ON THE SYMPTOMATIC TREATMENT OF ENTERIC FEVER.

By Colonel R. H. Forman and Captain Robert Selby.

Royal Army Medical Corps.

During 1904 a somewhat severe epidemic of enteric fever broke out in Bangalore, the first case occurring on May 24th, and the last on September 7th. In all there were 68 cases with four deaths, which, as mortality runs in India, is decidedly low. One of us, Captain Selby, was in immediate charge of the fever wards; the other, Colonel Forman, was in command of the hospital, and in daily consultation with him.

The first symptom we would wish to direct attention to is that of haemorrhage and its treatment by the administration of adrenalin. Of the 68 cases 10 had haemorrhage, more or less severe, most of them more than once, and in no case did death ensue from it, per se. It is true that three of these cases died, but haemorrhage was not the cause of death, as the post-mortem showed. We quote below very briefly the salient points of all these cases, and others can judge whether haemorrhage was the cause of death and whether adrenalin had any effect in controlling this grave, and often fatal, symptom. We are fully aware that so few cases are far from furnishing sufficient data upon which to base any reliable deductions, but feeling, as we do, that in this drug we have a powerful means of controlling bleeding, we can but hope to show a sufficiently strong case to induce others to give it a trial. And, parenthetically, it may be added, that it is well nigh impossible to convey to others those numerous, often trifling, indications, only appreciable at the bedside, which tell the observant man that a given treatment is acting beneficially. Certainly neither of us possess the necessary facility of diction, but to every doctor it is so much a truism as scarcely to call for remark.

The method of administration was: On the first sign of haemorrhage to give a quarter of a grain of morphia hypodermically and thereafter fifteen minims of adrenalin (1 in 1,000 solution, Parke, Davis) in an ounce of water every two hours, four to six doses being given according to the severity of the case.

Case 1.—A severe, protracted case with relapse, and some dysenteric symptoms during convalescence. Two slight haemorrhages occurred during the night of the fifteenth to sixteenth day of disease. A quarter of a grain of morphia was given hypodermically and six doses of adrenalin, ice being applied to the abdomen.
Nothing occurred until the nineteenth day, when a streak of blood was observed. After two doses of adrenalin there was no further haemorrhage until after the fifty-first day, when six more doses of the drug were given. Thereafter there were no further haemorrhages.

Case 2.—A malignant, fatal case, with lungs involved, high temperature, albumen in urine, involuntary evacuations, delirium, subsultus, progressive asthenia and emaciation. On the twenty-first day haemorrhage occurred. A quarter of a grain of morphia and four doses of adrenalin were given. There was no further haemorrhage for eighteen hours, when it again came on, in spite of which stimulant was pushed freely to combat threatening cardiac failure. No drug was given. Three hours afterwards haemorrhage (four ounces) occurred. One-sixth of a grain of morphia and four doses of the drug were given, brandy still being pushed. There was no further haemorrhage before death, four days afterwards.

Post-mortem examination. Recent double pleurisy and pneumonia were present, and the characteristic ulceration in ileum; no blood in the bowels, liver was fatty, and kidney capsules adherent.

Case 3.—An extremely grave case in a highly neurotic patient, with lung complications, high prolonged fever and extreme emaciation, with deep sloughing bed-sores on all prominences. At 7.45 p.m. on the twentieth day haemorrhage occurred (four ounces), and again an hour later. At 7.45 a quarter of a grain of morphia was given and a dose of adrenalin every two hours, but at 4.45 a.m. further haemorrhage (twelve ounces) came on with collapse. Nine doses of the drug altogether were given. No further haemorrhage until the twenty-eighth day, when it came on again (three ounces) at 4 p.m. The usual morphia and six doses of adrenalin were administered, but at midnight the haemorrhage (twelve ounces) returned. Morphia and two doses of adrenalin were given, making seven doses in all. The effect of the haemorrhage was plainly marked, the condition being very grave. Again, on the thirtieth day, haemorrhage appeared (one ounce). Morphia and four doses of the drug were given. By this time the patient’s condition was pitiable, but there was no more haemorrhage, and although the prognosis was as bad as it well could be, he ultimately recovered after a protracted convalescence.

Case 4.—A mild, somewhat atypical prolonged case. Two haemorrhages occurred, one on the twenty-eighth day (four ounces), the other on the twenty-ninth day (three ounces); on each occasion morphia and six doses of adrenalin were given. There were no
further haemorrhages, and he made a good recovery, being discharged to duty on the eighty-first day.

**Case 5.**—A peculiarity about this case was that the man gave a clear history of a severe attack of enteric fever in South Africa, for which he was invalided. Yet there was no doubt about the diagnosis in this second attack, which was exceptionally severe, and reduced the patient to a mere skeleton. His temperature was not quite normal one hundred days after the onset. Slight haemorrhages occurred on the thirteenth, fifteenth and sixteenth days; morphia and four doses of adrenalin were given the first time, on each subsequent occasion morphia and six doses of the drug were administered, two of the doses expectively. On the twenty-ninth day it returned (four ounces), when morphia and four doses of the drug were given. Thereafter no further haemorrhage occurred. The patient was ultimately invalided.

**Case 6.**—A mild case in an officer, aged 36. Haemorrhage (ten ounces) occurred on the twentieth day. Morphia and six doses of adrenalin were given, and afterwards caesium chloride, fifteen grains every hour for four hours, and repeated next day. There were no further haemorrhages. The condition of the patient was very grave for forty-eight hours after the bleeding.

**Case 7.**—A malignant fatal case, with lung complications. At 2.30 a.m. and 7.30 a.m. on the seventeenth day slight haemorrhages occurred. On each occasion morphia and adrenalin were given, altogether nine doses of the drug. Thereafter there was no more haemorrhage, though stimulants had to be pushed. He died on the twenty-fifth day. *Post-mortem:* there was double pneumonia and numerous deep enteric ulcers, three inches of the lower part of the ileum being practically gangrenous; there was no blood in the bowels.

**Case 8.**—A fatal case with perforation. There was very slight haemorrhage on the ninth day. Morphia and six doses of the drug were given. There was no further haemorrhage. The patient died on the fourteenth day. *Post-mortem:* general peritonitis was present, the appendix being gangrenous, and there were numerous deep comparatively recent ulcers which had eaten deeply into the intestinal wall and had only the serous coat as a base; the site of perforation was not found. There was no blood in the bowel.

**Case 9.**—A moderately severe case. Slight haemorrhage occurred on the eighteenth day. Morphia and four doses of the drug were given. There was no return of the haemorrhage and the patient recovered.
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CASE 10.—A very mild case. A trace of blood was observed on the twenty-third day, which did not recur after four doses of adrenalin.

According to authorities haemorrhage occurs in from 3 to 5 per cent. of all cases, and proves fatal in from 30 to 50 per cent. of the cases. In this outbreak we had haemorrhage in 14.70 per cent. of the cases, so that from four to seven should have died, and we submit that none died from this complication. Note that in the three fatal cases death occurred respectively, four, five and eight days after all bleeding had stopped, and that the post-mortem showed no internal haemorrhage, but other pathological changes which fully accounted for the fatal issue. We repeat that we make no claim to dogmatise on such limited data, whether it was coincidence or good fortune we are not prepared to say, but we do suggest that the apparent results were such as to warrant extended trial. It is asserted that adrenalin does control haemorrhage, and these cases, so far, support that assertion.

The second symptom we would wish to direct attention to is that of temperature and its control by the bath. We are perfectly aware that there is nothing new in this treatment, but we do think that in spite of many convincing proofs of its efficacy, Royal Army Medical Corps Officers as a rule have failed to appreciate the powerful therapeutic agent they possess in bathing, judiciously used; and when we say bathing, we do not mean sponging or packing, but complete immersion of the whole body. There is a right way, and many wrong ways, of bathing a typhoid patient, and perhaps the simplest way of illustrating the former is to quote an official communication made by one of us some two and a half years ago, which resulted in special baths being supplied to certain hospitals in India. Much of it is taken from a small book, “The Cold Bath Treatment of Typhoid Fever,” by F. E. Hare, M.D., late Resident Medical Officer, Brisbane General Hospital, Queensland (Macmillan and Co.), published in 1898. Statistics are admittedly fallacious and liable to be misinterpreted, but Dr. Hare is ultra careful in their application, and his argument carries conviction. These arguments cannot be reproduced here (they will be found in detail in his book); we merely append one general table explaining that in the context any possible statistical error is discounted.

It will be observed that under the bath treatment the percentage case mortality is reduced by one half, and that this is not peculiar to Brisbane one of us is in a position to assert, from an experience of the treatment dating from 1885. Taking, for example, the Army
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Medical Report for 1898, we have in India 2,375 admissions for enteric and 654 deaths, i.e., 27.5 per cent.; in our small group of 68 cases the mortality is 5.8 per cent. If then the bath treatment had been universally adopted in India in 1898 and had been as successful as in Dr. Hare's hands, and there is no reason why it should not have been, then some 325 lives, at a low estimate, would have been saved in that one year alone.

### Table A.

**Expectant Period.**

Brisbane General Hospital, Queensland.

<table>
<thead>
<tr>
<th>Year (From May 15)</th>
<th>Number of cases</th>
<th>Deaths</th>
<th>Percentage mortality</th>
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<tbody>
<tr>
<td>1882</td>
<td>147</td>
<td>25</td>
<td>17.0</td>
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<tr>
<td>1883</td>
<td>273</td>
<td>40</td>
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</tr>
<tr>
<td>1884</td>
<td>575</td>
<td>89</td>
<td>15.5</td>
</tr>
<tr>
<td>1885</td>
<td>369</td>
<td>49</td>
<td>13.3</td>
</tr>
<tr>
<td>1886</td>
<td>464</td>
<td>68</td>
<td>14.6</td>
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</tbody>
</table>

**Total**      .... 1,828 271 { Average 14.8

**Bath Period.**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of cases</th>
<th>Deaths</th>
<th>Percentage mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1887</td>
<td>230</td>
<td>27</td>
<td>11.3</td>
</tr>
<tr>
<td>1888</td>
<td>399</td>
<td>23</td>
<td>6.8</td>
</tr>
<tr>
<td>1889</td>
<td>595</td>
<td>42</td>
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<td>1890</td>
<td>150</td>
<td>16</td>
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<tr>
<td>1891</td>
<td>137</td>
<td>7</td>
<td>5.1</td>
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<tr>
<td>1892</td>
<td>104</td>
<td>7</td>
<td>6.7</td>
</tr>
<tr>
<td>1893</td>
<td>50</td>
<td>2</td>
<td>4.0</td>
</tr>
<tr>
<td>1894</td>
<td>79</td>
<td>1</td>
<td>1.3</td>
</tr>
<tr>
<td>1895</td>
<td>69</td>
<td>8</td>
<td>11.6</td>
</tr>
<tr>
<td>1896</td>
<td>180</td>
<td>10</td>
<td>7.7</td>
</tr>
</tbody>
</table>

**Total**      .... 1,902 143 { Average 7.5

Various reasons are put forward in opposition to the treatment—liability to pneumonia, danger of perforation, heart failure, &c.; all these Dr. Hare shows to be fallacious, and with that opinion we are entirely in accord. But there is one objection raised that has weight, viz., that the treatment is troublesome to both the patient and attendants. That is so when proper appliances are not available, but when they are, the treatment is not only less irksome but distinctly less troublesome than sponging or packing. It is far more efficacious in controlling high temperature, and in that it has a
very pronounced effect on the nervous symptoms; much anxious
watching and restraint are avoided. A bath was made locally for
this hospital, of which a sketch and description is appended.

(1) The bath, constructed of three-quarters of an inch planks
lined with galvanised iron, rectangular in form, seventy-two inches
long, twenty-two inches wide, and nineteen inches’ deep. When
ready for use it should be about two-thirds full and contain about
seventy-five gallons. At one end of the bottom is a waste plug
three inches in diameter. It is mounted on four wheels, one pair
(the larger) fixed, the other pair attached to a revolving under
carriage. From the front of the latter projects a hinged handle for
convenience of moving. The best wheels are the patent-tyred
trolley wheels made by Warren and Co., London, and the axles
should be turned to ensure silence and smoothness of motion.

(2) The stretcher, made of perforated canvas stretched between
two light poles of wood, the extreme ends of which are connected by
light galvanised iron cross-bars. The poles should be as thin as
possible to allow of the patient being easily rolled on and off when
the stretcher is laid across the bed. Its dimensions are such that it
fits loosely the bottom of the bath, with sufficient space to admit
the fingers for the purpose of lifting.

(3) The back rest, a light wooden frame filled in with canvas
a little narrower than the stretcher so as to rest comfortably within
the poles. It forms an oblique rest for the head and shoulders, and
should project from six to eight inches beyond the head of the
stretcher, so that when the latter is lowered into the bath it catches
the end and mechanically forms the back rest. It is well to state, to avoid error, that the back rest is not attached to the stretcher in any way.

(4) Circular water cushion with central diaphragm for the head. Failing the cushion, a large sponge acts very well.

(5) Piece of board (thirty inches by ten inches). This is used for two purposes, viz., placed end on, at the foot of the bath, to form a sloping end to raise the feet out of the water, when it is desirable not to chill the extremities too much, and placed across the bath to rest the stretcher upon. By this means two orderlies can easily bathe a succession of patients without fatigue to themselves, or any exertion on the part of the patient.

It might be as well to briefly discuss further some of the objections which in our experience are urged against the bath treatment.

(1) Dislike to it on the part of the patient. A certain number of men do dislike it and object; many, however, like it and even ask for it; most are indifferent; and there are very few indeed whose objection reaches the point of opposition. And in this connection we may say that it is seldom necessary to employ the "cold" bath; "tepid" is quite sufficient, and we usually had the bath at 85° F., and even added hot water to it after immersion up to a maximum of 92° F. Thus, one frequent cause of objection—the shock of cold water—is removed. The warmer water takes longer, especially at first, to produce defervescence; but that is not of much consequence, and experience proves that the latter baths accomplish the desired object much more rapidly as a rule, and the effect is more lasting.

(2) Fear of it, and opposition to it, on the part of the nurses, and, for that matter too, of the doctors. Shivering, especially in patients who have suffered from malaria, frequently alarms the inexperienced, but the heating of the bath as above stated largely discounts this. Though it persists, however, there is no need to be alarmed about it; even though the face becomes pinched and slightly cyanotic, no harm ensues except the discomfort. Similarly, both doctors and nurses get frightened at the condition of the pulse, and jump to the conclusion that cardiac failure threatens as a result of the bath. We can only say that this is want of accurate clinical observation. It is curious how few people are aware that in a healthy man the primary effect of a bath is to lower the pulse tension temporarily, and this natural physiological effect is somewhat more pronounced in the typhoid patient, plus the fact that, in the latter, the comparison with the antecedent hard bounding pulse,
so frequently present, is striking and gives rise to an erroneous impression. As a matter of fact, we believe that the bath, far from favouring cardiac failure, wards off that fruitful source of fatality, and if any one will note the pulse in a succession of cases half an hour after the bath, we assert that this contention will be verified.

(3) Pneumonia.—If the pneumonia of enteric is a septic complication, as undoubtedly it is, how can a bath increase that susceptibility? It does not, and, in our opinion, the presence of lung complication does not contraindicate the use of the bath, short of pathological conditions that call for rigid physiological rest.

(4) Perforation.—We doubt whether any slight movement of a patient with proper appliances could favour this almost necessarily fatal complication. The natural peristalsis is surely a more potent factor, and the bath can have no influence upon that. In our group of 68 cases and four deaths, only one of the fatal cases (case No. 2 above) was treated with the bath. The fatal case of perforation (case No. 8 above) reported sick late in the disease, and his condition was such as to contraindicate even the slight exertion called for in bathing. He died five days after admission.

Though probably familiar enough we may just indicate briefly the method of bathing. The bath is placed at right angles to the foot of the bed, the patient stripped and a towel adjusted round the loins, the stretcher and head rest are then laid diagonally across the bed, the patient having previously been moved gently into a diagonal position also; he is then half lifted, half rolled on to the stretcher by two attendants, one at his head, and the other at his feet, and is warned to remain passive himself. The head and back are then sponged with cold water; the stretcher is lifted gently and lowered into the bath, the head rest mechanically adjusting itself in the process; the foot rest may or may not be placed in position as circumstances dictate. The temperature of the water need not as a rule be lower than 85° F. The mouth temperature is taken at intervals of three hours, and if it is over 103° F. the patient is bathed. The duration of the bath varies; twenty minutes will usually suffice, but at first it may require even an hour. A peculiarity which is frequently noted is, that whilst at first it may be necessary to give four or even more baths in the twenty-four hours, this is seldom necessary for more than a few days; the baths, in the majority of cases, appearing progressively to keep the temperature more and more within the limit. A fall to at least 101° F. should be aimed at, and, if the observation is made, it will often be found that the temperature continues to fall for sometimes as much as an hour after the bath. The advantages of the bath are: The
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amelioration of the nervous symptoms—most patients sleep quietly after a bath and delirium is markedly diminished; the digestion appears to be improved as evidenced by the dry brown cracked tongue becoming moist and cleaner; and last, but not least, the systematic control of the temperature must retard the rapid metabolism which is so marked a characteristic of all fevers, and which, through its wasting effect on the tissues in general, and on the heart muscle in particular, must increase the risk of the patient.

Looking facts in the face, no one can assert that the course of enteric fever can be cut short by any known method of treatment, and until such a discovery is made the treatment must of necessity be symptomatic. Intestinal antiseptics, so-called, have been tried, and a host of other remedies, but with little or no result, for the case mortality remains much as of yore, and that is very high. In the bath, scientifically used by skilled men, we believe that we possess a therapeutic agent which, though not by any means new, has been far too little exploited. The experience gained in Brisbane by an experienced and competent observer is surely not one that should be ignored, and in the small group of 68 cases we here quote, the results are most encouraging. One of us at the beginning of this outbreak was prejudiced against the use of the bath, believing as he did the statements, many of them rash and ill-digested, that have been urged against it; but yielding to the suggestion of his colleague, who had used it extensively for twenty years back, he tried it, and that more and more freely as the epidemic advanced, and experience removed his misgivings, the result being that he is now fully convinced of its high value, and of the chimerical nature of the objections raised against its employment. Last, and very briefly, we should like to say just a word in favour of trional as a hypnotic in enteric cases. Anyone who has suffered from the disease must know how terrible is the insomnia which is so frequently a concomitant. In our hands trional has proved most efficacious and superior to any other hypnotic, though at different times we have tried the whole gamut. Happily in these days the physician does not as erstwhile combat nature by denying water to a cholera patient, or hypnotics to an enteric. There is still a vivid and but too painful personal recollection in the experience of one of us, battling through an attack of enteric (called simple continued fever, by the way), and left to the tender mercies of one of those mediaeval wiseacres who looked upon a hypnotic as anathema and pinned his faith in mist. diaphoretic. There is a sort of negative satisfaction in the knowledge that he ultimately closed his career in a lunatic asylum.