few from which to draw any very positive conclusion, but I feel that I would at least say that in a worth while percentage of cases of typhoid fever the intravenous injection of a 1% solution of mercurochrome "220", is a valuable method of treatment, and that any ill effects resulting from its use are almost negligible as compared with the good effects. This latter point is in agreement with the findings of Young, who used even larger doses in some cases.

The real value of the drug will of course appear only as time goes by.

THE PRACTICE OF MIDWIFERY IN MANY LANDS

I. FORMOSA

It is our purpose to publish a series of articles as material comes to hand showing how the midwifery question is handled in different countries and what success has been attained by these efforts. The first of these we publish in this issue. The material has been obtained from a letter from Dr. D. Landsborough, for over thirty years in charge of a large hospital in the centre of that island—Editor.

Dr. Landsborough writes:—

As you know, it is not necessary nor is it at all common in Formosa for midwives to take the ordinary three years training in general nursing before their midwifery course.

There are two nursing diplomas granted in Formosa:

- (a) The ordinary Tsaw-san-hu diploma which qualifies for practice in Formosa only.
- (b) The San-po diploma which qualifies for practice in Japan proper as well as in Formosa.

To get the ordinary Tsaw-san-hu diploma, the girls must pass a competitive examination and study for a year at the Taihoku Government Hospital and then pass an exit examination in midwifery, which however is not at all stiff and very few of the girls fail to pass it.

Or, instead of going to Taihoku, a girl may attend a midwifery course of one year in Taichu under Dr. Chhoa, the Christian lady doctor there, who has at present about 20 pupils. Dr. Chhoa is in private practice in Taichu but she is allowed by the Government to carry on this course of training in midwifery. After a year's training her pupils have to go in for an examination and, if successful, they get their Tsaw-san-hu diploma just the same as if they had studied at Taihoku.

At Taihoku the students get elementary lectures in anatomy and physiology and first aid before the daily midwifery lectures begin. They have also to help in a very subordinate way in the general nursing of the hospital without any remuneration and of course they have also to be present at cases of labour in the hospital.

In Taichu Dr. Chhoa gives daily lectures to her pupils and they also accompany her to out-call midwifery cases in turns, two at a time. When she has a midwifery case in her small midwifery ward, she has six of them in turns helping, but her pupils do not take any part in general nursing as the Taihoku students do.

For the higher diploma which qualifies for practice in Japan as well as Formosa two years of study and training are necessary after which an examination has to be passed, this examination being rather stiff with a large percentage of failures.

In my opinion the diploma-holding-midwives are a very great blessing in Formosa. I am called out to midwifery cases now and then and I make it a rule never to go unless a qualified midwife or a qualified doctor sends for me. If the patient's friends have not called in a qualified midwife when they send for me, I tell them that they must call in one at once and I do not go unless she sends for me. When she does send, I nearly always find that she has really required assistance and that she knows her job. She has all the necessaries ready for one too, except the instruments, when one gets to the bedside.

I certainly am strongly of the opinion that it would be a very great pity if in China it should be made obligatory for candidates for a midwifery diploma to have a full training in general nursing before beginning their training in midwifery. It seems to me unnecessary and it would cause much delay and put a big obstacle in the way of meeting a great and pressing need.

Dr. Chhoa spoke to me in high terms of the training in midwifery that Dr. Mary Stone gives in Shanghai.

SPINAL ANESTHESIA IN OBSTETRICS

S.A. COSGRAVE, M.D., F.A.C.S.

We believe that this work, though small, is sufficient to show that spinal anesthesia by the technic indicated and in the dosage employed, is safe for obstetric use. The single contraindication is hypotension.

It is not fitted for first stage analgesia by reason of its short duration.

At the termination of the second stage by the vaginal route, it causes entire soft-tissue relaxation; in selected cases this property may obviate lacerations or the necessity for episiotomy; it may be used here for any condition contraindicating general narcosis; it is of course not offered for routine use.

In obstetric laparotomies it offers the same advantages which it does in general surgery, namely, complete anesthesia, thorough muscular and visceral relaxation, relatively slight bleeding, minimal post-operative discomfort, and smooth post-operative course. These advantages are definite enough to constitute a very strong appeal to us in this field of work.

Finally, inhalation narcosis is contraindicated on physiologic grounds in pregnancy toxemia and eclampsia. Where operative procedures of any sort are undertaken in this class of case, spinal anesthesia has a very special and important indication. We believe it is directly conservative of both maternal and fetal life.

Clinical Notes

HENOCH'S PURPURA

DR. C.H. BRANGWIN, AND DR. G.P. BURR, SWATOW

A severe case of Henoch's Purpura is sufficiently rare to warrant a few notes on a case seen here recently.

The patient a young European man of 31, had a clean medical history until this illness. He came to see us on November 15th, 1927, and told us that on his way down from Tientsin, which port he left on Nov. 9th., he had been confined to his bed with sore throat and pain and swelling in his right knee. He was then apparently well and happy. The throat showed nothing in particular but it was obvious that it had been bad.

He was given an iron tonic and told to use a formalin lozenge.

Three days later (Nov. 18th) I was sent for urgently in the morning and told that he had had a very bad night with acute abdominal pain and vomiting. He was found lying on a couch complaining of great pain at a spot he showed us midway between navel and left 9th Costal Cartilage. A vessel was by his side which contained 2 quarts of dirty black watery vomit, sweet to the smell. The appearance of the vomit was like that produced by mixing black ink and water. Pulse 80. Temp. 98.

In many ways the appearance of acute abdomen was simulated but one felt that further watching was necessary before making a diagnosis. No morphia was given so that a clear perception should still be possible.

At 10 a.m. The abdomen was boat shaped, there was no rigidity and the wall moved well to respiration. There was no tenderness in either iliac fossa. An injection of Atropine was given at 11.

During the day the pulse got more thready. In the afternoon the patient was removed to Hospital and stood the journey in a boat across the harbour quite well. A specimen of urine was obtained and found to contain a good quantity of albumen but no sugar, acid, specific gravity 1035.

Soon after arrival in Hospital there was a small vomit of bright red blood. The man was easier and on routine examination of his body a purpuric eruption was found on his legs. The spots were large and situated over the middle third of each leg, on the shin and sides. He told us these spots had been there some days and had come

out after his knee was swollen on board ship. The possibility of acute abdomen was then given up and the case regarded as one of Henoch's Purpura.

At 7 p.m. a small dose Morphia and 5 c.c. of blood clotting serum (Mullford's Thrombol) was given. During the night there were several vomits chiefly of black watery fluid. The patient drank a little water but it always restarted the vomiting.

On the morning of Nov. 19th a big glucose enema was given and retained, later in the day a very foul blood stained stool was passed. The vomiting continued but was now clear watery. The kidneys worked normally and the amount of albumen was less than the previous day.

Nov. 20th. He had an enormous black fluid vomit accompanied by much pain which necessitated Morphia to relieve it. After this vomit (which took place in the early morning) he was very comfortable all day.

He was now having an injection of Thrombol 5 c.c. every day and three nutrient enemata during the 24 hours. There was still some blood in stool. By Nov. 21st urine was free of albumen. If he took fluids by the mouth they were retained for about 8 hours but then vomiting started of fluids and dark green bile stained mucus. Colicky pains always accompanied this. By the 23rd some improvement was noticed and a little minced chicken was given but 6 hours later pain and vomiting again started.

The next 3 days were very bad, both as regards pain and vomiting and the abdomen became distended but there were no localizing symptoms. The daily stool still smelt strongly and red blood was visible in each one.

By Nov. 27th feeling so much better that a cup of tea was allowed. Whilst the nurse was absent he seized the pot and emptied it—thus drinking 5 cups. The effect was amazing. In a few hours all the pain and vomiting returned and he was a very sick man again.

Thus he continued at times better, weary at the length of his illness and occasionally vomiting, but it was noticed that these vomits did not produce the great collapse which the ones at the beginning of the illness did and that his recovery from them was very rapid. He had still the 5 c.c. dose of Thrombol daily and 3 nutrient enemata.

On Nov. 30th the left knee was painful and again there was red blood in stool, but on the following day improvement started and beef-juice in one drachm doses was allowed.

Daily he progressed but on Dec. 8th a big vomit again displeased us. It contained some lumps which looked like sloughs of mucous membrane and one was red, as if only recently cast off. In a few hours he had recovered from this vomit and on the following day rectal feeding was stopped. He was taking small feeds only and now that the large amounts of fluid were no longer given per rectum, his weakness became most pronounced.

His progress was now good and he left Hospital on Dec. 19th.

In January 1928 he returned to duty and since then I have seen him 3 times when he reports "all well".

The great interest of the case, apart from its rarity is:—

1. The way in which it exhibited the classic book description, in that there were joint pains, albuminuria, spots, vomiting and great abdominal pain simulating acute abdomen.

2. The length of time (22 days) on which rectal feeding alone was tolerated.

3. The enormous vomits, which in quantity only, not colour, reminded one of the early vomits of a Cholera patient. This led to one wondering whether the sore throat which started the illness was caused by an Haemolytic streptococcus. In many ways the illness looked an infection. A great breaking up of blood was going on as shown by the size of the vomits both in the original attack and in the relapses he had in Hospital.

A CHINESE CYST

CHAS. LEWIS, M.D., PAOFINGFU, China

Mrs. Chang Wei Shih, Height 5 Ft. $\frac{1}{2}$, Age 33 yrs. Weight on entrance to Hospital 265 lbs. Twelfth day after operation she weighed 102 lbs. Amount of liquid removed 146 lbs. or 18 gallons and 1 quart. Weight of the tumor removed 17 lbs. Weight of the tumor and liquid 163 lbs. Tumor 63 lbs. larger than the woman. Has two living children, one $8\frac{1}{2}$ yrs. and one 7 yrs.

Her third pregnancy was five years after the second, and she aborted about the sixth month. She then noticed that her abdomen did not resume its normal size but was fuller on the left side and has kept on increasing in size up to the present time—a period of two years and eight months.

When she came into the hospital she could not walk and had not been able to walk for over two months. She says she has always been

a strong woman. When she came she had a mitral insufficiency, legs and abdominal wall were oedematous. She could not lie on her back as the tumor was too much weight on her intestines, and only with difficulty could she sit up.

On Nov. 25th. with patient lying on her left side, a trocar and canula were thrust into the tumor above the umbilicus and 113 lbs. of thick viscid chocolate colored liquid was allowed to run out; when no more fluid would run out of itself, the patient was placed on her back and being assured that no more fluid would escape of itself the canula was removed.

At operation one week later there was no evidence of any leakage from the tumor and no adhesions to the abdominal wall. The tapping caused her very little distress, much less than one would expect from the removal of such a large quantity of liquid, but the abdominal wall looked like a wreck of its former greatness, as it lay spread out over the bed and half way down her thighs, having the appearance of a rhino skin.

At operation one week after the tapping the patient was given ether and an incision made about four inches below and four inches above the umbilicus; this was all that was needed for room to work in any part of the abdomen as this incision could be moved to any quadrant. The densest adhesions were to the diaphragm which were divided between clamps, some other adhesions that needed ligation were to the omentum. The cyst grew from the left ovary and broad ligament, and was readily clamped and cut away and the stump ligated in sections and covered with peritoneum. Some three liters of normal salt solution was poured into the abdomen and it was then closed. Her temperature did not go above 37.5 C. at any time. Her heart was irregular and rapid at times when she at first came, but the use of digitalis and the rest in bed she enjoyed after the tapping, prepared her for the operation, which was passed without incident and the patient made a comfortable recovery, and left the hospital in a splendid state of health on Dec. 25th.

I am sorry not to have had a photo of this unusually large tumor but am enclosing one of two other cysts which we removed some years ago, (*see frontispiece*) one of which weighed 67 lbs. and the other weighed 96 lbs. the woman in this case weighed but 92 lbs, the tumor being three pounds larger than the woman. When I was called to see Mrs. Chang she was lying on the *Kang* or Chinese bed and she was veritably hidden behind the enormous tumor. One can imagine how large this one looked as it was almost twice as large as the larger of the other two just mentioned.

Editorials

THE BIENNIAL CONFERENCE

A draft scheme of the arrangements for the meetings appears in the *Association Section* in this issue of the *Journal*. We wish to call special attention to one change in our order of meetings which we believe will help to meet a criticism which has been growing in strength of recent years.

The division of the Conference into Sections is the necessary corollary of the advance of Medical science and the need for specialisation. Many of our Members however, the majority indeed, are in positions where, working alone or with a diminutive staff, no specialisation is possible and they have to tackle everything that comes along belonging to every branch of the profession. They are able to do this too with a wonderful measure of success and there is no doubt that this gives a breadth of judgement that is often sadly lacking among the specialists.

To such doctors the division into sections is a real hardship as their interests are so varied that the simultaneous meeting of sections can hardly avoid depriving them of participating in the discussion of subjects in which they are deeply interested.

If there are to be sectional meetings at all, and these there must be, this difficulty cannot be entirely overcome, but the arrangements for the forthcoming Conference do meet them to some extent.

The order of meetings in the morning, following on the opening Devotional Exercises, is to be first a period given up to business connected with Divisions, Councils and Committees, and also including matters of general interest to be presented by the Executive Committee. This will be followed, for the remainder of the morning by general meetings on five of the days of the week. These meetings will be conducted by one of the Sections in order and it will be up to the Chairman and Secretary of the Section to arrange a discussion on one or more subjects which are of wide general interest. There will thus be no overlapping of these meetings and no other meetings will be held during this period. Sectional meetings will be held in the afternoons.

The subjects of these general meetings will be published as soon as possible, and we wish very strongly to impress on the physicians who have complained so much of the overlapping of the Sections that it is their business to make these meetings a success by their presence at

them and by their readiness to take a share in the discussions on the subjects chosen for consideration.

This is frankly a new experiment and, if it is to find a place in future conferences, the Members in general must use every effort to make it a success.

THE PLACE OF MEETING

With the growth of the Association it becomes increasingly difficult to find suitable accommodation for a Conference lasting a week in any except University Centres where ample buildings are available, and even in some of these the accommodation for delegates is not easily arranged. These difficulties are accentuated by the time of year when our Conference is usually held, except when the meetings take place in the extreme South of China. Elsewhere artificial heat is required if the delegates are to be really comfortably and speakers suitably thawed for action. It becomes a question therefore whether the time of meeting of the Biennial Conference should not be altered and we trust that consideration will be given to this at the forthcoming meetings.

A very large amount of work has been put in in trying to secure suitable premises in Shanghai for our next Conference and in the end some compromise of ideals will have to be made. This difficulty has prevented so far our announcing the exact dates and place of meeting of the 1929 Conference, but we hope to be able to make such announcements in our next issue.

THE REFERENDUM

While it is impossible before next month to report the final result of the Referendum on the amalgamation of the China Medical Journal with the English Section of the Journal of the National Medical Association the result has never really been in doubt.

The large majority of our Members in China have already voted showing a preponderance of between 30 and 40 to 1 in favour of the proposal. Returns are now beginning to come in from our many Members temporarily in Europe and America, and these show the same practical unanimity for the proposed change.

The votes up to the time of going to Press are: For 311; Against 8; Qualified Approval 4; Spoilt 4; Declines to vote 1; Cards returned owing to absence of Member without notifying address 4; Total 332.

We rejoice in this practically unanimous expression of our desire to cooperate with our Chinese Sister Associations in every possible way and although there may be snags yet to be got past before anything like complete union can take place, the spirit of friendly cooperation on all sides suggests that no division of medical forces in China will long be allowed to exist.

We wish in closing these remarks to call attention to the fact that four, rather more than one per cent of our returns to date have been spoilt. It is not quite to the credit of the medical profession that even this small number of Members should sign their names to a document without being careful that their signature carries with it the meaning which they intend. "I approve" and "I do not approve" would seem to be so clear that no mistake could arise, and the omission to erase one of these and return a card which reads that the signatory does both seems hardly conceivable, yet in four cases this is what actually has happened.

HENOCH'S PURPURA

Our thanks are due to Dr. Brangwin of Swatow for an account of a case of Henoch's Purpura appearing under *Clinical Notes* in this issue.

The clear sequence of classic symptoms in this case makes the diagnosis conclusive and we have thus added yet another to the list of diseases met in China.

We believe that this is the first case reported from this country though it does not follow that it is the first seen. Henoch's Purpura is probably not quite so rare a disease as is usually supposed and milder forms are not very easily diagnosed, so it is well for clinicians throughout China to bear in mind the possible occurrence of the condition.

THE MIDWIFERY QUESTION

We are beginning in this issue a series of articles entitled "Midwifery in Many Lands." These will be continued as material comes in. We have already received an interesting letter from Siam and are hoping shortly to be able to give details of a very successful work in the Philippines.

Later we are expecting to publish articles on midwifery training in India, Europe, America and elsewhere.

Whatever view we take of midwifery training there is no doubt of the value of studying the experience gained in the practice of other lands and our desire is to make the facts about this available here.

MEDICAL CHARTS AND BOOKS

In our advertisement pages from month to month there appears a list of Books and of Hospital Forms and Charts published by the C. M. A. Council on Publication. At the top of this list and in as clear type as possible is printed :

Order from The Mission Book Company

13 North Szechuen Road, Shanghai.

It is difficult to see how this could be made more clear but we fear that a number of our Members and of Hospital Managers suffer from a considerable degree of myopia.

In any case few days pass without a letter coming to our office ordering these publications and not infrequently such orders are marked "urgent." The distance to the Mission Book Co. from our office is about one mile and a coolie is not always available when such orders are received, hence in the handling of some of them there is a quite unnecessary delay.

The Secretary counts it a privilege to be able to do anything he can to help up-country Members in securing instruments, medical stores and material when they have any difficulty in obtaining such, and will very gladly supply any information he can on these and other matters. He has not however yet acquired that meek and humble spirit which will allow him to enjoy interruptions to his work from those who will not read clear directions. He would be really grateful if these orders could be sent, as directed, to the Mission Book Co.

China Medical Association Section**REPORT OF BRANCH ASSOCIATIONS****SOUTH CHINA BRANCH**

President	Dr. J. M. Wright, 216 Wai Fuk Sai Lo, Canton.
Vice President	Dr. Ross Wong, Hackett Medical College, Canton.
Secretary Treasurer	Dr. J. F. Karcher, Hackett Medical College, Canton.

These officers were elected at the first meeting of 1928 of the South China Branch. Dr. Wright has left Canton on furlough and Dr. Wong is the acting President.

T SINAN BRANCH

President	Dr. Gaston	Laichowfu
Vice-president	Dr. Thornton Stearns	Tsinan
Secretary Treasurer	Dr. Frances Heath	Tsinan

ANNOUNCEMENT**PEKING UNION MEDICAL COLLEGE**

(Intensive Studies in Obstetrics and Gynecology 1928)

J. PRESTON MAXWELL, M.D., B.S., L.R.C.P., F.R.C.S., *Professor of Obstetrics and Gynecology and Head of the Department.*

GORDON KING, L.R.C.P., F.R.C.S., *Instructor in Obstetrics and Gynecology.*

AMOS WONG, M.D., *Assistant in Obstetrics and Gynecology (from February 1, 1928).*

SHIH WEI LEE, M.D., *Assistant in Obstetrics and Gynecology.*

MARION YANG, M.D., *Instructor in the Department of Hygiene and Public Health (from July 1, 1928) and Voluntary Assistant in the Department of Obstetrics and Gynecology.*

With the assistance of the Department House Staff and :

BERNARD E. READ, PH.C., PH.D., *Professor of Pharmacology.*

A. B. DROOGLEEVER FORTUYN, PH.D., *Associate Professor of Anatomy.*

CHEN-HSIANG HU, M.D., *Associate in Pathology.*

C. E. LIM, M.B., S.B., D.P.H., D.T.M., *Assistant Professor of Bacteriology.*

ERNEST SHEN-CHIH TSO, M.D., *Associate in Pediatrics.*

GEORGE Y. CHAR, S.B., M.D., *Clinical Associate in Surgery.*

ERNEST DE VRIES, M.D., *Associate Professor of Neurology.*

BERT G. ANDERSON, D.D.S., *Assistant Professor of Oral Surgery.*

C. N. FRAZIER, S.B., M.D., *Associate Professor of Dermatology and Syphilology.*

DR. THEODORE GREENE, *American Presbyterian Mission, Peking.*

Intensive studies in Obstetrics and Gynecology will be offered from August 25th to September 15th, 1928.

Special attention will be given to macroscopic and microscopic pathology. Ward rounds will be held, dealing with the diagnosis of cases, which will subsequently be submitted to operation before the class, and a final ward round will be given to discuss the after history of these cases. There will be special demonstrations dealing with the diagnosis and treatment of sterility, the management of normal and abnormal labours, and female urology. The use of radium in the treatment of gynecological disease will be discussed and shown to the class.

Seminars will be held at which the class will be expected to discuss chosen subjects under the guidance of members of the Department. The class will also be invited to bring up cases and subjects for discussion.

An effort will be made to show to all the members of the class the conduct of normal labour, and they will be called to any case of abnormal labour occurring during the course. Rubin's test will be shown to the class.

Enrollment will be limited to twenty-five, and all doctors are eligible for admission. The tuition fee is \$35.00. Applications should be sent to the Registrar of the Peking Union Medical College or to the Head of the Department of Obstetrics and Gynecology. For information in regard to fellowships, address The Peking Office of the Rockefeller Foundation.

Missionary Section**THE CONTRIBUTION OF CHRISTIAN THOUGHT TO THE
SCIENCE AND PRACTICE OF MEDICINE***

HAROLD BALME, F. R. C. S.

THE PROBLEM OF PAIN

From the earliest days of human life on earth, the problem of pain and sickness has challenged the thought and faith of humanity. The mysteriousness of its origin: the uncertainty of its outcome: the crippling results of its ravages: these are some of the factors which constitute the essence of the problem, and which, in all ages, and amongst all people, have led to the same unanswered questionings as to the ways of God. There has always been something so inexplicable, so baffling, so portentous, about the onset of disease, and it is little wonder that it has readily given birth to nervous dread and apprehension, and has led to every kind of superstitious practice. Totem worship and secret cult, hidden charm and magic potion, votive offering and weary pilgrimage—all bear witness to the same pathetic efforts to appease an angry spirit, to ward off some noxious influence, or to counteract some unknown and impalpable evil, thus restoring health and vigour to a loved one. It has needed the vision of an Elizabeth Browning to see that.

“Knowledge by suffering entereth,
And life is perfected by death,”¹

or the inspiration of our own great poet-physician John Keats to appreciate the necessity of a world of pains and trouble, in order, as he put it, “to school the intelligence and make it a soul.”² It has needed the genius of a Mrs. Hamilton King to ennoble suffering as an act of worship, of fellowship, and of needed discipline, so that men could say:

“How poor were earth if all its martyrdoms,
If all its struggling sighs of sacrifice
Were swept away, and all were satiate-smooth:
If this were such a heaven of soul and sense
As some have dreamed of:—and we human still.
Nay, we were fashioned not for perfect peace
In this world, howsoever in the next:
And what we win and hold is through some strife.”³

But not many have risen to such heights. To the vast majority sickness and pain have been twin spectres of dread omen, understood by few and feared by all.

An Address Delivered at the Dedication of the Pillar of Healing in St. Anne's Cathedral, Belfast, January 8th, 1928.

THE CONTRIBUTION OF GREEK THOUGHT

It is part of the glory of the golden age of Greece that the leaders of that period—those “fearless mariners on the uncharted sea of thought,” as Professor Angus calls them⁴—dared to probe into the mysteries of disease, and succeeded in lifting the science and practice of medicine on to an entirely new plane of human endeavour. Two streams of thought converged upon the problem, the one religious, the other intellectual and scientific, but each flowing in complete harmony with the other. The religious stream had its fount of origin in the ceremonies associated with the worship of the God-Physician Aesculapius—reputed son of the divine Apollo and the human maiden Coronis—and found its inspiration, for the most part, in the teachings of the old Mystery Religions, with their emphasis upon a benevolent, though remote, Deity, their yearning for redemption, and their idealisation of a beautiful body enshrining and harmonising with a beautiful mind.

The intellectual stream was the natural product of an age which bore such acute and accurate minds as those of Herodotus and Sophocles, Thucydides and Aristophanes, Socrates and Plato—all of them, be it remembered, contemporaries of him whom we have come to speak of as the Father of Medicine, Hippocrates of Cos. Looking back, as we do to-day, after the lapse of nearly 2,400 years, it is easy to fall into the mistake of regarding Hippocrates as though he were some amazing human comet, born out of due time and flashing upon his generation a brilliance of thought and intuition of incomparable splendour. But such was not entirely the case. Great pioneer as he undoubtedly was, Hippocrates was also, on the one hand, an inheritor of the trained observations of physicians like Democedes, or the generation of men who gave to Homer his accurate knowledge of anatomical detail, whilst on the other hand, he was a sharer in the intellectual stimulus of the great thinkers of his day.⁵ The genius of Hippocrates lay in his power to build upon this foundation, to project into the physical sphere the same independent and fearless thinking as characterised the philosophers of his age, and thus to erect an edifice of scientific thought based upon close observation of natural processes and meticulous attention to clinical symptoms, and inspired with high idealism and a lofty ethical code. In this way Hippocrates, and the school which succeeded him, made an invaluable contribution to medical progress. They delivered the investigation and treatment of disease from blind empiricism and superstitious priestcraft, they proclaimed to the world that all physical disorders were subject to natural laws, and they inspired the profession with a noble quest for ultimate truth and a lofty conception of ethical conduct.

And yet, as Sir William Osler used to remind us, although "the tap-root of modern science sinks deep into Greek soil," Hippocrates, with all his genius, did not go beyond highly trained observation and a conception of disease as a process of Nature,⁶ whilst the religious thinking of the Greeks was largely pessimistic in outlook, knew nothing of conscience, nothing of a conception of the Kingdom of God, and possessed but little interest in the fate of mankind.⁷

THE COMING OF JESUS CHRIST

It was thus to a world of mysterious suffering for which Grecian culture and piety could find no adequate solution, and to which the best religious thought of Judea had no higher interpretation to offer than that of "the fathers eating sour grapes and the children's teeth being set on edge,"⁸ that the Son of Man came; and with His coming our whole conception of sickness and disease has been utterly transformed, and an entirely new motive in life provided. Christianity "lives by the growing hope of a better world," to quote Albert Schweitzer's splendid phrase, and while Græco-Oriental mystery religions could only bid men to "free themselves from the world," Jesus was telling them to get free in order to work in the world, in the spirit and in the love of God.⁹

Of the profound mystery of the Incarnation we shall never, perhaps, discover the full meaning, but one aspect of that mystery is patent to all eyes, for it lies illumined on every page of the gospel record. The Incarnation meant identification with common humanity, in all its frailty, its suffering and its physical limitations. We see this sublime wonder in every detail of Our Lord's life among men—in the infinite tenderness with which He "bare our infirmities" and entered into the sorrows of the afflicted, as in the exquisite sympathy which compelled Him to stretch out His pure hands to touch the loathsome leper, and which made it impossible for Him to deafen His ears to the appeal of a Syrophenician mother, or to pass, unheeded, the cry of a blind Bartimæus.

We see it anew in His solicitous care for the "little maid" whom He bade to arise from her deathbed, in His chivalrous concern for the sisters of Lazarus, in the "virtue" which goes out of Him as He heals the woman who touched the hem of His garment. But most of all we see it in His own experience of physical pain, in the bloody sweat which dropped from His brow in the night-vigil of the Garden, in the agony of martyrdom which drew from His lips those impassioned cries on the cross of Calvary. "He shared pain," as T. R. Glover says in his *Jesus of History*, "He sympathised with suffering; and His

understanding of pain, and, above all, His choice of pain, taught men to reconsider it and to understand it, and altered the attitude of the world towards it."¹⁰

But it was not alone by His sharing of human suffering that Jesus has changed our conception of disease and pain. He did far more than this, for He brought to the world an entirely new revelation of God and of Man. Instead of a remote deity, infinitely just and righteous, but far removed from the sorrows of humanity, Jesus Christ came to reveal a God Who was clothed with personality, a Father Whose whole being was Love, and One in Whose sight the most insignificant of His creatures possessed infinite worth. The God of Jesus was a God Who cared intensely for the welfare and happiness of His children, One Who planned for them a complete redemption of body, mind and spirit, and Who called them into the fellowship of the divinest of all services,—the creation of a brotherhood of which Christ Himself should be the firstborn.¹¹ This was the evangel which Jesus Christ brought to the world, and it is in the inspiration of that message that numberless men and women have gone forth to lives of heroic endeavour and splendid sacrifice.

Let us now attempt to discover how far these new conceptions have affected the course of medical progress and have influenced the science and practice of medicine. We shall find traces of that influence in at least four different directions.

A NEW VALUATION OF HUMAN LIFE

In the first place, the Christian view of a Godcontrolled world has placed a new valuation on human life and personality, such as is found in no other religion, and it is out of this new sense of values that our hospital system, and all that is associated with the care of the sick and helpless, have sprung. "The chief glory of mediæval medicine," writes Dr. F. H. Garrison in his History, "was undoubtedly in the organisation of hospitals and sick nursing, which had its origin in the teachings of Christ. For while the germ of the hospital idea may have existed in the ancient Babylonian custom of bringing the sick into the market-place, for consultation as it were, and while the Iatreia and Asclepeia of the Greeks and Romans may have served this purpose to some extent, the spirit of antiquity towards sickness and misfortune was not one of compassion, and the credit of ministering to human suffering on an extended scale belongs to Christianity."¹²

It was during the reign of Constantine that the Asclepeia were closed, along with other temples, and it was shortly after this time that the movement to found and build hospitals sprang up—a movement in

which Helena, the mother of Constantine, is said to have taken a prominent part. In the year 369 one of the first of these institutions was established at Caesarea by St. Basil, with a hospital for the sick and houses for physicians and nurses. Six years later a large hospital of 300 beds was opened at Edessa for plague-stricken patients, whilst a variety of philanthropic institutions were founded, each with its separate title, for different classes of needy and destitute sufferers. In Western Europe the first *nosokomeion*—as the ordinary hospital came to be called—was founded about A.D. 400 by Fabiola, a Christian lady of Rome, its purpose being, as St. Jerome informs us, “to gather in the sick from the streets and to nurse the wretched sufferers, wasted with poverty and disease.” It was the religious orders and fraternities, which were growing up in the Christian Church at this time, which founded and maintained these institutions, where, as Mrs. Hamilton King beautifully describes it:*

“A small part only of the house served
The brethren’s needs; but all the larger rooms,
Lofty and bare, they made their hospital,
In which by day and night they ministered
Unto their sick; and these were always full.
And all of them had diligently learned
The art of healing, and among them were
Some surgeons and physicians much expert.
But mostly those whom they received within,
Were stricken by diseases, tedious more
Than mortal, needing tenderness and care;
Or else incurable, and needing but
A refuge for the last sad days of life;
Or else which poverty and care had bred,
Needing the oil and wine of charity.
And all, as brethren, they compassionately
Waited upon, and tended.”¹³

*But to myself the finest example of all, is that expressed in the charge to those employed in St. Bartholomew’s Hospital, London, in the ancient times.

It was the beautiful custom of the brethren and the sisters to see in the patient the direct representative of Christ, and to call him “Master” or “Lord”, no matter who he might be. The patients were sick persons found in the streets of the City, and all wounded or injured who chose to apply for relief.

When the patient was brought in, the first thought of these good people was for the comfort of his soul. One of the directions runs thus:—

“First, having confessed his sins to the priest, he shall be communicated religiously and afterwards be carried to his bed and be treated there as Our Lord, according to the resources of the house; each day before the repast of the brethren, he shall be given food with charity.” —Editor.

From the thirteenth century onward this practice of mercy has overflowed the borders of the Christian Church and has gradually permeated the whole of our national life, so that we no longer think of hospital practice as a duty confined to religious bodies. But let us never forget that the instinct which impels men and women to-day to fly to the help of the sick and wounded, the instant response to a call of need which drove aviators and sleigh-drivers hundreds of miles last year in the teeth of a sixty-mile-per-hour blizzard, to take anti-toxin to the diphtheria patients in far Alaska, the compelling force which leads a sea-captain to change his course in order to carry medical aid to some sick man on the heaving ocean—these instincts all find their origin in the new valuation of human life and sacrifice which our Red Cross Flag for ever symbolises.

Nor is this new valuation of human life confined to the physical nature of man, for the very heart of Christ's message was His insistence on the essential unity of all parts of man's being, physical, moral and spiritual, and on the need of each for that complete redemption which He had come to bring. By its insistence on this unity, and on the influence which body, mind and soul exert, the one upon the other, Christian thought has concentrated attention on a vital fact, the importance of which is being recognised more and more to-day by every Guild of Health and by every student of medico-psychology.

A NEW MOTIVATION FOR MEDICAL RESEARCH

In the second place it may fairly be claimed that the quest for truth, which, as we have seen, has come down to us as a magnificent legacy from the Grecian school of thought, has received a new connotation as a result of the life and teachings of Jesus Christ. To the man who has caught a vision of the full significance of life as Jesus saw it, or who, all unconsciously perhaps, has come under the pervading influence of His teaching, this quest becomes a veritable crusade, the end of which is not a mere discovery of hitherto unknown facts, but the forging of a new weapon with which to alleviate the sufferings of a stricken humanity. "I could shout for joy," writes Walter Reed to his wife, as he successfully concluded his important investigation of Yellow Fever at Panama. "The prayer that has been mine for twenty years, that I might be permitted in some way, or in some time, to alleviate human suffering, has been granted."¹⁴

It is a thrilling story, this patient search for the causation and cure of disease. "To wrest from nature the secrets which have perplexed philosophers in all ages, to track to their sources the causes of disease, to correlate the vast stores of knowledge that they may be quickly available for the prevention and cure of disease—these are our

ambitions," declares Osler in one of his noblest addresses,¹⁵ and in these apt words he gives us the life-history of that splendid corps of scientific investigators to whom the whole world stands debtor to-day—William Harvey, the man who avowed himself "the partisan of truth alone," diligently tracing out the circulation of the blood; old Antony Leeuwenhoek, the Dutch draper, grinding the first lenses which revealed the existence of micro-organisms, and paving the way for the brilliant achievements of a Louis Pasteur in France, a Joseph Lister in Britain, a Robert Koch in Germany; Humphry Davy and Horace Wells, Morton, Jackson and our own great-hearted James Simpson, all sharing in the discovery of anaesthetics, those God-given drugs which enable the surgeon of to-day, in Weir Mitchell's immortal phrase, "with God-like will to decree the death of pain";¹⁶ Laveran, finding the malaria parasite, and Manson and Ross and Grassi, after infinite labour, completing the whole story of malarial infection and its cure; Castellani and Sambon performing the same service in the case of sleeping sickness; Carroll and Lazear, Reed and Gorgas, ridding the world of its fear of yellow fever, as Jenner had rid it of the peril of smallpox; James MacKenzie, working in humble obscurity for twenty long years at those laborious researches which have revolutionised our knowledge of cardiac disease; Ehrlich, that great plodding genius, adding experiment to experiment until he presents humanity with a means for destroying pathogenic spirochaetes.

So might we continue, for the tale is not half told of the men and women whom the profession loves to honour, to say nothing of that still larger army of "silent workers who, often unknown and neglected by their generation, kept alive the fires on the altars of science, and have so opened the doors of knowledge that we now know the laws of health and disease."¹⁷

AN INSPIRATION TO HEROIC SERVICE

In the third place, may we not say that the tradition which has come down to us from the sacrificial life of Jesus Christ has been one of the most potent factors in inspiring men and women to undertake hazardous and devoted acts of service for their fellows, with utter disregard of personal danger. The Roll of Honour of the medical profession, and of its sister-profession of nursing, is a record of which we may well feel proud, including, as it does, not only the names of those who have actually given up their lives in the pursuit of science and the service of humanity, but also of hundreds more who "jeopardied their lives unto the death in the high places of the field."¹⁸

Emblazoned on that roll are the names of scores of scientists who gladly risked life and health and reputation in the course of their

research—Haffkine, inoculating himself with his own plague and cholera vaccines before he would risk the lives of others; Carroll and Lazear submitting to the bites of the venomous yellow-fever-bearing mosquitoes (an act which cost Lazear his life); Prowazek, the Russian investigator, perishing of typhus fever from the bite of an infected louse; Thuillier, of the French Commission, carried off by cholera in the midst of his investigation into the terrible epidemic of 1883; Joseph Dutton, dying on the Congo whilst tracking the causation of sleeping sickness. We think also of the sublime moral courage of Pasteur, as he staked his great scientific reputation on the success of those experiments which were to mean so much to a suffering world; of Lister, with "faultless patience and unyielding will"¹⁹ calmly facing ostracism and ridicule in his fight for the mastery of sepsis; of Hall Edwards and Blacker, of Bergonie and the scores of other physicians and scientists who have suffered the loss of limbs or of life itself whilst experimenting with the all-powerful Roentgen Rays.

And what shall we say of the men and women who have risked their all in the common service of suffering humanity—of David Livingstone, shaking with fever as he tramped through the African jungle; of Pennell, dying of septicæmia in the attempt to save the life of a beggar on the Afghan frontier; of Wilfrid Grenfell, battling with Arctic storms on the Labrador coast; of Elsie Inglis, dying of sheer exhaustion after her magnificent service to the stricken Serbians; of Edward Wilson, Scott's "best of comrades and staunchest of friends" on the immortal South Pole Expedition; of Albert Schweitzer, gladly surrendering a world-wide reputation as theologian and musician in order to succour the dwellers in the primeval forest; of Father Damien and Arthur Jackson; of Florence Nightingale and Edith Cavell? And what of that gallant company of surgeons and nurses of all nationalities who performed incredible feats of valour and of endurance as they tended the wounded during the Great War? The line of medical and scientific heroes in the cause of humanity has never been broken, and as we bow our heads in reverent memory of those who willingly gave up their lives in this royal service, we can use no more fitting words than those of the great epic of the eleventh of Hebrews: "These all died in faith, not having received the promises, but having seen them afar off. . . . Of whom the world was not worthy."

A COMPELLING SENSE OF TRUSTERSHIP

But there is a fourth contribution which Christian thought has made to the science and practice of medicine, and one which is perhaps the greatest of all. It is the conviction of trusteeship which characterises every true scientist and physician and nurse, both with regard to

the knowledge which they have acquired by individual effort, and also the ability to alleviate suffering and cure disease which training and experience have placed in their hands.

We have only to look round the world to-day, and especially those portions of it which have not yet come under the dominance of Christian teaching, to realise how much we owe, in our public life and in our social relationships, to this essentially Christian conception. In every act of Our Lord's crowded days, as well as in the profound lessons which He gave to His followers, we find repeated emphasis on this divine view of life. It forms the central theme of the symphonic music of Christ's last recorded parables—those striking word-pictures of the Ten Virgins, the Talents, and the Sheep and Goats. The failure of the maidens who had no oil in their vessels, of the steward who so carefully wrapped up his master's talent in a secure place of concealment, of the respectable company who were not interested in philanthropic efforts—what was it but an essential failure in trusteeship? for the lamps were entrusted to them for the purpose of shedding light in the dark watches of the night, the talent was intended for investment and profit, whilst the hungry and naked, the sick and imprisoned, whom the busy passed so heedlessly by, were no other than the little brothers of Our Lord.

To the medical and nursing professions there has been given, in no ordinary measure, this conviction of trusteeship, largely as a result of the influence of Christian thought, and never perhaps has this been acknowledged in finer language than that employed by him whom we love to call the Father of British Clinical Medicine, the great Puritan doctor Thomas Sydenham. Writing in 1666—the year preceding the publication of Milton's *Paradise Lost*—Sydenham prefaces the first edition of his monumental work on *The Cure of Fevers* with these splendid words—his *religio medici*, as Sir George Newman calls it:

“Whoever applies himself to Medicine should seriously weigh the following considerations: first, that he will one day have to render an account to the Supreme Judge of the lives of sick persons committed to his care. Next, whatever skill or knowledge he may, by the divine favour, become possessed of, should be devoted above all things to the glory of God, and the welfare of the human race. Moreover, let him remember that it is not any base or despicable creature of which he has undertaken the care. For the only-begotten Son of God, by becoming man, recognised the value of the human race, and ennobled by His own dignity the nature He assumed.”²⁰

Thus, throughout the ages, as we trace the whole wonderful story of medical progress, we see, in countless ways, the pervading influence of the Divine Son of Man. We readily acknowledge that

many of those to whom we owe unbounded gratitude for their magnificent contributions to the march of science would hesitate to claim for themselves the title of Christian, but we cannot fail to see, in their lives and in their character, the reflection of Him Who came not to be ministered unto but to minister, and to give His life a ransom for many.

“ A fire mist, and a planet,
 A crystal, and a cell,
 A jelly-fish, and a saurian,
 And caves where the cave-men dwell ;
 Then a sense of law and beauty,
 And a face turned from the clod—
 Some call it Evolution,
 And others call it God.
 A picket frozen on duty,
 A mother starved for her brood,
 Socrates drinking the hemlock,
 And Jesus on the rood ;
 The million who, humble and nameless,
 The straight hard pathway trod—
 Some call it Consecration,
 And others call it God.’ ’21

REFERENCES

1. E. B. Browning: *A Vision of Poets*.
2. Sir George Newman: *Essay on John Keats in Interpreters of Nature*, an inspiring volume which has been freely drawn upon in the preparation of this address.
3. Mrs. Hamilton King: *The Disciples*.
4. S. Angus: *The Environment of Early Christianity*.
5. L. Dyer: *The Gods of Greece*.
6. Sir William Osler: *Man's Redemption of Man*.
7. G. Lowes Dickinson: *The Greek View of Life*.
8. Ezekiel xviii, 2.
9. Albert Schweitzer: *Christianity and the Religions of the World*.
10. T. R. Glover: *The Jesus of History*.
11. Romans viii, 29 (Moffat's Version).
12. F. H. Garrison: *The History of Medicine*.
13. Mrs. Hamilton King: *The Disciples*.
14. David Masters: *The Conquest of Disease*—another volume to which the writer wishes to acknowledge his indebtedness.
15. Sir William Osler: *Chauvinism in Medicine*.
16. Weir Mitchell: *The Death of Pain*.
17. Sir William Osler: *Man's Redemption of Man*.
18. Judges v, 18. 19. W. E. Henley: *The Chief*.
20. Thomas Sydenham: Preface to *Methodus Curandi Febres*, quoted by Sir George Newman in *Interpreters of Nature*.
21. Dr. W. H. Carruth: *Each in his own Tongue*.

Current Medical Literature**INFANTILE TETANUS (TETANUS NEONATORUM) IN HONGKONG
ITS PREVALENCE AND SOURCE OF INFECTION**

C. Y. WANG

Professor of Pathology, University of Hongkong

This paper records the results of an investigation which was undertaken with the view to determine, in the first place, how many of the new-born who were admitted into the Italian Convent Foundling Home in Hong Kong and succumbed with symptoms similar to that manifested in tetanus actually died of the disease, and, in the second place, the source of such infection.

It was observed that in nearly every case where a child was brought into the institution with tetanus-like symptoms the cord had previously been treated with some kind of Chinese medicine which is commonly known as sealing-cord powder and suspicion was at once raised that this form of medicament may have been the source of infection. Accordingly, such cases as were admitted into the Foundling Home, showing tetaniform symptoms, were examined for the *B. tetani*, the powder which was still adherent to the cord, or that which was known to have been used for the child, furnishing the material for the investigation. Owing to shortage of experimental animals at the time, it was decided to confine the examination to only those cases which would come under observation during one single month. The investigation was begun in June, 1926, and during that month alone there were admitted for treatment eight infants exhibiting symptoms of the disease, and these were examined bacteriologically. The investigation was extended to include the examination of various samples of the sealing-cord powder which was sold by the Chinese druggists in different districts of the town. These were purchased in the ordinary way. In all, 121 samples, one from each shop, were examined, of which 66 were bought in the central district, 39 in the western district, 7 in Kowloon and 9 elsewhere in town. From the general physical characters of the powders it was apparent that they have not all been prepared according to one fixed formula, 6 being red in colour, 8 white, while the rest either dark grey or blackish in tint. Some were found to float, others tend, in part, to sink; but they were all mostly insoluble in this medium. The Chinese pharmacopœia gives various formulæ for the preparation of this medicament, but it is important to note, as shall be observed later, that practically all have in them as a constituent some dry earth, charcoal or dry animal manure.

In a few samples the powder contained a certain amount of red mercury. The cost was 2 or 3 cents for a packet containing about half an ounce of the medicine.

RESULTS OF EXAMINATION

Of the eight samples of powder which had been used for the cord, seven were definitely shown to contain living tetanus bacilli, capable of conveying infection. With regard to the one which failed to yield the organism on cultivation it was found that, in this instance, the amount of powder available for examination was scanty, and this might give explanation to the negation of the finding. Or, as it seemed not improbable, the source of infection in this case might have been the instrument used in cutting the cord at the time of birth.

From 8 out of the 121 specimens of the powder procurable from shops in different areas of the town the *B. tetani* in the living state was demonstrated in culture and its identity confirmed by animal inoculation.—*The Caduceus*, November, 1927.

TRACHOMA TREATED BY OIL OF CHAULMOOGRA

The oil of chaulmoogra was first employed as an anti-trachomatous agent by DELANORÉ, in Morocco, who found the results satisfactory, while the oil had the great advantage of being painless and therefore well borne by the patient. Not only were the immediate results described as being rapid and excellent, the photophobia and heavy feeling of the lids ceasing after the first application, but the trachomatous pannus and the corneal infiltrations were favourably influenced by the drug.

GABRIELIDÉS, having a large amount of trachoma material at his disposal, resolved to give chaulmoogra oil a thorough trial and to follow up the cases treated to complete cure, if such resulted. He has done so, and even for a period of six months after cure. In order to determine exactly the advantages of the oil treatment, the author submitted cases presenting different forms of trachoma with or without complications, but of the same intensity in both eyes, to what he calls a comparative treatment. In other words, one eye was treated with the chaulmoogra oil, the other by a method which after long trial has proved itself efficacious, namely, the use of sulphate of copper in pencil form or in glycerol together with slight surgical measures, scarifications or light curetting, followed immediately by friction with a 1 in 500 solution of copper sulphate.

After some remarks on the principle which should govern all efforts in the treatment of trachoma and on the value of a modified form of the instrument known as Terson's "propulseur," he proceeds to describe the methods of applying the oil of chaulmoogra.

Instil cocaine. Evert the upper eyelid with the aid of the "propulseur." By means of a glass rod rub carefully backwards and forwards over the whole surface of the conjunctiva a cotton wad which has been dipped into chaulmoogra oil liquified in a water bath.

Continue the to-and-fro application of the wad fifty times and treat the lower lid in a similar manner. Thereafter massage energetically, an important part of the treatment.

During the friction a white foam appears on the conjunctival surface of the lids, indicating the formation of a liquid soap due to the action of the fatty acids of the oil on the alkaline tears.

After the friction this film should be carefully removed by cotton wool as, if this is not done, sharp prickings and pain may result.

The œdema which follows the applications soon disappears. The friction should be repeated three times a week.

A series of cases illustrating the comparative method is recorded, and it was found that the oil of chaulmoogra compared favourably, especially as regards absence of pain, with the medico-surgical method above-mentioned and with which, if desired, it may be combined.

The author considers that the action of the oil is due to its chemical properties as well as to the mechanical pressure employed during its application.

He finds that:

1. Oil of chaulmoogra is undoubtedly a good anti-trachomatous agent, easily employed and nearly painless as compared with other remedies for trachoma. It has the advantage of being readily accepted by patients.
2. It can be used in all forms of trachoma and in the complications thereof. It has a specially rapid and beneficial effect on trachomatous pannus.
3. It is inoffensive to the corneal epithelium.
4. Its therapeutic properties, apart from the pressure effected during its application, are probably due to the salts and fatty acids which it contains.
5. Oil of chaulmoogra, in combination with sulphate of copper and slight scarifications and curettings, gives excellent results in a short space of time.—*Trans. of Roy. Soc. of Trop. Med. and Hyg.* November, 1927.

**LEPROSY
THE INCREASING HOPEFULNESS OF TREATMENT**

ROBERT G. COCHRAN, M.B., Ch.B., M.R.C.P., D.T.M. & H.

Nearly ten years have passed since the new treatment of leprosy by the ethyl esters of chaulmoogra oil (hydnocarpus oil) was introduced, and therefore it might be well to review the present situation and see how far optimistic forecasts have been justified. It is gratifying to have the following statement from no less an authority than Dr. Muir of Calcutta: "I think we have already in our hands a line of treatment which will aid the rapid disappearance of leprosy from India." And not only in India, but in many other parts of the world, workers continue to report favourably on the present methods of treatment. Dr. Wade, of Cullion, when referring recently to the new outlook for lepers, said: "In view of the impressive total, which all 1926 releases will bring to 800 or more, one cannot, we submit, deny the relative effectiveness of the present-day treatment or its absolute value in selected cases."

It is no exaggeration to say that every case of early leprosy if treated properly, that is with due attention being given to exercise, good food and all the other adjuncts to the chaulmoogra treatment, should recover completely from the disease. While saying this we have, however, to recognise that the present-day treatment of leprosy is by no means perfect, and that in spite of many encouraging results, failures are often reported. But this is only to be expected; for in a disease which runs such a protracted course the stage at which the patient presents himself for treatment, his general health, and a hundred and one other factors must be taken into account. Anything which reduces the vitality of the body mitigates against effective treatment. In spite then of pessimistic reports that have been issued from time to time there has been no other decade in the whole history of leprosy when hope has run so high, and when the massed results all over the world have justified such optimism. It seems as if the rays of the dawn of a new era have at last appeared to dispel the darkness of the lepers' night. This report shows how far the Mission is helping to bring not only comfort to the distressed and needy leper, but health and healing as well. In last year's report the new opportunity which was opening out for the work was stressed and it might be well this time to see how far advantage has been taken of the new situation.

The year 1926 has been very largely a year of consolidation and the laying of foundations for more effective work. Great improvements have been made in some of our larger homes with the object of being

able to treat lepers more efficiently. A medical report on the work of the Mission has recently been issued and the recommendations contained therein will be carried out as and when circumstances permit. For all this we are profoundly grateful, and in addition we have to give thanks that the total number discharged from our homes in India to date is well over 300. Equally encouraging reports come from Korea and China and wherever the new treatment is being effectively given.

Besides those patients who have been discharged there are as many cases in our homes which have become symptom-free. Some of these are being closely watched for some months before being finally discharged. Other cases have come so late that it makes their discharge impossible because they are liable to injuries and deformities due to some permanent damage which has been done and cannot be repaired although the body is free from disease. Such cases need the shelter of our homes so that any ulcerations that appear may be treated at once. Yet another group of people still remain in our homes because so far it has been impossible to reabsorb them into the general community. This last group mainly consists of women, because they have lost any position they had in the home when they became lepers; this problem of reinstating the leper women is likely to increase.

In a recent report from our Dayapuram Leper Hospital at Manamadura (S. India) we learn that sixteen patients have been discharged within the last eighteen months, and it is interesting to note the occupations these cured lepers have entered. Some are labourers, others are shop-assistants, farmers and teachers; one has become a catechist and another a pastor, and so on.—*53rd Report of The Mission to Lepers in India 1926-1927.*

BENZOCAINE—CHAULMOOGRA OIL IN THE TREATMENT OF LEPROSY

Preliminary Note on the Use of an Oil-Soluble Analgesic Which Renders
Intramuscular Injections of Chaulmoogra Oil Painless

By FREDERICK A. JOHANSEN

METHOD OF PREPARATION

Three grams of benzocaine are added to 10 c. c. of olive oil and mixed with a stirring rod; this is then added to 90 c. c. of chaulmoogra oil previously warmed on water bath to 70° C.; the oil mass is then agitated in a flask until all remaining crystals of benzocaine are dissolved. The mixture is filtered through filter paper and then heated on water bath at 100° C. for one hour. Benzocaine goes into solution without increasing the volume of the finished mixture.

After experimentation to determine dosage and the most appropriate regions for repeated injections it was ascertained that the maximum, average, comfortably tolerated dose was the semiweekly injection of 5 c. c. into the deltoid regions, alternating with 8 c. c. into the buttocks, and this was adopted as routine. Certain muscular lepers tolerated 15 c. c. twice weekly with no reported discomfort other than that to be expected from the size and pressure of the mass of oil.

It was found that the oil was completely absorbed within 48 hours in the majority of patients, and rarely any evidence of the injection was noted after the third day.

The mixture is best given at body temperature, as this allows the oil to pass freely through a medium-sized needle thus giving only a minimum of pain from the puncture.

SUMMARY

Crude chaulmoogra oil in combination with benzocaine dissolved for convenience in olive oil has been injected into 24 lepers in comparatively large doses twice weekly over a period of six months, with a negligible amount of pain, slight discomfort from pressure, and only a few oil abscesses (0.2 per cent, such as are not infrequently encountered when an oil is injected intramuscularly).

The preparation has the advantage of not causing pain and of absorbing readily, thereby giving the patient a uniform amount of chaulmoogra oil over a definite period of time.

Of the 24 cases, 6 showed marked improvement; 12 showed moderate improvement; 4 showed slight improvement; 1 was unchanged, and none became worse.

COMMENT

This contributor is well aware that temporary improvement may take place in lepers coincident upon the administration of any new treatment; retrogression usually follows in inverse ratio. In this experiment the enthusiasm of the patients is progressive and there is not the frequent complaint that the cure is worse than the disease.

Since the treatment was started, 36 patients have been added, making a total at this time of 60 who are taking the injections semi-weekly as routine treatment.—*Public Health Reports of the U. S. Public Health Service. December 9, 1927.*

A SIMPLE PREVENTIVE OF MOSQUITO BITES

H. B. NEWHAM, C.M.G., M.D.
London School of Hygiene and Tropical Medicine

Recently a letter has been received by me from a lady residing in the Madras Presidency in India, of which the following is an abstract.

"I have found a truly wonderful fact—namely that plain [cut] lime [fruit] rubbed well over your feet and arms (after your bath) and let dry into the skin, keeps mosquitoes away. I tried it in desperation to soothe my poor limbs as I was eaten alive when I came out, but now I can wear even *black* stockings and stick my feet under a table and not get bitten. I have given up using a mosquito net. I put the lime generously on, neck and arms (face if necessary) and with bare arms at night have no misery; and to think I found such a simple cure after nearly 20 years of well, not heaven! It is so simple that people smile and, would you believe it, won't even try it. One girl did, and thanked me."

The remedy is such a simple one and so readily obtainable in the tropics, that it appears to merit well a more extended trial, and it would be of the greatest interest to have opinions as to its efficacy from other users in various parts of the tropics.—*Trans. of the Roy. Soc. of Trop. Med. and Hyg. February, 1928.*

A NEW LARVICIDE FOR MOSQUITOES

ROBERT MATHESON AND E. H. HINMAN

SUMMARY

1. Borax in concentrations of 1.5 or more grammes per liter of water proved an efficient larvicide for mosquito larvae.
2. Such concentrations of borax retained their lethal action for a considerable period of time, from July 25th to Sept, 7th. At the latter time they were as effective as at the beginning of the experiment.
3. We believe that borax will prove a practical and safe larvicide in cisterns, rain-water barrels, and in any type of container where water is stored for purposes other than that of drinking. The borax would need to be renewed as such containers are emptied of their contents and refilled by fresh water. It may also prove effective in various types of temporary and permanent pools where the plant and animal life are of little importance. In such places it may be necessary to renew the borax supply only at long intervals. This can only be determined by further experimental work.
4. It should be possible to manufacture a borax of sufficient purity for use as a larvicide at a very low cost.—*Am. Jour. of Hyg. March, 1928.*

**LIVER EXTRACT IN THE TREATMENT OF
PERNICIOUS ANAEMIA**

REPORT BY THE MEDICAL RESEARCH COUNCIL

The following preliminary report on the liver treatment of pernicious anaemia has been received for publication from the Medical Research Council.

The treatment of pernicious anaemia by addition of liver to the diet, introduced in America by Minot and Murphy, has already been widely adopted with encouraging results. An important development of this has recently become possible through the successful preparation, by Cohn and others, of an extract of liver containing in small bulk the unknown factor which produces the ameliorating effect. The treatment is thereby made available for patients who cannot tolerate the large daily consumption of liver itself.

It is at present impossible to gauge the therapeutic effects of liver extracts in pernicious anaemia by any other method than that of direct trial upon human patients. The extracts supplied by the three firms were, therefore, distributed widely to various hospitals.

A total of 34 apparently clear cases of the disease came under treatment. The object of the trials was to test the activity of each extract as rapidly as possible, rather than to watch the results over a long period of time. For this purpose the early increase in the count of reticulocytes—the young red cells with special staining properties—was adopted, as it had been found to be satisfactory in the American work. This rise is usually associated with clear sensations of improvement on the part of the patient, and it is succeeded by a progressive increase in the general red cell count, while the relative proportion of reticulocytes diminishes.

Out of the 34 cases all but 2 showed a good response. In 23 of these the conditions were such that other reasons for the improvement than the administration of the extract were clearly excluded. In the remaining 9 the response during treatment was no less marked, but the possibility of natural remissions or the influence of other treatments, such as previous administration of fresh liver, rendered the conclusion less certain. The daily dose of extract, corresponding to half a pound, or 250 grams, of liver, generally brought a clear rise in reticulocytes, culminating about the twelfth or fifteenth day; double that amount daily excited an earlier reaction, with a maximum as early as the fifth day. As illustrating the remoter benefit in a case that had been treated with only the smaller doses, but over a longer period, the total red cell count rose from 750,000 to 5,000,000 in thirty-four days.

These effects are identical with those obtained with liver itself, although the effect of a given dose of the extract is not so great as that of the quantity of liver from which it is derived. Time has not yet permitted an estimate of any possible deterioration of the extract on keeping.—*B. M. J. March 10, 1928.*

SERUM TREATMENT OF POLIOMYELITIS

The treatment of acute anterior poliomyelitis by means of injections into the spinal canal of serum from patients who have suffered from the disease previously has not received an extended trial in this country, although the late Dr. F. E. Batten interested himself in it. Since 1910, when this procedure was suggested by A. Netter, attention was given to its possibilities by Professor G. Etienne of Nancy, and on Oct. 22nd, 1927 (p. 743), we referred at some length to the results which have been obtained. In a recent communication to the Académie de Médecine A. Netter suggests that the reasons for the relative neglect of what is held to be a valuable therapeutic measure are an insufficient knowledge of the indications for the use of serum and an exaggeration of the difficulties of obtaining it. In consequence of the outbreaks in 1926 in Great Britain and Germany Netter has reviewed the subject, and recalls the fact that in 1910 he discovered, jointly with Levaditi, that the blood of patients who had suffered from anterior poliomyelitis contained immune bodies which rendered virulent spinal cords uninfec-tive for monkeys. Netter places the cases for which convalescent serum is indicated in three groups—namely, those in the pre-paralytic stage, those with rapidly spreading paralysis (Landry type), and acute cases with recent paralysis which is showing no tendency to extend. In the first group, he remarks, the main difficulty lies in diagnosis, but in the presence of an epidemic this should not be impossible, and lumbar puncture gives valuable help. In one series of cases in America seven patients were treated within the first twenty-four hours of onset by intramuscular injections of serum, with rapid recovery in each instance. Of the acute spreading variety, the ascending type of Landry, Netter records his personal experience of two cases where the prompt injection of convalescent serum not only prevented further paralysis, but brought about in one the complete disappearance of a paraplegia with retention of urine. When paralysis is already established the beneficial results of serum treatment depend largely upon how soon it is employed. Netter believes that it is of little efficacy after the fourth day, and still less at the end of a week, although reports from South America seem to indicate that small doses may still do good as late as the twelfth day after onset. The dose of serum

employed by Netter varies with the age of the patient, the gravity of the symptoms, and the duration since the onset. He usually administers 10 to 30 c.cm. intrathecally, although in one case he gave as much as 66 c.cm. in ten injections. He adds that the difficulty of obtaining the serum of patients who have suffered from the disease has been largely overcome by keeping a record of old patients so as to make use of them when an epidemic commences. This was accomplished in 1925 in Melbourne, where 110 patients who had previously had the disease were quickly obtained as donors by the help of official registers, hospitals, doctors, masseurs, and even orthopaedic instrument makers. The serum so obtained can apparently be stored for short periods in ampoules. The serum of immunized horses has also been efficacious in certain cases, but its supply at the present time is limited.

—*B.M.J. March 10, 1928.*

Book Reviews

DEONTOLOGIE MEDICALE D'APRES LE DROIT NATUREL

PROFESSOR G. PAYEN, AURORA UNIVERSITY, Shanghai

This small volume, issued by the Siccawei Press, and censored and approved by the reverend Fathers there, is concerned with religio-medical Ethics. The word Deontology signifies the science of Duty, and medical Deontology defines its application to the life and work of a doctor.

It shows how we should observe "The grand principles of justice and charity as established by common morality" and how a medical man should be perfectly honest and charitable.

In order to avoid errors one is advised "(a) to consult authoritative moralists and (b) to hold in great esteem the decisions given by the Tribune of Morals which sits at Rome."

After this the succeeding pages are given over to a series of chapters embodying precepts of the highest order as might be expected from a work issued from such sources.

Thus the doctor is enjoined to be careful of his dignity, devoted entirely to his profession, ever ready to throw himself wholly into the interests of all his patients, to be the soul of discretion and never to charge excessive fees. In the chapter on Neo-malthusianism (Contraception) it is stated that the only anti-conceptual practice which can be approved is prolonged continence. There are two chapters on obstetrical operations which are treated from the moralist point of view and are therefore somewhat contentious. Thus it is said "The Natural Law does not permit a pregnant woman to sacrifice, for her own preservation, the infant which she carries within her" and again "To kill the child in order to save the Mother means lack of knowledge of the resources of modern obstetrical surgery".

The latter part of the book deals with a doctor's gratuitous assistance to the poor, professional confidences, his rights to fees and the ethics of consultation room practice.

While this small volume contains many of what to a medical man are the veriest platitudes and seeks to impress the views of the Roman Church on the general conduct of practice it is a work which could be read with interest and benefit by young graduates, especially Chinese who may not been brought up in the traditions and ethics of Western Medicine. G. D. G.

THE SIMPLE GOITRES

ROBERT MC CARRISON, C.I.E., M.D., D.Sc., L.L.D., F.R.C.P.
Bailliere, Tindall and Cox, Henrietta St. London. Price 10/6

This book is, in an amplified form, the Report by the Author to the International Conference on Goitre held under the auspices of the Swiss Goitre Commission, at Berne, in August, 1927.

The first part of the volume is devoted to a consideration of the different types of Goitre,—Parenchymatous, Diffuse Colloid and Lymphadenoid—their distribution and causation. The second part is devoted entirely to illustrations, 143 in number.

The largest part of the first section is occupied by a masterly review of the causative elements in simple parenchymatous goitre especially as regards insanitary conditions and iodine deficiency. The Author's considered opinion is that the ultimate cause of this type of goitre is a positive toxic agent derived from the gastro-intestinal tract. Excess of iodine would seem to prevent goitre development even under insanitary conditions but iodine deficiency is not, he argues sufficient in itself to cause goitre.

The other forms of simple goitre are attributed mainly to dietetic factors.

There is an interesting addendum on the distribution of Iodine in food-stuffs.

The numerous illustrations are excellently reproduced and are most instructive. Among the most interesting are the charts showing the growth of incidence of goitre in the pupils in the Royal Military School at Sanawar reaching after a period of 9 years residence to 75 to 80 per cent; and the complete eradication of the disease from the same school in the period of 5 years following the introduction of a bacteriologically pure water supply. J. L. M.

AN INTRODUCTION TO PRACTICAL BACTERIOLOGY

T. J. MACKIE and J. E. McCARTNEY
Published by E. & S. Livingstone. Price 10/6

The appearance of a second edition of this useful manual is welcomed. The authors to a great extent have surmounted the usual difficulty of knowing what to include and what to withhold in an elementary text book. The technique described is accurate and of proven value. One finds most of the procedures mentioned to be standard and acceptable to experienced workers. This manual should be of great assistance to Hospital technicians and would usefully be translated into Chinese for the benefit of laboratories in the field in China.

Most of the larger and more comprehensive text books on Bacteriology contain over much detail which is apt to confuse the non-medical reader when seeking simple explicit instructions.

This manual should prove a good work table guide. If one might criticise, the only sins are those of "omission" and perhaps an undue brevity with regard to technique which is every day routine in laboratories in Eastern countries. The macroscopic agglutination tests for Enteric group infections should be given more space and Dreyers method warrants more description.

A section on Haemocytology would enhance the value of the book.

Similarly the cytology and pathological examinations of cerebro-spinal fluid, although not strictly bacteriological technique should certainly be included.

Intestinal protozoa are described briefly, but not sufficiently fully for workers in Eastern countries. No concentration method for ova in faeces is mentioned.

The methods of identifying ordinary pathogenic bacteria are well described and the sections on Cholera and Plague are quite fair summaries of the present state of knowledge of the subject.

The book according to the preface is primarily intended for students attending the classes of practical bacteriology in Edinburgh University. Therefore more space is given to the bacteria which are commonly met with in laboratory investigations in European countries.

At the same time one congratulates the authors in producing a very excellent summary of practical bacteriology.

R. C. R.

Hospital Reports

SWATOW MISSION HOSPITALS, E. P. M. 1926-27

Staff, General Hospital: Drs Wight, Fraser, Siau, and Tan.

Women's Hospital: Drs Ross, Heyworth (1926) Tie, Tan (1927)

General Hospital Inpatients 4,011. Outpatient Attendances 88,829

Women's Hospital Inpatients 2,774. Outpatient (individuals) 7,596

The year 1926 saw the retirement of Dr. Lyall after 47 years work in the Swatow Hospital: we wonder whether this is not unique in the annals of hospitals in China. Dr. Lyall was greatly beloved and his loss to Swatow has been a very serious one. Despite this the doctors have been able to carry on the enormous work which he had built up. They are to be congratulated on their success in doing this in the face of many difficulties and through at least one very critical period.

The report includes some notes on the leprosy clinic with an average attendance of 60. This work appears to be carried on with increasing success.

Cholera as usual visited the city and much of the work of treatment fell on the hospital.

The prevalence of hookworm is shown by the fact that no less than 1300 patients received treatment for it.

Much of the surgery of recent years has been in the treatment of war wounds and the X ray department has been correspondingly busy.

The financial position is not satisfactory which perhaps is not surprising in view of the depressed economic conditions, but which is very disappointing in its result of limiting the work and hindering the erection of much needed new buildings.

The absence of trained nurses from the staff of a hospital doing such an enormous amount of work can hardly be said to be creditable to the Board at home.

The Women's Hospital reports hookworm disease and tuberculosis as the two most frequent complaints, though typhoid and dysentery seem both to have been common during the summer months.

An untoward event occurred in the collapse of the roof of one of the surgical wards due to the ravages of white ants; mercifully none of the patients were injured in the catastrophe. New buildings are also urgently needed for this hospital.

ROBERTS MEMORIAL, HOSPITAL, L.M.S. TSANGCHOW, CHI. 1927.

Staff: Drs Howard Wright and T. K. Chai.
Nurses: 1, Foreign, 3 Chinese.
Inpatients 321
Outpatient Attendances 6,029

The statistics for the year suffered badly from the constant menace of bandits and subsequent unsafe condition of the roads, also from the compulsory absence of the foreign staff for part of the year under report.

Despite these difficulties the work has been successfully carried on throughout the year and the report of the evangelistic work is full of encouragement.

In view of all the troubles the hospital is to be congratulated on a satisfactory financial statement.

A most interesting section written by Dr. Chai tells of the difficult times after the foreign staff had been forced to leave.

Valuable tables of diseases and operations are included in the report.

Correspondence

Department of Anatomy
Peking Union Medical College
April 21, 1928.

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

Dear Dr. Maxwell:—

I wish to avail myself of this opportunity of bringing to your attention that Julius Springer in Berlin has recently published an "Index Biologorum." This book brings the names and addresses of about 14,000 investigators working on the subject of biology in the broadest sense of the word, of more than 6,000 laboratories and 357 periodicals. It is particularly useful that after the name of each person a list of subjects in which he is especially interested is given. This should bring people interested in the same subject together. A large number of laboratories and workers in China are included. The references are in English, German or French. The price of this book of 545 pages is R.M. 27.00. I am wondering whether this book should not be announced to the readers of the China Medical Journal.

I remain, very sincerely yours,
A. B. D. Fortuyn.

Kuling Sanatorium

April 17, 1928.

The Editor,
China Medical Journal.

Dear Sir,

Will you kindly do me the favour of inserting the following. After an enforced closure of the Kuling Sanatorium for the past sixteen months we are planning to re-open for the admission of patients about the middle of May next. As in previous years we are limiting admissions to Foreign patients suffering from pulmonary tuberculosis. The general conditions at Kuling appear to be normal. There has been no disturbance or even a case of annoyance to Foreigners who have remained here throughout the past year. If the political situation remains as at present there is no good reason for further delay in making a fresh start here.

I am,
Yours faithfully,
H. G. Barrie

WANTED COLUMN

A Chinese Dentist, fully qualified, with post-graduate experience in the United States is anxious to be connected with some Christian Institution pre-

ferably in the South. Further particulars can be obtained from the Secretary.

Obituary

Dr. WALTER F. SEYMOUR,* born in Reedsburg, Wisconsin, in 1862. Graduate of University of Wisconsin, Northwestern University Medical.

Came to China in 1893 under Board of Foreign Missions of Presbyterian Church, U.S.A.

For the first twenty-five years he was associated with the Tengchow Station in Shantung. There he worked in simple Chinese quarters for many years. In 1910, Mr. Louis Severance who had been much interested in the excellent work Doctor Seymour was doing without adequate equipment, provided a small but thoroughly equipped hospital.

In 1918, Dr. Seymour was transferred to Tsining also in Shantung and in that large, crowded city has carried on a great work. Again the hospital was housed in Chinese buildings not easily adapted to their purpose. Yet the hospital was always a joy to the visitor because of the active service carried on there. The beds were nearly always full. The Mission for some years had approved of building a hospital with modern conveniences and equipment but the fund had not been completed.

Dr. Seymour was married in 1894 to Mary Gochenour, who was a deaconess of the Methodist Episcopal Church serving in China.

They have two living children.—Ida Marie Seymour and Walter J. Seymour. Miss Seymour joined her parents in Tsining in 1920 where she became superintendent of the nurses' training school and of the nurses in the hospital in Tsining. She resigned from the Mission in 1926 because of health conditions and has been living near Chicago. It was hoped that she would rejoin the hospital in Tsining this fall. The son, following in his father's footsteps in both his university and professional course, is now serving his internship near Chicago.

Mrs. Seymour was in all things a wonderful assistant in her husband's work. She usually served as matron in the hospital in which he worked. Both were keenly interested in following up the evangelistic opportunities opened by their work. In both Tengchow and Tsining their enthusiasm and effort were largely responsible for building up Sunday schools which were famous throughout Church circles in China.

* Dr. Seymour was murdered by soldiers at Tsining on 16th April.

News and Comments

Hospitals Re-opening

St. Andrew's Hospital. Wusih. (Dr. Claude Lee) was re-opened on April 2nd. This Hospital was first opened on 16th March, 1908, so is now twenty years old. The cost of repairs to the amount of \$3000 is being borne by the Chinese community.

Kuling Hospital (Dr. A. G. Barrie) Attention is called to Dr. Barrie's letter in our Correspondence Columns, where announcement is made of the re-opening of this Hospital.

It is good to hear of the recommencement of regular work in these hospitals and in not a few others of which we have no full details.

Apparatus for Kahn Test

One of the pleasures that falls to the lot of the Editor is the friendly relations that he is able to keep up with many of the advertisers in the Journal. They are themselves interested in meeting the needs of the readers from their side as the Editor is from his. They have also always shown themselves willing to submit new preparations to the judgement of clinical tests. Someday we hope that this side will be better developed and we shall be able to arrange for the systematic testing of drugs purporting to be of special value for diseases out here.

An example of what may be done mutually between the Journal and its advertisers is shown in the following note that we have received from the Hospital Supply Co. Ltd. 6, Ichome Yamato cho, Kojimachi, Tokyo.

KAHN PRECIPITATION TEST FOR SYPHILIS

The Hospital Supply Co., Ltd. of Tokyo have prepared a special set of apparatus for the above test, which

will be sent postage paid to any part of the Far East, for Yen 11.00 in ordinary glass, or Yen 12.00 in hard glass.

The Set consists of the following:—

- Copper water bath.
- Copper test tube rack, holding 30 tubes.
- Chemical thermometer, 100° cent.
- 0.2 c.c. Graduated pipette, graduated in 1000ths.
- 1 c.c. Graduated pipette, graduated in 100ths.
- 10 c.c. Graduated pipette, graduated in 10ths.
- 50 Test tubes, 1 cm. × 7.5 cm.
- 50 Test tubes, 1.5 cm. × 5.5 cm.

A Centrifuge can be included for an extra Yen 12.00.

The China Medical Journal of Dec. 1927, contained two articles, explaining the method for making the test, as also its reliability and simplicity as compared with the wasserman test.

Kahn Standard Antigen

Dr. J. E. Skinner of Yenping Fukiensien who wrote an interesting article on the Kahn Test in the *Dec., 1927 Journal* writes the Editor that he has prepared several hundred c.c. of Kahn Standard Antigen and will be glad to supply anyone wishing it at \$5.00 per 50 c.c. bottle. He adds that it is titrated and will, he is sure, prove satisfactory.

A REPORT from Harbin states that, with three pounds of cast iron in his stomach, a Korean resident of a small station on the Chinese-Eastern railway called upon a doctor, complaining of pain in his abdomen. An X-ray examination disclosed the presence of a large amount of foreign matter, and the next day he was

operated upon. The amazed surgeon extracted more than three pounds of cast-iron chips. Later on, the patient explained that he had felt rather ill, and had consulted a Chinese quack doctor, and had received the advice to grind a small cast-iron pot into

bits, and to take a spoonful of the mixture every three hours, as his constitution evidently lacked iron. He had faithfully carried out the directions for two weeks, until the pain became unbearable.—*N.C. D-N*, April 12, 1928.

NEW MEMBERS PROPOSED

Yoh, I.T.	M.D. West China Univ.	U.C.C.	Kiating, Sze.
	Proposers:—Dr. S.H. Liljestrand, Dr. E.C. Wilford.		
Mussig, Richard	M. D. Heidelberg	Basel Mission	Kaying, Tung.
	Proposers:—Dr. James L. Maxwell, Dr. J. C. McCracken.		

NEW MEMBERS ELECTED

Dr. S.J. Sing	C.M.S.	Pakhoi
Dr. L.M. Disosway	A.C.M.	Shanghai
Dr. L. Kao	S.P.G.	Peking
Dr. W. Hollister	P.S.	Mokpo, Korea
Dr. W.R. Soutter	C.M.M.I.	Chao-Yang-Hsien, Man.
Dr. Y.P. Chan.	Ind.	Canton
Dr. W.L. Wong		Hackett Med. Coll. Canton