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THE PREVALENCE OF ENTERIC FEVER IN PIETERMARITZBURG.

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(Continued from p. 212.)

Deaths from Enteric Fever.

The mean ratios per 1,000 are given on page 196. The fatality by age groups has been given on page 197. The numbers are too small to justify any conclusions.

The mean ratios of deaths to attacks in various countries are as follows:

- United Kingdom 1887-96, cases 1,276, deaths 257 = 20.1 per cent.
- Cape Colony 1884-96, 164, 33 = 20.1
- Maritzburg 1884-96, 257, 49 = 19.0

In the civil hospitals in Natal:

- Grey's, Maritzburg 1891-93, cases 136, deaths 28 = 20.6 per cent.
- Addington, Durban 1894-96, 196, 34 = 17.3

Thus the death-rate to attacks for South Africa in civil and military hospitals does not differ materially from that in the United Kingdom, while the Indian rate is very much higher.

It is possible that the low death-rate in Maritzburg in 1897 may be explained by the fact that so many of the cases occurred in men who were "acclimatised," that is, who had shown themselves to be comparatively resistant to the disease.

A fuller consideration of the South African death-rates during the period is interesting and suggestive. The period 1884-96 may be divided into two of six and seven years respectively, in the second of which, in Maritzburg, enteric fever was much more prevalent than in the first. The table on page 352 shows the incidence and death-rates per 1,000 of strength, and the mortality per cent. of cases in Cape Colony and in Maritzburg for these two periods and for the whole period also.

It is at once evident that there is a striking difference between Cape Colony and Maritzburg. In Cape Colony the incidence, mortality and case mortality in both periods and over the whole period are practically identical. In Maritzburg, however, we find a very
large increase in the incidence rate during the second period as compared with the first, and similarly a distinct increase in the mortality. But on the other hand, with this increase in the mortality to strength, the mortality to cases has diminished. The mean incidence rates and case mortalities over the whole period are practically identical in the two areas, Cape Colony and Maritzburg, but, even using the large value for the probable error given by Poisson's formula, the Maritzburg mortality to strength is distinctly greater than that in Cape Colony.

<table>
<thead>
<tr>
<th>Area</th>
<th>Period</th>
<th>Numbers</th>
<th>Rate per 1,000 of Strength</th>
<th>Percentage of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Strength</td>
<td>Incidence</td>
<td>Mortality</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deaths</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cape Colony</td>
<td>1884-89</td>
<td>13,517</td>
<td>89</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>1890-96</td>
<td>13,200</td>
<td>75</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>1884-96</td>
<td>26,717</td>
<td>164</td>
<td>33</td>
</tr>
<tr>
<td>Maritzburg</td>
<td>1884-89</td>
<td>6,988</td>
<td>31</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>1890-96</td>
<td>9,150</td>
<td>226</td>
<td>36</td>
</tr>
<tr>
<td></td>
<td>1884-96</td>
<td>16,138</td>
<td>257</td>
<td>49</td>
</tr>
</tbody>
</table>

* The percentage in brackets is the ordinary value; the others are the much larger values calculated by Poisson's formula.

The valid conclusions appear to be (1) that judging from the mortality to strength, there has been a real and considerable increase in the incidence of enteric fever in Natal, and that there has been no similar increase in Cape Colony; (2) no change has been made in the standard for diagnosis in Cape Colony, and we may probably conclude with some reason that the milder cases have not been returned as enteric fever, as the case mortality is high. But in Maritzburg during the second period the standard for diagnosis has been changed, the milder cases have been returned as enteric fever, and the case mortality has fallen considerably.

The following table shows the total cases and deaths and the case mortality in each quinquennium, and in Maritzburg it has been possible to carry this table into June, 1898. The numbers are small, and the probable errors are large in proportion to the ratios, but bearing this in mind, it is legitimate to conclude that the case mortality in Cape Colony is not only comparatively high,
but has remained fairly constant throughout the period, whereas in Maritzburg the case mortality has diminished fairly steadily from about 1886 to 1898.

<table>
<thead>
<tr>
<th>Period</th>
<th>Cape Colony</th>
<th>Maritzburg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Admissions</td>
<td>Deaths</td>
</tr>
<tr>
<td>1884-88</td>
<td>52</td>
<td>15</td>
</tr>
<tr>
<td>1885-89</td>
<td>43</td>
<td>11</td>
</tr>
<tr>
<td>1886-90</td>
<td>27</td>
<td>9</td>
</tr>
<tr>
<td>1889-90</td>
<td>39</td>
<td>11</td>
</tr>
<tr>
<td>1888-92</td>
<td>38</td>
<td>11</td>
</tr>
</tbody>
</table>

The question now arises, what relation do these case mortalities bear to those occurring in other climates among men of similar ages? If we take the series of 372 cases of enteric fever which occurred between 1891 and June, 1898, and are grouped according to ages in Table V., and using the actual number of cases which occurred, we calculate the deaths which would have occurred among the cases in each age group, supposing that the case mortality for each age group had been that found to obtain in both sexes in the Metropolitan Asylums Board Hospitals, between 1871-97, we find that the total of the deaths in all the age groups would on this basis be 78, giving a mean case mortality of 20.97 ± 5.97 per cent. But the number of deaths which in fact did occur among these 373 cases was 43, giving a mean case mortality of 11.56 ± 4.69 per cent., a difference of 9.41 per cent., whereas the probable difference is 7.59 per cent., so that the difference is significant even when using the very large probable error shown above (Poisson).

That is, the mean case mortalities in Cape Colony over the whole period, and between 1884-89 and 1890-96, and also the mean case mortality over the whole period in Maritzburg, are practically identical with the mean case mortality for the same age groups in the Metropolitan Asylums Board Hospitals, and with the case mortality of the Army in the United Kingdom from 1887-96. But in Maritzburg between 1891 and 1896 it was distinctly lower.

Now, the Metropolitan Asylums Board case mortalities are less than those among males only, as the returns include both sexes; on the other hand, as they date from 1871, they are probably somewhat higher than they should be, as cases are now returned as enteric fever which in the seventies were not considered to be of that nature. The cases are also no doubt selected to some extent...
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on account of their severity, at least during the earlier years. These two tendencies are in contrary directions, so that we may tentatively accept the net case mortalities as approximately correct.

On the other hand, the soldier is a selected life, and the influence of good physique and sufficient food may tend to lessen fatality as compared with the general population, from which cases are sent to the Metropolitan Asylums Board Hospitals.

There appear to be three explanations of the lessened case mortality in Pietermaritzburg during the second period: (1) Diminished fatality among selected lives; (2) the inclusion of non-enteric cases; (3) a less degree of virulence of the disease.

(1) Selection of Individuals.—In India selection obtains as in South Africa. Between 1897 and 1902, 8,376 cases of enteric fever occurred of which the ages are given, and among these, the calculated deaths at the Metropolitan Asylums Board rates would amount to 1,760, or $21.01 \pm 1.26$ per cent., practically the same calculated case mortality as in Pietermaritzburg over the whole period, and in Cape Colony. The actual number of deaths that occurred was 2,304, or $27.51 \pm 1.38$ per cent., giving a probable difference as compared with the calculated rates of $1.87$ per cent., and an actual difference of $6.50$ per cent. That is, the real case mortality in India probably exceeds the calculated by more than the real case mortality in Pietermaritzburg falls short of it. Differences of climate will probably account for the greater range, but the point is that among similar bodies of men the case mortality in the one country largely exceeds that in the other.

Selection of the individuals exposed does not, then, appear to be an important factor in reducing the case mortality (note the case mortality in the Army in the United Kingdom).

(2) The Inclusion of Non-Enteric Cases in Recent Years.—This should, if it occurs, affect India also, and the recent case mortalities, then, should have shown a decline as compared with earlier periods. This does not appear to be the case. The higher rate during the first period in Pietermaritzburg would appear to be due to the exclusion of enteric cases.

(3) A Less Degree of Virulence.—This conclusion is supported by the personal experience, in South Africa, of a good many observers, both military and civilian, and the rates quoted above from the civil hospitals in Durban and Pietermaritzburg are not inconsistent with this, both because the numbers are small, and because the cases sent to hospital are to some extent selected on account
of their severity. There is no doubt that the number of undoubted though mild cases is much larger than in India, while similar mild cases appear to be rare in the United Kingdom. The case mortality in the Army in Great Britain is practically that of the Metropolitan Asylums Board Hospitals for the same ages.

The Influence of Locality.

It has not been possible to make any complete enquiry into this point, as the numbers of many of the various barrack-rooms have been changed during the period. Up to the last few months, the various branches of the Service have been so far separated that the table of prevalence by arms of the Service already given (p. 196) shows the distribution according to locality sufficiently well, and shows also that after excluding other causes for increased prevalence, there appears to be no predominance in one part of the camp over the other.

The only case in which there was a distinct difference in environment was in the 9th Lancers. This regiment arrived in September, 1896, and was divided into two sections; one, strength 355, occupied the cavalry barracks in Fort Napier; the other, strength 190, was quartered in the Agricultural Show Ground, on the outskirts of the town. The former had eight cases of enteric fever, the latter nine cases, during the first six months of 1897, giving admission rates of 22.5 and 47.3 per 1,000 respectively. These numbers, though suggestive, are of course too small to lead to any definite conclusion as to any special influence among the men at the Show Ground.

The 1st Royal Dublin Fusiliers for the whole of the time, and the 1st Leicester Regiment for a part of the time during which enteric fever prevailed among men of these battalions, were under canvas; in other respects they did not differ from the rest of the garrison.

There is no such difference in the sanitary conditions of the various parts of the camp as to lead one to suspect any determining influence in the prevalence of the disease amongst the different corps.

The Relation between the Simple Continued Fevers and Enteric Fever.

The annual and seasonal prevalence and the age incidence have already been dealt with.

Simple continued fever is, of course, a very indefinite and un-
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satisfactory term. Those cases returned as simple continued fever, and of short duration, probably include a large number of cases of those minor ailments of which a rise of temperature forms a symptom, and on the whole may be set aside as too indefinite for discussion. But the case appears to be different with those of longer duration. No doubt in some of these cases symptoms of some other definite disease have been observed after the disease has been formally diagnosed, but a very large proportion remains in which the distinction, if it exists, between the specific disease, enteric fever, and some other continued fever must be made. There is no doubt that this is a difficulty invariably occurring where enteric fever exists, so much so, that in discussing the prevalence of enteric fever one instinctively enquires as to the coincident prevalence of simple continued fever.

The reports on medical transactions and prevailing diseases from this hospital show that for a good many years this difficulty has occurred, and has occasionally been expressed. In 1886 the medical officer in charge remarks, with regard to the seven cases (five fatal) of enteric fever, and the 116 cases of simple continued fever, in a garrison of 1,547: “Enteric fever was stated to prevail in the town, and almost all these cases would probably have been diagnosed as enteric fever by the civilian medical practitioners”; and in 1887, of three cases of enteric fever, with one death, and twenty cases of simple continued fever in a garrison of 1,414: “This is also true this year. This line has in some cases been very narrow, which has separated the symptoms of cases so returned from those of the earlier stages of enteric fever, and possibly in some instances have been cases of which early treatment has prevented the full development of the disease”; again, in 1894, referring to the cases of simple continued fever and febricula, after stating that the majority were plainly due to exposure, the remainder “did not show specific symptoms sufficient to warrant a diagnosis of enteric; it is possible, however, that some at least of these cases were mild attacks of that disease.” This expresses the difficulty very plainly. If a certain standard of severity is necessary to justify a diagnosis of enteric fever, then no doubt this difficulty will constantly occur. But the position is this: either these cases are milder types of enteric fever or they are cases of some continued fever not yet differentiated, which has practically the same annual and seasonal prevalence, and the same incidence relatively to age, as enteric fever, and to all appearance differs from it only in being less severe and not fatal. If they are not
cases of enteric fever, it is easier to say that they are not of a malarial type, nor have the character of Malta fever, than to name them satisfactorily. They are certainly not cases of what is described as simple continued fever by the authorities. (No doubt some of these cases at least would now be termed paratyphoid.)

There is little doubt that enteric fever has often been regarded not only as a serious disease, which it is, but also as a disease which in most cases has very decided and serious symptoms, and this confusion between the possibly grave results of the disease and the possible or even probable occurrence of grave symptoms has caused the establishment of a certain standard of severity to which the symptoms must attain before the diagnosis of enteric fever is believed to be justified.

Whether these fevers are enteric or not is a question which will probably be settled sooner or later by bacteriological methods, but in the meantime one must recognise that a certain standard of severity is not a sufficient means of differentiation.

Further, it has already been observed, that there is at least a suggestion of an interchange between these two forms at the times of greatest and least prevalence, both seasonal and annual; that the tendency, not unlikely on general grounds, is to diagnose the doubtful cases as enteric fever, when undoubted cases are common, and vice versa, or instead of a definite standard we have a sliding scale. But the effect of this is to exaggerate the increase in the periods of greater prevalence, and conversely, or the fluctuations in the enteric rate (which is much influenced by methods of diagnosis) are out of proportion to those of the death-rate, which is only secondarily influenced by diagnostic methods.

This is of importance in considering the question whether enteric fever has increased of late years. It has already been shown that comparing two periods of five years each at the beginning and end of the period, 1884-96, and excluding epidemic years, the admission rate per 1,000 has increased nearly fourfold, while the death-rate has increased about one-seventh.

The answer which is most probably correct seems to be that enteric fever has increased rather more than is shown by the increase in the death-rate per 1,000, for the earlier recognition of a case as one of enteric fever will, on the whole, conduce to a diminished death-rate. The exclusion of the epidemic periods does not affect the validity of this conclusion as to the general incidence. Most probably periods of prevalence, unusual to a greater or less degree, will always occur when the various predisposing factors are present together.