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Proceedings of the Madras Government, Public Department,
7th July 1869.

No. 23. Read the following letter from the Sanitary Commissioner, Madras, to the Chief Secretary to Government, Fort Saint George; dated Madras, 31st May 1869, No. 1617B.

I have the honour, with reference to my letter No. 1017 of 15th April to your address, and recorded in Proceedings of Government of 4th current, to submit, for the information of Government, a report upon the prevalence of diphtheria at Bangalore.

2. I reached that station on the 1st May and placed myself in communication with the Deputy Inspectors General of the Indian and British Medical Departments, to whom I had previously transmitted a set of printed questions for circulation to medical officers, from whom full replies were solicited.

3. The questions, modified to meet local requirements, were selected from those adopted by the Medical Officer of the Privy Council in his second report for 1859 upon the disease under consideration, then prevalent in England; and which were framed "after much preliminary study of the subject and consultation with several eminent members of the medical profession." They are consequently well calculated to elicit all required information regarding the origin and spread of the disease; its duration, extent, and novelty; the existence of any local or personal conditions that may have predisposed to attacks of the disease; evidence in favour of its communicability; its association with other varieties of sore-throat; the contemporaneous existence of other diseases of men or cattle which have in Europe been found often to precede or accompany attacks of this specific disease; and other points of interest.

4. These questions, with the replies of the medical officers, will be found in a tabulated form in the appendix.

5. Before proceeding to submit a narrative of the outbreak as elicited from those replies, and from information gathered by personal communication with medical officers and from examination of the localities in which cases of the disease occurred, it may be well to give, for the information of Government, a concise sketch of the natural history of the affection as witnessed in Europe, and to note the opinion formed by competent authorities upon the different points of interest in regard to its causation, and the adoption of measures calculated to mitigate its severity or arrest its spread.

6. The inquiry, instituted under the orders of the Privy Council referred to in paragraph 3 of this letter, resulted in a mass of information which Mr. Simon epitomized in a minute published in his third report to the Privy Council, and Dr. Greenhow, one of the gentlemen to whom the inquiry was entrusted, imparted the knowledge thus acquired to the medical profession in a work which is still accepted as a text-book upon the subject.

7. Diphtheria is by no means a new disease, but was known to physicians in the sixteenth and seventeenth centuries under the names of "Morbus suffocans," "Morbus strangulatorius," "Putrid sore-throat," "Malignant ulcerous sore-throat," "Epidemic croup," &c., and the writings of older physicians clearly establish that the symptoms of the diseases they described are identical with those of diphtheria of the present day. For two or three generations the disease would appear to have been little observed; but about the first quarter of the present century it again began

to attract attention by its great prevalence over a large part of Europe, notably at Paris in 1823, at Boulogne in 1855, and subsequently commencing in 1856 in England.

8. This latter epidemic was made the subject of the inquiry already referred to, and the following conclusions were deduced from the information gathered on that occasion :—

That diphtheria is an acute specific blood disease of contagious and very fatal character, marked by great depression of the system, showing a proclivity to attack the young, but not sparing adults or even aged persons. It occurs more generally as a sporadic affection, that is, in scattered cases than as an epidemic.

It has, moreover, a proclivity to become endemic in those localities or places in which it has once appeared, and even to attach itself to particular houses. It is usually preceded and attended by a general prevalence of "sore-throat," not putting on, in the large majority of instances, the peculiar morbid action of true diphtheria, the formation of false membrane which gives the disease its name; but manifesting certain features and peculiarities which indicate the operation of an "epidemic influence," just in the same way as the prevalence of diarrhoea during periods of invasion of cholera indicates the existence of a similar influence to that which, in some individuals and under certain predisposing agencies, is developed into true cholera.

9. The fact that diphtheria manifests a tendency to localize itself in certain places and even to cling to individual houses, is held to indicate that it spreads mainly by communication, either direct or indirect, between the sick and healthy; and that it is an endemic rather than an epidemic disease, dependent more upon some conditions of persons and places than upon any generally distributed cause.

Its widespread prevalences, however, on certain occasions, brings it within the category of epidemic diseases.

10. It has been observed that other epidemic diseases of men and cattle are apt to be concurrent with diphtheria, a fact which is of interest in relation to the prevalence last year at Bangalore of an epidemic amongst the horses, many cases of which presented symptoms referable to the throat, as hoarse cough, difficulty of breathing, discharge from the nostrils and mouth, and swelling of the throat.

11. In regard to the *causation* of diphtheria, the information gathered during the English epidemic was somewhat inconclusive. Dr. Simon remarks generally that "sanitary faults were found which it was thought right to point out to the local authority; not with insistence upon them as the essential causes of diphtheria, but with warning that they were likely to promote the spread of this as of many other diseases, and with assurance that the amendment of such faults, besides what it might effect in reference to the extension of diphtheria, would in other ways conduce to the healthiness of the affected districts."

12. It would occupy too much space to analyze the reports from which Mr. Simon draws this conclusion; but I may remark that cases of the disease occurred on high and dry as well on low and damp localities, in houses the sanitary conditions of which were faultless or nearly so, as well as in those reeking with all manner of insanitary evils; in the dwellings of the rich as well as those of the poor; amongst the affluent as well as the indigent. Low-lying and damp localities presented,

however, the more numerous cases of the disease, and generally the *first* cases from which the disease gradually extended to higher levels. *Damp* would appear to have more special relations to the disease than any other cause; but as an auxiliary rather than a principal agent.

13. No very reliable evidence was adduced regarding the influence of filth and effluvia from decomposing organic substances in the causation of the disease. The Medical Officer of the Privy Council writes, "I am not indeed able to say what are the causes which first give local rise to diphtheria;" and, in making certain suggestions for the removal of unwholesome conditions existing in some localities in which the disease prevailed extensively, he offers those suggestions rather in their general bearing upon public health than in their direct relation to diphtheria. Dr. Greenhow also writes as follows upon this subject :—

"When public attention was first drawn to the increasing spread and fatality of the epidemic, diphtheria was injudiciously and hastily asserted to be caused by the effluvia from decomposing organic matter, an opinion quoted from certain French authorities; but as hitherto no one has been able to point out any particular kind of district as its special birth-place, so have my inquiries and personal observation entirely failed to connect its occurrence with the defective construction of houses, or with uncleanness of dwellings, imperfect drainage, or any other cause of offensive effluvia. Indeed, this disease has rather prevailed more extensively in rural districts, country villages, and small semi-rural towns, where offensive nuisances are less common, and, from the free ventilation, less dangerous than in populous cities, where such nuisances are more common, and their effluvia are less rapidly dispersed. Some of my informants in the provinces, indeed, suppose the disease to be connected with local sanitary defects; but such opinions have sometimes appeared to me to arise from the fact that the practice of these gentlemen was almost restricted to the poorer classes of the community residing in the worst sort of dwellings; at others, from the common supposition that disease, especially of the kind called zymotic, is mainly attributable to sanitary defects.

"The absence of relation between diphtheria and effluvia is, in a great measure, confirmed by the circumstance that many practitioners, whose experience is confined entirely to the wealthier classes, have seen more cases of the epidemic than the union medical officers of the same places. One very acute observer in large general practice, Mr. Clowes, of Statham, who had treated about one hundred and fifty cases of diphtheria, stated to me that he had endeavoured to connect the existence of the epidemic with sanitary defects, in the hope of effecting some much-needed local improvements; but that he had completely failed, for he met with cases as frequently in the best as in the worst conditioned houses, among his more affluent as among his poorer patients, and quite irrespectively of the presence or absence of local impurities.

"I myself visited between thirty and forty houses in the villages of Holdenhurst, Throop, Musoliffe, Charminster, and Redhill, in the union of Christ Church, in which thirty-one deaths from diphtheria had occurred. There had been altogether about seventy-five cases in these houses, which were, for the most part, clean and well kept.

"Some of them stand on high ground and in a dry situation, others on low-lying ground near to the river Stour. Some of them were quite free from any kind of uncleanness, either within doors or in the neighbourhood; others had nuisances such as manure heaps or pools of foul stagnant water in their immediate vicinity; but, so far as I could discover, there was no marked preference of the disease for one class of residence rather than the other."

14. The *communicability* of the disease has been established by numerous independent observers. The best test of the communicability of any disease is (1), its occurrence, in any place where it did not previously exist, immediately upon, or soon after the arrival of a case from an infected locality; and (2), its attacking persons who have been in direct communication with individuals sick of such disease.

Many instances illustrating both these methods of communication are recorded in the report so often referred to, and the fact that solitary cases often occurred without extension to other members of the same family must not be permitted to outweigh the numerous instances in which members of the same family fell in succession victims to the disease.

15. Diphtheria, then, is certainly communicable; but it is held to be less contagious than either scarlet fever or small-pox.

16. These are all the facts in relation to the disease elicited by inquiry in England that I think it necessary to lay before the Government before proceeding to the consideration of the outbreak, if it may be so termed, at Bangalore.

17. The *symptoms* and *treatment* of the affection I do not, for obvious reasons, touch upon.

The discussion of purely medical questions would be out of place in a report of this nature.

The inquiry I thought it advisable to make was entered upon solely to ascertain how far the disease, as witnessed at Bangalore, might be associated with, or dependent upon, any local insanitary conditions capable of remedy or removal. I may state generally that the symptoms observed by medical officers in the cases they had under treatment are precisely those pertaining to the disease as witnessed in Europe.

18. Sporadic cases of diphtheria have been witnessed at Bangalore from time to time since 1847; but the earliest tabulated case occurred in 1863, in which year Drs. Johnstone and Kirkpatrick had each a typical case under treatment. In November 1865, a lady residing in a house in the Cavalry (now Sapper) Lines died of the disease; but it is only within the last few months that cases have followed each other in such succession as to awaken public alarm and to give a *quasi* epidemic character to the disease.

I write *quasi* epidemic advisably, for the cases are not sufficiently numerous to bring them within the category of those depending upon established epidemic influence. They have in many instances been single cases, showing no disposition to spread even to members of the same family. They have also been scattered about the whole cantonment; but have shown a proclivity to certain localities,

History of disease as observed at Bangalore.

to time since 1847; but the earliest tabulated case occurred in 1863, in which year Drs. Johnstone and Kirkpatrick

especially upper and Native Infantry Lines, five of the fourteen tabulated cases having occurred in the former and five in the latter locality.

And, in addition to these, Dr. Young alludes to two (one fatal) having occurred in the Sapper Lines, the fatal case having been in the same house as that which Mrs. C. (No. 2 in register of cases) formerly occupied.

The cases tabulated by medical officers only number fourteen, and have, with two exceptions, occurred amongst the families of officers of the force and resident gentry.

There is certainly no conclusive evidence of an epidemic of the disease amongst the native inhabitants of the bazaars and pettahs, while the families of the European troops have almost entirely escaped. Their children (amongst whom the largest number of cases usually occur, as the disease especially attacks the young) have enjoyed entire immunity.

The Medical Officer of the Mysore Commission and the Garrison Assistant Surgeon in charge of the Bowring Hospital occupy positions which must necessarily have made them acquainted with the existence of the disease had it prevailed to any extent amongst the native community; but the only cases are those noted by Doctors Farquhar and Oswald, one of a peon who resided in the Sapper Lines, and two others, children, one living in the same locality, who was brought to the Civil Hospital for treatment as an out-patient, but who was subsequently lost sight of, and the other residing beyond the fort.

19. Fourteen cases, extending over a period of six years and occurring almost entirely amongst the European population moving in the upper classes of society, can scarcely be brought within the category of an epidemic, although the occurrence of eleven cases out of the whole number within the last few months would point to some intensification of those causes or agencies, whatever they may be, upon which the cases are dependent.

20. But, although cases of true diphtheria have not been sufficiently numerous to justify the disease being denominated epidemic; *diseases of the throat*, many of the cases putting on suspicious characters, and some termed diphtheretic had been, and still were, during my stay at Bangalore, unusually prevalent; and if these cases can be accepted as allied in their nature to those graver ones returned as diphtheria, then the existence of epidemic influence may be admitted, and the graver cases considered as manifestations of the same epidemic influence, intensified by constitution or certain conditions of locality or person.

21. Owing to the fact that cases of sickness among the families of officers, soldiers, and resident gentry are not generally recorded with the same accuracy and uniformity as in the case of troops, it is quite possible that sickness, as alleged by the local press, may have been much more prevalent than it is possible to trace by any available returns of sickness and mortality.

22. I now proceed to examine the replies to the printed questions submitted to medical officers, and which were designed to elicit, as far as possible, all those conditions appertaining to each case which might be accepted as influencing the development of the disease.

I.—As regards the duration, extent, and novelty of the epidemic in the cantonment.

1st.—When was the first, and when the last case of diphtheria seen?

23. The first recorded case is that by Dr. Johnstone in 1863; the second that of Mrs. C., who was attacked in the

Sapper Lines in November 1865, and died the same month; the last child of Captain A., who was attacked on the 13th of the present month.

2nd.—What was the number of attacks of diphtheria; what the number of deaths occasioned by it, and what the number of houses among which the attacks were distributed?

24. The total number of tabulated attacks are fourteen; of these, one occurred in 1863 and one in 1865. In 1866, no instance of the disease appears to have been observed. In 1867, one case is recorded; in 1868, three; and in 1869, eight. Of the fourteen tabulated cases, six occurred in adults of the ages of 21, 22, 25, 42, 65, and 70 respectively, and eight amongst children. Of the total number, eight died and six recovered; the mortality, therefore, was 57 per cent. of cases attacked. The attacks were distributed amongst twelve houses. In two instances only did a second case occur in a house in which the disease had previously shown itself, viz., in No. 10, Cavalry (now Sapper) Lines, and No. 19, Infantry Lines.

3rd.—Is there any local recollection of diphtheria having prevailed before in the district or neighbourhood? If so, when, and to what extent?

25. As stated in paragraph 17, sporadic cases of the disease have occurred from time to time since 1847. The present epidemic may be set to date from October 1868.

II.—As regards contemporaneous or recent diseases in the cantonment.

4th.—Did other varieties of sore-throat (i.e., varieties not attended by the formation of false membrane) prevail in the cantonment at about the same time as diphtheria? If so, did they precede, or accompany, or follow its prevalence? and did they in any cases prove fatal, or present unusual features?

26. Diseases of the throat are reported to have been very prevalent for some two or three years past, and especially in the Cavalry (now Sapper) Lines. In this locality it is affirmed by Dr. Young that scarcely an individual amongst the European community has escaped ordinary sore-throat. During my stay at Bangalore, "sore-throats" were still very prevalent. In many instances, by general testimony of medical officers, the affection of the throat was something more than ordinary sore-throat, and, although not falling within the category of true diphtheria, presented diphtheretic characters, and was considered to be induced by the same morbid influences which in other cases induced true diphtheria. None of these cases proved fatal; but many presented unusual features both general and local, were attended by low febrile action and unusual depression, while the inflamed surfaces were dotted with aphthous-looking spots or ulcerations. In some there were patches of exudations, but not coalescing into the "false membrane" constituting true diphtheria. A case of this nature was detailed by Dr. Farquhar, which he terms "diphtheretic throat."

5th.—Did scarlatina prevail in the cantonment at about the same time as diphtheria? If so, did it precede, or accompany, or follow? and did it present unusual features?

6th.—Did erysipelas or puerperal fever?

7th.—Did common continued fever?

27. Dr. Johnstone is the only medical officer who met with a case resembling scarlatina; but it is by no means clear that it was a case of that disease. Neither erysipelas, puerperal fever, nor common continued fever have

been prevalent; but cases of typhoid fever have occurred.

8th.—Did any other disease, either of the human subject or of the lower animals, prevail in the cantonment to an unusual extent or with unusual features, either during or shortly before or shortly after the prevalence of diphtheria?

28. Measles, mumps, and fevers are said by some reporters to have been unusually prevalent, and Dr. Farquhar alludes to the occurrence of a good many cases of capillary bronchitis. Dr. Oswald,

on the other hand, reports that the season has been unusually healthy for some time past. Dr. Young refers to a very fatal epidemic amongst horses last autumn. I myself witnessed cases of a disease of air passages attended by swelling of the throat, discharges from the nostrils, difficulty of breathing and hoarse rancous cough, on the occasion of my visit to inquire into the epidemic then prevalent amongst the horses of the Artillery.

III.—As regards local and personal conditions predisposing to diphtheria.

9th.—In what number, and with what severity, did cases occur in dry and airy parts of the cantonment, as compared with low-lying, damp, and confined parts?

29. The number of cases are too few to admit of any satisfactory generalization on these points.

10th.—In what number, and with what severity, did cases occur in thoroughly well-constructed and well-kept houses or rooms, as compared with houses or rooms in which the atmosphere was offensive from defects of drainage or from overcrowding and non-ventilation, or from other kinds of uncleanness, as dampness, foulness of floors of bath-rooms, &c.

A large number of the cases occurred in the old Cavalry (now Sapper) Lines and in houses not far removed from the Ulsoor Lake, the compounds of some extending to the margin of that piece of water. This is about the lowest level of the cantonment, and doubtless damp and

unwholesome exhalations arise from the shores of the tank, which is, moreover, much polluted. The water is very foul, as has been proved repeatedly by direct analysis, though the fact is sufficiently established by the circumstances under which the tank receives its supply. It is true that efforts have been made to separate the sewage of the large bazaar, which formerly flowed into it, from the storm-waters, by leading the former by a closed conduit beneath the waters of the lake; but there is good reason to believe that the masonry channel is not water-tight, and admits of leakage.

30. But, independent of this probable source of contamination, the gathering grounds of this tank are foul in other directions. Certainly the locality comprising the houses in the Sapper Lines bordering upon the tank have acquired a most unenviable notoriety from the great prevalence of "sore-throat" amongst the residents, and a damp site associated with exhalations from the water may reasonably be advanced as probable causes of the greater prevalence of these affections of the throat in this part of the cantonment.

The Native Infantry Lines also are low as regards other parts of the cantonment, and some of the houses on lower levels than others and even below the level of the road-way, so that storm-waters during heavy falls of rain flow into and over the compounds.

31. The houses in this locality are also old, much crowded together, the compounds small and confined and in close proximity to the large bazaar. The bath-rooms of two houses I inspected were very damp. This is a sanitary defect very apt to occur if not guarded against.

The floorings of few houses are impervious, and in course of years the basements of buildings become damp from percolation of bathing waters beneath the

floors. In one instance the occupant admitted that an unpleasant smell proceeded from the bath-room, and doubtless this is, more or less, the case in all bath-rooms the floors and sub-soils of which have become saturated with water used in personal ablution, which speedily decomposes and becomes offensive.

32. The system of conservancy, as applied to officers' houses in the cantonment, is very faulty. Cess-pits exist upon the premises: into these the domestic utensils are emptied, and they are also used by the servants as latrines, the surface of the pits being covered by stones laid across. These cess-pits are not kept upon any regular system, and, as soon as one is nearly full, another is dug. Stable litter and refuse heaps also exist in each compound. In some instances, these dung heaps are kept in pits; in some, the manure is removed as it accumulates; in others it is carefully stored and utilized in manuring the crops of grass so generally grown at this station, while in many instances it is uncared for and allowed to accumulate to the detriment of the purity of the atmosphere.

33. From the replies to the questions under this head, and from the remarks in the table appended, it would appear that the majority of the cases occurred in low-lying localities.

But the disease was not confined to such localities. One reporter remarks, "the present epidemic has appeared in all parts of the cantonment without any regard to locality, the last case having occurred in the high ground and about the most airy part of the cantonment."

34. If the remarks appended to the register of cases in the appendix be accepted as in any way indicating the probable influence of locality or of insanitary conditions of houses or premises in the causation of the cases, it will be observed that the reporters, with two exceptions, record some objectionable features in a sanitary point of view.

The two exceptions are the houses in which Cases Nos. 6 and 10 occurred. I am not, however, disposed to lay much stress upon the several insanitary conditions noted in other instances, or to read them in the light of cause and effect. Still they are not without their significance, and point to the directions in which it is as much to the interest of the landlord as tenant that improvements should be made, not so much in relation to the present inquiry as to the general salubrity of the station.

35. Low-lying localities in the neighbourhood of water have certainly furnished a large number of cases, and it is in such localities that the prevalence of other varieties of "sore-throat" has been principally observed.

Dr. Oswald's two cases, however, both occurred in dry and airy localities; in the highest parts of the cantonment, in fact.

36. In regard to other conditions, ill-construction of houses, want of ventilation, crowding together of dwellings, and defective sanitation, and especially the existence of the cess-pit system, are advanced by reporters, and the latter (want of efficient conservancy of premises) with some insistence.

11th.—Had the houses in which diphtheria was prevalent been previously much subject to any (and, if any, what) other kinds of disease?

37. Dr. Johnstone, the Garrison Surgeon, notes that he treated two cases of erysipelas in the house in which the first of his cases of diphtheria occurred,

and in the adjoining house a case of typhoid fever; which disease he considered to be endemic in the Artillery Lines at the time he had medical charge of that arm of the force. Dr. Farquhar remarks that his third case of diphtheria occurred in the identical house that Dr. Lowe's patient (Mrs. C., No. 2 in register) died in. Dr. Beaman also remarks that one of the residents in the house in which his second case of diphtheria occurred had frequently suffered from ulcerated sore-throat. Dr. Kirkpatrick writes as follows:—

"Having been familiar for many years with the cantonment, I may state that the houses in which the recent cases of diphtheria" (those, I presume, that came under his cognizance) "occurred have never been remarked as insalubrious in any special way."

12th.—In what number, and with what severity, did cases occur among persons enjoying affluent or comfortable circumstances of life, as compared with persons suffering privation?

38. The reply to this query is, that almost all the cases occurred in the families of persons enjoying affluent or comfortable circumstances. The three exceptions, the peon and two children (not included in the register of cases) cannot be considered as coming within the category of persons "suffering privation."

13th.—What has been observed as to the influence of age, occupation, habit of body and personal antecedents in increasing or diminishing the liability to contract diphtheria, or to suffer any of its symptoms in a severe form?

39. Of the fourteen cases tabulated, eight occurred amongst children ranging in age from 11½ months to 8 years, and six amongst adults, two of them in aged persons of 65 and 70 years respectively. No information is afforded upon other points included in this question.

14th.—Did it often happen that cases of diphtheria occurred singly in households where there were children in free communication with the patient?

40. The tabulated cases, with two exceptions, are single. In several free communication existed between the invalid and other members of the family

without the disease spreading. In one other instance, however, a second member of a family was attacked; but not in the same house. In this case, the sister and brother of the patient were sent to Madras the moment the nature of the disease was ascertained; the former was attacked within twelve hours of her arrival at Madras, was seriously ill, but eventually recovered: the latter escaped. In the second instance, two members of the same family (both children) were attacked, the second case occurring after an interval of forty-one days, the house having in the interim been white-washed and thoroughly cleaned and aired. In the remaining instance, an interval of three years elapsed between the attacks, (vide Cases Nos. 2 and 5 in the register).

15th.—Did it often happen that all or nearly all the inmates, or all or nearly all the children of considerable households, were eventually attacked with diphtheria in houses where one case had arisen? or that they were attacked with any other kind of sore-throat?

41. The replies to this question are involved in that immediately preceding it.

In only three instances were second members of a family attacked. "Sore-throats" were by universal testimony very prevalent, and ran through entire households in many instances; but I have not been furnished with any return of such cases.

16th.—Where two or more cases occurred in succession in one house, what commonly was the interval between them?

or (say) about twenty-four hours after removal from the infected house. In the instance in which two cases occurred, in one instance three years, and, in the other, forty-one days elapsed.

17th.—To what extent is it the case (either as regards the cantonment generally, or as regards particular houses and establishments in the cantonment) that the persons first attacked with diphtheria had previously been in communication with houses wherein that disease was prevailing, or with houses in which some other kind of sore-throat was prevailing, or with houses in which scarlatina was prevailing, or with houses in which erysipelas or any other kind of febrile or inflammatory disease was prevailing?

in frequent contact with the children of a neighbouring family in which "sore-throat" had for some days been prevalent. No conclusive evidence is, however, furnished of the propagation of the disease by direct intercourse.

44. No replies were made to Queries 18, 19, and 20, the field of inquiry not being sufficiently large, in the practice of any single medical officer, to enable him to offer an opinion upon the subjects of them.

Conclusion to be drawn from replies to questions.

several heads of inquiry; but at the same time there is reliable evidence of the general prevalence of diseases of the throat, many of the cases putting on exceptional and suspicious characters, and occurring in numbers sufficient to warrant their being attributed to the same influences, which in a few instances under certain, though not easily definable conditions, either local or personal, have generated true diphtheria, and which have given to the disease an epidemic character.

46. The restriction of this epidemic influence almost entirely to the European community, and the great immunity, so far as can be ascertained, of the native population, is quite consistent with what was elicited during the epidemic at Boulogne in 1856, which was almost entirely confined to the *English* residents.

The fact also of its having attacked the upper classes of the European community attracted an amount of attention that would not otherwise have been given to it.

47. But although the disease has not prevailed to the extent which rumour indicated, and although also it may not be, and, indeed, is not possible to state definitely the conditions or circumstances that may have led to the unusual prevalence of disease of the throat and to cases of the particular disease under report, the inquiry will not be entirely without results, inasmuch as that it is possible to point to certain conditions which favour the incidence of this affection.

Some of those conditions have been already alluded to, such as low-lying localities in the neighbourhood of pieces of water, dampness of dwellings, especially of the floorings of bath-rooms, a condition of some moment in many of the small ill-ventilated houses with which Bangalore abounds.

48. The system of conservancy also is most faulty, and should be immediately changed.

I put myself in communication with the Cantonment Magistrate and President of the Municipal Commission upon this latter subject. He admitted that the system was most faulty, that much remains to be done both in the bazaars and on the premises of officers' quarters and of civil residents generally. He informed me that cess-pit arrangements generally existed, and that heaps of night soil and manure were allowed to exist in the backyards of houses, in the bazaars, and upon the premises of the resident gentry. This manure is so valuable that it is stored

42. In one instance above noted the interval of time is not given. It is simply stated that the patient was attacked twelve hours after reaching Madras,

43. The replies to this question by medical officers are very inconclusive. Dr. Johnstone "refrains from giving any statement." Dr. Farquhar brings to notice that a visiting governess taught Colonel D——'s and Major G——'s children. He also states his belief that Colonel D——'s and Captain A——'s children mixed together. Dr. Beaman reports that his first patient and his brother had been

45. As before remarked, the cases of true diphtheria are too few to justify any satisfactory deductions under the

for sale or for use upon the grounds adjoining, and thus most objectionable accumulations are allowed to be made. He signified his intention to take the subject up and to enforce a better system. If this be done, it is not too much to say that the sanitary condition of the cantonment will be much improved, that the process of degradation of the general health, which is often only apparent on the outbreak of epidemic disease, inseparable from living under conditions of vitiation of the air by decomposing organic matters will be arrested, and the public health preserved.

49. In the appendix will be found replies by the President of the Municipal Board to a series of questions which I submitted to him after a personal interview, and an extract from the Proceedings of the Cantonment Municipal Board under date the 13th May.

These documents sufficiently indicate the necessity for improved sanitary administration of the cantonment. Filth is shown to be stored in the bazaars for sale; no establishment exists for the scavenging of houses of civil and military residents. They keep their own toties, and Captain Gompertz writes, "Action in the direction implied in this question (No. 4) is much needed; every compound has its cess-pit, and when one is used up another is opened; accumulations of stable manure" (reply to Question 5 says) "are not interfered with."

The extract from the Proceedings of the Board contains full admission of the evils the Commissioners have to cope with; and the resolution, evidence of their desire to remedy them. The entertainment of a Sanitary Inspector is sanctioned, and measures proposed for abolishing the present cess-pit system and for the daily removal of night soil.

50. In a note from Captain Gompertz forwarding me the replies to the questions and the extract from Proceedings, he writes, "As regards officers' compounds, the difficulty is that they, in most cases, wish to keep the stable refuse for manure, and it will not pay the contractor to remove night soil alone. * * * Medical officers say that stable refuse *per se* is not unwholesome; we, therefore, cannot see our way to enforcing its removal."

I look upon this accumulation of manure and its utilization throughout the cantonment in growing crops of grass an evil, in a sanitary point of view, which ought to be put down. The emanations from manure of this description may be less noxious than those from night soil; but that they are numerous I cannot admit, and I feel certain that the sanitary advisers of the Cantonment Committee will support me in this opinion.

51. At the time that the manure is spread upon the surface, the most noxious effluvia are, by universal testimony, given off, and the air is polluted. I am assured that the Band-stand is often deserted at that time of the year when the grass lands in compounds of officers adjoining the "stand" are placed under manure.

The system should, I have no hesitation in writing, be put a stop to; nothing should be allowed within the limits of a military cantonment that can possibly pollute either the air, soil, or water. I do not say this so much in connexion with the prevalence of diphtheria, but in regard to the general health of the community. Diphtheria we cannot, in the present state of knowledge, associate with cess-pits and dung heaps; but typhoid fever (which has been sufficiently prevalent at Bangalore, and which would appear to be likely to become endemic to the station) we can.

52. If then it be determined to adopt all those measures calculated to maintain the health of the community, civil and military, of this highly favoured station, cess-pits and dung heaps must be abolished; all night soil, stable litter, and other refuse must be removed beyond the cantonment and municipal limits, there to be utilized to any extent in horticulture or agriculture.

53. In regard, then, to the existence of diphtheria at Bangalore, although I am not able to point to the causes to which its prevalence may be attributed or to connect it with any special sanitary faults, I am able to point to the want of due sanitary precautions which tend to promote the spread of this, as of many other diseases; and to assert with perfect confidence that the amendment of such faults, besides that which it may effect in reference to the extension of diphtheria, will in other ways conduce to the healthiness of the station.

APPENDIX A.
Register of Cases of Diphtheria recorded at Bangalore.

Number.	Locality and residence.	Name.	No. of persons in family.	Cases of diphtheria.	Ages of sick.	Result.	Station in life.	Source of water-supply.	Date of		Remarks as to situation, sanitary condition of residence, compound, and adjacent locality.
									Attack.	Death.	
1	Cambridge Road	Lieut. T.	3	1	22 years.	Recovery	Officer...	Bad...	1863. April.....		An ill-constructed, low-lying house, badly-drained, and in the close vicinity of a pool with sewage.
2	Sapper Lines, No. 10.	Mrs. C.	2	1	21 do....	Death....	Officer's wife		1865. November.	1865. Novem ber.	A small confined, badly-ventilated house, very draughty when open.
3	Sapper Lines, No. 12.	J. A.	5	1	70 do....	Recovery	A gentleman of means.		1867. August....		Badly-constructed house. The bath-room water simply saturated the ground where it fell, there being no drain or gutter.
4	Bazaar near Sapper Lines.	Chinniah	...	1	65 do....	Do....	Peon....		1868. 22nd Oct.		
5	Sapper Lines, No. 10.	Mr. G. (E. J.)	5	1	8 do....	Death ...	Inconfortable circumstances.		17th Nov.	1868. 29th Nov.	A small confined, badly-ventilated house, very draughty when open.
6	Sapper Lines...	T. W. ...	7	1	3 do....	Do....	Son of a Chaplain.	Unknown...	5th Dec	6th Dec.	Situation the highest and most airy in Bangalore; house stands in a fine large compound with some low-lying swampy ground to east of it but at a little distance and with some other houses intervening, in which, I believe, some cases of diphtheria occurred; but I did not see them.
7	Infantry Road.	Thomas A.	4	1	3½ do....	Do....	Officer's child.	Well in Mess House, 39th Regiment.	1869. 3rd April.	1869. 8th April.	Situation low; but house itself raised, adjacent locality crowded with bungalows.

8	Infantry Road.	Ellen L....	5	1	11½ months.	Do....	Officer's child.	Well in Sapper Lines.	8th April.	10th April.	Situation low; house very low, below the road level. Sanitary condition of compound exceedingly bad. The house is situated in line with, and not far from, the one above mentioned.
9	Bangalore*	Anne F....	4	1	42 years....	Do....	Wife of a Private.	Good.....	20th April.	27th April.	
10	"High Ground"	Anna W...	6	1	4½ do....	Do....	Officer's child.	Well near new office.	28th April.	29th April.	Situation of the house is high; compound rather small, and surrounded rather closely by other houses. House is airy and lofty.
11	Sealing Hall...	E. G.	7	1	6½ do....	Do....	Officer's child.	Bad.....	April.....	Died at Madras.	An old, tolerably built house, low-lying, and near the margin of a half-dried tank.
12	Infantry Lines.	J. E. C.	3	1	25 do....	Recovery.	Officer's wife.	Good.....	2nd May.		Diphtheria has been very prevalent and of a severe nature in the Infantry Lines. The sanitary condition of the residences where the disease has occurred good, the compounds large and carefully attended to; the supply of water good, but it is near the large bazaar or market.
13	Do. ...	N. B.	6	1	5½ do....	Do....	Officer's child.	Do.	2nd May.		House good, well raised on a basement of three or four feet, well ventilated and not previously noted as unhealthy. About six weeks before this case his elder brother, aged 4½, was taken ill in the same house with diphtheria, and died. Intermediately between the cases the house was white-washed inside and out and well aired, and the mats taken up and shaken. The greatest care was also taken to keep the compound clean. A deep well, from which little smell issued, used as a latrine by the servants.
14	No. 19, Infantry Lines.	A. M. A....	3	1	2½ do....	Do....	Officer's child.	Drinking water from a well in 27th N. I., Mess House compound. Bathing water from tank above Railway road.	13th May.		

* Family quarters, 3-60th Rifles.

N. B.—In addition to these tabulated cases, Dr. Young alludes to two in the Sapper Lines, one in a European maid of Mrs. A.'s, and the other (a fatal case) as having occurred in the house formerly occupied by Mrs. C., (No. 2 in the above list). Dr. Kirkpatrick also alludes to the death of two infants, one a child of his own in 1847 or 1848, both of which he would now consider diphtheretic, the peculiar white pseudo membrane having been observed. Dr. Oswald also had a case recently under treatment, the only one he remarks he ever saw amongst native children.

(Signed) J. L. RANKING.

APPENDIX B.

Replies to questions circulated at Bangalore in regard to the prevalence of diphtheria at that station.

1.—*When was the first, and when the last case of diphtheria seen by you?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—The first recorded case occurring in Bangalore was in the Artillery Lines, and in my own practice when in charge of the Royal Artillery in 1863. It was an exceedingly typical case, as admitted by Inspector General of Hospitals Dr. Mackenzie, by whom the case was seen.

H. YOUNG, Surgeon Major, Sappers and Miners.—I have but personally seen two cases of diphtheria. The first occurred in the old Cavalry Mess House, St. John's Road, opposite the quarters occupied by married Serjeants of the Sappers, in the person of Mr. A., Senior, of Madras, who was sent off the same evening to Madras, and made a rapid recovery. This was on 3rd August 1867. The second case was that of a child of Reverend S. W.—, which occurred in Binny Lodge, St. John's Hill, on 5th December 1868. This child was also sent to Madras, but the case terminated fatally four hours after arrival. This was the first case I heard of in the present epidemic.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—First case seen (but under Dr. Lowe's care) was in November 1865. The last case treated by me was in November 1868.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—The first, six months ago, in a Deloyet Peon, aged about 45; the last, in a child 4 years old, four days ago.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—The first case "seen" by (me but not under my medical charge) was on March 24th; the last on April 8th.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—5th December 1868 and 29th April 1869.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—Only one case occurred; first seen on the 18th April, last seen and died on the 27th April.

2.—*What was the number of attacks of diphtheria; what the number of deaths occasioned by it, and what the number of houses among which the attacks were distributed?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—In my own practice, only two; death, one; one occurring in two houses.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—Three cases, one death, three houses. One out-patient seen once by Apothecary Pereira, death probable.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—The above two only; both in consultation with other medical officers, by whom they will doubtless be detailed. It might, therefore, cause confusion were I to tabulate them.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—Two, both fatal, two houses.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—Two, two, two.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—Only one.

3.—*Is there any local recollection of diphtheria having prevailed before in the district or neighbourhood? If so, when, and to what extent?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—None.

H. YOUNG, Surgeon Major, Sappers and Miners.—A fatal case of diphtheria occurred in St. John's Road, next door but one to the old Mess House, in a Mrs. C—, the wife of an officer of the Sappers, in April 1865. About the same period a case occurred in a European maid of Mrs. A— in the house next door to Binny Lodge; this case recovered. I heard last year of another fatal case occurring in the house formerly occupied by Mrs. C—.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—No.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—An infant of the Serjeant Major, 4th Light Cavalry, died in the Native Cavalry Lines (now Sapper) in 1847 or 48, and a child of mine on 10th April 1863 of the affections of the trachea and throat, which I would now

consider diphtheretic, white pseudo membranes having been observed, and, at the time, considered extensions of tracheal croup.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—No reply.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—Not that I know of.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—No.

4.—*Did other varieties of sore-throat (i. e. varieties not attended by the formation of false membrane) prevail in the cantonment at about the same time as diphtheria? If so, did they precede, or accompany, or follow its prevalence? and did they in any cases prove fatal, or present unusual features?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—Catarrhal fever, often attended by tonsillar and faucial inflammation, very generally prevailed in the cantonment and district, preceding not only the two cases above recorded, but also the others subsequently occurring in the practice of other reporters.

H. YOUNG, Surgeon Major Sappers and Miners.—A very large number of cases of sore-throat, relaxed and ulcerated, have come under my notice during the past six months, there being scarcely an house in St. John's Hill occupied by officers and people in comfortable circumstances in which cases have not continually and repeatedly occurred.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—Sore-throats of various kinds, sometimes with ashy patches on tonsils, preceded and accompanied recent outbreak. No fatal case. Had one case of tonsils and soft palate covered with a hepatic-looking eruption simulating diphtheria. Miss D— had both tonsils enlarged, spongy, and covered with ashy patches. I looked on this case as diphtheretic.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—I was absent on privilege leave from 17th March to 13th April, when most of the recent cases of diphtheria occurred. A few cases of ordinary sore-throat seen since, and one progressed to croup, but resulted in recovery. In this case there was at first a small ulcerated patch on each tonsil, but no membranes.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—Sore-throat (ulcerated variety) exceedingly prevalent, scarcely a family amongst the officers of my regiment but has been attacked by it. I am myself but just recovering from an attack which for some days was accompanied by low fever, great nervous prostration, and excessive muscular debility.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—I have seen a few cases of "sore-throat" lately, subsequent to the first case of diphtheria that occurred. They recovered, and presented nothing unusual.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—No.

5.—*Did scarlatina prevail in the cantonment at about the same time as diphtheria? If so, did it precede, accompany, or follow? and did it present unusual features?*

6.—*Did erysipelas or puerperal fever?*

7.—*Did common continued fever?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—5. A child aged 4, the sister of Case No. 2 which proved fatal, was subsequently attacked by catarrhal symptoms and slight congestion of the throat. In this case a peculiar erythematous blush appeared on the face and chest, disappearing, however, in a few hours.

6. No.

7. No.

H. YOUNG, Surgeon Major, Sappers and Miners.—5. It was rumoured that scarlatina prevailed on St. John's Hill amongst the civil population and pensioners' families.

6 and 7. Fever has been very prevalent for months past, also measles and mumps.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—5. One lady had an eruption with sore-throat, the former disappearing on fourth day, and resembling scarlatina more than any other disease.

6 and 7. No.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—5. No scarlatina heard of.
6. Not in my charge.

7. A few cases of common catarrhal fever met with among the sepoys of the 27th Native Infantry.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—5. Not to my knowledge.

7. Very prevalent amongst natives.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—5. Not that I know of.

6 and 7. Have not seen any case.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—5, 6, and 7. No.

8.—Did any other disease, either of the human subject or of the lower animals, prevail in the cantonment to an unusual extent or with unusual features, either during or shortly before or shortly after the prevalence of diphtheria?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—Measles prevailed to an unusual extent in the cantonment, often attended by pulmonary congestion; and, in one case, a child aged 6, by pericarditis, terminating fatally.

H. YOUNG, Surgeon Major, Sappers and Miners.—A very fatal epidemic prevailed among the horses during last autumn.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—During present outbreak there have been a good many cases of capillary bronchitis, of which Colonel D——'s child died on 24th March 1869. Shortly before Mr. A——'s attack, one of his horses died of glanders in his compound.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—A few cases of measles among the men and families of the 27th Regiment Native Infantry, and some, though it may be doubtful if they were not roseola, in the families of two officers living in the Native Infantry Lines. No information as to animals.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—No reply.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—On the contrary, the season has been unusually healthy for some time past both for man and horse.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—Measles prevailed.

9.—In what number, and with what severity, did cases occur in dry and airy parts of the cantonment, as compared with low-lying, damp, and confined parts?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—The cases indicated in paragraph 1 had their residence in low-lying localities, the first in the immediate vicinity of a pond charged with sewage filth, the other equally near to a partially drained tank.

H. YOUNG, Surgeon Major, Sappers and Miners.—The present epidemic has appeared in all parts of the cantonment without any regard to locality, the last case I heard of having occurred on the high ground and about the most airy part of Bangalore.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—The cases of diphtheria and of bad sore-throat I have treated have been mostly in low-lying or confined parts.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—9 and 10. Not having had any of the cases originally in my charge, it will be more proper to leave the answering of these questions to the medical officers in whose care the cases were; but may note that long previously to one of the recent cases (Captain W. A——'s child) I had noticed the bath-room to be ill-aired and rather foul-smelling.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—The two cases treated by me occurred in the low-lying and crowded part of Bangalore known as "Infantry Road," (eastern extremity).

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—The two cases I saw both occurred in dry and airy localities; in the highest parts of the cantonment, in fact.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—Only one case occurred in a woman of the 3-60th Rifles lately arrived from England.

10.—In what number, and with what severity, did cases occur in thoroughly well-constructed and well-kept houses or rooms, as compared with houses or rooms in which the atmosphere was offensive from defects of drainage or from overcrowding and non-ventilation, or from other kinds of uncleanness, as dampness, foulness of floors of bath-rooms, &c.?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—In the Infantry Lines, where most of the cases originated, the houses are old and froazy, close to each other, and having their small compounds shut in by walls, thus impeding ventilation: add to this, each compound has its own particular pit, the receptacle of the domestic feculence, an institution enforced, I believe, by the Municipal authorities, exhaling at all times a poisonous stench to be widely diffused by varying winds throughout the station.

H. YOUNG, Surgeon Major, Sappers and Miners.—As far as I am aware, all the cases that have occurred have been among the better classes, who have been well housed and fed.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—In my own cases and those seen by me under the care of others, I have noted either a bad construction of house or a want of proper ventilation or overcrowding (in child G——'s case) or something else defective in a sanitary point of view.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—See reply to No. 9.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—The house in which Case No. 1 occurred was a fair-sized bungalow, and seemed well ventilated; but hemmed in with other dwellings, and of doubtful sanitation as regards the compound. The house of Case No. 2 is very low, and the sanitary condition of the compound was found to be exceedingly bad. What all these houses require is the frequent visit of the scavenger cart to prevent the accumulation of filth.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—Both cases occurred in well-constructed and well-kept houses.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—Only one case; no overcrowding; sanitary condition good; ventilation good.

11.—Had the houses in which diphtheria was prevalent been previously much subject to any (and, if any, what) other kinds of disease?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—Two cases of erysipelas were treated by me in the house in which originated Case No. 1 in the Artillery Lines. In the adjoining house a case of typhoid fever occurred, a disease indeed endemic in the Artillery Lines, at least during the period when I had medical charge of the Artillery.

H. YOUNG, Surgeon Major, Sappers and Miners.—No reply.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—Case No. 3 (register) was in the identical house that Dr. Lowe's patient died in of diphtheria. I ordered immediate removal to another house.

W. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—Having been familiar for many years with the cantonment, I may state that the houses in which the recent cases of diphtheria have occurred have never been remarked as insalubrious in any special way; most of them are rather of the better class, and widely apart.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—One of the residents in the house of Case No. 2 had frequently suffered with ulcerated sore-throat.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—No, the contrary.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—None.

12.—In what number, and with what severity, did cases occur among persons enjoying affluent or comfortable circumstances of life, as compared with persons suffering privation.

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—No reply.

H. YOUNG, Surgeon Major, Sappers and Miners.—I have heard of no cases among the very poor or those suffering from privation.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—Two cases were in persons in comfortable circumstances, one inclining to the opposite.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—No reply.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—The two cases which came under my immediate observation were those of remarkably fine healthy children.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—Both cases were children of persons in comfortable circumstances.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—Only one case, the wife of a private Soldier in the 3-60th Rifles.

13.—*What has been observed as to the influence of age, occupation, habit of body and personal antecedents, in increasing or diminishing the liability to contract diphtheria, or to suffer any of its symptoms in severe forms?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—Case No. 1 was that of a healthy robust young man, the other was that of a child aged 7.

H. YOUNG, *Surgeon Major, Sappers and Miners*.—No reply.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—Two were in aged men, and, though they recovered, they were the most typical cases I have seen, the membrane being extensive and fully formed before coming under treatment.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—No reply.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—No reply.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—Nothing has been observed.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—Nothing.

14.—*Did it often happen (and, if so, give instances) that cases of diphtheria occurred singly in households where there were children in free communication with the patient?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—In Case No. 1 isolation was at once had recourse to; in Case No. 2 this was but partially carried out: subsequently, as stated in paragraph 5, suspicious indications simulating scarlatina supervened in this case.

H. YOUNG, *Surgeon Major, Sappers and Miners*.—The only cases under my knowledge occurred singly.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—In Mr. A——'s case, his three daughters and one son were constantly with him while here. In child G——'s case, several children communicated with her before and after (as I found subsequently) I saw her.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—In the case of the Deloyet Peon above (No. 1) noted, who is an intelligent man, repeated inquiries from him at various times have elicited that his house is situated near the Light Cavalry (now Sapper) Lines, in as cleanly a neighbourhood as other parts of the native town, and that neither before nor since his illness has any one in his family or neighbourhood been similarly sick.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—The little brother of Case No. 1 was in free communication with the patient until the nature of the disease was recognized. He was then sent to Madras; he was not attacked. The sister (aged 3 years) of Case No. 2 was also in free communication with the patient until I visited the case. She was immediately sent away to Madras, where she had not been twelve hours before exhibiting symptoms of the disease. She was seriously ill some days, but alternately recovered.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—Both my cases occurred singly in households where there were children who had been in pro-communication with the patient previous to attack, but were at once separated.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—No.

15.—*Did it often happen (and, if so, give instances) that all or nearly all the inmates, or all or nearly all the children, of considerable households were eventually attacked with*

diphtheria in houses where one case had arisen, or that they were attacked with any other kind of sore-throat?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—I have nothing to record under this category.

H. YOUNG, *Surgeon Major, Sappers and Miners*.—No reply.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—In the above cases, nothing of this sort happened.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—No reply.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—No reply.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—None of the other inmates suffered in any way.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—No.

16.—*Where two or more cases occurred in succession in one house, what commonly was the interval between them?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—And so, too, under this.

H. YOUNG, *Surgeon Major, Sappers and Miners*.—The only house in which I am aware that two cases occurred was that before alluded to, and an interval of three years had elapsed. There is evidently a predisposing tendency to the disease in that neighbourhood; but whether it arises from faulty drainage, damp, or unhealthiness from near proximity to the Ulsoor Tank, I cannot determine.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—No such cases.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—No reply.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—No reply.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—No reply.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—Only one case occurred.

17.—*To what extent is it the case (either as regards the cantonment generally or as regards particular houses and establishments in the cantonment) that the persons first attacked with diphtheria had previously been in communication with houses wherein that disease was prevailing, or with houses in which some other kind of sore-throat was prevailing, or with houses in which scarlatina was prevailing, or with houses in which erysipelas or any other kind of febrile or inflammatory disease was prevailing?*

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—Without positive proof stronger than the mere assertion that intercommunication between infected households and those subsequently attacked with the disease, I refrain from giving any statement under this heading.

H. YOUNG, *Surgeon Major, Sappers and Miners*.—No reply.

W. FARQUHAR, M.D., *Garrison Assistant Surgeon*.—None between cases I treated; but a visiting governess taught Colonel D——'s children, Major G——'s children, Colonel D——'s my own. No sore-throats among last two families; at the same time I believe Colonel D——'s children and Captain A——'s children mixed together; but I presume the same may be found to have taken place among children who contracted no throat disease.

J. KIRKPATRICK, M.D., *Surgeon Major, 27th Regiment N. I.*—No reply.

A. H. BEAMAN, *Surgeon, 39th Regiment N. I.*—Case No. 1 and his brother had been in frequent contact with the children of a neighbouring family in which "sore-throat" had for some days been prevalent. Case No. 2 had always been most carefully excluded from all contact with other children.

H. B. OSWALD, M.D., *Surgeon, Mysore Commission*.—Some cases of diphtheria had occurred, I believe, in the Sapper Lines, where one of my patients went to live only a few days before being attached, the other child could not have been near a case of diphtheria.

H. WALKER, *Assistant Surgeon, Her Majesty's British Service*.—None.

18.—If in any case diphtheria seems to have resulted from such communication, what was the nature of the communication? and what time elapsed after the communication before the new case of diphtheria commenced?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—No remarks.

H. YOUNG, Surgeon Major, Sappers and Miners.—No reply.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—I am not sufficiently aware of the first onset of illness of cases not my own to answer this question, but this investigation may show whether there was any communication of disease in the way hinted at in Answer 17.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—No reply.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—No reply.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—No reply.

H. WALKER, Assistant Surgeon Her Majesty's British Service.—No.

19.—Did it ever appear that diphtheria was propagated by accidental inoculation or contact of the morbid secretion of the throat?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—On this question I cannot speak.

H. YOUNG, Surgeon Major, Sappers and Miners.—No reply.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—I am not aware that it ever was.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—No reply.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—No reply.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—No.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—No.

20.—If, among persons equally communicating with the sick, some were attacked with diphtheria while others remained free from it, to what was this difference attributed?

Surgeon Major W. JOHNSTONE, M.D., Garrison Surgeon.—And so, too, of this question.

H. YOUNG, Surgeon Major, Sappers and Miners.—No reply.

W. FARQUHAR, M.D., Garrison Assistant Surgeon.—I cannot speak as to liability from communication; but child G—had always, I heard, enlarged spongy tonsils. This was true to some extent also of some cases of sore-throat, which at first there was no knowing might not turn out diphtheria.

J. KIRKPATRICK, M.D., Surgeon Major, 27th Regiment N. I.—No reply.

A. H. BEAMAN, Surgeon, 39th Regiment N. I.—No reply.

H. B. OSWALD, M.D., Surgeon, Mysore Commission.—No reply.

H. WALKER, Assistant Surgeon, Her Majesty's British Service.—None occurred.

(Signed) J. L. RANKING.

APPENDIX C.

MEMORANDUM BY CANTONMENT MAGISTRATE.

Questions.

Answers.

1. What is the strength of your conservancy establishment in (a), supervision; (b), carts, filth, and rubbish; and (c), scavengers?

(a). Eight overseers.

(b). Fifty-two carts: these were handed over to the contractors.

(c). One maistry-toty.

Five head toties.

Eighty-six toties.

Latrines are cleaned by contract at 50 Rupees per month.

2. Have you a Sanitary Inspector, and are periodical inspections made of the premises of civil and military residents?

No.

3. Is all night soil and other filth removed from houses in the bazaars, or are cess-pits allowed? are further latrines provided, and in sufficient quantity? and are they much resorted to?

Night soil is removed only in part; rubbish boxes are insufficient, and in many parts of the bazaar the natives do their best to keep their night soil, covering it with ashes and storing it for sale as manure.

Cess-pits are forbidden, but there is reason to believe that some still exist.

4. Is night soil and filth removed periodically, and how often from the premises of civil and military residents, or are accumulations allowed in cess-pits?

No civil and military residents keep their own toties. Action in the direction implied in the question is much needed.

They are not interfered with.

5. Are accumulations of stable litter (dung heaps) permitted?

Yes, by parties desiring to dispose of the same.

6. Is any sale found for night soil and stable manure?

The sewage contract is sold to advantage of Municipal Board.

7. Be good enough to give any other information regarding the condition of the station as to general conservancy, and your opinion as to the necessity for improvement, and your liability to carry out improvements with the funds now at the disposal of the Municipality?

Vide Extract from the Proceedings of the Board of 13th May 1869, paragraph 7, attached.

(Signed) E. D. GOMPERTZ,

President, Cantonment Municipal Board.

Extract from the Proceedings of the Bangalore Cantonment Municipal Board of 13th May 1869, paragraph 7.

The President begs to circulate, for the information of members of the Board, a communication from the Sanitary Commissioner with his replies, and to suggest the extension of the conservancy operations of the Board.

Mr. Seppings, formerly Sanitary Inspector, has resigned the situation; it appears that he never had time to carry out the duties of the appointment as they should be performed, viz., "book in hand constantly inspecting every house, noting any offensive nuisance, and taking immediate remedial measures." The President thinks that the Board require an active, trustworthy person, who could devote his whole time to this, and to supervise the Conservancy Overseers and establishment of each Municipal division; his pay should be about 60 to 80 Rupees per month.

He would also invite the Board to adopt measures for the conservancy of private compounds and yards of native houses. Night soil, stable refuse, and sweepings, are, in many instances, purposely accumulated, either for sale as manure when a sufficient quantity has been stored, or for use in the garden. In crowded localities, the vapour from such accumulations cannot but be injurious. Dr. Ranking, alluding to the Infantry Lines and such localities where houses are close together, expressed his conviction that much of the typhoid fever lately prevalent may be attributed to this.

He thinks that civil and military residents should be compelled to cause their sweepers to deposit the night soil of the house in the same pit as the stable manure; the whole could then be removed by the conservancy establishment, (to be increased, if necessary), or, if the parties desire non-interference, they should be compelled to cause its removal three times a week, or suffer prosecution for nuisance if offensive. By the sale of the rubbish contract the Board has realized about Rupees 3000, which might well be applied to improved conservancy.

RESOLUTION.—That a Sanitary Inspector be appointed on pay not exceeding 75 Rupees per month exclusive of horse allowance.

Also that the civil and military residents be addressed, informing them that, on their paying necessary expenses, the contractor will be directed to cart away night soil, &c., daily, and, that the means being thus afforded of removing the nuisance, persons neglecting to avail themselves of it

Cont. of 1869) ~~SW~~ ~~dr~~ ~~4~~

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• cc. cc. cc.

Dated July, 7th.

Recd.

Encl.

G. O., 7th July 1869, No. 914.

JULY.

Nos. 23-24.

Forwarding the Sanitary Commissioner's report upon the prevalence of Diphtheria at Bangalore, with reference to the suggestions contained therein for the improvement of the conserrancy of the station.

7th July 1869.

be liable to prosecution on report of Sanitary Inspector that offensive nuisance, exists: Subsidiary bye-laws to be framed to carry out these measures, if necessary; rules to be framed hereafter, these measures being adopted as tentative.

(True Extract).

(Signed) E. D. GOMPERTZ,
President, Cantonment Municipal Board.

No. 24. ORDER THEREON, 7th July 1869, No. 914.

The report submitted by the Sanitary Commissioner upon the prevalence of Diphtheria at Bangalore, will be sent to the Chief Commissioner of Mysore, with reference to the suggestions made by the Sanitary Commissioner for the improvement of the conservancy of the station in paragraphs 48 and 53 of the report.

(True Extract).

R. S. ELLIS,
Chief Secretary.

To the Chief Commissioner of Mysore.

- „ Inspector General of the Indian Medical Department.
- „ Sanitary Commissioner.
- „ Military Department.

Public Department.

PROCEEDINGS of the MADRAS GOVERNMENT.

Read the following letter from the

Sanitary Commr, Madras.
Here enters 7 June 1869 No 1617/69

Order thereon 7 July 1869 No 1617/69.

The report submitted by the Sanitary Commission upon the prevalence of Diarrhoea at Bangalore will be referred to the Sanitary Department and the Commission will be called upon to submit a report upon the same. In the meantime the Commission may consider necessary for

W. A. W.

~~for remedying the defects~~
~~of the~~ ~~within the~~
Cantonment limits which
are detailed by the Sanita.

~~by Commission in para~~
~~48 to 53 of the report.~~

2 - A copy of the report

~~will also~~ be sent to the

Chief Commissioner of

Hydro. with reference

to the suggestions made

by the Secretary Commr.

for the improvement

of the Conservancy of

the Station in/Paras

48 & 53 of the report.

Chief Comr of Mysore
The Military Dept. }
" Hy & Med Dept }
" Sanitary Commr }
" Military Department }

D 11/7
D 12/7

Box of 1863 & 1864.

Public

To
The Chief Justice, Supreme

See

Dated July 7. } 1869, No 914.
Recd.

Nos. 23. 24.

~~Memorandum~~
~~relating to the~~

~~subject. The Secretary~~

~~reports upon the~~

~~of the~~

~~in connection with the~~

~~for forwarding the~~

~~to the~~

~~and~~

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