A Study of 126 Post-operative Deaths at the University Hospital, Tsinan, Shantung.

PHILIP B. PRICE, M.D., Tsinan, Shantung

A well-known surgeon once remarked that experience is making mistakes once, and remembering them. Another has said that to admit that one was wrong is but another way of saying that one is wiser today than he was yesterday. It is both wholesome and stimulating to look back occasionally over the work we have done, courageously and critically, to see where we have failed; for every surgical death is a failure—although the blame cannot always be laid to the surgeon.

This is a study of all the histories that can be found of patients, who have died following operation at this hospital between March 1, 1927 and November 1, 1930.* The first half of these records are relatively poor; they cover periods of local warfare, evacuations, and greater or less shortage of staff. The latter half are excellent and detailed.

INCIDENCE

These 126 deaths represent 2.4% of the 5295 cases admitted to the hospital during this period, or 6% of the 2090 surgical cases operated upon. Only 17% of these 126 cases were females, although 30% of our beds have been occupied by women. This is due in part, at least, to the large number of young men, soldiers and civilians, who had gunshot wounds.

The age incidence is shown in Table 1.

*3½ years. The Hospital was closed Jan. and Feb. 1930 as the result of a strike.
The China Medical Journal

Table 1. Age Incidence.

The upper line shows the age incidence of the 2096 operative cases, the lower line the age incidence of the 126 cases that died, and the broken line the mortality rate in each 5-year period.

The second wave, i.e. the 13 cases between the ages of 56 and 65, are worth study. (See Table 2.)

It will be noted that only 3 of the 13 had diseases characteristic of old age. Two only were seriously ill at the time of operation. Excepting one, the remaining did not have operations in themselves particularly dangerous. At least 4 were
<table>
<thead>
<tr>
<th>Hist. No.</th>
<th>Age</th>
<th>Sex</th>
<th>Diagnosis</th>
<th>Cond. before operation</th>
<th>Operation</th>
<th>Length of operation (min.)</th>
<th>Anesthetic</th>
<th>Probable cause of death</th>
<th>Days Op. till death</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 3156</td>
<td>58</td>
<td>M</td>
<td>Cellulitis, arm</td>
<td>Poor</td>
<td>Incisions</td>
<td>?</td>
<td>Ether</td>
<td>Sepsis</td>
<td>7</td>
</tr>
<tr>
<td>F 3338</td>
<td>61</td>
<td>M</td>
<td>Simple ing. hernia</td>
<td>Good</td>
<td>Herniorrhaphy</td>
<td>?</td>
<td>?</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>F 3451</td>
<td>65</td>
<td>M</td>
<td>Strang. inguinal hernia, 1 day</td>
<td>Good</td>
<td>Resection, intes. herniorrhaphy</td>
<td>?</td>
<td>?</td>
<td>Shock</td>
<td>4</td>
</tr>
<tr>
<td>F 3985</td>
<td>57</td>
<td>F</td>
<td>Colloid goiter, pressure dyspnea</td>
<td>Fair</td>
<td>Tracheotomy</td>
<td>?</td>
<td>Local</td>
<td>Pneumonia</td>
<td>19</td>
</tr>
<tr>
<td>F 4556</td>
<td>58</td>
<td>M</td>
<td>Shell wounds, elbow</td>
<td>1</td>
<td>Good</td>
<td>1</td>
<td>Incisions</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>F 4680</td>
<td>60</td>
<td>M</td>
<td>Diabetes, carbuncle of neck</td>
<td>Moribund</td>
<td>Incision</td>
<td>?</td>
<td>None</td>
<td>Sepsis, shock?</td>
<td>4</td>
</tr>
<tr>
<td>F 4857</td>
<td>56</td>
<td>F</td>
<td>Gunshot wound, mesentery</td>
<td>Fair</td>
<td>Exploratory lapar., ligation vessels</td>
<td>45</td>
<td>Ether</td>
<td>Anemia, shock</td>
<td>1</td>
</tr>
<tr>
<td>F 4902</td>
<td>66</td>
<td>M</td>
<td>Infected toe, tetanus</td>
<td>Very poor</td>
<td>Amputation of toe</td>
<td>?</td>
<td>?</td>
<td>Tetanus</td>
<td>1</td>
</tr>
<tr>
<td>F 5534</td>
<td>69</td>
<td>M</td>
<td>Gunshot fracture femur, 5 days</td>
<td>Fair</td>
<td>Amputation, thigh</td>
<td>?</td>
<td>Spinal</td>
<td>Sepsis</td>
<td>3</td>
</tr>
<tr>
<td>F 6157</td>
<td>68</td>
<td>F</td>
<td>Art. sclerotic gangrene of foot</td>
<td>Good</td>
<td>Bilateral amputation, legs.</td>
<td>60</td>
<td>Spinal</td>
<td>Shock</td>
<td>1</td>
</tr>
<tr>
<td>F 6376</td>
<td>57</td>
<td>F</td>
<td>Carcinoma breast</td>
<td>Good</td>
<td>Radical amputation</td>
<td>100</td>
<td>Ether</td>
<td>Pneumonia</td>
<td>19</td>
</tr>
<tr>
<td>F 6420</td>
<td>60</td>
<td>M</td>
<td>Carcinoma of stomach</td>
<td>Good</td>
<td>Gastroenterostomy</td>
<td>127</td>
<td>Local</td>
<td>Shock</td>
<td>1</td>
</tr>
<tr>
<td>F 7344</td>
<td>58</td>
<td>M</td>
<td>Strang. inguinal hernia, 2 days</td>
<td>1</td>
<td>Good</td>
<td>1</td>
<td>Marsupialization</td>
<td>110</td>
<td>Spinal</td>
</tr>
</tbody>
</table>
operations of election. In 9 of these cases operation not only did no good, but actually hastened death. Sepsis or shock carried off the majority promptly. Careful study of the clinical records suggests that despite numerous other factors, and the uncertainties of so short a series, old age was a definite factor in the outcome. An interesting corroboration of this conclusion is found in the operating room day-book. Since March 1, 1927, 73 patients between 56 and 65 years of age have been operated upon; 30 with major, and 43 with minor procedures (chiefly cataracts). The postoperative mortality, therefore, for patients of this age is 16.4%, or for those submitting to major operations, 26.7% (8 of 30), as compared with a 6% mortality for patients of all ages.

CLINICAL HISTORY

Nothing of value was learned from a study of the Histories of the Present Illness, or the Past or Family Histories. 62% of the cases had acute illnesses, and 38% chronic.

PHYSICAL EXAMINATION

Heart and Blood Vessels: The cardio-vascular system was reported normal 83 times, abnormal 10 times, and in 33 cases (chiefly emergencies) there is no record of examination. We turn to the records of the 10 abnormal cases with special interest; routine physical examinations are made for the express purpose of picking up just such abnormalities; and every surgeon not infrequently has forced upon him the necessity of deciding whether or not a certain cardio-vascular abnormality contraindicates a particular operation. But the results of this study are disappointingly meagre.

Five cases were reported to have heart murmurs heard best at the apex, and transmitted to the axilla. Two of these occurred in patients practically exsanguinated, however, and were probably mere hemic murmurs. One case, which the interne diagnosed mitral insufficiency (but on insufficient recorded evidence, according to Dr. F. H. Mosse, who has kindly reviewed these 5 case-records with me) underwent within 4 days 3 operations under general anesthesia, and died 6 days after the last of septicemia. The fourth case, a probably organic lesion of the mitral value, withstood a rib-resection thoracotomy for
chronic empyema, and died 34 days later of progressive cardiac failure. A fifth patient, who had a definite mitral stenosis, stood very well a gastroenterostomy done under regional anesthesia, dying later of his disease.

One patient, 50 years old, reported to have hard peripheral arteries (B.P. 120/76) died suddenly and quite unexpectedly 3 days after gastroenterostomy done under local anesthesia. Partial autopsy showed generalized arteriosclerosis of all the abdominal and thoracic organs; cause of death not definitely found. Another patient, 63 years old, with arterosclerotic gangrene of both feet, died following bilateral amputation, of shock and (probably) over anesthesia.

The blood pressure is recorded in only 19 of the 126 cases. (Shame!) In 3 of these, all long-standing debilitating diseases, it was abnormally low, i.e. systolic below 90. These patients died, one of shock following operation, and the others of sepsis aroused by operation. There were no cases of hypertension.

Circulatory failure contributed to death in 3 of the 84 cases whose hearts were found to be normal on routine physical examination. A severe toxemia plus over-digitalization accounts for one, and extensive spreading pulmonary infections for the other two.

Lungs: Routine examination on admission showed the lungs to be normal (often reported merely “O.K.”) in 72 of the 126 cases. Yet of these 72, two died of pneumonia, bronchopneumonia contributed to the death of a third, and four others developed terminal pneumonia. Of these 7, who developed pneumonia, 4 had been given ether anesthesia.

Abnormalities in the lungs were reported in 25 admission examinations. Of these patients, 9 died of the pulmonary disease for which they came to the hospital (chiefly gunshot wounds of the chest), 11 died of other causes, and 3 of pneumonia. Two of these last 3 were given general anesthesia despite the abnormal findings in the lungs.

Or, to look at it from another angle, 10 of our series of 126 died of, or with the complication of, pneumonia. Six of these are reported to have had normal lungs before operation, and 4 pathognomonic signs.
None of the 31 cases, whose lungs were not examined before operation, developed pulmonary complications. (Some might have, of course, had they lived longer.)

LABORATORY EXAMINATIONS

Red Blood Cells: In 72 cases the red blood cells were counted before operation, with the results shown in Table 3. The highest count was 5,400,000; the lowest 1,600,000.

TABLE 3. Red Blood Cells

<table>
<thead>
<tr>
<th>Millions</th>
<th>6.5</th>
<th>5-4</th>
<th>4-3</th>
<th>3-2</th>
<th>2-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>11</td>
<td></td>
<td>17</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

It is worth while to note details of those below 3 million. (See Table 4.)

The course of the last case was uninfluenced by operation. In the fifth, inevitable death was postponed by operation. But in the other 4, operation definitely hastened death. Only one of the total 9 operations (ligation of the subclavian) can be
### Table 4.

**Details of cases with low red blood cell counts.**

<table>
<thead>
<tr>
<th>Hist. No.</th>
<th>Red Blood Cells</th>
<th>Diagnosis</th>
<th>Operation</th>
<th>Transfusion</th>
<th>Probable Cause of death</th>
<th>Days op till death</th>
</tr>
</thead>
<tbody>
<tr>
<td>F4582</td>
<td>1,600,000</td>
<td>Ruptured aneurysm, femoral artery.</td>
<td>Ligation of common iliac.</td>
<td>0</td>
<td>Shock, loss of blood.</td>
<td>0</td>
</tr>
</tbody>
</table>
| F5082     | 2,800,000       | Old gunshot wound, femur, chronic osteomyelitis; nephritis | 1. Incision.  
2. Incision.  
3. Incision.  
4. Incision. | 0 | Sepsis. | 21 |
| F5887     | 1,700,000       | Gunshot wound, shoulder, secondary hemorrhage. | Ligation of subclavian artery. | 0 | Shock. | 0 |
| F6155     | 1,600,000       | Cellulitis, leg; chronic nephritis. | 1. Incision and drainage.  
2. Incision and drainage. | 0 | Sepsis, nephritis. | 18 |
| F6160     | 2,100,000       | Gunshot wound, leg; gas bacillus infection; tetanus. | Amputation, midthigh. | 0 | Tetanus. | 3 |
| F7314     | 2,170,000       | Multiple abscesses, lung; acute nephritis. | Thoracotomy. | 0 | The disease. | 3 |
considered formidable. All of the patients died of shock or sepsis. Would transfusion have saved any of them?

_Hemoglobin:_ Table 5 shows the hemoglobin values before operation in 53 cases.

**Table 5. Hemoglobin**

<table>
<thead>
<tr>
<th>%</th>
<th>100+</th>
<th>90+</th>
<th>80+</th>
<th>70+</th>
<th>60+</th>
<th>50+</th>
<th>40+</th>
<th>30+</th>
<th>20+</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td></td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Some details of those with hemoglobin below 60% are shown in Table 6. (4 of these were also listed in Table 4.)

The anemia in these 11 cases was due either to recent loss of blood, or to long-standing infections. Death was probably inevitable in 8. All were poor surgical risks. Operation was responsible for death in only 2. Death was due to infection in
**Table 6.**

*Details of cases with low hemoglobin values.*

<table>
<thead>
<tr>
<th>Hist. No.</th>
<th>Hb. %</th>
<th>Diagnosis</th>
<th>Operation</th>
<th>Transfusion</th>
<th>Probable cause of death</th>
<th>Days post op. till death</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 4287</td>
<td>45</td>
<td>Gunshot wounds, chest and extremities</td>
<td>Incision and drainage, wounds of leg</td>
<td>0</td>
<td>Tetanus, pneumonia</td>
<td>3</td>
</tr>
<tr>
<td>F 4476</td>
<td>48</td>
<td>Tuberculous abscesses, neck and back</td>
<td>Incision and drainage, resection of rib</td>
<td>0</td>
<td>Meningitis (type?)</td>
<td>29</td>
</tr>
<tr>
<td>F 50:2</td>
<td>50</td>
<td>Old gunshot wound, femur, chronic osteomyelitis; nephritis</td>
<td>1. Incision, drainage</td>
<td>0</td>
<td>Sepsis</td>
<td>21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. &quot; &quot;</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. &quot; &quot;</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. &quot; &quot;</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 5710</td>
<td>58</td>
<td>Gunshot wound, chest, 7 days; empyema; syphilis</td>
<td>1. Thoracotomy without rib resection</td>
<td>0</td>
<td>Pneumonia</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Thoracotomy with rib resection</td>
<td>0</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>F 5887</td>
<td>21</td>
<td>Gunshot wound, shoulder, secondary hemorrhage</td>
<td>Ligation of subclavian artery</td>
<td>0</td>
<td>Shock</td>
<td></td>
</tr>
<tr>
<td>F 6155</td>
<td>82</td>
<td>Cellulitis, leg; chronic nephritis</td>
<td>1. Incision, drainage</td>
<td>0</td>
<td>Sepsis, nephritis</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>55</td>
<td></td>
<td>2. &quot; &quot;</td>
<td>0</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>F 6160</td>
<td>85</td>
<td>Gunshot wound, leg; gas bacillus infection; tetanus</td>
<td>Ligation of subclavian artery</td>
<td>0</td>
<td>tetanus</td>
<td>8</td>
</tr>
<tr>
<td>F 7344</td>
<td>1</td>
<td>Strangulated inguinal hernia</td>
<td>1. Marsupialization</td>
<td>0</td>
<td>Peritonitis</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>82</td>
<td></td>
<td>2. Enterostomy</td>
<td>0</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td></td>
<td>Ligation femoral vein</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F 7514</td>
<td>38</td>
<td>Multiple abscesses, lung</td>
<td>Thoracotomy</td>
<td>0</td>
<td>Sepsis</td>
<td>3</td>
</tr>
<tr>
<td>F 7643</td>
<td>30</td>
<td>Cellulitis, gas gangrene, leg</td>
<td>Amputation, thigh</td>
<td>0</td>
<td>Anemia, sepsis</td>
<td>1</td>
</tr>
<tr>
<td>F 7954</td>
<td>54</td>
<td>Gunshot wound, femoral vein</td>
<td>Ligation femoral vein</td>
<td>0</td>
<td>Septicemia</td>
<td>6</td>
</tr>
</tbody>
</table>
all but one case. As one reads the post-operative notes, he is impressed with the seeming lack of resistance to infection shown by these patients.

White Blood Cells: Leukocytosis was studied with the following hypothesis in mind: The percentage of polymorphonuclear neutrophils is a more or less accurate index of the amount of toxin being absorbed, irrespective of the patient's powers of resistance; the total number of white blood cells, however, is the result of both factors. If these are true, then it might be possible to gauge the potential resistance in a given septic case by comparing the two figures.

Forty-four septic cases, whose leukocytes were carefully examined before operation are shown in Table 7. (This scale of relative values for the total count and the polymorphonuclear neutrophil percentage was arrived at by examination of a large number of septic patients of all sorts, including many not in this series, in whom the resistance of the patient to infection seemed to be good.) The solid lines represent a favorable ratio, i.e. good resistance to infection however severe, and the broken lines an unfavorable ratio, i.e. low resistance to infection or absorbed toxins.

Table 8 gives details of the 4 with long broken lines, and a fifth high on the scale, but having nevertheless a favorable ratio.

All but one of these patients were relatively young. Of the first 4, (those with unfavorable ratios), 2 were acutely ill, and 2 had long-standing infections. None of them showed much stamina; the tissues of the 2 chronic ones showed little or no tendency to heal. It might be thought that anemia would be an important factor, in that hydremia might reduce the total count, without affecting the percentage of the white cells. This is not borne out, however, by study of these cases, or of other anemic cases in our series. It will be noted that 3 of the first 4 cases had streptococcus infections, and one of them tetanus as well. But that these organisms cannot in themselves account for the leukopenia (as we had suspected) is shown by several
Table 7.

Ratio of total leukocyte count to polymorphonuclear neutrophil percentage

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Neutrophil Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.01</td>
<td>0.02</td>
</tr>
<tr>
<td>0.03</td>
<td>0.04</td>
</tr>
<tr>
<td>0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>0.07</td>
<td>0.08</td>
</tr>
<tr>
<td>0.09</td>
<td>0.10</td>
</tr>
</tbody>
</table>

But Unfortunately the Patient Died
Table 8.
Details of cases showing unfavorable w. b. c. : p. m. n. ratio.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>F4105</td>
<td>19</td>
<td>Chronic osteomyelitis, femur.</td>
<td>3,600,000</td>
<td></td>
<td>Streptococcus</td>
<td>Incision, sequestrectomy, drainage.</td>
<td>Sepsis</td>
<td>13</td>
</tr>
<tr>
<td>F4106</td>
<td>24</td>
<td>Cellulitis, arm; tetanus.</td>
<td>5,400,000</td>
<td></td>
<td>Streptococcus</td>
<td>Amputation, arm.</td>
<td>Sepsis, tetanus</td>
<td>4</td>
</tr>
<tr>
<td>1'4566</td>
<td>58</td>
<td>Shell wound, elbow.</td>
<td>4,500,000</td>
<td>65%</td>
<td>?</td>
<td>1. Incision, drainage. 2. Incision, drainage.</td>
<td>Sepsis</td>
<td>11</td>
</tr>
<tr>
<td>F6155</td>
<td>34</td>
<td>Cellulitis; multiple abscesses, leg; chronic nephritis.</td>
<td>1,000,000</td>
<td>34%</td>
<td>Streptococcus</td>
<td>1. Incision, of abscesses. 2. Incision, of cellulitis.</td>
<td>Sepsis, uremia.</td>
<td>18</td>
</tr>
<tr>
<td>F6042</td>
<td>22</td>
<td>The. intestine; perforation; gen. peritonitis.</td>
<td>4,400,000</td>
<td>72%</td>
<td>B. coli.</td>
<td>Exploration; perforation not found; drainage.</td>
<td>General peritonitis</td>
<td>21</td>
</tr>
</tbody>
</table>
other similar infections in our series, whose blood had a favorable w.b.c.: p.m.n. ratio.

The fifth case is given here as an interesting contrast to the first 4. This man had a tremendous infection, general peritonitis from intestinal perforation, which could not be found at operation, but which was found later at autopsy. The high p.m.n. percentage indicates the severity of the toxemia, but the very high leukocytosis suggests great resistance, and in fact it was only after 21 days of stubborn fighting that he finally succumbed.

However, the number of cases reported here is so small, and so many factors have contributed to the downward progress and death in each one, that it would be unwise to draw any conclusions in regard to this hypothesis. Until we gather further evidence, we shall consider an unfavorable w.b.c.: p.m.n. ratio merely a possible danger signal.

Urine: Examination of the heart and lungs, and urinalysis, are generally said to be the minimum standard preoperative work-up for a patient, however urgent the operation. It is of interest therefore to note whether, in this series, failure to examine the urine before operation, or operation done despite abnormal findings in the urine, were responsible for, or contributed to, any of the deaths, and whether the finding of normal urine on routine examination is a dependable indication that the patient has normal and competent kidneys.

In this series of 126 cases, there is no recorded pre-operative examination of urine in 46. But since all but 5 of these died within 3 days after operation, there is little chance to determine how serious such an omission is. So far as can be determined, none of the 5, who lived longer, showed urinary complications later.

*Since the writing of this article, the writer's attention has been directed to a paper by Menninger and Heim, who review briefly a fairly large literature on the subject, analyze the leukocytosis in over 2000 cases of appendicitis, and conclude that the total leukocyte count is a trustworthy indication of the patient's resistance, while the polymorphonuclear neutrophile percentage indicates the severity of the infection. This hypothesis was suggested first by Sondern in 1905, and applied clinically by Gibson in 1906.
In 63 cases the pre-operative urinalysis was reported normal. However, one of these showed albumin, r.b.c., w.b.c., and casts after operation, and his nephritis helped bring about his exodus. Another was found at autopsy to have a pyonephrosis on the left side.

17 cases were operated upon in spite of the finding of pathological urine.

Five of these were admitted to the hospital for diseases of the urinary tract, and so operation in the presence of abnormal urine was inevitable. Most of the others died promptly of shock, or sepsis of some sort. There remain only 2 (F6042 and F7344) who lived for any considerable time after operation. Neither of these died of renal disease; on the contrary the urine of both cleared up gradually following operation. Both had general anesthesia.

This portion of our study, therefore, is inconclusive.

Feces: Stools were examined in about half (62) of the cases. They were found normal in 37. Ascaris ova were reported in 21, ascaris and hookworm in 2, trichiuriis in 1, and pinworm in 1. That is, 37% of those examined had parasites in the intestines. This is about an average incidence. The average hemoglobin of patients without parasites was 68%; of those with parasites 71%. There is therefore no demonstrable relationship in the average case between the presence of intestinal parasites and death.

In one remarkable case, however, ascariasis undoubtedly was at least a contributing cause of death. F4504, a female child of 7, had a rupture of the intestine (cause?), and at operation 26 adult worms were removed from the peritoneal cavity. The patient died the day after operation.

Wassermann Reaction: 53 of our series had Wassermann tests, of which 42 were reported negative, 3 ++, 5 ±, and 3 +++. Study of the 8 cases with definitely positive reactions shows that in at least 3 lues may have been a contributing cause of death. All 3 were long-standing pyogenic infections, which should have done well, but whose tissues showed no resistance to infection, and who died finally after gradually growing worse for weeks. It is interesting that none
of the 3 had an unfavorable p.m.n.: w.b.c. ratio, or were anemic. Would it not have been wise to treat the syphilis in these cases before attempting operation?

*Predominating Organism in Wound:* We have been doing routine wound cultures for only about a year. Nevertheless, a few of the earlier records have descriptions of wounds so characteristic as to leave little doubt as to the type of bacteria, and so have been included in the following analysis.

In 36 cases, whose wound-infections were the chief cause of death, streptococci predominated in 26, staphylococci in 4, the gas bacillus in 2, colon bacilli in 2, Friedlander's bacillus in 1, and tubercle bacilli in 1. This is a striking commentary upon the mortality of streptococcic infections!

**DIAGNOSES**

Table 9 gives a classification of the diagnoses at time of operation. It is a challenging list. Any surgeon would like a chance at such a group of patients, feeling that he could save at least some of them. And he probably could!

Almost every department of general and special surgery is represented, and none predominantly. These 126 deaths are not due chiefly to the seriousness of the diseases. We must look elsewhere for the causes.

**OPERATIONS**

*Classification:* The 154 operations performed upon these 126 patients do not lend themselves to simple classification, and to include the entire list in this report would not be worth the space. Reference to the preceding table of diagnoses will give the reader a fairly accurate idea of the procedures that were required.

Three of the operations were clearly minor procedures, i.e. operations upon skin and subcutaneous tissues, or excision of fistula in ano. 89 of the operations were clearly major procedures, i.e. amputation of arms or legs, opening of abdominal, thoracic, or cranial cavities, exploration of large joints, herniorrhaphies, thyroidectomies, radical removal of breast, etc. But 56 operations fall into a middle class, such as large incisions
### Table 9. Classification of Admission Diagnoses

<table>
<thead>
<tr>
<th>Classification of Admissions Diagnoses</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recent injuries and acute local infections of extremities</td>
<td>30</td>
</tr>
<tr>
<td>2. Chronic diseases of bones and joints (Chronic osteomyelitis, 8; fracture, 1; old dislocation of hip, 1; tuberculosis of knee, 2)</td>
<td>12</td>
</tr>
<tr>
<td>3. Blood vessel lesions (Laceration or gunshot wound, 4; aneurysm, 2.)</td>
<td>6</td>
</tr>
<tr>
<td>4. Cranial injuries (Gunshot or shell wound, 7; mule kick, 1)</td>
<td>8</td>
</tr>
<tr>
<td>5. Diseases of spine (Gunshot wound, 1; Tuberculosis, 1)</td>
<td>2</td>
</tr>
<tr>
<td>6. Goiter (non-toxic)</td>
<td>3</td>
</tr>
<tr>
<td>7. Breast carcinoma</td>
<td>1</td>
</tr>
<tr>
<td>8. Diseases of chest (Gunshot wound of lung, 6; multiple abscesses of lung, 1; chronic empyema, 4; carcinoma of esophagus, 1)</td>
<td>12</td>
</tr>
<tr>
<td>9. Diseases of abdominal cavity (Carcinoma of stomach, 3; simple inguinal hernia, 2; strangulated inguinal hernia, 3; strangulated internal hernia, 1; rupture of intestine, 1; gunshot wound of abdomen, 14; appendicitis with peritonitis, 1; abscess of liver, 1; carcinoma of pancreas, 1; tuberculosis, 1)</td>
<td>28</td>
</tr>
<tr>
<td>10. Diseases of rectum and anus (Sarcoma of rectum, 1; fistula in ano, 1)</td>
<td>2</td>
</tr>
<tr>
<td>11. Genito-urinary diseases (Tuberculosis of kidney, 1; bladder stone, 2; urethral stricture with fistulae, 2; extrophy of bladder, 1; rupture of bladder, 1)</td>
<td>7</td>
</tr>
<tr>
<td>12. Gynaecological diseases (Fibroma of uterus, 1; carcinoma of uterus, 1; sarcoma of pregnant uterus, 1)</td>
<td>3</td>
</tr>
<tr>
<td>13. Miscellaneous (Gangrene of feet, 3; epithelioma of scalp, 1; sarcoma of arm, 1; carbuncle in diabetic, 1; tetanus and suppurative parotitis, 1; acute mastoiditis, 1; chronic tonsillitis, 1; cirrhosis of liver, 1)</td>
<td>10</td>
</tr>
<tr>
<td>14. No diagnosis</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>126</td>
</tr>
</tbody>
</table>

into deep tissues, removal of bone fragments after shattering fractures, plastic operations, tonsillectomy by the dissection method, amputation of portions of hands and feet, etc. It used to be that all operations done under general anesthesia were considered major, while those that could be done with local anesthesia were called minor. That criterion no longer holds true. In the case of 6 operations there is no record to show what was done.
Thirty-three of the operations were "clean cases," 95 in infected fields, 22 (chiefly amputations) were operations through grossly normal tissues proximal to infected regions. There is no record of 6 of the operations.

Two groups, amputations of extremities and gunshot wounds of the abdomen, invite comment.

Amputations: In this series of 126, 22 died following amputation of arm or leg. In every case the operator attempted to amputate through clean tissues. 12 patients died of shock following operation, 9 patients, who had amputations through apparently clean tissues, died of virulent infection of the stump. The remaining case had an extensive gas bacillus infection in the thigh muscles, unsuspected before operation.

Several lessons may be learned from these unfortunate cases. One is that amputation is not a minor surgical procedure, nor one to be done thoughtlessly. It is startling to discover that at this hospital during the past 3½ years amputation of arms or legs has had a mortality of 24%. Amputation should not be done at all unless it is absolutely necessary. As has been well said it is an admission of defeat. Very often when it is necessary, the patient is in poor condition, not infrequently almost pulseless from shock and loss of blood. These cases dying in shock following operation have impressed upon us the truth that amputation is simply more than many of these

These suggestions have been carried out with considerable success on a number of recent cases. These will be published in detail when a sufficient number have been collected. Our procedure is: 1) carefully to clean the site of operation, 2) to wrap the infected distal portion of the arm or leg in many layers of sterile towels and a sterile bandage, handling it as little and as gently as possible, 3) to raise it toward a vertical position for a minute or more, 4) to place a very tight tourniquet below the site of amputation, 5) to place a second tourniquet above the line of incision, 6) to lower the limb and finish draping, 7) to amputate between the tourniquets through the almost bloodless tissues, and remove the amputated limb still wrapped, 8) to look for and ligature the larger vessels, 9) to place hot packs against the stump for 3 or 4 minutes in order to coagulate the blood in the smallest vessels, 10) to remove the upper tourniquet and tie off any bleeding points, and 11) to close without tension, with or without drainage. By this method, we have been able to amputate through the thigh, with the loss of not more than 5 or 10 c.c. of blood, and to get primary union despite virulent infection below the amputation.
patients can stand. An immediate bloody operation is more dangerous for the patient than mangled or gangrenous tissues. We should treat shock first, get in all the fluids we can, warm the patient, try to secure blood for transfusion, wait for the blood pressure to come up, and the pulse to steady down; and at operation speed should be a secondary consideration. Gentleness and meticulous hemostasis more than compensate for the extra quarter or half hour they require. By raising the diseased leg or arm to a vertical position before applying the tourniquet, a considerable amount of blood can be saved for the patient. And to prevent infection from the diseased area, it might be well to place a tourniquet below as well as above the site of amputation, so as to prevent infected blood, or lymph, or tissue-space fluid from being squeezed into the field of operation by the necessary handling of the septic extremity.

Gunshot Wounds of the Abdomen: The tragic record of cases of gunshot wound of the abdomen treated at this hospital during the past 3½ years is shown in Table 10. To the 14 cases already in our series have been added the only 3 that recovered. Thus it will be seen that our mortality for all cases is 82%, and for those whose intestines or stomach were perforated, 85%. The only 2 of this latter sort that recovered were in good condition before operation, did not have general peritonitis, and had small holes in the visceras that could be closed with purse-string sutures.

It is difficult to assign satisfactory reasons for this high percentage of failures. There were five different operators. Most of the patients came with surprising promptness, and were operated upon as soon as possible. Although some of them were in poor condition, and operation was thought to offer a slight but the only chance of recovery, others in retrospect do not appear to have been hopeless. It is interesting that the 2 patients that died on the table had both been given spinal anesthesia. No doubt the relatively low muzzle-velocity of the guns, the close range, the soft bullets used, and jostling transportation were real factors in the outcome of most of these cases. The only bullet wound of the intestine that recovered was produced by a Japanese military rifle. One cannot but wonder what would
have been the result of expectant treatment in some of these cases.

Anesthesia: Ether by inhalation was given for 59 of these operations. 3 of the patients died of pneumonia, 8, 9, and 19 days after operation, and 2 others died with terminal pneumonia.

Ether and oil per rectum was given in one case. The patient had a choking adenomatous goiter. He died a few hours after operation due to edema and collapse of the trachea. Profound anesthesia was doubtless a factor in the outcome.

Chloroform was used 4 times. In 3 cases it was given because the patient had pathognomonic signs in the lungs. All 3 died of pneumonia.

“General anesthesia” (kind not specified) was given 10 times. One of these, a very septic case, developed pneumonia, and died 11 days after operation.

Ethyl chloride narcosis was administered for 35 minutes to a patient with active bilateral pulmonary tuberculosis. Up to the time of death 5 days later, there was no evidence that the anesthetic had done any harm.

Novocaine was used exclusively in 20 of the operations: in 19 without ill effect; in one case, simple herniorrhaphy, the novocaine solution was suspected of having caused a wide-spread streptococcus hemolyticus infection, which proved fatal.

Novocaine supplemented with ether was used in 4 long, difficult cases. 3 of them died of shock, and the fourth of infection, probably spread by local infiltration in tissues infected with streptococcus organisms.

Spinal anesthesia was employed in 16 operations, being supplemented with ether in 5. Two patients with gunshot wounds of the stomach or intestines, died on the table. Another, with rupture of the bladder, died shortly after operation. One wonders whether in these 3 cases, the fall in blood pressure that accompanies spinal anesthesia might not have lessened the chances of success. General peritonitis is said to be a contraindication to spinal anesthesia. In the remaining 13 cases spinal anesthesia was without serious untoward effect.*

*Spinal anesthesia has been given 354 times here during the period under study.
TABLE

Study of cases with gunshot wounds of abdomen

<table>
<thead>
<tr>
<th>Hist. No.</th>
<th>Age</th>
<th>Part of Abd.</th>
<th>Weapon</th>
<th>No. hrs. injury to op.</th>
<th>Cond. before op.</th>
<th>Pathological Condition found</th>
</tr>
</thead>
<tbody>
<tr>
<td>F 3995</td>
<td>42</td>
<td>R. L. Q.</td>
<td>Pistol; self-inflicted</td>
<td>18</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>F 4391</td>
<td>28</td>
<td>L. U. Q.</td>
<td>&quot;Gun&quot;</td>
<td>8</td>
<td>Fair</td>
<td>3 holes in small intestine</td>
</tr>
<tr>
<td>F 4847</td>
<td>70</td>
<td>R. L. Q.</td>
<td>&quot;Gun&quot;</td>
<td>6</td>
<td>Good</td>
<td>4 holes; no feces; bleeding mesentery</td>
</tr>
<tr>
<td>F 4857</td>
<td>56</td>
<td>Left lumbar to L. L. Q.</td>
<td>&quot;Gun&quot;</td>
<td>4</td>
<td>?</td>
<td>Lacerated and bleeding mesentery</td>
</tr>
<tr>
<td>F 5163</td>
<td>19</td>
<td>Hypogastrium</td>
<td>&quot;Gun&quot;</td>
<td>11</td>
<td>Poor</td>
<td>Retroperitoneal hematoma</td>
</tr>
<tr>
<td>F 5642</td>
<td>27</td>
<td>R. L. Q.</td>
<td>&quot;Gun&quot;</td>
<td>9</td>
<td>Very poor</td>
<td>Intestines terribly lacerated; blood and feces</td>
</tr>
<tr>
<td>F 6092</td>
<td>16</td>
<td>R. L. Q.</td>
<td>Rifle</td>
<td>14</td>
<td>Fair</td>
<td>2 holes in small intestines; worms protruding; feces</td>
</tr>
<tr>
<td>F 6550</td>
<td>20</td>
<td>R. L. Q.</td>
<td>Rifle; self-inflicted</td>
<td>6</td>
<td>Poor</td>
<td>Small intestine severed in 2 places; blood and feces</td>
</tr>
<tr>
<td>F 6554</td>
<td>20</td>
<td>R. U. Q. to left flank</td>
<td>&quot;Gun&quot;</td>
<td>6</td>
<td>Poor</td>
<td>Laceration of colon; severed spinal cord</td>
</tr>
<tr>
<td>F 6756</td>
<td>21</td>
<td>R. L. Q.</td>
<td>Rifle; self-inflicted</td>
<td>6</td>
<td>Poor</td>
<td>Multiple perforations, large and small intestines; blood and feces</td>
</tr>
<tr>
<td>F 7962</td>
<td>7</td>
<td>L. L. Q.</td>
<td>&quot;Gun&quot;</td>
<td>5</td>
<td>Good</td>
<td>2 holes, colon and small intestine</td>
</tr>
<tr>
<td>F 7993</td>
<td>40</td>
<td>Left hypochondrium</td>
<td>&quot;Gun&quot;</td>
<td>10</td>
<td>Very poor</td>
<td>2 holes in stomach, 3 in small intestine</td>
</tr>
<tr>
<td>F 7994</td>
<td>18</td>
<td>L. L. Q.</td>
<td>&quot;Gun&quot;</td>
<td>7</td>
<td>Very poor</td>
<td>7 or 8 holes; blood</td>
</tr>
<tr>
<td>F 8091</td>
<td>35</td>
<td>L. U. Q.</td>
<td>&quot;Gun&quot;</td>
<td>8</td>
<td>Good</td>
<td>Laceration, ant. stomach wall; no gen. peritonitis</td>
</tr>
<tr>
<td>F 4265</td>
<td>22</td>
<td>Umbilicus</td>
<td>&quot;Gun&quot;</td>
<td>30</td>
<td>Good</td>
<td>Intestines uninjured</td>
</tr>
<tr>
<td>F 4626</td>
<td>38</td>
<td>R. L. Q.</td>
<td>Japanese military rifle</td>
<td>5</td>
<td>Good</td>
<td>4 small round holes in small intestine</td>
</tr>
<tr>
<td>F 8186</td>
<td>10</td>
<td>Just below umbilicus</td>
<td>Bomb in hands</td>
<td>5</td>
<td>Good</td>
<td>2 minute holes in small intestine</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operation</th>
<th>Anesthetic</th>
<th>Length of op. in min.</th>
<th>Time, operation till death</th>
<th>Probable cause of death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploratory laparotomy</td>
<td>Ether</td>
<td>7</td>
<td>Few hrs.</td>
<td>?</td>
</tr>
<tr>
<td>Exploratory laparotomy; suture of holes; drainage</td>
<td>Ether</td>
<td>150</td>
<td>3 days</td>
<td>General peritonitis</td>
</tr>
<tr>
<td>Suture of holes; no drainage</td>
<td>Local</td>
<td>7</td>
<td>2 days</td>
<td>Unknown; no signs of peritonitis</td>
</tr>
<tr>
<td>Exploration; ligation of bleeding vessels</td>
<td>Ether</td>
<td>45</td>
<td>5 hrs.</td>
<td>Shock; anemia</td>
</tr>
<tr>
<td>Exploratory laparotomy; aspiration of hematoma</td>
<td>Ether</td>
<td>75</td>
<td>7 hrs.</td>
<td>Shock; anemia</td>
</tr>
<tr>
<td>Resection of 2 portions of intestines; anastomoses; suture of other holes</td>
<td>Ether</td>
<td>200</td>
<td>10 hrs.</td>
<td>Shock; general peritonitis</td>
</tr>
<tr>
<td>Resection of 1 portion of intestine; ends brought out</td>
<td>Ether</td>
<td>90</td>
<td>26 hrs.</td>
<td>General peritonitis; shock</td>
</tr>
<tr>
<td>Resection of 2 portions of intestine; anastomoses</td>
<td>Ether</td>
<td>104</td>
<td>1 hour</td>
<td>General peritonitis; anemia</td>
</tr>
<tr>
<td>Suture of intestine; no drainage</td>
<td>Local ether</td>
<td>60</td>
<td>12 hrs.</td>
<td>General peritonitis; anemia</td>
</tr>
<tr>
<td>Suture of intestines; drainage</td>
<td>Ether</td>
<td>70</td>
<td>12 hrs.</td>
<td>General peritonitis; anemia</td>
</tr>
<tr>
<td>Suture of intestines; drainage</td>
<td>Spinal</td>
<td>95</td>
<td>13 hrs.</td>
<td>Shock</td>
</tr>
<tr>
<td>Died just after abdomen was opened</td>
<td>Spinal</td>
<td>10</td>
<td>0</td>
<td>Shock</td>
</tr>
<tr>
<td>Died soon after abdomen was opened</td>
<td>Spinal</td>
<td>7</td>
<td>0</td>
<td>Shock</td>
</tr>
<tr>
<td>Suture of stomach; no drainage</td>
<td>Local</td>
<td>70</td>
<td>32 days</td>
<td>General peritonitis</td>
</tr>
<tr>
<td>Exploration; drainage</td>
<td>Local ether</td>
<td>7</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Purse-string suture of holes</td>
<td>Ether</td>
<td>75</td>
<td>Recovered</td>
<td></td>
</tr>
<tr>
<td>Purse-string suture of holes</td>
<td>Ether</td>
<td>60</td>
<td>Recovered</td>
<td></td>
</tr>
</tbody>
</table>
No anesthesia was given in 3 cases.

In 37 operations there is no record of the anesthesia used.

One is justified in drawing the conclusions that ether and chloroform are both unsafe for patients with diseased lungs, that the chief danger of novocaine lies in the introduction or spread of infection, and that spinal anesthesia has contraindications.

**Length of Operation:** A study of the duration of operations was made to determine if possible whether long operations are more dangerous than short. The results are shown in Table 11. The columns represent the total number of operations grouped according to length. The striped portions represent the number of patients who developed shock, or whose general condition appeared definitely worse, either during or immediately following operation. The only 2 cases in this series, whose complication of pneumonia could possibly be charged to the anesthetic are shown.

It will be noted that the development of shock is relatively only slightly more frequent in the longer operations.

These few cases indicate that if the patient is in good condition before operation, and if hemorrhage and trauma to soft tissues are avoided, a long operation either under local or general anesthesia is little if any more dangerous than a short one.

**POST-OPERATIVE COURSE**

**Reaction after Operation:** A rather laborious attempt was made to study the general reaction of patients following operation, by comparing the temperature and pulse records for 48 hours before and 48 hours after operation, and to study the characteristic temperature and pulse curves produced by hemorrhage, tissue trauma, the cutting into badly infected tissues, and the development of infection in clean wounds. But the number of cases with sufficiently careful records, before as well as after operation, proved to be too few, and our results too diverse, to report here. It is an interesting subject, probably worth repeating on a larger series of cases.

**Blood Stream Infections:** A final diagnosis of septicemia was made in 13 cases, but in only 3 of these records can reports
But Unfortunately the Patient Died
of positive blood cultures be found. These 3 proved-infections followed operations upon chronic osteomyelitis, carcinoma of the penis, and superficial shell wounds, respectively, all of which harbored streptococci. Bacteremia (or pyemia), also streptococcic, occurred at least twice following operations upon chronic osteomyelitis, and cellulitis.

Mercurochrome, gentian violet, and acriflavine, singly or in various combinations, were given intravenously in 2 of the proved cases of septicemia, in 6 of the suspected septicemias, and in 7 other cases with severe local infections. In these cases the effectiveness of this therapeutic measure cannot be demonstrated.

_Time until Death:_ Table 12 shows the number of days that elapsed between operation and death.

Three somewhat indefinite waves can be made out. The first and largest, i.e. deaths within 3 days after operation, are found, on reference to the records, to have been due to shock, or loss of blood, or both. Two were due to post-operative hemorrhage. The second wave, i.e. deaths 6 to 11 days after operation, are found to have been due, 31 of them to sepsis, 2 to pneumonia, 1 to secondary hemorrhage, 2 to the disease, and 4 to undetermined causes. The third wave, i.e. deaths 19 to 21 days after operation, are found to have been caused by a variety of conditions: sepsis, pneumonia, meningitis, cardiac failure, and the disease for which the patient was admitted. These findings suggest that there are 3 especially precarious periods during the post-operative course: first, shock or hemorrhage immediately following operation; second, severe sepsis during the second week; and third, various complications at about the end of the third week.

**CAUSES OF DEATH**

*Classification:* This phase of our study was rendered more difficult and less accurate by the necessity of depending on guesses based for the most part on clinical findings. There were only 6 complete, and 3 partial autopsies in the entire series.*

---

*This is in striking contrast to articles such as that by Neuhof and Aufses: _Cause of death after operation, a study based on 860 autopsies_, Ann. Surg., 91, 321, March 1930.
"But Unfortunately the Patient Died"

TABLE 12.

Showing Length of Post-operative course
Nevertheless, each case has been subjected to thoughtful scrutiny, and only those in which the causes of death are reasonably certain, are included in this part of our report.

Table 13 shows in graphic form some of the results of our study. The number of cases where the given pathological condition was the primary cause of death, is represented by the striped portion of the line, and those in which the pathological condition was a contributing cause, by the blank portion.

Thus it will be seen that only 49 of the patients (45%) died primarily of the diseases for which they came to this hospital, and in only 18 of the remainder can the disease be considered an important contributing factor in the outcome.

Twenty-three patients were brought to their death primarily by sepsis spread by the operation, i.e. they were cases with more or less severe localized infections, in whom after operation there occurred, either a rapid overwhelming extension of the septic process, or fatal blood stream infection. 17 out of the 23 had "simple incision and drainage for cellulitis." These findings give emphasis to a rule that should be impressed indelibly upon every interne: Incision and drainage of cellulitis, and perhaps of other streptococcus infections, is often useless, and always dangerous.

Infection introduced at operation was the primary cause of death in 6, and a contributing cause in 2 others. These are heart-breaking cases for the surgeon. They occur in every hospital, but not so frequently, perhaps, in better hospitals than this. The 6 cases in which infection was the primary cause of death were: open reduction of ancient dislocation of hip, in which there was a break in technic during operation; excision of rectum, streptococcus infection of wound, septicemia; ligation of femoral artery for aneurysm, gangrene of foot, fatal streptococcus infection; suprapubic lithotomy, general peritonitis, and perivesical abscess; enteroenterostomy, general peritonitis; repair of inguinal hernia, streptococcus infection of wound (probably from novocaine), septicemia.

Shock following operation was the primary cause of death in 21 cases, and a contributing cause in 22 others. Considering
"But Unfortunately the Patient Died"

Table 13.

Causes of Death, Primary and Contributing

| Disease of admission (including sepsis, local & general) |  |
| Sepsis—spread by operation |  |
| Sepsis—produced at operation |  |
| Post-operative shock |  |
| Over-anesthesia |  |
| Operative or post-operative hemorrhage |  |
| Post-operative pneumonia |  |
| Terminal pneumonia |  |
| Circulatory failure |  |
| Renal complications |  |
| Tetanus |  |
| Paralytic ileus |  |
| Serum reaction |  |
| Asthania |  |
| Collapse & edema of trachea |  |
the former group: 6 were in good condition before operation, and 15 in relatively poor condition; if operation had not been done, 12 would in all probability have died within a few days, 3 within a few weeks, 4 within a few months, and 2 would have lived indefinitely, for they did not have fatal diseases; sepsis played an important part in the outcome in only 4; one had local anesthesia, 2 spinal, 1 spinal and ether, 13 ether, and in 4 there is no record of anesthesia; 4 of them had operations less than an hour in length, 4 between 1 and 2 hours, 6 between 2 and 3 hours, and 7 had operations of unrecorded length; all the operations were major procedures; in at least 10 there was considerable loss of blood at operation. Critical retrospect of these 21 cases shows that in 8, at the least, more was attempted than was absolutely necessary (e.g. bilateral amputation for dry gangrene of the feet), and in 6 of the remainder it is possible that more thought before operation, better technic during operation, or different anesthesia, might have avoided fatal shock. It is brought out that the following are important factors producing post-operative shock: poor condition of the patient before operation, prolonged, deep general anesthesia, loss of large quantities of blood at operation, rough handling of soft tissues, and attempting too much.

Four patients in this series were admitted with tetanus; 1 developed the disease 2 days after admission. Considering the large number of gunshot and shell woulds treated at this hospital during the past 3½ years, and the fact that a very small proportion of them received prophylactic tetanus antitoxin, either before or after admission, this is a surprisingly small number.* The incubation period in these 5 cases ranged from 5 to 35 days. 2 of the cases received no antitoxin; 2 were given 6000 and 9000 units intraspinally with little or no benefit; but the one who developed the disease after admission received 18,000 units intraspinally, 2000 intravenously, and 8000 subcutaneously, and improved markedly, only to succumb to pneumonia.

*Altogether 17 patients with tetanus have been treated at this hospital since March 1, 1927, with a mortality of 53%, or, if we eliminate altogether the 2 cases dying of other causes, the mortality is 46%. All of the cases which were cured were given over 50,000 units of antitoxin, and all that died received less than 35,000.
**Emergencies**

Forty-nine of the 126 patients were operated upon immediately after admission, allowing no time for careful history, physical or laboratory examinations, or for rest, forcing of fluids, and other procedures that so improve the patient's general condition, and chances of recovery. 30 of these cases were definite emergencies, with every hour of delay lessening the patient's chances of recovery; 10 were borderline cases, where opinions might differ, or where the surgeon might have difficulty making up his mind; but 9 were definitely not emergencies. All but one of these 9 operations were done by one eager operator. In 1 case, a missed diagnosis, which should have been avoided, led to death. Only 2 of the 9 operations can be said to have improved the patient's chances of recovery; the other 7 almost certainly did more harm than good. Immediate operation, when it is not indicated, must be included, therefore, among our causes of death.

**UNNECESSARY DEATHS**

One of the most sobering questions that ever comes to a physician, and especially the surgeon, is, was the death of my patient necessary? could he have been saved by more skill, or care, or a different procedure? Often we must admit that he might have been, and sometimes (alas!) that he probably would have been. Nowhere else must one be more honest with oneself, and more charitable toward one's colleagues. It is, therefore, in a spirit of kindly criticism of results, not persons, and from a desire to share any benefit that may have come from our mistakes that we present the following.

In our series we find that 66 deaths undoubtedly were inevitable, but that 26 almost surely were avoidable. We have been unable to come to definite conclusions in the remaining cases. That means that one out of every 4 surgical deaths at this hospital during the last 3½ years has probably been unnecessary, and might have been avoided by more care, and thought, and better judgement.

Table 14 shows a classification of these cases according to the principal causes of death. The letters refer to the various operators (purposely placed in an unrecognizable order). Since important contributing factors are included, the totals exceed the actual number of patients.
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operations of election</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>4</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>Missed diagnosis</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Too much attempted</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Post-operative shock</td>
<td>1</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Infection produced at, or definitely spread by operation</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>9</td>
<td>1</td>
<td>21</td>
</tr>
<tr>
<td>Hemorrhage during or after operation</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Due to anesthesia</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Total fatal mistakes per operator</td>
<td>7</td>
<td>6</td>
<td>12</td>
<td>1</td>
<td>16</td>
<td>3</td>
<td>45</td>
</tr>
</tbody>
</table>

Thus it will be seen that 11 of these were operations of election. Two operators made the 4 fatal mistakes in diagnosis. C and E, at one time or another, fell into almost all these pitfalls. E would have had a better record had he not incised so many cellulitis lesions; as it is 11 of the 26, who died unnecessarily were his patients, the other 15 being distributed among the other 5 operators. Fatal infection is a pitfall that none of the operators were able to avoid entirely.

**DISCUSSION**

*Surgical Risk*: Each patient presents a unique problem, and it is the duty of the surgeon to estimate, by painstaking examination, and especially by exercising that indefinable faculty, called surgical judgement, how much each patient will be able to stand. If the patient is a *good surgical risk*, almost any operation may be attempted with impunity, provided the anesthetic is skillfully given, and good surgical technic is maintained throughout. But if the patient is a *poor surgical risk*, nothing more than is absolutely necessary should be attempted. To risk doing a little more, in hopes of an even better result, is a temptation that some operators find hard to resist. Every means should be used to raise the resistance of the poor
surgical risk before, during, and after the operation. He is a
wise surgeon, who can so gain the confidence and cooperation of
these patients as to delay operation (if the disease permit) long
enough to get them into the best possible shape before
attempting any major surgical procedure.

*Surgical Judgement*: An operator may have considerable
knowledge and dexterity, but he cannot deserve the name of
Surgeon unless he also possesses surgical judgement. It is a
quality hard to define, but easy to recognize when seen, for it
demonstrates itself. It is an "uncanny faculty" for knowing
what to do, and what not to do, when to operate, and just how
much the patient can stand. It cannot be acquired by listening
to lectures, or reading books, but only by first-hand observations,
frank analysis, large experience, and teachableness. Not only
in this series, where we have put our worst foot foremost, but
in any large series, lack of good surgical judgement has worked
much ill to confiding patients.

*Hurdles*: Unfortunately the great ambition of every sur-
gically-minded intern, and of many a younger operator, is to
perform as many major operations as possible. But with
ripening experience, by virtue of many distressing results of
his handiwork, he learns (alas, if he doesn’t!) that real success
in major surgery is very difficult to attain. The surgeon is like
the track athlete, who must clear a series of hurdles, or else he
loses the race.

(1) Correct diagnosis. This requires the habit of patient
study of each case, open-mindedness, and the exercise of all one’s
accumulated surgical wisdom. Although one of the less im-
portant and easiest of the hurdles, 2 of us tripped over it
irretrievably 4 times.

(2) Attempting more than the patient can stand. This
requires surgical judgement, and the patience and fortitude to
wait. During the period covered by our study, this hurdle was
stumbled over at least 35 times.

(3) Post-operative shock. This hurdle can usually be
cleared by watchfulness, care for details, gentleness, and skill.
And yet operators here fell over it, and so lost their patient,
21 times in 3½ years.
(4) Granted a correct diagnosis, and the successful completion of the operation without shock, the operator must be on the lookout for infection, which manifests itself usually the second, third, or fourth day. In at least 30 of the cases under review, the operator could get no further than this hurdle. Here is where an operator's training, and the good technic and cooperation of assistants, and operating room nurses, all count. Failure on the part of anyone may cause an unnecessary infection, or even a death.

(5) Post-operative hemorrhage is a worrisome hurdle, but fortunately one rarely fallen over. Meticulous hemostasis at operation will usually remove even the worry.

(6) For 2 or more weeks after operation, the surgeon must be on the lookout for complications of all sorts. At least 9 times in our series this hurdle spoiled all chances of a successful outcome. This is the only hurdle that cannot almost surely be passed in every case by sufficient care and effort; luck plays a role here.

(7) And then it is weeks, or sometimes months, or years, before the surgeon is assured of a cure. In these 126 cases, no operator even reached this hurdle.

(8) The final, and most difficult, of the hurdles is good physiological function of the part operated upon. It is the acid test of the surgeon's ability. But it cannot be accurately estimated without an efficient follow-up system. It is our opinion, that the casual operator greatly over-estimates the success of his operations.

Let not the young operator think, therefore, that when he ties his last suture, he has finished. He has only begun!

Par: The operator does not always do good. He sometimes does more harm than good. It not infrequently happens that Nature unimpeded could do better. We would propose a standard, therefore, by which the surgeon may measure himself. The operator who excises hemorrhoids, but produces an anal stricture; who incises a cellulitis, but produces a fatal septicemia; who clears up a chronic otitis, but gets ankylosis, or more or less paralysis, of the distal portion of the extremity; who amputates both legs at the same operation for ischemic
gangrene of the feet, but loses the patient from loss of blood and shock; who removes a bladder stone, but loses his patient from renal failure; who resects a tuberculous knee, but stimulates thereby a generalized miliary tuberculosis—this operator, however well-meaning, is in these cases doing more harm than good. To borrow an expression from golf, he is playing above par. Most doctors, who lance subcutaneous abscesses, take credit for the cure. They don't deserve it! We are only just learning that Nature can take care of subcutaneous abscesses better, and heal them more promptly, then the surgeon can. We play above par far more than we realize. It is a rare surgeon, unfortunately, who plays consistently below par.

Improvement at the University Hospital: It is only fair to all concerned to add that this study has shown marked and steady improvement in the surgical work done at this hospital during this period. A chart (not included here) has been prepared for the students and resident staff, showing by curves the great improvement in the clinical records, and the decline almost to the vanishing point of needless "emergency operations," and of unnecessary deaths.

SUMMARY AND CONCLUSIONS

The clinical records of 126 patients, dying after operation at this hospital during the past 3½ years, have been studied from various standpoints. From the mass of data thus collected, we may extract a few principles of practical value.

(1) If a Chinese patient is over 55 years of age, or has pathognomonic signs in the lungs, or less than 3 million red blood cells, or less than 60% hemoglobin, or a low w.b.c.: p.m.n. ratio, or a strongly positive Wassermann reactions, or a streptococcus infection, and especially if he has more than one of these abnormalities, he is a poor surgical risk. The operator who fails to look for these danger signs before operation, or ignores them in planning his operations, will lose lives that otherwise might be saved.

(2) Long operations in themselves are not dangerous. The things that make them dangerous are: poor condition of the patient before operation, deep anesthesia, loss of blood, rough handling of soft tissues, and the development of shock.
(3) Ether and chloroform both were found to be injurious to pathological lungs.

(4) In operating upon patients, who are poor surgical risks, it is wise to do just as little as possible.

(5) Streptococcus infections have a relatively high mortality. Simple incision and drainage of cellulitis, and perhaps of all streptococcus infections, is often useless, and always dangerous.

(6) Amputations of arms and legs are not minor surgical procedures. In the type of cases we see, shock, or severe infection of the stump, often supervene. The mortality at this hospital has been 24%. A method is suggested which is simple, rapid, almost bloodless, and lessens the chances of infection from the infected distal portion of the extremity.

(7) It is dangerous to operate immediately upon admission, unless it is absolutely necessary. The patient is due the advantages of rest, supportive treatment, routine examinations, accurate diagnosis, and a carefully considered operation. More time and care and thought before operation will save, not only time in convalescence, but lives as well.

(8) Success in major surgery is not easy to attain. One must be faithful in routine preoperative examinations, (history, physical examination, and laboratory work), try to diagnose correctly, learn to estimate how much operating each patient can stand, consider the danger signs, avoid shock, avoid spreading infection by operation (It is better to do nothing!), avoid wasting a single c.c. of blood, watch out for complications, and strive, not only for the cure of the local disease, but for good physiological function of the part as well.

REFERENCES

1. J. Morgan: Intestinal parasitism in Tsinan as observed in 1273 routine feces examinations during a period of 17 months, China M. J. xli, 827, 1927.

The relationship between the occurrence of disease and conditions of environment is a matter of interest and importance. It seems worth while therefore, to put on record some observations, made during the course of a recent visit to a small island, the conditions of life on which are in some respects unusual.

Geographic Conditions. The island visited lies to the extreme South West of the Pescadore group of Islands, in the Formosan Channel, off the West Coast of Formosa.

It is about three miles long, and the greatest breadth is about two miles.

It takes nine hours or more to cross to Formosa, but the boat service is irregular and frequently suspended for weeks at a time, as the small privately owned craft are unfitted for rough seas. This comparative isolation means that the people may be thrown on local resources entirely, both in the matter of food and in the case of illness. As will be shown later the island is able to provide food sufficient in quantity and quality only to meet bare requirements.

Climate. Although in the tropics, the weather is generally cooler than in other places of the same latitude, owing to constant breezes and frequent strong winds. There are practically no trees or shrubs, and such crops as can be grown have to be protected by stone walls. This exposure to wind is at least partly responsible for the widespread occurrence of eye disease.

There are no roads and the rough paths are soon converted into streams by rain, thus making medical visitation very difficult.

Mosquitoes are relatively few.

Economic Situation. The men are mostly engaged in fishing, and frequently cross to Formosa for the purpose of disposing of their fish.
The women and children cultivate the fields, and look after the poultry, etc.

Thus with their substantial stone houses, and the bare necessities of life—fish, maize, green vegetables, sweet potatoes and eggs—at their doors, the people are not poverty stricken. But money is scarce. It is significant that there are no shops.

The only doctor on the island is not called in except in cases of urgency, and the people complain that they cannot afford his charges. Thus slight illness is neglected and may become acute or irremediably chronic. Hitherto no doctor has found it financially worth his while to stay for a long time in this 'unopposed practice.' Surgical cases are apt to be sadly neglected with this comparative poverty as well as the isolation from the nearest hospital, over in Formosa.

The Population. The 3,200 inhabitants are Chinese, though since 1895, Japanese subjects. Of these some 220 were seen as patients; that is one out of every fourteen or fifteen of the entire population. There were about 600 attendances recorded.

Diet and Disease. Among the patients seen the following diseases are either known to be or are suspected of being attributable to metabolic error: Dental Caries, 16 cases, Purpura, 1 case, Non-toxic Goitre, 1 case, a woman aged 77.

There were several cases of eczema, and five of asthma, but it is open to question whether these allergic conditions should be included here.

Most of the dental caries was in each case confined to one or two teeth only, and I am not prepared to say that the general state of the teeth is unusually poor. I saw no case with pyorrhoea.

From the above it will appear that the diet of the islanders, limited though it be in variety, nevertheless contains all essential factors. It is therefore worth while to consider the matter in more detail. The main articles of diet are: maize, green vegetables, sweet potatoes, eggs, fish and other marine products.

These are sometimes supplemented by supplies such as fruit and rice from Formosa, but such supplies are not constant and in some cases at least very limited. Generally speaking, other than fish, practically no meat, little fruit, and less rice than by other Chinese is eaten.
I have consulted tables prepared by R. H. A. and V. G. Plimmer with regard to the vitamin content of the main articles of diet. From these it will be seen that all requirements are met with at least to some extent. I have summarised the matter below:

<table>
<thead>
<tr>
<th>Vitamin</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>B2</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish</td>
<td>++</td>
<td></td>
<td>-</td>
<td>++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eggs</td>
<td>++</td>
<td></td>
<td>-</td>
<td>++</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Green Vegetables</td>
<td>+</td>
<td></td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Maize</td>
<td>+</td>
<td></td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Sweet Potatoes</td>
<td>-</td>
<td></td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Vitamin A. anti-infective (n.b. anti-pyorrhoea), growth.  
B. anti-beri-beri.  
B2 anti-pellagra.  
C. anti-scurvy.  
D. anti-rachitic.  
E. reproductive.

I saw no case of scurvy, and my information is to the effect that it was more common earlier in the history of the island. Manson-Bahr mentions that the sweet-potato has valuable anti-scorbutic properties.

In the recent Hastings Lecture Professor Mellanby stated that a cereal-free diet, rich in vitamins A. and D. retards and alleviates pyorrhoea. My observations tend to confirm this.

As most of the infants are breast-fed for two or three years there should be no calcium deficiency with which to start life. Some of the children were however decidedly small for their age.

**Alimentary Diseases.** In this connection it may be noted that the field near the house is the usual latrine, in most cases also that there is no scarcity of house-flies.

I was told that diarrhoeal disease, particularly dysentery is a frequent cause of death, especially among children. My cases included three children suffering from Amoebic Dysentery, as well as other cases of diarrhoea of uncertain origin. The fact that children are nursed for so long means that when at length
the maternal supplies are no longer available they may find
difficulty in digesting ordinary foods.

Among other cases 17 required treatment for Ascariasis—
and others admitted the infestation which seems to be very
widespread.

Although I was unable to confirm the observation micros­
copically, no case seen suggested, clinically, Ancylostomiasis. In
fact I saw no case apparently suffering from any form of
anaemia.

Eye Diseases. It is no exaggeration to say that to see an
islander with a pair of perfectly sound eyes is exceptional.
Nearly half of the patients seen (105) received treatment for
eye diseases. Of the others I observed in most cases varying
degrees of inflammation, and as one goes about the island
prevalence of this trouble is everywhere obvious. To the
economic and climatic conditions is added the dirty habit of
rubbing sore eyes with cloths in a state of varying degrees of
filthiness—using perhaps, 'the family towel.' Most of my cases
were chronic. Three were totally blind (I saw others non-
professionally). Three others were almost blind in both eyes
and eventually will be. Ten were blind in one eye. Glaucoma
was the apparent cause of blindness in the totally blind cases.
Of those blind in one eye, Chronic Keratitis was present in all
cases. In some large Leucomas were seen, and among these
Iridectomy would restore some measure of sight, or would have
done so formerly. Thirty cases had Trichiasis or Entropion,
most of which had some degree of chronic Keratitis. I was able
to operate on some of these, and it was a matter of regret to
have to leave before all who wished for an Entropion operation
had been dealt with; many such cannot afford to go to Formosa
for treatment, and the local practitioner does not do any surgery.

There were some cases of elderly women whose palpebral
apertures were reduced to small slits, the lids being very much
thickened and chronically inflamed, and void of lashes. In
these cases the globe was usually atrophied or chronically
flamed, but in no case was there total blindness, the removal
of the lashes probably preventing this final disaster.

Of other eye diseases 6 cases had Glaucoma (including
3 totally blind), 6 had cataract, and 11 others, in addition to
other lesions, had Pterygium. It was difficult to fix the diagnostic label to some of the more chronic cases, where atrophy of the globe tended to obscure the original condition. Often one case would show chronic Trachoma, Entropion, Keratitis, Leucoma, and perhaps Pterygium. Typical cases of Trachoma were seen, but often it was difficult to differentiate between this and other forms of conjunctivitis. There was one case of Blepharitis and one of acute Corneal Ulcer, with accompanying Irido-cyclitis. Much preventable disaster to sight is unrelieved for reason of ignorance or tolerated for economic reasons. For example, a man blind in one eye with the sight of the other imperilled by entropion, called off the operation that I offered, because, with the seeing eye bandaged, he “would not be able to go fishing for a few days.”

Respiratory Disease. Of the 30 cases seen in this group, 5 were suffering from asthma. Chronic Bronchitis is a common ailment. Four cases admitted having at one time or another seen blood in their sputum. None of these cases, all elderly, showed evidence of active disease. But I have been told that Pthisis is not uncommon among the the southern group of these islands. I was told that Pneumonia is a frequent cause of death among the islanders.

Gynaecology and Obstetrics. I had little opportunity of investigating these types of cases, but 9 cases with “aches and pains” accompanied by menstrual disturbance and leucorrhoea suggest that inflammation of the female pelvic organs is not uncommon.

Unclassified Diseases. Six patients complained of muscular “Rheumatism.” There were 4 cases of headache due to Accessory-nasal-sinusitis. Two cases of leg ulcer may be syphilitic, but I was not able to confirm this. Apart from these and perhaps some of the leucorrhoea cases, I saw no cases of Venereal Diseases. Various cases demanding surgical treatment were seen, but have no special significance, and need not be enumerated.

I saw no case of Malaria, but was told that there are occasional cases. I saw no case with anaemia, and none with enlarged spleen.

Conclusions. Some of the observations, both positive and negative, are suggestive, but are not based on sufficient evidence to justify generalisations.
There can be no doubt, however, that the constant exposure to wind predisposes to eye disease to an abnormally large extent. But the harm done would be considerably lessened if it were made economically possible for all ophthalmic cases to receive proper treatment.

There is also no doubt that some simple sanitary improvements would be beneficial.

The islanders are as a whole a robust people, and apart from eye trouble, the conditions of life under which they live cannot be regarded as unfavourable for the enjoyment of good health.

REFERENCES
2. Manson-Bahr, P., "Manson's Tropical Diseases" Ed. 8; page 339.

THALLIUM ACETATE AS A DEPILATORY
L. F. Heimburger, M.D. and C. C. Yiu, M.D.
Department of Dermatology and Syphilology, Shantung Christian University, School of Medicine, Tsinan, Shantung, China.

Although thallium acetate was used by Sabouraud1 over 30 years ago for its depilatory action in ringworm of the scalp, it has been only within the last two or three years that any considerable use has been made of this chemical in the English speaking world.

Sabouraud became discouraged in its use because when using the chemical in 5 mg. doses per kilogram of body weight he encountered severe toxic symptoms which led to his discontinuing this form of epilation of the scalp.

Following up this seeming failure of Sabouraud, Buschke and others, by experiments carried on with animals over a period of 20 years determined the exact dose per kilogram of body weight required to produce epilation.
Thallium Acetate as a Depilatory

Cicero and others using these animal experiments as a basis, tested thallium therapeutically on 545 Mexican children with successful results and since then many very favorable reports of the use of thallium acetate and other thallium products have been published in journals from all parts of the world.

Up until the time of the discovery of the practical use of thallium as a depilatory, the X-ray was regarded as the only effective and practical method of obtaining the necessary epilation in treating ringworm and favus of the scalp, and by many dermatologists it is still considered the best and safest method in the hands of an expert roentgentologist. But in China where ringworm and favus of the scalp are diseases seen in every village street and where X-ray apparatus is available only in the largest and best equipped hospitals in very few centers, thallium acetate is a remedy which can be and should be used very effectively even in the smallest out-patient department.

The advantages of thallium acetate epilation as summarized by Buschke and confirmed by a host of reputable dermatologists since, are as follows:

(1) Treatment is extremely simple and costs almost nothing.

(2) It can be used for children under three years old.

(3) It can be used in country districts, where X-rays are not available.

(4) It can be used in cases where X-ray has proved unsuccessful.

(5) It may be used in cases of inflamed ringworm. (Kerion).

(6) There is no danger of permanent alopecia.

The disadvantages are, (1) its toxic effects if not used with caution, and (2) the ignorance of the ultimate effect it has on the growing human.

Pharmacology and Toxicology.—In attempts to solve the mysterious action of thallium acetate on the human organism, extensive animal experiments have been carried on. Among
these Dixon reports that thallium causes loss of hair and general alopecia in all animals. This action “appears to depend on a failure of the normal process transition from the large polygonal epithelial cells of the hair bulb to the horny scales of the hair.” Thallium rubbed into the skin has no local action but is readily absorbed and causes alopecia only after absorption. The autonomic nervous system is rendered more sensitive to electrical stimuli, which is more marked on the sympathetic portion. This is probably an explanation of the action of thallium on both the growth and loss of hair. Through the sympathetic system thallium has a direct action on the suprarenal gland.

Truffie reports in the histological examination of animals after chronic poisoning with thallium acetate, no changes in any of the internal organs including the suprarenals, thyroid, testes, etc., which indicated any change other than that produced by other poisons as phosphorus, arsenic and bromides. Neither was the neurovegetative system disturbed anatomically.

In contradistinction to the above report, Pardo-Castello reports atrophy and parenchymatous degeneration of thyroid, spleen, and suprarenals, therefore in his opinion “thallium produces a temporary rest of the trophic action of the endocrine glands, probably the thyroid, on the hair” and believes that X-ray depilation is still the method of choice.

Ormerod in summarizing clinical and experimental evidence of the literature on the pharmacology and toxicology of thallium to December 1928, points out:

(1) Young children up to 7 or 8 years withstand thallium well; older children and adults are more likely to show toxic symptoms.

(2) Evidence is offered of various endocrine disturbances during the use of thallium. Whether these are directly due to the drug cannot be stated definitely.

(3) Evidence of disturbed metabolism, especially calcium deficiency, is presented. The muscle cramps could be correctly explained by a removal or antagonism of calcium by thallium. Edema, diuresis, etc. may be due to increased capillary permeability which occurs in calcium deficiency. Disturbances of the nervous system such as fits, tremors and apathy occur where calcium metabolism is upset, as damage to the parathyroids. Whether this calcium disturbance is caused directly or secondary to parathyroid damage is not certain.
Thallium Acetate as a Depilatory

(4) Nerve damage is not permanent. Kidney damage is also temporary, if at all.

(5) There is no permanent damage to the hair follicle with the use of therapeutic doses.

(6) Since the action of thallium is cumulative, its toxic effect must be endured for its therapeutic benefits; and drugs to increase its elimination, as sodium thiosulphate, are contraindicated.

(7) Close follow up should be made on cases for a sufficiently long period to say definitely whether or not permanent damage may follow such chemical and/or endocrine upsets inasmuch as all patients are growing children.

In a recent report Rubenstein reports a death in a boy 7 years of age, a congenital syphilitic with pulmonary tuberculosis, who had been given 8 mg. of thallium acetate per kilogram of body weight, a total dose of 0.16 gram. The onset of symptoms one week after the administration of the drug with neurologic manifestations, acute nephritis and necrosis of the liver were all evidences of metallic poisoning. Toxic encephalitis was the cause of death.

Judging from the majority of reports and our own experience thallium seems to be as safe a remedy as any of the metals we use in the treatment of disease conditions in the human. Arsenic, mercury, bismuth, antimony, etc. are not used without danger but nevertheless we continue to use them as specific therapeutic agents in proper dosage.

During the past 2½ years we have used thallium acetate as a depilatory in the treatment of both ringworm and favus of the scalp in 104 cases with excellent results. Within the past six months we have had an exceptional opportunity to study carefully the action of this drug when used therapeutically in the treatment of an epidemic of tinea capitis in two orphan asylums in Tsinan. In these cases, with the cooperation of the teachers in charge of the asylums, we have been able to follow carefully the cases from the diagnosis of the disease to the time when the new growth of hair was complete.

In the Po Tsi Orphanage, 31 boys out of 50 had ringworm of the scalp. In each infected case microscopical examinations of both the diseased hair and scales from the scalp showed definite ringworm infection. Each infected case was given 0.007 grams of thallium acetate per kilogram of body weight,
dissolved in a small rice bowl of sugared water (making approximately a 1% solution). In addition an ointment containing 7% each of sulphur precipitate and salicylic acid was given to be applied thoroughly once a day to the scalp. The 31 cases reported to the clinic every five days, accompanied by their teacher who reported in detail any reactions or disturbances noticed following the administration of the thallium.

The notes taken on these 31 cases may be summarized as follows:—

55% complained of pains in the legs, especially the knee joints and groins, but there were no inflammatory signs in either the joints or the lymph glands.

16% complained of headache. Two boys, one 15 years of age, the other 17, had severe headache and pains in their legs incapacitating them for three or four days, but even in these the severity of the reaction had passed off within the week after the dose had been administered. In the remainder the pains lasted only two or three days.

In 26 cases epilation was complete. One case left the orphanage shortly after the dose was given and no report was obtained from him. Two cases which had received a dose of thallium acetate about 6 months previously obtained no epilation following the second dose. In the epilated cases the hair began to fall out between the 9th and 14th day, the majority on the 12th day. Four to 9 days later the alopecia was complete. The period of alopecia lasted on the average for 10 days when the new growth of hair was evident. This new growth was complete in all cases about the 54th day after the administration of the thallium.

In eight cases a few scaly spots in which tinea were demonstrated microscopically persisted for several weeks after the thallium treatment, but these readily cleared up under local treatment.

Of the 74 boys in the second orphanage, 21 were infected; 2 with favus, 19 with ringworm. These were treated in the same manner as those in the Po Tsi Orphanage with the following results:—
In 20 cases epilation was complete. In one boy, 12 years of age, with a reinfection of favus, who had received thallium three years previously, epilation failed.

Six boys, approximately 29%, complained of pains in their knee joints and groins; one complained of loss of appetite only; the remainder had no symptoms whatever.

Six cases, after the regrowth of hair, still showed scaly lesions on the scalp which disappeared with local treatment.

Among the 52 remaining cases treated, one deserves particular mention. A boy, 9 years of age, due to a failure in recording a previous visit, was given two doses of thallium acetate within 3 days. The morning following the second dose he was carried to the Hospital complaining of intense pains in both legs and groins, inability to walk, headache and toothache. On examination, except for fissures of the lips, nothing abnormal was found; temperature and pulse were normal. He was given a purgative. After three days the intensity of the symptoms had subsided and no further trouble resulted.

In all the female patients in which this treatment was used, no toxic symptoms occurred, but all the girls were comparatively young.

Toxic Symptoms: In the cases observed the toxic symptoms noted in order of frequency were as follows:—1. Pains in the knee joints and groins; 2. headache; 3. loss of appetite. In the observations of other authors gastro-intestinal disturbances, as nausea, vomiting, and diarrhea, tachycardia and albuminurea have been reported. In cases of poisoning for suicidal or homicidal intent or through accidental ingestion of thallium, convulsions and unconsciousness are reported, but comparatively few deaths have occurred in the therapeutic use of thallium except where large doses were taken or in cases where severe constitutional disease has been a complication.

With such a history and in view of the thousands of cases in which thallium has been used for epilation of the scalp, there is no doubt that its use is past the experimental stage and marks a real advance in the treatment of tinea infections of the scalp.

Epilation: The selective action of thallium has been noted by all dermatologists who have used it. Because of the age of
the cases under our observation, the action on the public and axillary hair could not be noted, but in no instance was there any loss of the eyebrows, only the hair of the scalp was affected. The theory of this selectivity depends upon the effect of the endocrine system on the growth of hair. Seemingly the growth of the hair of the scalp alone is controlled by the endocrine glands on which thallium seems to have a selective action. This selective endocrine function is further borne out by the peculiar loss of hair seen at times in thyroid and parathyroid disfunction.

**SUMMARY**

1. Thallium acetate is a valuable drug for epilation of the scalp and its use marks a real advance in the treatment of tinea infections of the scalp.

2. Thallium acetate acts only as a depilatory and has no fungicidal properties, therefore local treatment must be used in conjunction with epilation.

3. A dose of 0.007 gram of thallium acetate per kilogram of body weight, dissolved in sweetened water to make about a 1% solution and taken on an empty stomach, is the maximum required to produce epilation.

4. Complete epilation usually appears within three weeks after the administration of the dose but may occur earlier or be delayed a few days.

5. Regrowth of normal hair is usually acquired within two months of the administration of the required dose.

6. Toxic symptoms, as pains in the legs, headache, loss of appetite may be expected in about one-third of the cases, but these symptoms are transitory.

7. Young children generally show a good tolerance for thallium but the nearer the patient approaches adolescence the more apt toxic symptoms are to appear.

8. In three cases in which the dose of thallium acetate was repeated because of re-infection after several months, no epilation took place.

9. In China where the use of the X-ray cannot be readily obtained for epilation, thallium acetate should be used as a
The Dick Test on Chinese Students

Daniel G. Lai, M.D.

Department of Hygiene, College of Medicine, National Central University, and University of Shanghai.

Scarlet fever is by no means a rare disease in Shanghai. According to the report of the Public Health Department of the Shanghai Municipal Council,\(^1\) this malady first appeared in the city in 1873; and at that time, it was virulent in type among the Chinese and also among Foreigners, the case mortality rising to about 30% compared with a usual rate of about 3%. In 1926, there was another severe outbreak in Shanghai when the case mortality in the Isolation Hospital was 14.6% among Foreigners, and 30.4% among the Chinese.

In 1923, Drs. G. F. and G. H. Dick\(^2\) of Chicago were able to produce experimental scarlet fever in man with cultures of streptococcus haemolyticus isolated from scarlet fever patients. In the following year, they\(^3\) further demonstrated that diluted...
filtrates of these streptococcus cultures, when injected intradermally, produced a characteristic erythematous reaction in a proportion of persons who had not had scarlet fever. In view of this finding, they claimed that this test, commonly known now as the Dick test, could be used for the determination of presence or absence of immunity to scarlet fever.

The principles of this test are quite similar to those of the Schick test for diphtheria. However, there are some points of difference between the two tests. In the first place, the scarlet fever streptococcus toxin is relatively stable; and, when, being inactivated by heat for the purpose of making a control injection, it requires heating at 100°C. for sixty minutes instead of 75°C. for ten minutes, which inactivates diphtheria toxin. Secondly, it is more difficult to standardize the streptococcus toxin than diphtheria toxin as the former can only be properly tested in the skin of human beings. Thirdly, the positive skin reaction fades more quickly than the corresponding Schick test; and it thus makes it harder to differentiate the true reactions from the pseudo ones.

I. TECHNIQUE OF THE DICK TEST

In the Dick test, a skin-test dose of the streptococcus toxin is employed. It is the smallest amount of a toxic filtrate which will give within 24 hours, in a susceptible person, an erythematous reaction at least 1 cm. in diameter. The filtrate is diluted with normal saline so that it is contained in 0.1 cc. or 0.2 cc. After the flexor surface of one arm is cleansed with alcohol, it is injected into the skin with a small tuberculin syringe and a fine needle. A small wheal immediately results and disappears in a few minutes.

Reactions should be read within 36 hours after the injections are made.

In a negative reaction, the site of injection is indicated only by the point of the needle prick, or by a faint pink streak along the course of the needle in the skin.

Positive reactions usually appear from four to six hours after the inoculation, and reach a maximum size and intensity between eighteen and thirty-six hours after the injection. The degree of the positive reactions may be as follows:
(a) *Slightly positive reaction* (+) consists of a faint red area less than 2 cm. in diameter without local swelling or tenderness.

(b) *Moderately positive reactions* (++) are 1.5 to 3 cm. in diameter, and bright red with some swelling in the skin, and occasionally slight tenderness.

(c) *Strongly positive reactions* (+++) are more than 3 cm. in one or both diameters, and intensely red with marked swelling of the skin, and usually some tenderness.

II. RESULTS OF THE DICK TEST ON THE STUDENTS IN SHANGHAI

In the spring of 1930, the National Epidemic Prevention Bureau, Peiping, kindly sent us for trial a supply of the streptococcus toxin, and with it we did the Dick test on 683 school children in Woosung. As shown by Table 1, out of this number, 78% gave a positive reaction. This spring (1931), we received another supply of the toxin from the same place, and we carried out the test on the students in Woosung, and also in the University of Shanghai including the middle school and elementary school. But this time, the percentages of positive reactions in both places (26.8% in Woosung, and 30.3% in the University of Shanghai) were much lower than our previous figures. This difference might be chiefly due to the diminished potency of the second supply of the toxin, as pointed out by Dr. Edgar T. H. Tsen of Peiping.

**Table 1. Showing the Number and Percentages of Positive and Negative Dick Tests**

<table>
<thead>
<tr>
<th>Date</th>
<th>Place</th>
<th>No. Tested</th>
<th>No. Pos.</th>
<th>Per Cent</th>
<th>No. Neg.</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>Woosung Schools</td>
<td>688</td>
<td>496</td>
<td>73.0%</td>
<td>185</td>
<td>27.0%</td>
</tr>
<tr>
<td>1931</td>
<td>Woosung Schools</td>
<td>112</td>
<td>30</td>
<td>26.8%</td>
<td>82</td>
<td>73.2%</td>
</tr>
<tr>
<td>1931</td>
<td>University of Shanghai</td>
<td>601</td>
<td>182</td>
<td>30.8%</td>
<td>419</td>
<td>69.7%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1,396</td>
<td>710</td>
<td>50.9%</td>
<td>686</td>
<td>49.1%</td>
</tr>
</tbody>
</table>
The China Medical Journal

Table 2. The Degree of Positive Reactions

<table>
<thead>
<tr>
<th>Date</th>
<th>Place</th>
<th>Pos.</th>
<th>+</th>
<th>%</th>
<th>++</th>
<th>%</th>
<th>+++</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1936</td>
<td>Woosung Schools</td>
<td>498</td>
<td>320</td>
<td>64.3%</td>
<td>125</td>
<td>25.1%</td>
<td>53</td>
<td>10.6%</td>
</tr>
<tr>
<td>1931</td>
<td>Woosung Schools</td>
<td>30</td>
<td>28</td>
<td>93.4%</td>
<td>1</td>
<td>3.3%</td>
<td>1</td>
<td>3.3%</td>
</tr>
<tr>
<td>1931</td>
<td>University of Shanghai</td>
<td>182</td>
<td>157</td>
<td>86.3%</td>
<td>25</td>
<td>13.7%</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>710</td>
<td>505</td>
<td>71.1%</td>
<td>151</td>
<td>21.3%</td>
<td>54</td>
<td>7.6%</td>
</tr>
</tbody>
</table>

Table 3. Number and Percentages of Positive tests with reference to Sex

<table>
<thead>
<tr>
<th>Date</th>
<th>Place</th>
<th>No. Boys</th>
<th>No. Pos.</th>
<th>Per Cent</th>
<th>No. Girls</th>
<th>No. Pos.</th>
<th>Per Cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>Woosung Schools</td>
<td>477</td>
<td>349</td>
<td>73.1%</td>
<td>206</td>
<td>157</td>
<td>76.2%</td>
</tr>
<tr>
<td>1931</td>
<td>Woosung Schools</td>
<td>94</td>
<td>22</td>
<td>23.4%</td>
<td>18</td>
<td>8</td>
<td>44.4%</td>
</tr>
<tr>
<td>1931</td>
<td>University of Shanghai</td>
<td>456</td>
<td>146</td>
<td>32.0%</td>
<td>145</td>
<td>36</td>
<td>24.8%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>1,027</td>
<td>517</td>
<td>50.3%</td>
<td>369</td>
<td>201</td>
<td>54.5%</td>
</tr>
</tbody>
</table>

From Table 3, one notices that the percentage of positive reactions among the girls (54.5%) was slightly higher than that among the boys (50.3%).

It has been found that scarlet fever in Shanghai is particularly frequent in children under five years of age, and about three-quarters of all cases occur under the age of ten. Unfortunately, most of our students tested were above these ages (see Table 4 and Chart 1), for, otherwise, much interest could have been added to this study. Nevertheless, our results tend to show that as school children grow older the percentage of positive Dick tests becomes smaller; and, in other words, their susceptibility to this disease is decreased.
The Dick Test on Chinese Students

Table 4. Showing the Number and Percentage of Positive Dick Tests with reference to Age

<table>
<thead>
<tr>
<th>Age in Yrs.</th>
<th>Woosung (1930)</th>
<th>University of Shanghai (1931)</th>
<th>Total No. Tested</th>
<th>Total No. Pos.</th>
<th>% Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>24</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>25</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>64</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>64</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>82</td>
<td>54</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>71</td>
<td>56</td>
<td>4</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>13</td>
<td>64</td>
<td>47</td>
<td>9</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>14</td>
<td>67</td>
<td>46</td>
<td>29</td>
<td>8</td>
<td>19</td>
</tr>
<tr>
<td>15</td>
<td>48</td>
<td>38</td>
<td>26</td>
<td>5</td>
<td>19</td>
</tr>
<tr>
<td>16</td>
<td>42</td>
<td>80</td>
<td>24</td>
<td>7</td>
<td>43</td>
</tr>
<tr>
<td>17</td>
<td>33</td>
<td>21</td>
<td>18</td>
<td>6</td>
<td>34</td>
</tr>
<tr>
<td>18</td>
<td>5</td>
<td>5</td>
<td>1</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>19</td>
<td>7</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>20</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td>94</td>
</tr>
<tr>
<td>21</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
<td>67</td>
</tr>
<tr>
<td>22</td>
<td>5</td>
<td>8</td>
<td></td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>23</td>
<td>6</td>
<td>1</td>
<td></td>
<td></td>
<td>40</td>
</tr>
<tr>
<td>24</td>
<td>10</td>
<td>6</td>
<td></td>
<td></td>
<td>21</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>2</td>
<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Above 25</td>
<td>30</td>
<td>22</td>
<td></td>
<td></td>
<td>14</td>
</tr>
</tbody>
</table>

The Dick Test on Chinese Students
The prevalence of scarlet fever seems to have something to do with geographical locations. In his book, "Diseases of China," Dr. Maxwell states, "It is essentially a disease of subtropical and temperate climates and never succeeds in getting a hold on the tropical regions of the country." In Hongkong, from 1912 to 1922, there were 15,492 cases of infectious diseases, of which only 41 were of scarlet fever. On the other hand, the disease is frequent in the Central Provinces, and severe in North China. As seen in Table 5, the majority of our students came from Central and South China; and in the percentages of positive Dick tests, there was a striking difference between the two sections (see Chart 2). If the Dick test was an reliable indication, the people in the Southern provinces showed more immunity to scarlet fever than those in the Central region; and

**Table 5.** Showing the Number and Percentages of Positive Dick tests with reference to Nativity

<table>
<thead>
<tr>
<th>Nativity</th>
<th>Woosung (1930)</th>
<th>Woosung (1931)</th>
<th>University of Shanghai (1931)</th>
<th>Total No. Tested</th>
<th>Total No. Pos.</th>
<th>% Pos.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>South China</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kwangtung</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>190</td>
<td>18</td>
</tr>
<tr>
<td>Fukien</td>
<td>7</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>40</td>
<td>7</td>
</tr>
<tr>
<td><strong>Central China</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kiangsu</td>
<td>508</td>
<td>384</td>
<td>61</td>
<td>15</td>
<td>144</td>
<td>30</td>
</tr>
<tr>
<td>Chekiang</td>
<td>100</td>
<td>74</td>
<td>16</td>
<td>3</td>
<td>119</td>
<td>57</td>
</tr>
<tr>
<td>Hupeh</td>
<td>7</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>29</td>
<td>21</td>
</tr>
<tr>
<td>Hunan</td>
<td>10</td>
<td>8</td>
<td>2</td>
<td>-</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Anhwei</td>
<td>7</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>24</td>
<td>6</td>
</tr>
<tr>
<td>Kiangsi</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>1</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Szechuen</td>
<td></td>
<td></td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td><strong>North China</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hopei</td>
<td></td>
<td></td>
<td>9</td>
<td>4</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td><strong>Other places</strong></td>
<td>38</td>
<td>13</td>
<td>20</td>
<td>8</td>
<td>11</td>
<td>2</td>
</tr>
</tbody>
</table>
The Dick Test on Chinese Students

this might explain the reason why the disease is comparatively rare in the South.

III. DISCUSSION

Since the introduction of the Dick test in 1924, reports from the various parts of the world have been published. Including our present small series, Table 6 is a brief summary of some of the findings:

**Table 6. A Summary of the Positive Dick Reactions in the Different Countries**

<table>
<thead>
<tr>
<th>Nationality</th>
<th>City</th>
<th>No. Tested</th>
<th>% Pos.</th>
<th>Authors</th>
<th>Year of Publication</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. S. A.</td>
<td>N. Y.</td>
<td>4,570</td>
<td>34.5%</td>
<td>Zingher</td>
<td>1924</td>
</tr>
<tr>
<td>U. S. A.</td>
<td>Gary, Ind.</td>
<td>6,462</td>
<td>53. %</td>
<td>Smythe and Nesbit</td>
<td>1928</td>
</tr>
<tr>
<td>Scotland</td>
<td>Aberdeen</td>
<td>1,500</td>
<td>72.1%</td>
<td>Kinlock et al.</td>
<td>1927</td>
</tr>
<tr>
<td>Japan</td>
<td>Manchuria</td>
<td>1,727</td>
<td>34.9%</td>
<td>Nishimura et al.</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>do.</td>
<td>431</td>
<td>17.3%</td>
<td>Ditto</td>
<td>1926</td>
</tr>
<tr>
<td>China</td>
<td>Manchuria</td>
<td>47.0%</td>
<td></td>
<td>Lin</td>
<td>1928</td>
</tr>
<tr>
<td>China</td>
<td>Peiping</td>
<td>646</td>
<td>46.4%</td>
<td>Dzen</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>Shanghai</td>
<td>1,396</td>
<td>50.8%</td>
<td>Present</td>
<td></td>
</tr>
</tbody>
</table>

As regards the reliability of the test, in the opinion of Dr. W. H. Park of New York, it is almost, but not quite, as good as the Schick test. Halsam of London supports this view by finding the closeness with which the ages showing most numerous Dick-positives agree with those of greatest scarlet fever incidence. He also points out that the differences in the various reports may be, in whole or part, due to real differences of herd susceptibility in the populations tested, or they may, perhaps, be due to employment of the different dosage for the test, or to differences in standardization of the toxin, or to a combination of these factors. Our own two series of cases seem to illustrate the truth of this statement.
CHART 1. *Broken Line shows Percentages of Positive Dick Tests with reference to Age*

CHART 2. *Graphic Comparison of Percentages of Positive Dick Tests among Students from Different Provinces of China*
IV. Summary

1. Scarlet fever is a prevalent disease in Shanghai, particularly in children under ten years of age.

2. The principles and technique of the Dick test and its differences with those of the Schick test are described.

3. In our 1930 series of 683 school children in Woosung, 73% gave a positive Dick reaction. In the spring of 1931, by using another supply of the toxin, we obtained much lower figures of the positive tests (26.8% in Woosung, and 30.3% in the University of Shanghai). Combining these two series of cases, the average percentage of the positive reactions among the students in Shanghai was 50.8%.

4. In our two series, the percentage of positive reactions among the girls (54.8%) was slightly higher than that among the boys (50.3%).

5. In general, as students grow older, they are more immune to scarlet fever, and consequently, they give less number of the positive tests.

6. The students from South China had a low incidence of positive Dick tests in comparison with the school children from central China.

7. Including our series, reports of the Dick tests from America, Japan, Great Britain and China are tabulated, and their figures of the positives vary from 17.9% to 72.1%.

Without knowing the exact potency of the toxin used, we feel that our report can only be regarded as a preliminary one, and it needs a further confirmation.

Acknowledgement

For their co-operation in this work, the writer wishes to give his thanks to the following:—Drs. C. L. Kao, and L. C. Yang, and the Nursing Staff of the Woosung Health Station; and Miss Dorothy Wu, and Mr. S. C. Shou of the University of Shanghai Health Service.

Literature


THE DIAGNOSIS OF OBSCURE FEVERS IN SOUTH CHINA*

W. B. McClure, M.B., D.P.H., Kongmoon, Kwangtung

Perhaps there is nothing that will cause more anxiety and worry to the physician than to have one of his patients “running” fever, the cause of which he cannot for the moment lay his hands on, and which he cannot assign to its proper peg in the diagnosis of disease. It gives him a good deal of concern as to the prognosis, expected duration of the disease, and the treatment of the case.

*Read at Meeting of the South China Branch of the China Medical Association, Canton, March 27, 1931.
At such a time the patient's friends and relations have to be treated as well. They must have a bone to chew on, until by the slender efforts of the physician and our good friend *vis medatrix naturae*, the defensive mechanisms of the body are able to overcome the causative factor whether infective, toxic or metabolic.

The outlook of the physician in the subtropics is vastly different from the medical man practising in the temperate zones. This especially is true when we come to the study of fevers.

When one attempts to diagnose a fever in the subtropics he should keep constantly in mind the methods of spread of disease. The most important method of spread is that due to the ingestion of infective material, those diseases due to uncleanliness and a lack of hygienic conditions among the people. This is aggravated by the hot climate which hastens the processes of putrefaction and the growth of pathogenic organisms in the drinks and foods of the people. Here we have such fevers as the typhoid group, dysenteries and cholera. Then one must constantly keep in mind those fevers due to the inoculation of infective material into man and especially those diseases transmitted by insect vectors. One must also be on guard for fever due to excessive heat and sunlight as we get in heat hyperpyrexia.

Let us review briefly the various causes of fever that we may be called upon to differentiate.

Fevers are commonly divided into those of long duration continued for two weeks or more, and those of short duration under the two weeks period. Here we find no hard and fast rule. Sometimes a typhoid, which is classed as a fever of long duration, may be of the abortive type and the fever may have become normal some days before the two weeks is up. Again, malaria which is classed as a fever of short duration may be of the pernicious type and extend over the two weeks period.

For the purpose of diagnosis it is possibly better to think of fevers from the standpoint of the method of spread of disease. In this way one may divide fevers into at least four classes.
First Class—includes those fevers due to the inoculation of some infective agent on, into or under the skin or mucous membrane of the host. In this class we have the following diseases: Malaria, dengue, yellow fever, trypanosomiasis, relapsing fever, kala azar, typhus, plague, syphilis, gonorrhoea, and sepsis (which includes various foci of infection in the body as pyelitis, ischio-rectal abscess, salpingitis, endocarditis, and septicaemia).

Second Class—includes those fevers due to the ingestion of infective material as: Bacillary dysentery, amoebic dysentery with its sequela amoebic hepatitis, the typhoid group, undulant fever, cholera, trichiniasis, food poisoning by the salmonella group of organisms, and abdominal tuberculosis.

Third Class—includes those fevers due to the entrance of infective material by way of the respiratory tract otherwise airborne. In this class we have the: Exanthemata, whooping cough, common cold, influenza, tonsillitis, pneumonia, tuberculosis, poliomyelitis, cerebrospinal meningitis.

Fourth Class—includes those fevers due to metabolic factors as in: Heat hyperpyrexia, brain injuries, uraemia, etc.

Let us consider the type of fever that is considered normal in these various diseases and also any variations that we are liable to meet with in the temperature chart.

MALARIA

As malaria is caused by three different plasmodiae we would expect to have at least as many types of fever. We shall find that there are more than these.

1.a. Malignant tertian malaria (subtertian). In this disease the fever rises abruptly preceded by a chill. The fever lasts for 24-36 hours so that we have a pyrexia every other day. After the temperature rises to its peak there is a remission of one to two degrees and then a secondary rise occurs but does not go so high as the first one. When the fever drops it may still stay above normal and seldom becomes subnormal. The remission between the bouts of fever is quite short.
1.b. *Malignant tertian-quotidian infection*. This is not very commonly found. When it does occur the chart shows daily remissions and it may resemble a typhoid chart very closely. The fever may be of a daily intermittent type.

*Abnormal fevers in malignant tertian malaria*—In the pernicious type the fever may resemble a typhoid chart in which there is a high remittent fever with a daily remission of only 1-2 degrees. At times the fever may be very irregular, or it may be doubly remittent and in this way resemble Kala azar. Occasionally there may be a low intermittent fever. This fever may not be over 100 degrees. It may not be recognized as a malaria. In the cerebral form of malaria the patient has a very high fever and is unconscious. This resembles the heat hyperpyrexia due to exposure to sunlight or excessive heat.

2.a. *Benign tertian malaria*—The classical curve shows a temperature rise every other day. The temperature rises rapidly to 103-105 degrees. Within 8-14 hours it has fallen to normal and very often is subnormal. It remains down until the attack on the following day when it again rises suddenly. This type is not very common.

2.b. *Double benign tertian malaria*—The double infection with the benign tertian is much more common. Here one gets a pyrexia every day, with a marked intermission. The chart is one of a marked intermittent fever.

3. *Quartan malaria*. This infection is not very common. There is an abrupt rise in the temperature as in benign tertian to 103-104 degrees and then a rapid fall to normal or subnormal with a rise 2 days later. There may be a double or a triple infection. They show the same sharp rise and fall as in the ordinary quartan infection.

**Diagnosis.** Malaria showing regular features is much rarer in the Chinese or in the natives of any malarial infested country. The best opportunity to study such normal types is in infants or in the newly arrived immigrants or tourists to an infected country. Since quinine is being used more and more by the people in China it also helps to obscure the normal picture that one would expect to find. The final diagnosis depends on the early examination of a blood smear before any quinine has been given. Failing this the therapeutic effect of quinine by mouth or by intravenous injection.
DENGUE

This is commonly known as the three day fever. The temperature rises rapidly to 105 degrees and then falls by a rapid lysis in 24-36 hours to subnormal. On the 5th or 6th day of the disease there may be a secondary rise coincident with the appearance of the rash.

Diagnosis—depends on the prevalence of an epidemic in the district. There are very severe joint pains and a rash appears on the 5th or 6th day.

YELLOW FEVER

Although the vector, the aedes mosquito, is to be found in South China yellow fever does not seem to have found its way into the country. There is a rapid rise in the temperature within 24 hours to 103-104 degrees in mild cases and it begins to fall gradually on the 3rd day. In the severe type there is a remission to 100-101 degrees and following this there is a secondary rise. The fever is very variable in degree and duration.

Diagnosis, depends on its presence in an endemic area associated with icterus, petechial haemorrhages, black vomit and leucopaenia.

TRYPANOSOMIASIS

The fever is very variable. It may be absent or it may rise to 100-101 degrees in the evening with a normal or subnormal temperature in the morning. In the last stages it is nearly always subnormal.

Diagnosis, headache, glandular enlargement, search for the causative organism in the blood smear.

RELAPSING FEVER

In this disease the onset of the fever is abrupt and the temperature rises to 103-105 degrees in a few hours. The pulse is rapid. It remains up for 6-7 days as a remittent fever and then it falls by a crisis to subnormal. The period of apyrexia lasts for 3-12 days when there is a repetition of the fever which again falls by crisis.
**Diagnosis of Obscure Fevers**  

*Diagnosis.* Examination of a blood smear to determine the presence of the spirochaete. There is headache, vomiting, joint and muscle pains, and a polymorphonuclear increase.

*Abnormal.* The fever may be prolonged and it may resemble typhus.

**KALA AZAR**

This is a prolonged fever and very variable. The most common is the double remittent type which occurs in 25% of the cases. In this form there are two peaks in the 24 hours. This may last for several weeks. Then there is the low intermittent type with the temperature not over 100-101 degrees and lasting for weeks. Finally there is the high continued fever which is not so common.

*Diagnosis.* It may be very difficult to differentiate from chronic malaria at times. There is splenomegaly, hepatic enlargement, double remittent fever. Do a liver puncture to show the presence of the Leishman-Donovan bodies.

**PLAGUE**

The temperature is very variable. It rises rapidly in 1-2 days. The fever is of the high continuous type (102-104 degrees). There are irregular remissions of several degrees. It falls to normal by an intermittent lysis. If the patient dies the fever rises before death.

*Diagnosis.* Glandular involvement with buboes.

**TYPHUS**

In this disease the temperature rises suddenly to 103-104 degrees. It is remittent in type. The maximum is usually attained about the 5th day (105-107 degrees). It is continuous until the 12th-14th days with slight morning remissions. A crisis then occurs and the temperature may fall to subnormal in 12-24 hours. If it is fatal the temperature rises before death to 108-109 degrees.

*Diagnosis.* Rash, Widal-Felix reaction (5th-6th day), blood smear to exclude relapsing fever.
SYPHILIS

In the secondary stage of syphilis there may be a continuous fever. It may show marked remissions or it may be of the intermittent type up to 105 degrees. It may resemble typhoid, malaria or tuberculosis.

Diagnosis. History, Kahn test.

SEPSIS (due to the pyogenic organisms)

The fever in such a case may be remittent but it is usually markedly intermittent. It is generally accompanied with a chill and it may be confused with malaria.

Diagnosis. White blood count is high unless the patient is not reacting to the toxins circulating in the blood.

DYSENTERY

There is nothing distinctive in the fever chart of a dysentery patient but one must consider the type of fever in amoebic hepatitis. It is of a low remittent type but it may be an intermittent fever with an evening rise in the temperature. If pus has already formed the fever is more intermittent in type. In the morning the temperature is normal with a rise in the evening to 102 degrees. Rigors occur and are suggestive of the formation of pus.

Diagnosis. There is usually a history of dysentery, hepatic pain and enlargement of the liver. Examine the stool for the presence of amoeba. Leucocytosis is marked. In any obscure fever one should be always on the look out for this condition even though there may be no history of dysentery previously. This is especially true if there is any pain in the epigastrium or over the liver.

TYPHOID

There is a step like rise in the temperature over a period of 3-5 days. The fastigium may be for several days or for 4 weeks in which there is a continuous fever of 103-104 degrees. There is a diurnal remission of not over 2 degrees, and above 101 degrees. During the defervescence there is an intermittent lysis lasting for days or weeks. If the typhoid is mild it may be more intermittent in type. The fever is remittent in the morning.
Diagnosis of Obscure Fevers

PARATYPHOID

It may resemble typhoid but the fever is generally more intermittent in character and it may be quite irregular.

Diagnosis of the typhoid group—Blood culture, Widal, culture of stood, blood smear to exclude malaria.

UNDULANT FEVER

This fever may last from 60-90 days. It is a remittent fever from 103-105 degrees. It comes down to normal in the morning with an afternoon rise. Types, a. undulant—There is a crest in the remittent fever about every 10 days and a series of waves of remittent pyrexia. b. malignant type—A high continuous remittent fever as in typhoid. c. intermittent type—The temperature is 100 degrees in the a.m. and 101 degrees in the evening.

Diagnosis. Blood culture for the organism, agglutination, involvement of a joint in 40% of the cases. Occurs in milk drinkers.

CHOLERA

The rectal temperature may be high with a low body surface temperature. The other symptoms are very marked. If the patient is seen in the reaction stage it may resemble typhoid very closely. (cholera typhoid).

Diagnosis. Rice water stools, vomiting, collapse, culture of stools.

TRICHINIASIS

In this disease one gets a remittent or intermittent fever from 102-104 degrees. It lasts for several days to several weeks.

Diagnosis—Myositis, tension of the muscle groups, eosinophilia.

FOOD POISONING (Salmonella group)

There is an intermittent or a remittent fever and it resembles the paratyphoid chart quite closely. In such a case there is an intermittent pyrexia.
Diagnosis—History of eating something out of the ordinary and those eating it becoming sick at the same time, with vomiting and diarrhoea.

ABDOMINAL TUBERCULOSIS.

It is usually an intermittent fever with an evening rise in the temperature.

Diagnosis. There are usually abdominal symptoms and often symptoms of partial obstruction.

INFECTION BY WAY OF THE RESPIRATORY TRACT

One cannot here give an account of the various types of fever which are to be found in children’s diseases. In South China one must constantly keep in mind measles and smallpox. Recently diphtheria seems to be more prevalent than it was formerly. In the fevers due to the involvement of the respiratory tract there are usually some signs which will help one to arrive at a diagnosis. In influenza the onset is abrupt. The fever rises suddenly and falls again in several days by lysis. The headache and the pain in the back are marked and may be confused with the onset of smallpox.

CEREBROSPINAL MENINGITIS.

The temperature is not all characteristic. There may be no fever or the temperature may be 105-106 degrees.

Diagnosis. Signs of spinal cord and brain being involved. Organism found in spinal fluid on lumbar puncture.

ANTERIOR POLIOMYELITIS.

The patient may have a fever up to 103 degrees or more. There may be no fever at all. The paralysis may come on without any fever preceding it.

Diagnosis. Sudden onset, gastro-intestinal upset, presence of an epidemic.

LOBAR PNEUMONIA.

In central lobar pneumonia there may be no physical signs of consolidation for some time. There is a sudden rise in the temperature to 105 degrees in 12 hours and the remissions are
Diagnosis of Obscure Fevers

not marked. In from 5-10 days there is a crisis. Bronchopneumonia is usually preceded by a nasopharyngeal or bronchitic infection. In these diseases the white blood count is quite high.

TUBERCULOSIS.

In some cases of tuberculosis of the lungs the physical signs may be obscure and yet the patient may be having an intermittent fever with an evening rise in temperature. Acute miliary tuberculosis is often diagnosed as typhoid. There is an evening rise to 103-104 degrees and there is a remission of 2-3 degrees in the morning. The fever may be intermittent. There sometimes occurs an inverse type of fever with the pyrexia in the morning and the remission in the evening.

Diagnosis. Widal, blood culture, white blood count, X-ray of the lungs.

HEAT HYPERPYREXIA.

In this there is coma and it is accompanied by a high fever. It may be difficult to differentiate this fever from cerebral malaria where there is also coma with a high fever.

Diagnosis. Blood smear to exclude malaria. History of the case. The two conditions may be associated in the same patient.

In order to diagnose a fever whose origin is more or less obscure it is essential that one should be able to recognize the normal fever charts of the common diseases which are to be met with. One should also have a knowledge of the most common irregularities that are liable to occur in each of the fever.

ILLUSTRATIVE CASES.

Case No. 1. This was one of our hospital coolies, age 18. For 2 days before asking the doctor to see him he said that he had headache and was weak and unable to work. However he was able to partake of some food that the other coolies bought on the street. The same night he became nauseated and when his temperature was taken on the following day it was 100 degrees. He was seen in his room and was given a purgative, quinine and aspirin. One other coolie who had had some of this special food was unwell for 2-3 days with nausea, headache and fever.
On entry to the hospital the patient did not seem to be very ill. He complained of fever with no chills. He had headache, nausea and was constipated. There was a history of malaria the previous year.

Tongue was coated but moist, face flushed, spleen slightly enlarged, heart and lungs apparently normal.

For the first 5 days the fever was remittent. On the 6th day in the evening the temperature dropped to 95 degrees and did not return to normal for 24 hours. The temperature then rose and for the following 10 days there was a marked intermittent fever with an evening rise in temperature. Then there was a second marked remission. Just before this there commenced an inverse type of fever with the remission in the evening and the fever in the morning. This was followed by a remittent fever for 6 days. The fever then became intermittent of the inverse type with the fever in the morning and subnormal in the evening. This type persisted until the 38th day of the disease when the temperature became subnormal and in 2 weeks time had returned to normal without any further pyrexia. On the 23rd day of the disease the patient first complained of having a chill which was not severe. Several times during the course of the disease there was nose bleeding.

Before giving any further information such as laboratory findings and treatment let us consider the differential diagnosis. The diseases that one would think of in the four classes that I have given would be, malaria, sepsis due to some hidden focus of infection, influenza, tuberculosis, typhoid fever, paratyphoid fever, undulant fever, amoebic hepatitis, and food poisoning due to the salmonella group of organisms.

As far as malaria is concerned it might be a double infection of benign or malignant tertian. Double benign is much more common than double malignant infection. This patient did not seem to be ill enough to have a malignant malaria as we had difficulty keeping him in bed. On the 6th and 16th days of the disease blood smears were taken and did not show any malaria organisms present. However the patient had been given quinine before these smears were taken. On the 12th day quinine grains 5 was given intravenously. He was also given 12 grains per day by mouth. On the 16th day plasmoquine (grains 1/12th) was started, 2 pills per day. On the 23rd day the patient had a mild chill and on the 24th and 25th days was given quinine grains 10 intravenously. This did not seem to have any effect on the fever. On the 37th day he was given an intravenous injection of neosalvarsan .3 grams. The following morning the temperature rose to 101.6 degrees, the same evening fell to 95 degrees and there was no return of the fever. The
Diagnosis of Obscure Fevers

intermittent fever and patient being not very ill would point to a benign tertian malaria. If it were such it was quinine resistant. One notes that the inverse type of fever occurred after the plasmoquine was started. Whether the plasmoquine had anything to do with this is uncertain but it is suggestive.

The neosalvarsan given intravenously and the effect it had on the fever would suggest that the drug had some definite effect in controlling the fever.

As far as a focus of infection is concerned I may say that the W.B.C. on the 6th day was 7000 and on the 17th day was 7300. These blood counts should exclude the possibility of any focus of infection in the body.

Influenza is not suggestive. During the first couple of days the symptoms were not severe enough for the onset of an influenza. In the miliary form of tuberculosis there sometimes occurs this inverse type of fever as we see in the later stages of this case. This patient did not seem to be ill enough to have tuberculosis and the sudden onset would rule it out.

Amoebic hepatitis is a possibility but there are no definite symptoms of such and no history of any dysentery. Even without any history of dysentery one must still keep such a possibility in mind in South China where the amoeba is so commonly found. Undulant fever may be excluded as the patient has not been a milk drinker.

Typhoid group and the salmonella group must be considered. The nose bleed would suggest typhoid rather than a malaria. If the case is one of typhoid it must be an irregular one. It does not follow the normal course of a remittent fever followed by an intermittent fever with a gradual lysis. One would expect the patient to be much worse. This case did not resemble the other typhoids we had in the hospital at the time. As far as paratyphoid is concerned this temperature chart fits in very well with a paratyphoid of an irregular intermittent fever in a patient not extremely ill. The fact that one other coolie was sick after eating the food bought on the street would suggest food poisoning. Against this is the fact that the patient was not very well before he took this food.

I think we may bring the diagnosis down to one of malaria or the typhoid group of organisms. Blood culture on the 7th
day was negative for typhoid. Widal on the same date was negative for typhoid. Widal on the 20th day was negative for typhoid and also for paratyphoid A. Widal on the 27th day was positive for typhoid (1-40 complete). In order to control these Widals and to prove whether this was a false positive due to technicians error I have had the Widal repeated 65 days after the disease commenced and 38 days after this positive test. It was positive for typhoid (1-20 complete) and Paratyphoid A no agglutination. In this case the Widal first became positive between the 20th and 27th days. This is very much out of the ordinary. One also notes that it did not agglutinate in a very high dilution. The question arises as to whether this was a typhoid or was it some other member of the typhoid group. If it were one of the group one would expect to find some cross agglutination in the paratyphoid A. antigen.

There is also the possibility that we are dealing with two different infections in the same individual, namely, malaria and typhoid. One would be inclined to favour such a diagnosis.

*Points of interest*—1. Inverse type of fever following the use of plasmoquine. 2. Decline of the fever following the use of neosalvarsan. 3. Inability of quinine to control the fever. 4. Late date at which a positive Widal was first obtained.

With regard to the use of neosalvarsan let us look at Charts 2 and 3 which are rather interesting in this connection. In Chart 2 one sees a typical typhoid chart in which the fever carried on for 44 days before it stopped. On the 12th day of the disease and the 2nd day in the hospital the Widal was positive 1-40 and on the 19th day positive 1-80. As the intermittent fever was carried on to the 38th day I gave him an intravenous injection of quinine without any effect. Two days later I gave neosalvarsan .3 grams. The fever rose the following evening and then dropped to subnormal. In this case the pyrexia was in the evening. This would suggest that the neosalvarsan had some effect.

In Chart 3. the patient had a positive Widal 1-80 on the 12th day of the disease when first taken. On the 29th day of the disease the temperature suddenly dropped to subnormal without any return of the fever. The patient was being given some quinine by mouth at the time but did not have any injections at the time of defervescence. Most cases of typhoid do not end so
Diagnosis of Obscure Fevers

abrutly as this one did. This case is a control on the other two. The other two cases might have ended up as suddenly as they did even though one had not given any neosalvarsan.

Case 4. This man was 29 years of age. He took sick 6 days before coming to the hospital. He says that his sickness commenced with bleeding of the gums and the appearance of red spots all over the body. There was fever at this time but there was no history of a chill at any time. No haemorrhage at any time previously. Says that he had syphilis one year ago.

On examination the patient appeared quite ill, tongue dry and coated. There was an oozing of blood from the gums with some blood clots between the teeth and cheeks. All over the body there were numerous purpuric spots about 2-3 mm. in diameter. They were at all stages. Some were a bright red colour, others a dark red, and still others were a greenish yellow colour. On the back these spots had become confluent where the patient had had his back pounded as a method of cure at home. The spleen was slightly enlarged. The heart and lungs were apparently normal.

On the 5th day in hospital the patient complained of severe pain in the right lumbar region. This pain radiated down into the scrotum. At this time the urine showed a large number of R.B.C. with some albumen but no more than could be accounted for by the blood present. No pus in the urine. There was some blood in the stool. The stools were loose and of dark colour.

The patient was given calcium lactate by mouth (20 grains per day), with Pil parathyroid (grains 1/6th daily), and quinine 12 grains per day. This was given for 2 days and then on alternate days.

On the 4th day in hospital the purpuric spots began to clear up and no new spots appeared. By the 13th day the purpura had almost disappeared. At this time the patient went home on urgent business. His W.B.C. was 6,000 and R.B.C. 3,000,000. No malarial organisms were found on blood smear. Kahn test negative. Stool showed ascaris and clonorchis. Blood clotting time not determined.

After staying at home for one week he returned to the hospital. While at home he said that the lumbar pain was quite severe. He also had fever. The patient arrived back one evening and the next morning was given quinine intravenously grains 5. The pain in the lumbar region subsided on the following day. The same evening the temperature rose to 103.4 degrees. On the following day the temperature dropped. There was an abortive rise on the following day. The patient did not complain of a chill at any time.

Here we have a case of purpura of the haemorrhagic type. Purpura of course as we find it is only a symptom and not a disease in itself. We must try to find out the cause of such a condition occurring in an individual with fever.
Purpura may be infective, toxic, cachectic, neurotic or mechanical. With this fever one would expect some infection to be the cause. Of the infectious causes we have pyaemia, septicaemia, malignant endocarditis, typhus, smallpox, cerebrospinal meningitis and malaria. There are no indications that the patient is suffering from typhus or smallpox. If malignant endocarditis were present one would expect to find some lesion in the heart. It might be due to a toxaemia but one would not expect to have such a high fever.

The patient was given 12 grains of quinine per day by mouth. Not until an intravenous injection was given together with this dose by mouth was the fever controlled.

In true purpura haemorrhagica the temperature is not so high as in this case. In purpura haemorrhagica the blood platelets are diminished but not so in the other purpuras. The pain in the lumbar region in this case was due no doubt to blood clot in the ureter causing a spasm of the ureteral musculature.

In subtertian malaria one may have haemorrhage from the bowel with symptoms of dysentery. In such a case the temperature is usually high. Petechial haemorrhages and haemorrhages in the mouth are not commonly seen in malaria. One would say that this purpura was due to malaria.

I should like to say a few words about two conditions which we may fail to recognize when we come to diagnose disease in South China. The first condition is focus of infection hidden somewhere in the body.

Case 5 shows the chart of a patient who came in to the hospital complaining of cough, pain, and frequency of urination with blood in the stool in macroscopic amounts. Rectal examination showed some tenderness in the region of the prostate. A sputum examination done as soon as the patient entered the hospital was positive for tuberculosis. The urine showed some pus and a large amount of blood. The urine was positive for tuberculosis.

The next day the patient complained of some pain in the perineum. On examination the perineum was found to be bulging slightly. An incision was made and a good deal of pus was drained out. There were no organisms found in this pus.

The same evening the temperature had fallen and was normal by the following morning. Having found the organism for tuberculosis in the sputum and urine one thought that the fever was due to this tuberculosis
when it was caused by a collection of pus in the perineum, a hidden focus of infection.

The second condition that I would like to draw your attention to is the amoebic hepatitis following infection with the amoeba hystolytica.

Case 6 was ill for 2 months previous to entry to the hospital with chills and fever. This lasted for 14 days. Apparently he felt well after this. Seven days previous to entry he had chills and fever again. Five days ago he first complained of pain in the epigastrium and in the region of the liver. This pain persisted. There was no history of dysentery at any time.

On examination the liver was just palpable below the costal margin. It was tender. The patient was given acid sodium phosphate and aspirin by mouth. He was also given an emetin injection (grains 2/3) intravenously. The temperature came down and the pain in the liver decreased. Unfortunately the patient thought he was quite well and left the hospital and we were unable to follow up the case.

The presence of chills in a case of amoebic hepatitis generally means that pus has formed but this is not always the case. One would not expect emetin to have much effect in this case were there any pus present I think that we may diagnose the case as one of amoebic hepatitis although there was no history of dysentery nor could we find any amoeba or amoebic cysts in the stool. This patient was not given any quinine.

One should be constantly on the look out for this condition in medical practice in South China. Any patient with fever and some tenderness over the liver should be regarded as one of amoebic hepatitis until proved otherwise.

In South China there are five conditions which we must commonly differentiate and which may be the cause of a fever which is difficult to diagnose. These are the typhoid group, malaria, tuberculosis, amoebic hepatitis, and focus of infection.

The course of the fever and any abnormalities that are liable to occur in the temperature chart of these various fevers and also the common and special methods of differentiation must be on our finger tips if we are to approach a fever intelligently in an effort to trace it to its lair.
CASE II.

Diagnosis of Obscure Fevers
Diagnosis of Obscure Fevers

CASE IV.
CASE OF LEAD POISONING
WITH ASSOCIATED MINERS NYSTAGMUS
A. J. WATSON, M.D., D.P.H.

The following is an account of a very unusual combination of two industrial diseases in one man.

He was a Chinese labourer named Lee Fung Chuen, aged 25, who came to the outpatient department of the C. M. S. Hospital, Yunnanfu, on 10th November, 1930, complaining of drop wrist. He happened to come on a day when there was a very large clinic and it was only when he came on a later date, November 21st, that he was thoroughly examined. There was complete wrist drop on the right side and marked weakness on the left. The knee jerks were so brisk that knee clonus was obtained with the slightest tap. This was sustained.

There was no ankle clonus and the plantar reflexes were doubtful but appeared to be flexor.

The abdominal reflexes were as follows: Upper two quadrants brisk. Lower left absent, lower right very slight response.

Ocular reflexes. The pupils appeared to react to light and accommodation. The arresting feature was the marked nystagmus, which was circular in type. It was aggravated by light.

When a beam of light was reflected upon the pupil of either side there was a rapid oscillatory movement, the pupil was not drawn under cover of the eyelids but the wild mothlike movements continued as long as light was projected.

There was no intention tremor, no involvement of the sphincters and no ataxia. The man was of dull and lethargic type and his speech was of the drawling rather than the staccato type. He was very anaemic and a blood film showed some basophil erythrocytes but none with punctate stippling.
Diagnosis. When first examined the case was suggestive of Disseminated Sclerosis but the definite drop wrist would not fit in. The man had said that he was not working, but metallic poisoning i.e. Lead or Mercury seemed very probable as a diagnosis. It was only with difficulty that we were able to get the full history which made the diagnosis clear.

The man was not working because his employer had discharged him two months previously because of illness. He had suffered from violent colic and distressing vomiting with pains in the legs and increasing weakness of the wrists. He was anaemic and had suffered from loss of appetite and was quite unable to work.

His work had been the manufacture of white lead by a kind of Dutch process, for making "Face Powder" and paint. One hundredweight per week of white lead was made in the shop premises and besides this man only the employer and his family were engaged in the preparation.

A hospital representative visited the shop and verified the particulars and brought away samples of the lead metal and the half finished white lead as well as the final product. The man had been 14 months in all employed there and the colicky attacks began after 4 months and continued until he was too ill to work—two months before he was seen at the hospital. This interval would explain the absence of marked blue line and the absence of punctate basophilia in blood films. The diagnosis of Lead Poisoning was made with confidence, except that there was the nystagmus to be accounted for. The employer of this man stated that the eye movements were present when the man first came to him and said that his previous employment was in a lead mine near Yunnanfu.

When questioned the patient stated that he had first worked in the tin mines at Kochiu, Yunnan, but only on the surface. He had then come to the lead mine owned by the Chinese University of Yunnanfu. Here he had worked underground for four months. He was not very clear as to when his eyes became bad but admitted that they were bad before he went to the white lead manufacture.

The samples obtained were sent to Sir Thomas Oliver with an account of the case. They were reported upon by Professor
Briscoe of Durham University. The metal was substantially pure lead with no trace of mercury (which might have caused the nystagmus) and the powder was white lead with no trace of mercury in either.

Sir. Thomas Oliver who is an international authority on lead poisoning in a letter to the writer states:

I have never observed nystagmus in lead miners nor have I heard of one nor read of it, but prima facie one sees no reason why, if the cause is dim lighting (which is not always the case seeing that it occurs where electric light is used) nystagmus might not develop and be the explanation in your patient. Lead per se occasionally causes convulsive movements and tremors as well as paralysis so that the nystagmus might possibly be the result of the metal—usually where lead affects the muscles of the eyeball paralysis however is the sequel.

The lighting of this mine is very bad indeed and it is reasonable to make a diagnosis of Miners Nystagmus with Chronic Lead Poisoning in this case, as Sir Thomas Oliver states that he has never seen nystagmus associated with lead poisoning and that mercury poisoning from a trace of that metal is ruled out by the report of Professor Briscoe.

The patient was not seen for more than 5 months after his discharge from Hospital. On May 15th he came to the O. P. department for some gastric disorder. He said that he was now working in a flour shop. The symptoms of lead poisoning had almost entirely abated. The wrists were weak still but he was able to extend both sides. The knee clonus had disappeared and the reflexes were normal. There was still a trace of blue line and possibly there was still some elimination of lead going on.

The nystagmus was however still present and the effect of light from a hand torch caused the same violent exacerbation of the movements.

It is interesting to find "Face powder" again if indirectly concerned with Lead Poisoning after the several other reports from China and the Straits. The manufacturer of the powder here had come to Yunnan from Canton and had introduced the business fairly recently. There are in Yunnan several villages where white lead is made on a small scale and used in the preparation of paint.
MUMMIFIED TUBAL
PREGNANCY RETAINED ELEVEN YEARS

Report of a Case

HYLA S. WATTERS, M.D., D.T.M. and H.

This case is reported because of its unusual nature.

Hospital Number 1930-716. The patient, a farmer woman 34 years old, was admitted to Wuhu General Hospital, July 15, 1930, complaining of abdominal pain.

Admission note, July 16: Abdominal mass for about eleven years. Child born in 9th month last year,—during pregnancy—mass moved up into right side—returned to mid-line after delivery. Pain in abdomen for “ten and some” days. Needling done, with no improvement. Story is confused, but there seems to have been little or no growth in the mass in some years.

Mass is hard, medial, large as a 6 months fetus, not movable, painful on palpation, especially mid-line and right side.

History and physical exam. C. C. Abdominal pain.

F. H. Father died at 48 years of pulmonary tuberculosis (cough and blood-spitting). Mother died at 30 years, in quarrel with mother-in-law, a month after child-birth. One brother living and well. No sisters. Two half-brothers, living and well.

P. H. General health good. Smallpox in childhood. Reddish skin eruption at 17 years. Occasional poor hearing, left ear. No other illnesses remembered. Betrothed at 3 years and went to husband’s home to be brought up. Married at 19, 15 years ago. Menstrual periods: time of onset forgotten. 30 days interval, 3 days duration. Blood moderate, slight pain. 11 years ago present abdominal mass developed. Patient feels that it has not grown since that time. 9 years ago, normal pregnancy and delivery. Female child, at term but small and thin, “size of a little cat.” Died of smallpox at 3 years. 5 years ago, normal pregnancy and delivery. Female child, living and well. 9 months ago, normal pregnancy and delivery. Male child, living and well. No milk for any of these, fed by neighbors. No miscarriages. During pregnancies, the abdominal mass always moved up into right side, to return to mid-line after delivery.
P. I. 15 days before admission, patient suddenly began to have abdominal pain, most marked in epigastrium. No vomiting. Daily fever. Difficulty in urination. Pain worse right side than left, patient lay most comfortably on right side, legs straight. No sleep, poor appetite, fever. Patient was carried 30 li in a chair to hospital.


Local condition: Protruding mass present in middle of lower abdomen, as large as a 6 to 7 months fetus but very hard, immovable. Tender over lower portion just above symphysis. Mass is smooth, abdominal wall not freely movable over it. Both lower quadrants tender. No other masses palpable in abdomen. Spleen not palpable. Over the mass skin shows many bluish discolorations of the sort made by "fire-needle" treatment. On the left lower quadrant three and on the right lower quadrant two round lesions, superficially infected, evidently the result of recent and unhealed punctures.

Vaginal: Introitus normal. Cervix has scars of old lacerations, otherwise normal. Large, tense, hard and tender mass palpable anterior to cervix, not movable. Tenderness most marked in right fornix.

Impression: Abdominal tumor of unknown nature Possibilities most likely: (1) Myoma uteri, (2) Ovarian cyst.

Progress notes:

July 17. Pt. complains of difficulty in urination and defecation for the past few days. Also of pain, perhaps due to bladder distention.

July 18. Pt. was much relieved by catheterization last night. Five ounces of urine obtained. Feeling much better today.

July 19. No further trouble in urination.
July 25. Fire needle marks nearly healed. As Dr. Darley will not be here after tomorrow and this operation needs two surgeons, it is decided to sterilize the fire-needle lesions (for whose healing operation has been delayed) and seal them with collodion and do the operation tomorrow. Patient is willing, and has been urgently requesting operation ever since admission.

Operation note:  

Operation: Resection, right tube, with mummified fetus, and ovary. Appendectomy.

Pathological findings: Uterus and left adnexa normal. Right tube enormously dilated, occupied by a mummified fetus of nearly full term size, in R. O. P. position. Placental attachment through tube wall to anterior abdominal wall at level of symphysis, above bladder.

Right ovary slightly enlarged, cystic, hanging from the enlarged tube.

Mass about 1 1/2 inch in diameter, apparently a myoma, present below fetal head, just to right of uterus, in broad ligament or lower part of tube.

Appendix represented by some tags of rotten tissue. Large gut, small gut, appendix, omentum, and abdominal wall, all adherent to the mass.

Procedure: Before operation, abdomen painted with iodine and “fire-needle” marks covered with collodion.

Mid-line incision, from just above symphysis to about 2 inches above umbilicus. Adhesions separated on all sides and tied where vascular. (Omental adhesions carried large vessels). Appendix and some accompanying tags of tissue ligated, removed with cautery, base buried under chromic gut pursestring suture. Clamps applied to broad ligament both sides of the mass, and the entire right tube with its contents and the accompanying myoma and ovary removed.

Resulting edges whipped with chromic gut and united. Hemostasis reviewed.

Part of placental tissue left adherent to anterior abdominal wall. Since some grayish fluid contents of fetus had escaped into abdomen during separation of adhesions, when thin tube
X-ray of Tumor
Day of discharge. “Feeling better than in the past eleven years.”

The patient and her tumor.

Proving it to the family.
wall repeatedly tore away, a cigarette drain was inserted to site of tumor.

Abdomen closed in layers, chromic gut in deep layers and silkworm gut interrupted sutures in skin.

Dressing applied. Hypodermoclysis of 1000 cc. saline given. Patient sent back to ward in fair condition.

*July 26, Evening.* Further history obtained: 11 years ago, while the abdominal mass was developing, there was no menstruation for ten lunar months, and patient supposed she was pregnant. Fetal movements were felt in abdomen up to term, when she went into labor. Movements were most felt in right side.

Labor was continued, with severe pains "day and night for thirty days," but she was unable to deliver. Patient ate opium on account of the pain. A Chinese doctor was called, who drove in fire-needles (red hot) about two inches deep—patient estimates these as "very many," "several hundred," driven in at several sittings. She was told that the mass was not a fetus but the accumulated blood from her suppressed menses. Fetal movements stopped, and mass ceased to grow. After this, menstruation was irregular, occurring at one to two months intervals, blood scant and dark-colored, pain referred to right side.

The three succeeding pregnancies and deliveries were uneventful, the mass being displaced upward and to the right by the developing fetus and returning to place after delivery.

**Progress notes, continued.**

*July 28.* Considerable sero-sanguinous discharge. X-ray of tumor clearly shows skeleton of fetus.

*July 29.* Wound in good condition. Discharge around drain.

*July 30.* Drain is being shortened about an inch each day. Wound clean. Considerable serosanguinous discharge around drain.

*August 1.* Drain shortened about an inch as usual. One suture removed on account of tenderness. Wound clean.

*August 1, evening.* Dressing changed. Sero-sanguinous discharge present around drain.

August 4. Sutures removed, 9 days post-op. Wound healed except for drain-hole, which is one inch deep. General condition excellent.

August 6. Drain wound is even with surrounding skin. Rest of wound completely healed. Patient complains of itching of skin around wound. Dead skin washed off with gasoline.

August 9. Allowed up in chair. 14 days post-op.

August 10. Small fistula remains at drain site. When patient urinates, this discharges sero-sanguino-purulent fluid about a quarter of an ounce. Patient says this has been so ever since she sat up for the first time after operation. She thinks the amount of fluid is decreasing. Otherwise, condition is excellent.

August 18. Wound completely healed. Middle of epigastrium is very tender. Gas distention present, moderate. Enema ordered.

August 20. Condition excellent. Some tenderness remains, both sides of epigastrium. Patient has been given a print of the X-ray of the fetus. She goes home today, saying that she feels better than she has felt in eleven years.

Laboratory findings.

Urine—July 30: yellow—acid—1016—no albumen—no sugar.

Stool—August 1: yellow—soft—ascaris ova found.

Blood—

<table>
<thead>
<tr>
<th></th>
<th>July 16</th>
<th>July 23</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. B. C.</td>
<td>15,200</td>
<td>15,200</td>
</tr>
<tr>
<td>Neutrophiles</td>
<td>82%</td>
<td>81%</td>
</tr>
<tr>
<td>Small monocytes</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>Large monocytes</td>
<td>6%</td>
<td>9%</td>
</tr>
<tr>
<td>Eosinophiles</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Basophiles</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Transitionals</td>
<td>1%</td>
<td>1%</td>
</tr>
</tbody>
</table>

Blood—July 29: Kahn test neg.

We wish to express our appreciation for the valuable cooperation of Dr. Darley of H. M. S. Gannett.

In conclusion, I think we should express our fellow-feeling with the husband who, when patient told him what we had found, gasped with astonishment and said, "Ni shih hu li yün tung ti," which will be recognized as the Chinese equivalent of "You are dizzy in the head."
A BRIEF STUDY OF CANCER OF CERVIX AMONG KOREAN WOMEN AND ITS TREATMENT

J. D. Bigger, M.D., Pyengyang Union Christian Hospital, Korea.

As Cancer of the Cervix is considered the most common in the human body and a good percent can be cured, 18% of all cases reported by Dr. Cullten of Johns Hopkins, 54% of early cases reported cured by Dr. Kelly of Baltimore and 71% of early cases by Mayo Clinic, it should be a subject of interest to us all.

From casual observation it seemed to me that among Korean women Cancer of the Cervix appeared earlier than in the women of America and Europe. One would think that in early marriage and oft returning pregnancies cancer would occur earlier, hence the impetus for this study.

In the last two years we have had thirty-three cases of which nine entered the hospital for operation. From our request for statistics from other hospitals in Korea only Dr. Black of Lungchingtsun reported five cases in 1930. His youngest case was 35 years and oldest 54 years old.

Dr. Gardner in Nelsons’ Surgery says that more than 50% of cervical cancer occurs between the age of 35 and 50 years and cases have been reported even in the teens. Only 2% were in nulliparas.

In our series of cases the youngest was 30 and the oldest was 60. Counting Dr. Black’s cases the average age was 45. All had had children and only one woman of 60 had passed her menopause.

With such a small number to judge from it appears that cancer of the cervix among Korean women occurs at about the same age as in American and European women.

In past years we used to consider these cases, usually late ones, hopeless and dismissed them. Since the installing of an Endothermy machine operation has been advised and X-ray after treatment: Only 9 have been operated on with Endothermy, the one of 60 years received X-ray only. All of the 9 were

*Read at the Spring Meeting of the Korea Medical Association, 1931.*
fairly well advanced cases with histories of bleeding and foul odorous discharge from 3 months to one year. At first the operations were considered only palliative. Even if the patient lived only a little while the relief from discharge and hemorrhage was considered worth-while.

In a recent follow up of these cases we were surprised to hear that 5 were reported cured. As the longest time was only 2 years these cannot be considered as cures by any means, but it does show that the distressing and weakening hemorrhage is gone and some of these will remain cured.

Four were reported dead, the earliest three months after operation and the latest five months after, but relatives reported that the symptoms had been alleviated.

Two cases did not report. All operated cases had X-ray treatment and two had vaginal hysterectomy later. The two hysterectomies seem to be cured.

The latest treatment in America is a combined one but some advocate radium alone, most radium and diathermy and some diathermy and X-ray.

In all articles reviewed great emphasis was made on early diagnosis. Dr. Novak of Baltimore says that the great majority of cervical lesions are obviously benign or malignant, only about 5% need microscopic examination. We used to think that biopsy was dangerous but it is not now so considered if treatment follows soon after. It is indicated where the cervix is granular, vegetative, ulcerative or very vascular, also in erosion or ectropion where there is a hardened or raised area with vascularity, sponginess, or tendency to ulceration.

With the free service of the Severance Pathological Research Department we in Korea can get reports within a week.

None of us have yet become wealthy enough to own radium but to most electricity is now available and Endothermy machines are becoming common. Dr. Curtis of Chicago says that Endothermy has added very materially to our clinical cures of cancer of cervix. It can be used under local, sacral, or spinal anaesthesia, requires no special preparation and the results are so encouraging that I would like to see it used in all our hospitals wherever possible.
SOME CONGENITAL ANOMALIES OF INTEREST

NATHANIEL BERCOVITZ, M.D.

American Presbyterian Hospital, Hoi How, Hainan.

Within the past few months a number of cases of congenital anomalies have been seen in the hospital. Those are mentioned briefly as a matter of interest.

O.P.D. April 25, 1931. Congenital left inguinal hernia in twins. A man brought in twin boys, 16 months old, each showing congenital inguinal hernia on the left side. The father claimed that the herniae were present at birth. The boys were taken home.

Inpatients No. 32015, and 32016. Brothers, age 16 and 13 respectively; both with left inguinal hernia, the history of which together with operative findings, brings about the diagnosis of congenital left inguinal hernia in brothers.

O.P.D. May 5, 1931. A girl of 3 years was brought into the clinic with a complete cloaca. Under anaesthetic, an examination showed absence of the anus, the lower bowel opening into a common passage with the vagina, which was separated from the rectum by a thin membrane, extending about \( \frac{3}{4} \) of an inch from the posterior fornix.

O.P.D. May 8, 1931. A child two days old was brought into the clinic with imperforate anus. The abdomen was greatly distended. The anal dimple was present. The parents consented to exploration of the anal region only, at which time a fibrous cord was found but no sign of rectum.

Inpatient No. 33224. A boy of 12 with double harelip was admitted and operated. The palate was intact.

Inpatient No. 33224. Girl age 6 months. Congenital atresia of external genital organs. Examination showed labia majora, with anterior folds of nymphae showing only. Very tiny urethral opening. Between the labia majora, and from the anterior folds of the nymphae to the perineaeum extended a membrane of skin. Under anaesthesia the urethra was located, and the membrane of skin divided. Underneath the skin the external genital organs were found normal in shape and position.
O.P.D. May 28, 1931. A boy of 18 months was brought into the clinic showing no anal opening, although an anal dimple was present. Feces were discharged through an opening at the base of the scrotum. The discharge of feces was involuntary. No further examination was permitted.

O. P. D. May 28, 1931. A boy of 16 was brought into the clinic with hypospadias of an unusual type—the urethral opening being at the base of the scrotum, and the testicles being in two sacs. The right testicle was well formed, and seemed normal. The left testicle was small and soft—apparently undeveloped. The penis was small and sharply curved posteriorly, being held down by a band of fibrous tissue which probably represented the undeveloped urethral canal. The pubic hairs were scanty, and of the female type. The boy claimed that there was occasional sexual desire, with partial erection.

REPORT ON EXAMINATION OF STOOLS

Dr. A. G. Taylor, Lanchow, Kansu

April 1931

92 cases examined (majority once, a few twice)

<table>
<thead>
<tr>
<th>Organism</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Councilmania, E. Coli</td>
<td>31.5%</td>
</tr>
<tr>
<td>E. Nana</td>
<td>10.0%</td>
</tr>
<tr>
<td>I. Butschlii</td>
<td>8.7%</td>
</tr>
<tr>
<td>Chilomastix</td>
<td>6.5%</td>
</tr>
<tr>
<td>Giardia</td>
<td>5.4%</td>
</tr>
<tr>
<td>E. Histolytica</td>
<td>5.4%</td>
</tr>
<tr>
<td>Trichomonas</td>
<td>1.1%</td>
</tr>
<tr>
<td>Ascaris</td>
<td>44.6%</td>
</tr>
<tr>
<td>Taenia Saginata</td>
<td>2.2%</td>
</tr>
<tr>
<td>Trichuris</td>
<td>1.1%</td>
</tr>
<tr>
<td>Ancylostoma</td>
<td>1.1%</td>
</tr>
<tr>
<td>Strongyloides</td>
<td>1.1%</td>
</tr>
</tbody>
</table>

Trichuris and Ancylostoma found only in patients who have come from other provinces, neither observed in local people.

Trichomonas only seen once this winter, apparently more prevalent in summer (several cases seen last summer).
Institute of Hospital Technology Laboratory Course

The following schedule is printed for the general information of physicians sending students to the I.H.T. for study. The Institute laboratory is however being refitted and when this is completed a revision of the schedule will be made. The I.H.T. will welcome any suggestions that will make the laboratory course of greater value to students from Mission Hospitals.—Editor C.M.J.

TESTS AND METHODS OF EXAMINATION AVAILABLE AT THE LABORATORY, UNION HOSPITAL, HANKOW

The I. H. T. laboratory students carry out all these procedures, or at least see them demonstrated and are taught the methods. Some they have very little practice in using; but those that are italicised in the lists below they are at least fairly well drilled in, and in many cases very thoroughly. These they should be able to carry out in their own hospitals on their return as satisfactorily and reliably as the native ability of each, the facilities of his own hospital, and the obvious limitations of a five months' course permit. Their technique may be expected to steadily improve as their own hospital doctors give them encouragement and opportunity for using their knowledge.

URINE.

*Routine Examination (Colour, reaction, sp. grav., albumen, sugar, bile if urine is a deep colour, microscopic examination of any sediment)*

- Diazox
- Chloride
- Haemoglobin
- Acetone
- Quantitative sugar
- Quantitative albumen
- Quantitative urea
- Microscopic examination (centrifugalised)

- Diacetic acid
- Indican
- Globulin
- Albumose
- Serum albumen
- Serum globulin
- Nucleo-albumen
- Total solids
- Cultures.
FAECES.

Routine Examination (Colour, consistence, ova, protozoa, cysts, occult blood.)

Iodine cosin method for cysts. 
Iron haematoxylin method for cysts. 
Centrifuge method for ova 
Incubation method for Schistosoma 
Differential pus cell count 
Reaction 
Bile 
Fat

Hook-worm egg count 
Mounting worms 
Cultures Shiga's bacillus 
B. Typhosus 
Paratyphoid A Bacillus 
B. C. C. 
Cholera vibrio

SPUTUM.

Routine Examination (Colour, consistence, ova, Ziehl Neelsen's staining for T.B., Vincent's bacillus, other bacteria and bronchial spirochaetes)

Special test for elastic fibres. 
Antiformin test for T. B. 

Cultures pneumococci 
K. L. B.

BLOOD.

Routine Examination (R.B.C. count, W.B.C. count, differential leucocyte count, Hb. percentage, R.B.C. anomalies, parasites)

Colour index 
Bleeding time 
Coagulation time 
Kala azar tests 
Blood grouping 
Fragility test for R. B. C.

Bremer and Wilkinson's test for diabetes 
Cultures B. typhosus 
streptococcus 
gonococcus 
meningococcus

BLOOD SERUM.

Widal test 
Kahn test

FLUIDS.

Routine Examination (Colour, reaction, specific gravity, globulin, sugar, microscopic examination)

Cell count 
Differential cell count 
Smears for bacteria 
Tests for saliva

Lange's colloid gold chloride test for spinal fluid. 
Gastric analysis 
Cultures

PUS, SWABBINGS, ETC.

Smears of common pathogenic bacteria (including M. leprae) 
Dark ground examination for S. pallida 
Parasitic fungi of skin.

Cultures of:—
Staphylococcus, Streptococcus, 
Pneumococcus, B. Pyocyaneus, 
K. L. B., Gonococcus.

TISSUE SECTIONS.

Paraffin embedding, cutting, mounting and staining.
THE INSTITUTE OF HOSPITAL TECHNOLOGY

It is with very great pleasure that we are able to inform our readers that the Institute of Hospital Technology is again looking forward to full courses in the coming session.

The Institute has been greatly hampered in the past year by the absence of its Director, Dr. George Hadden, who had to leave rather suddenly for health reasons. Dr. Hadden is now back in China and taking up his work again in the autumn.

The Staff of the Union Hospital have done a fine bit of service in keeping the Institute going during Dr. Hadden's absence but necessarily some courses had to be dropped and others curtailed. The present prospects for work are however excellent. Dr. Hadden is back with renewed vigour and Miss Waddington, the trained technician provided by the American Church Mission, will be taking up her side of the work.

In the July number of the Journal we published a brief account of the I.H.T. during the past year but the manuscript of this was received too late to allow of any editorial note. This month we publish a syllabus of the laboratory course given to technician students, and hospital doctors are asked to note the request that accompanies this.

Finance is still a difficulty to be overcome and while a few of the Missions are giving splendid assistance to the Institute, its needs have not yet been brought home to others. We know of no object at the present moment more deserving support nor more able to give really valuable assistance to country hospitals in a minimum of time and at a minimum cost. We therefore trust that the Institute will receive the fuller support which it deserves and we do not hesitate to urge every medical missionary in China to press the claims of the I.H.T. on his own Home Board.
INDUSTRIAL DISEASES

The importance of industrial diseases in this country has hardly yet been realised and the literature available on the subject is very limited. The paper by Dr. Watson of Yunnan in this number of the Journal is therefore very welcome and we wish that other members meeting with diseases directly due to industrial conditions would report these for publication.

Dr. Watson's case has a special interest in that it combines two diseases of this nature in one patient, a combination very rarely met with. Both of them are important but the lead poisoning especially so, as it brings the problem of face powder poisoning again before us. The deadly nature of some of these powders is evident and it is to be hoped that before long some steps will be taken by those in authority to mitigate this evil. We shall be specially glad to publish notes of any further cases of this nature that are met with. Publicity is the only way at present to focus attention on this important matter.

SURGICAL FAILURES

Dr. Price's paper on post-operative deaths is one of great value whether we all agree with his conclusions or not. Its special merit lies in the fact that it compels or should compel all who are engaged in regular surgical practice to stop and think. If these thoughts are followed by a personal valuation of the work done and the failures which greater care and better technique might have obviated the end and aim of this article will have been obtained.

We are not going to allow that we are entirely convinced by all Dr. Price's arguments. His case would have been much stronger if full post-mortem findings had been available in these cases. They are not and could not be in the backward state of the law as related to medical practice in this country, but in the absence of these there must remain some considerable doubt as
to whether all deaths classified as either inevitable or avoidable are fairly placed in these categories.

There are one or two points moreover on which we definitely join issue with the writer of this paper. We differ from him in regard to the statement that "Long operations in themselves are not dangerous." It is true that he qualifies this by stating the things that make these dangerous but it seems to us that this is hardly a fair way of putting it when one or more of these are the necessary accompaniment of certain operations. We maintain that long operations on the general peritoneal cavity are dangerous because they almost necessarily involve a considerable amount of shock and possibly a good deal of unavoidable handling of the abdominal contents.

The danger is obviated to some extent when really skilled nursing and after treatment is available, but in the absence of this and as a result of considerable personal experience of their absence we came to the definite conclusion that our own chances of saving a patient in a serious abdominal operation varied inversely with the time that the operation lasted and that the mortality was very high if this were over an hour. We believe that speed in operation ought to be much more impressed on young surgeons.

The other point on which we differ from the writer is on the question of incision and drainage in cases of cellulitis and streptococcus infection. We do not understand the very high mortality to which he refers and suspect that it must be due to some special type of case. There must be few with extensive surgical experience at large war hospitals during the war who did not have to deal with many of these cases and though they gave us frequently a very anxious time and often required prolonged treatment the mortality was very low indeed, except where the bacillus of gas gangrene was the cause of the cellulitis.

A paper of this kind naturally invites criticism and there are not a few points on which differences of opinion may exist but it will prove of very great value if it compels surgeons to think more carefully and plan more thoroughly the treatment especially of the border-line cases.
THE TREATMENT OF MALARIA

Extracts are given in Current Medical Literature this month from two very interesting papers on Malaria.

An enquiry has been going on in the British Army in India on the use of Plasmoquine and Quinine in the treatment of benign tertian malaria. The conclusions reached are given in this issue and should be carefully studied. There is a practically unanimous opinion that the use of plasmoquine with quinine marks a great advance in the treatment of malaria when the drug can be used under control. The answer to the question whether it can be given to patients not under medical control is a little disappointing but we have no doubt that having advanced so far the manufacturers will sooner or later be able to improve this product to the stage where it can be employed on a wider scale.

The second paper referred to is one dealing with the drug prophylaxis of malaria and suggests an advance in this line that may almost work a revolution in our views on malaria prophylaxis where mosquito destruction measures are impossible. We gather that the drug referred to is not yet on the market but further information on its use will be anxiously awaited.

DR. D. DUNCAN MAIN

The Executive Committee at its last meeting on 12th June was notified of the approaching golden wedding of Dr. and Mrs. Duncan Main on 1st September of this year, and adopted the following minute:

The Executive Committee of the China Medical Association has heard with great interest of the forthcoming golden wedding of the distinguished former President of the Association, Dr. D. Duncan Main.

The Committee desires to convey to Dr. and Mrs. Main its very warm felicitations for this auspicious occasion and its best wishes for many years of continued happiness.
We know that all the members of the Association will join very heartily in the good wishes thus expressed. Dr. Main has left us now for some years but the memory of his work is still fresh and if here we miss his smiling face and merry jokes we trust that he will still be spared for years to come to strengthen and encourage those at home who have the work in China on their hearts.

---

THE LEPROSY NUMBER

We had hoped to have been able to issue a special Leprosy Number of the Journal this month. Owing, however, to delays in securing some of the material for that issue we have decided to delay its publication for a month. This special number will be issued next month, September.
WEST CHINA UNION UNIVERSITY CLINICAL MEETING

A Clinical meeting of the Medical-Dental Faculty of the West China Union University was held at the Women's Hospital, Chengtu, on Friday evening May 15th with Doctor Retta Gifford Kilborn in the chair.

Several members presented case reports. An opportunity to discuss these cases was given.

Dr. E. C. Wilford reviewed the last seven cases of appendicitis on which he had operated. Several of these were complicated by rupture and others were about to rupture. It was pointed out that in all these cases, six of which were performed on Chinese, it was remarkable that in the Chinese patients the constitutional symptoms and signs, i.e. pulse, temperature and pain, were very mild considering the condition found at operation. A second interesting detail brought out was that all these cases were Christians. Dr. Wilford quoted statistics from Shanghai hospitals to show that appendicitis is much more frequently diagnosed in white people than in Chinese. He queried whether it be really a fact that westerners are affected with this disease more frequently than the Chinese, or is it merely a question of diagnosis of cases of appendicitis in white people presenting themselves more often for examination.

In the discussion Dr. Canright stated that most of his recent appendectomies had been on non-Christians and he was inclined to believe that the disease was merely more frequently diagnosed in white people. Dr. Anderson concurred in this opinion. Dr. Canright also discussed the etiology of appendicitis and reviewed very briefly work done by Rosenow and Dunlap which indicated the selective action of the organism taken from infected appendices, in producing similar lesions in rabbits injected with the infected material. He also referred to other work by Rosenow, Dunlap, Evans and others showing the relation between naso-pharyngeal streptococcic infections and appendicitis. Dr.
Williams expressed the opinion that one factor in the apparent increase in the number of cases of appendicitis among the Chinese was undoubtedly an increased knowledge among people of the possibilities of their abdominal pains, which lead to more frequent diagnosis of the condition.

Dr. S. H. Liljestrand presented an interesting paper on “Indications for Cystoscopy.” These he divided into extrinsic—those outside the urinary tract and, intrinsic—those caused by true urinary disease. Under the first group he placed: 1, Uterine displacements; 2, Adnexal disease; such as ovarian cyst or abscess, tubal disease, cancer of the cervix; 3, Blood infections, e.g. motile amoebae had recently been found in the catheterised renal pelves of five cases. Under the second group, indications were persistent pyuria and hematuria, pain or tenderness in ureter (reference was made to “Hunner’s point” in diagnosis); lumbar pain or distress. Other general indications suggested were: loss of appetite and indigestion which often accompany stricture of ureter; nausea and vomiting which may be reflex manifestations of irritation in renal pelvis; chronic appendicitis, which often turns out to be an infection of the urinary tract; abdominal pains of obscure origin. Cases illustrating the points were cited. A short outline of the methods and technic was given and the paper concluded with the statement that, “The Surgical and Medical competency of the urinary tract is a major consideration and demands the diagnostic attention by aid of cystoscopy, ureteral catheterisation, intravenous functional tests and pyelography.”

In the discussion following Dr. T. H. Williams remarked that the bladder was a half way house, where the urine waited or that the bladder might be called one of those individuals who makes louder complaint than his neighbors if conditions are not satisfactory. This being true, cystoscopic examination was one of the best methods of revealing kidney disease. In reference to the finding of amoebae he stated that in the laboratory they could but report what was seen and that there seemed after all no good reason why amoebae should not follow the example of the bacillus coli and travel up the urinary tract to the bladder and the kidney pelvis. Dr. Canright emphasised the need of careful differential diagnosis between pyelitis and appendicitis,
particularly in children. A demonstration of cystoscopy was given by Dr. Liljestrand.

Dr. G. S. Cunningham illustrated with a group of cases, some of the commoner causes of fever of extra-pelvic origin during the puerperium. She pointed out that since no conscientious obstetrician could leave the cause of a temperature during the puerperium undiagnosed, it became his or her business to rule out pelvic infection. Thereafter he could look in many other places for the cause. Cases cited included, phlebitis, pyelitis, mastitis, malaria, endocarditis, stitch abscess, common cold and small pox. Dr. Wilford remarked that in private practice in Canada he had had a case which gave him several bad nights, till he found the causative factor of the temperature—an abscess in the calf of one leg.

On account of the lateness of the hour, a paper by Dr. Retta G. Kilborn on "Four Cases of Infected Knee Joints" was left over till another meeting.

Announcement was made that the second meeting would be held on May 29th when a program would be presented at the Men's Hospital by members of the staff there. The meeting adjourned.

Edison R. Cunningham
Secretary.
SOOCHOW HOSPITAL, 1930. M.E.F.B.

K. C. Wang and four internes.

Nurses: Two Foreign, 29 Chinese graduate and 16 student nurses.
In-patients 1,183 Out-patient attendances, 19,859

Of the many interesting points in this report perhaps that of finance is the most striking. The increase of local income is quite phenomenal being $14,679 more than in the previous year and $35,088 more than in 1928. In addition to this, the Park Memorial Fund has been completed and this totals over $20,000. An income of $2,000 from this fund is assured for the treatment of poor patients. The local income is now 90.4 per cent of the total cost of maintenance.

Reports are given of the different departments with separate tables of diagnoses for each department. This adds to the interest of each separate section but the absence of a general list of diagnoses, does, in our opinion, detract from the value of the report as a whole.

The report of the surgical department deals with a remarkable series of operations for appendicitis, this series, however, is included in the very interesting paper on this subject published in our July issue.

The Medical department reports Tuberculosis, Epidemic Meningitis and Malaria as the three diseases most frequently treated. It is rather sad to see Epidemic Meningitis taking such a high place. The disease appears to be getting an endemic hold on these regions. The typhoid fevers appear in the proportion of Typhoid 28, Para A. 14 and Para B. 1. We would suggest the desirability of examining for Para C in future as there seems some possibility of this being of greater importance than has hitherto been recognised.

The report contains some excellent illustrations including Dr. Snell’s now famous case of frontal mulocele.
LUCHOWFU CHRISTIAN HOSPITAL, ANHWEI.
1930. U. C. M. S.

Staff: Drs. D. S. Chen, D. S. Corpron and H. F. Tsuei.
Nurses: One Chinese graduate and 16 pupil nurses.

In-patients 791 Out-patient attendances 14,319

The hospital is to be congratulated on the installation during the course of the year of a new and up-to-date X-ray outfit, the consummation of several years effort in the face of many difficulties. The report this year is taken up largely with the problem of acquiring and then transporting this outfit, no small task through a bandit-ridden country, and finally dealing with the very complicated problem of installation.

A full list of in-patient diagnoses and another of operative procedures are given also lists of laboratory and X-ray work.

The statistics for the hospital and a brief financial statement close the report.
REPORT ON A TRIAL OF PLASMOQUINE AND QUININE IN THE TREATMENT OF BENIGN TERTIAN MALARIA

MAJOR J. A. MANIFOLD, D.S.O.
Royal Army Medical Corps.

In conclusion the objects of the investigation may be reconsidered, with a view to ascertaining whether answers to the questions at issue have been arrived at.

(1) Whether the treatment may be safely given to all classes of patients whatever their physique may be?

The answer as far as the British soldier in India is concerned appears to be definitely "yes." As regards the Indian sepoy and follower the answer appears to be also in the affirmative for the great majority of cases.

In a small minority, about 0.1 per cent, it is possible that an attack of blackwater fever may be precipitated in individuals who have suffered from many attacks of subtertian malaria. The percentage is probably even smaller than appears from the results in this series of cases, as plasmoquine in larger daily doses, and over a period of five to twelve days, has been used to destroy the gametocytes of \textit{P. falciparum} in most tropical countries. The number of cases treated must by now be very large, and instances of methaemoglobinuria occurring after treatment seem practically negligible from the literature available.

As in both British and Indian cases there appears to be a small percentage with a definite idiosyncrasy to the toxic action of plasmoquine, patients will require to be kept under observation, and should be excused duty during the three weeks' treatment. While keeping the symptoms of the toxic effects in mind great care is obviously necessary to avoid the effect of suggestion on the minds of patients with regard to these symptoms.
It also appears that minor manifestations may, as long as a watchful attitude is adopted on the part of the physician, be disregarded in the large majority of cases and treatment not withheld.

(2) Whether such toxic effects were observed more frequently in the British or Indian group?

The answer appears to be that epigastric pain, cyanosis, etc., were less frequent among Indian cases, but that the difference in the incidence was probably largely due to colour, and to the different mentality in the two groups. If the later cases in the registers of both groups are compared, there is little difference in the incidence of toxic symptoms.

(3) The incidence and importance of toxic manifestations. These are fully discussed in the body of this report. The incidence is low, and would certainly be lower in any future series of cases treated by the same medical officers. Toxic symptoms are of importance only in a very few cases with special idiosyncrasy, and as long as a look-out is kept for the possible occurrence of such cases, after a temporary cessation for a day or two the treatment may safely be continued in the great majority of cases.

(4) Was the treatment efficacious in preventing relapses? There is no doubt that it is most efficacious and a great advance on the ordinary quinine treatment. By its introduction, post-hospital courses of quinine can be abolished and the relapse rate reduced to a very low figure, thus benefiting not only the health of a large number of patients but at the same time causing a saving to the State by diminishing the number of readmissions to hospitals annually.

(5) Can plasmoquine be safely issued to patients not under medical supervision? Although not of great importance as regards the Army in India, in which treatment can always be controlled, the question of whether the drug can be safely issued to patients not under medical supervision is constantly being referred to in the literature. From the results obtained in the present series of cases with a continuous daily dose of 0.04 gramme plasmoquine for twenty-one days, the answer would appear to be definitely in the negative. Good results might be met with in ninety-nine cases, but disaster might occur in the hundredth case.
If the margin of safety can be made greater, and good results obtained by utilizing 0.03 gramme plasmoquine as the daily dose plus quinine 20 grains for twenty-one days, a definite advance would be made.

Journal of the Royal Army Medical Corps, June, 1931.

A DRUG WHICH PREVENTS MALARIA

Since 1927 Colonel James and his collaborators at Horton have been occupied in endeavouring to find a drug which possesses this property. After devising a method of infection by the intravenous injection of sporozoites, they proceeded at first by adding dilute solutions of drugs such as quinine and various preparations of antimony and of arsenic to the suspension of sporozoites which was to be injected. It was hoped in this way to ascertain what drug and what concentration of it would suffice to kill the sporozoites and the young trophozoites resulting from them. Later they adopted a method of test which imitates precisely the practice which would actually be followed in prophylactic administration in the field. The drug to be tested is administered in one or two doses on the day previous to infection and again in one dose shortly before infection. After waiting to ensure that this dose is circulating in the blood the person is bitten by five or six infected mosquitoes, and, in addition, the sporozoite content of the salivary glands of one or two mosquitoes is injected intravenously. By so doing it is made certain that the person receives a heavy infection and that, if the sporozoites were not killed by the drug which was being tested, his attack of malaria would begin within the usual incubation period. Then, to ensure that the drug does not disappear from the blood while the sporozoites are circulating in it, another dose of the drug is given and repeated at intervals during the next few days. The persons are then watched to ascertain whether they develop an attack of malaria or not. Finally the fact that those who fail to develop the malarial attack were not immune to the disease is proved by subsequent reinfection in the usual way.
So far seven preparations have been tested by this method. They include different salts of quinine and of hydroquinine, "cinchona febrifuge," and three synthetic derivatives of the quinoline ring, one of them being the German preparation Beprochin, of which samples were received in 1926, and which may or may not be identical in composition with the substance now issued by the same firm, the I. G. Farbenindustrie (Bayer-Meister Lucius) under the name Plasmoquine (Plasmochin). In all 34 persons who were to undergo a course of malariotherapy collaborated in the experiments. In 30 of the experiments the mosquitoes used were infected with the benign tertian malaria parasite and in four with the malignant tertian malaria parasite. With six of the seven preparations the result in preventing infection was entirely negative. With the seventh, however, which is the German synthetic preparation beprochin there is a different tale to tell. Eight experiments were made with this drug. In six of them the mosquitoes used were infected with the benign tertian parasite (Plasmodium vivax) and in two with the malignant tertian parasite (P. falciparum). On an average each person was bitten by nine infected mosquitoes and in five cases the bites were supplemented by the intravenous injection of sporozoites. Parallel experiments with quinine and other drugs served as controls. The result in every case was that the prophylactic administration of beprochin in the manner described was successful in preventing the attack of fever and the appearance of parasites in the blood. In view of this striking result the experiments are now being repeated on a larger scale.

*Lancet, 6 June 1931.*
EMERGENCY SURGERY. Vol. 1. HAMILTON BAILEY. John Wright & Sons, Ltd. Bristol. 25/- net.

This, the first volume of Hamilton Bailey's "Emergency Surgery" deals with the Surgery of the Abdomen and Pelvis alone. The book is well written and the subject matter well chosen—the Author drawing not only upon his own experience but upon that of others with whom he has been associated. The avowed object of this work is to assist the "isolated Surgeon," but it will undoubtedly also have its place as a handbook for the young surgeon at the commencement of his career.

Lines of treatment such as the Fowler position and the Ochsner-Sherren for appendicitis are given in detail but we notice that while Loewi's test for Acute Pancreatitis is urged and illustrated the actual test is not given.

The illustrations are excellent, the type clear and the paper good, and we congratulate Mr. Bailey and also the publishers upon an excellent production. We await the second volume with interest and if it is up to the same standard as the one already produced, there is no doubt that further editions will soon be called for.

H. G. T.

CHEMISTRY FOR NURSES. By HARRY C. BIDDLE A.M. Publisher Davis & Co., Philadelphia. Price G.$2.75.

The preliminary education of students who enter Schools of Nursing varies so much, that it has been rather difficult to find a book on Chemistry that would be simple enough for the small schools to use, and at the same time be stimulating enough to be interesting to the more advanced students. This book has struck that happy combination.

Professor Biddle has written this book from a long experience in teaching Chemistry to student nurses. The essential facts which are necessary as a foundation for the study of such subjects as, Materia Medica, Dietetics and Surgical Technique, are well covered. The applications of the subject matter to every day procedures on the wards, are well chosen.
The outlines at the beginning of each chapter are a great help to the instructor in preparing the lesson. The notes under, 'Do you remember this' are good for review of the former lessons, and serve to prepare the students' mind for the connection of the past lessons with the new one.

The laboratory periods are very clearly arranged. The apparatus required is very simple, and could be found even in small hospitals.

This book is not only full of valuable helps for the instructor in chemistry, but should prove profitable reading for any one teaching such subjects as Materia Medica, Dietetics, and Hospital cleaning and housekeeping.

The forty five hour course in Chemistry suggested in this book, should prove time well spent by the student, giving her a better foundation for the more advanced subjects, and a better understanding of many of the nursing procedures carried out in her every day work on the wards.

E. P.

A TEXTBOOK OF MASSAGE FOR NURSES AND BEGINNERS.

MAUDE RAWLINS. Publisher C. V. Mosby Company, St. Louis, U. S. A., Price G.$2.

In this book the author gives us the result of 30 years of experience in practising and teaching massage. She shows how the hands must be trained to rub patients properly, and explains how to ease patients who are uncomfortable from casts, splints and bandages, and when and why massage of any description is advisable or not.

Massage used in different diseases is gone into very carefully and one full chapter is given to general massage. The chapter on massage in convalescence is especially good and contains many valuable suggestions for the care of a patient recovering from illness.

The book is written in plain language easily understood by a beginner. Each movement is explained in detail and a person reading it intelligently should have no trouble in putting the movements described into practice.

The many illustrations throughout the book give a clear idea of the different strokes and are very helpful in understanding the movements described.

The book should prove very valuable as a text book in schools of nursing and should prove most helpful to any one interested in massage.

H. T.
PRACTICAL METHODS IN THE DIAGNOSIS AND TREATMENT OF VENEREAL DISEASES. By DAVID LEE, D.S.O., D.P.H., F.R.C.S. Published by E. & S. Livingstone, Teviot Place, Edinburgh. 2nd Edition. Price 15/-.

This excellent book is a complete account of the diagnosis and treatment of venereal diseases in a reasonable compass, 600 pages, and fulfils the claim of its title in giving a good description of practical methods. It is as inclusive as such a book needs to be, very clearly written and well illustrated.

The reading matter is divided into two parts. The first part dealing with syphilis with a chapter on chancroid, phagedena and inguinal bubo. The second part treats of gonorrhoea and closes with a section illustrating instruments employed in treatment. Finally a pharmacopoeia for gonorrhoea and syphilis is appended.

The subject matter is of a very high standard throughout but one of the best of the chapters is that dealing with—Intolerance to treatment by Arsenic and its Derivatives. The instructions for staining films to show the gonococcus are exceptionally clear and the section on acute and chronic arthritis in gonorrhoea is excellent and will commend itself especially to physicians in this country where the condition is so common.

There are one or two minor omissions which might well be remedied. No details are given of the Kahn test which out here at least is much more often employed than is the Sachs-Georgi test. We are sorry too to see the old fashioned and really valuable treatment of gonorrhoea in its earliest stages by the use of water by the mouth in really large quantities, omitted. Water in quantity is a far better diuretic than any drug for the purpose of washing out the urethra.

The only serious omission however is the absence of any reference to the use of protein injections in gonorrhoeal ophthalmia. We take it from the references to gonococcal conjunctivitis in the adult that the disease at home is much milder than it is here, where it proves a frequent cause of blindness, and this doubtless accounts for the very limited space given to it and for the omission of any reference to so valuable a treatment.

Lastly, in view of the wide circulation abroad as well as at home that this book deserves, it should have a better description of Granuloma inguinale (pudendi) alike as to its etiology, symptoms and treatment.

These criticisms however are on minor points only, the book itself should take its place among the standard works on medicine and the price at which it is issued is extraordinarily reasonable, a remark that unfortunately can be made about few medical books.

J. L. M.
A TEXT-BOOK OF MEDICAL JURISPRUDENCE AND TOXICOLOGY.


This book is one of the standard British text-books on Forensic Medicine and has now reached a fifth edition. Professor Glaister has been a teacher of his subject for forty-eight years. His many old students of medicine and law will appreciate the appearance of a revised and up-to-date edition of his well known book which contains the fruits of his ripe experience in medico-legal subjects.

Glaister's Medical Jurisprudence is primarily intended as a practical guide to Forensic medicine for practitioners in medicine and law domiciled in Scotland but it has besides a world-wide reputation since it is regarded as a comprehensive yet concise work on the science of Forensic medicine. The section on Toxicology alone occupies 250 pages and is very valuable as a work of reference.

It is surprising how frequently a problem in Toxicology confronts the physician in Far Eastern countries and it is then that a convenient work of reference such as "Glaister" proves its value. One can instance carbon monoxide poisoning from charcoal braziers; alkaloidal poisoning; insect bites and stings; snake venom; chloroform poisoning and so on. Special text-books on Toxicology may not be available but one can be sure of finding a store of valuable information in "Glaister."

We note that the edition under review has been brought up to date with the collaboration of the author's son, Dr. John Glaister, Junr. who is medico-legal adviser to the Government of Egypt.

R. C. R.


The success of this book may be judged from the fact that our review of the first edition was only published this year. (C.M.J. xlv 94). The first and second printings were so rapidly exhausted that a second edition has already been published. If there is any criticism at all it is that this hardly warrants the name of a second edition. The changes made are very slight indeed and except for a little more detailed description of the technic of injection for Pruritus Ani are of little importance.

This does not detract from the value of the book itself for, as we noticed before, it is clearly written and well illustrated and any extensive
additions to the substance of the volume would tend to make it of less value to the busy practitioner.

As we noted previously the book should be of special value in China where hemorrhoids are particularly common, where hospitalization of patients is not always easy and where prejudice against surgical operations has still to be overcome.

Again we repeat that careful and exact technic is essential if successful results are to be obtained, and the few special instruments designed for this operation ought to be obtained by those wishing to try this treatment.

J. L. M.


A third edition of this manual is to hand. We reviewed the second edition in May 1928 and recommended the text-books as being of assistance to Hospital Technicians and acceptable for bench use for qualified laboratory workers.

The present edition follows the general lines of previous editions but has certain revisions due to the development of bacteriological technique during the last three years.

The reviewer notes the addition of a paragraph on the newer methods of performance of the Widal test in enteric group infections. This is in reference to the use of different methods of preserving standard bacterial suspensions and their application in the macroscopic agglutination test for determining "H" and "O" agglutinins.

In view of the great interest this newer principle has aroused and the hope that routine Widal tests will become increasingly valuable in routine diagnosis, clearer working directions should have been given. Some information that the clinician could go upon when handed a Widal report by the laboratory worker would also be a useful addition.

In our review of the previous edition of this hand-book we commented on the rather undue brevity with regard to technique which is every day routine in laboratories in Eastern countries. This remark applies to the third edition but of course it is understood the book is not intended as more than a summary of lecture notes on Practical Bacteriology which the student will use while actually performing laboratory procedures.

The book is chiefly used by students attending the courses on Bacteriology at Edinburgh University and is no doubt supplemented there by diagrams and illustrative practical work.

R. C. R.
Correspondence

Wilmay Memorial Hospital,
China Inland Mission,
Luan, Shansi.
July 7th, 1931.

Editor,
China Medical Journal

Dear Sir:

Among other medical problems that have interested me in connection with my work in China has been that of "Light." I therefore found Dr. Collier's article in the June number especially interesting. You suggest in your editorial that Dr. Collier take up the therapeutical side of the subject at greater length in a subsequent paper.

 Might I suggest a few questions that he might see fit to touch upon should he write this subsequent paper?

In what way does the light from the sun as it reaches us on the earth's surface in China differ from that which reaches us at the same latitude in other countries, e.g. U.S.A. Do climatic conditions cause a different percentage of transmission of ultraviolet, visible and infra-red rays? What is it that we are protecting ourselves from when we wear a sun-helmet in Peking when we do not need one at the same latitude in America?

Further, is there any foundation scientifically for the popular notion among some missionaries that red lining in the hat and red umbrellas give more efficient protection from the sun's rays in China than other colors?

I also would like to know if there is any scientific basis for speaking of photo-sensitization and photo-desensitization corresponding approximately to protein-sensitization and protein-desensitization. For example I know a medical man in China who claims that by properly exposing the human body to increasingly greater doses of sunlight, he can make it possible for this individual to dispense with the protection for his head which he formerly found indispensable.

Another question which suggests itself in connection with the ratio of ultra-violet, visible and infra-red rays of China's sun is the matter of protective glasses. What color is best adapted to China?

I believe the answer to these questions, or at least their discussion, would interest many physicians practising in China.

Truly yours,

Paul E. Adolph, M.D.
H. M. McCandliss, M.D.

Dr. McCandliss was born in Iowa in 1859. He received his medical education in Philadelphia, graduating from Jefferson Medical College in 1885. After his graduation he was appointed by the Presbyterian Board of Foreign Missions to Canton, and joined Dr. John Kerr of the Canton Hospital in the same year.

After about six months with Dr. Kerr, Dr. McCandliss was appointed by the Canton Mission to go to Hainan Island, and opened medical work there. Hainan Island at that time was entirely unopened to Western medicine except as a little had been practised by Mr. Jeremiah, who had come in 1881 as the first Protestant missionary to Hainan.

Dr. McCandliss, therefore, had the task of beginning medical work in an entirely new field, and in a place where the contacts with the outside world were very few, and where, as a result, there was an unusual amount of superstition, and suspicion of anything as new as modern medical work.

However, by rare tact, and an infinite amount of patience, Dr. McCandliss succeeded in overcoming the obstacles which he met, and finally established the large American Presbyterian Hospital in Hoi How.

The outstanding professional work of Dr. McCandliss in Hainan was the introduction of surgery; the introduction of the knowledge and treatment of malaria, hookworm, and other tropical diseases of Hainan; and perhaps the most remarkable of all the introduction of modern obstetrical methods, by which the large maternity work of the Hoi How hospital was built up. For many years now from 400 to 700 women have been delivered in this hospital every year.

Dr. McCandliss, like many other missionary doctors, was in China because of a very strong and active missionary spirit, and he declined opportunities to engage in lucrative practice in America. For many years he took active part in the religious services in the hospital chapel, and the Hoi How church, which, by the way, he built. This part of his work, together with the work of Mrs. McCandliss who shared his labors with him, was largely responsible for the strong Hoi How church which exists today, as well as for many groups of Christians in Hainan and the Lui Chow peninsula.

Dr. McCandliss married Miss Olivia Kerr, daughter of Dr. John Kerr of Canton, in 1888. Four children were born to them. Three of these children returned to China as missionaries, Dr. W. K. McCandliss being in Yeung Kong for several years; Mrs. Judson being in Lien Chow for several years; and Dr. Robert McCandliss at present in Hwaiyuen. Dr. Charles
McCandliss expects to be on the mission field at some future date.

Dr. McCandliss was forced to retire in 1926 because of ill health. From 1926 until the time of his death on June 14, 1931, he lived in Pasadena, California.

Few doctors in China today have any conception of the conditions which Dr. McCandliss struggled through in the early, difficult days. His monument exists in the work he has done, the institution he built up, the patients he healed, the friendly contacts he made, and the men and women he led to Christ.

NATHANIEL BERCOVITZ, M.D.

NEW MEMBERS PROPOSED

Brines, Rolland J. M. D. (Loma Linda) S. D. A. Yencheng, Ho.
Nyi Pao-chun M. D. (Chicago) Shanghai, Ku

NEW MEMBERS ELECTED

Dr. D. V. Rese C. I. M. Lanchow, Kansu.
Dr. E. Warren Knight C. I. M. Luon, Shansi.