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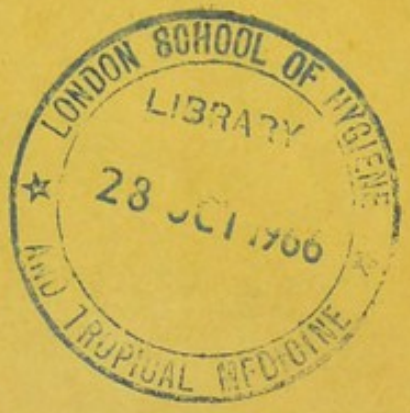
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STATISTICS

OF

CHOLERA

BY

EDWARD BALFOUR, L. R. C. S. E.

DEPUTY INSPECTOR GENERAL OF HOSPITALS, MADRAS ARMY
CORRESPONDING MEMBER OF THE IMPERIAL
GEOLOGICAL INSTITUTE, VIENNA.

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PREFACE TO THE SECOND EDITION.

THE first edition of the "Statistics of Cholera" was printed in the year 1849. It was founded on The Return to Parliament of the 17th February 1847, which Mr. Hume, on the 16th June 1845, had moved for at my request; and, while preparing my observations on it, Assistant Surgeon Lorimer's able Report on Cholera appeared: I have here pleasure in mentioning Dr. Lorimer's name; for, as I believed then, I believe now, that the numerical mode of investigating this ailment is likely to lead to results of value, and Dr. Lorimer's investigations took precedence of mine.

In the first edition, I expressed a hope that the data furnished might prove useful to some of the numerous inquirers then in the field, by suggesting to them new modes of inquiry; and, in 1856, I followed up the investigation by printing a large edition of "The Localities in India, Exempt from Cholera." Since then the work devolving on me and my distance from available sources of information have debarred me from doing more than watch the progress of the inquiries as to Cholera and collect such items of information as seemed of use: but the recent writings of Inspector General Murray, Drs. Duncan, John and Hugh Macpherson, the Reports of The Royal Sanitary Commission, and the Members of the Sanitary Commission with the Government of India—Mr. Strachey, Captain Malleson, Drs. Cunningham and Bryden—have added so vast a store of fresh facts that I now re-print the "Statistics of Cholera" in order to bring information as to this ailment up to the present day and I believe that a little further effort now will obtain for the world very valuable results.

SECUNDERABAD,
15th February 1870.

PREFACE TO THE FIRST EDITION.

THE data accumulated during the thirty years that have elapsed since epidemic cholera first made its appearance seeming to me sufficiently abundant to repay an inquiry into the mode in which this disease developes itself, and the interval of time being sufficiently long to allow of fair averages being struck, I have entered upon the investigation of the subject ; and, though some of the results obtained may surprise others as much as they did myself, I trust that a perusal of the tables will show that every care has been taken to ensure their accuracy, and that the deductions are fully warranted by the facts adduced.

This brochure, framed with the object of collecting all that is known concerning cholera, is offered as a contribution to vital statistics ; and the investigation being as yet very imperfect, particularly as regards the origin and treatment of the disease, I hope that the data here furnished may prove useful to some of the numerous inquirers now in the field, by suggesting new subjects of inquiry, and new modes of conducting it, and thus lead, perhaps, to the explanation of many hitherto unaccountable peculiarities of the malady. I have also great hopes that the inquiry (alluded to in the Appendix) now in progress in the Madras Presidency, may prove of great value in this respect, and trust ere long to be able to communicate the results of it.

It will be seen, on perusal of the following pages, that medicinal treatment is proved to be of decided value in this disease, but I have but slightly dwelt on that point, my own views leading me rather to inquire into the means of preventing sickness, than those of curing it. I allow it to be a beautiful idea that the Supreme Being, in permitting his creatures to be afflicted with pestilences, has also in his,

mercy provided remedies for their cure, and those who entirely adopt this belief will doubtless continue to search exclusively for means of removing this and other maladies ; but, without in any way wishing to damp the energy of such inquirers, I think all Medical men will allow the superiority of prophylactic over mere curative measures, and admit that those who regard disease as the consequence of an infraction of the physical laws decreed for our guidance, and consider it as a warning to observe these laws more strictly for the future, take a no less elevated view of their duties ; for we thereby open to ourselves a vast field for the exercise of benevolence in discovering the source of disease and the means of preventing it ; whilst, if we take the former view, we may look on with apathy till sickness break forth, and though we may then exert all our energies and employ all the means furnished by art and science to subdue it, the following pages will too clearly show, that, in combatting with Cholera, at least, we shall meet with but little success :—

I have given below* a list of the sources from which the information contained in the following pages is derived ; I have great pleasure in stating that all my brother officers, in the Madras Presidency, have evinced the greatest willingness to assist me, by furnishing me with extracts from the records of their departments, and I beg to offer to the Members of the Medical Board, Surgeon George Pearse, and Assistant Surgeon Lorimer my best thanks for their kindness.

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* Statistical Reports on the Sickness, Mortality and Invaliding of H. M. Troops Vols. 1838, 1839, 1840 and 1841.
Statistical Reports on the Health of the Navy, Vols. 1840 and 1841.
Reports on the Medical Topography of the Madras Army, Vols. 1842, 1843, 1844, and 1844.
Johnson and Martin on Tropical Climates, Edition 1841.
Dr. Lorimer's Report on Cholera, 1846.
Records of the Madras Medical Board's Office.
Records of the Office of the Superintending Surgeon Ceded Districts.
Surgeon James Macgregor H. M. K. O. Borderers, in Madras Medical Journal.
Parliamentary Return, 17th February 1847.
Dr. Forrie's Report on the United States Army.

I regret that I have been unable to add to the tables herein given, any particulars concerning the Bengal and Bombay Armies, having, as yet, received no answer from the authorities, there, to my applications for information.

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STATISTICS OF CHOLERA.

It is not known when cholera first occurred amongst the people of India, yet this point in the history of the disease is of value in any discussion of the question whether, like many of the plagues which have invaded Europe, and disappeared, this ailment will also run its course and then cease.

Dr. John Macpherson in his pamphlet on "Cholera in the East" gives a resumé of all that is known regarding the appearance of this disease, and he arrives at the conclusion that cholera of various degrees of intensity, with the symptoms of the several forms of the disease running into each other as now, has always prevailed in India as it does at the present day. He shows that it has been known to Europeans from their first arrival in the country, and instances a notice of its occurrence at Calicut, in 1503, though the Portuguese only reached Goa in 1497. He is further of opinion that in the West and South of India, it has always been endemic : but, from the fact that it is not alluded to by several European writers who have resided in India, and who were not likely to have been silent regarding its ravages had it been epidemic during their stay, he concludes that it has had periods of activity and quiescence. One of these invasions occurred between the years 1756 and 1797 ; but, between 1775 and 1785, and particularly in the years 1781, 1782 and 1783, the disease prevailed severely in an epidemic form. From that time there was a season of comparative slumber till 1817, when the disease again awoke to a period of activity, which has continued to the present day. (See Appendix A).

The Proceedings of the Madras Hospital Board of the 29th November 1787, notice "A disease having, in October last, prevailed at "Arcot, similar to an endemic that raged amongst the natives about "Paliconda, in the Ambor Valley in $\frac{1780}{1770}$; in an Army of observation in "January 1783, and the Bengal detachment at Ganjam in 1781, and "several other places at different times, as well as epidemic over the "whole coast in 1783, under the appearance of dysentery, Cholera-mor-"bus or Mordexym, but attended with spasms at the precordia and sudden "prostration of strength, as characteristic marks," and the Board then ordered to be recorded letters from Mr. Thompson, Surgeon of the 4th Regiment, from Mr Duffin, Head Surgeon at Vellore, and from Mr. Davis, Member of the Hospital Board. Mr. Duffin in his letter dated Vellore 28th October 1787, mentions that its progress was so rapid, many of the men were carried off in twelve hours. He speaks doubtfully as to the

value of opiates, and recommended castor oil as the only effectual remedy, with wine, brandy and water and opium and "scarce ever lost a man." In a subsequent letter of 3rd November 1787, he attributes the out-break at Arcot to filth, and the peculiar weather, and recommends removal ; notices the pallid hue of the body, spasms in the extremity, thirst, incessant vomiting, profuse clammy cold sweats, griping, purging and bilious coluves, resembling yeast, and the urine pale and in small quantity and he recommends wine, frictions, hot baths, hot fomentations, warm water steaming, and clysters.

Surgeon Maxwell Thompson of the 4th Regiment of Infantry in a letter dated Arcot 5th November 1787 reports that the disease then raging was "exactly the same as prevailed at Trincomallee in the months of April "and May 1782, when the season was very hot and chill."

Mr. Thomas Davis, Head Surgeon and Member of the Hospital Board, which then consisted of Dr. James Anderson, Mr. Lucas, and Mr. Davis, in a letter dated Madras 29th November 1787 reports his visit to Arcot on 29th October 1787, and his having found in the epidemic hospital three different diseases, vizt. "patients labouring under the cholera-morbus ; an "inflammatory fever with universal cramps ; and a spasmodic affection of "the nervous system distinct from cholera-morbus" and "understood "from the Regimental Surgeon that the last disease had proved fatal to "all who had been attacked with it and that he had already lost seven and "twenty men of the Regiment in a few days. Five patients, he adds were "then shewn me with scarce any circulation whatever to be discovered ; "their eyes much sunk within their orbits, their jaws apparently set, their "bodies universally cold , except at the precordia, and their extremities "livid." He "could discover no bilious indications in the whole system." He notices as a symptom the uncontrollable thirst, and after death the contracted bladder, and, in the ailment last described, we recognise the cholera-morbus of the present day.

It has distinct names in the various tongues of the South of Asia (see Appendix B), several of them, as the Arabic, Bengali, Hindi, Tamul, and Telugoo, describing the more prominent symptoms, of purging, or vomiting and purging; others of them, as the Arabic marz ul-aswad and Hindi-kala-marri or black-death, descriptive of the severity of the ailment, and the mordexym of the authors of the last century sounds like mort-de-chien or dog's death of the French. And, it is indeed an ailment from which, when in its severer forms, many of the races of India flee, leaving the dead

unburied and the sick to die, which they regard as emanating from a goddess whom they worship ; which carries off the strong robust man in a few hours, and passes by neither race nor age. Writing of the severer form known as the kala-marri, Dr. F. N. Macnamara tells us that in 1864 and 1865, "he had upwards of 1500 cases of cholera in the Assam and Cachar coolee depôts, and it was then a most common thing for these unfortunate people to die two or three at a time, as if they had been killed by some poison, paralysing suddenly all the vital energies. The Native Doctors," he adds, "used to report to me thus,—one man of the gang had Cholera and died, and the rest fell about like dead men, and they also died." The men died in one hour or so without vomiting or purging, as if in a deadly faint. Others might vomit once or twice, or might be purged once or twice with the characteristic discharges." Of those attacked with this ailment, whether Europeans or Natives of India, even with all the care that the medical art can give only one in every two or three of the sick recover, the loss to the community is every year great, and in some years it is enormous, a large proportion of all the deaths in India being caused by this one disease.

Cholera is separately enumerated in the Parliamentary Returns which were obtained in 1846, from the three Presidencies of India. Since the early part of 1817, when this disease made its re-appearance, in the continuous form that it now assumes, it has visited nearly all the countries north of the equator ; in most of those countries, however, although its ravages extended over all the population, it only remained a year or two and then disappeared for a considerable period of years : but, in India, it has continued to recur, sometimes generally, and occasionally to a limited extent, but still to recur year after year in one part or another of the country, and in the period embraced in the parliamentary returns of 1846, it caused nearly the eighth part of all the mortality of the European soldiers in India, while, of the deaths amongst native troops, nearly a fifth part arose from this singular disease. Out of 13,012 deaths of the H. E. I. Company's European soldiers in India, in the 20 years from 1825 to 1844, the deaths from cholera amounted to 1,741 ; and amongst their native armies, of 69,973 deaths, this disease alone occasioned a loss of 13,260, nearly a fifth part of the whole mortality.

In some seasons this disease has appeared only in sporadic cases ; in other years it has broken out in an epidemic form, but it has visited each Presidency every year, and while, in some stations, it has scarcely ever been absent from the crowded bazaars, in other places its occurence has been almost unknown.

TABLE I.—Showing the total deaths of the European and Native Soldiers, of the Indian Armies, and the Ratio per 1000 of their strength that died from Cholera in each of the three Presidencies, in the years from 1825 to 1844.

Years.	EUROPEAN SOLDIERS.						Years.	NATIVE SOLDIERS.					
	BENGAL.		MADRAS.		BOMBAY.			BENGAL.		MADRAS.		BOMBAY.	
	Total Deaths by Cholera.	Annual Ratio per 1000 died.	Total Deaths by Cholera.	Annual Ratio per 1000 died.	Total Deaths by Cholera.	Annual Ratio per 1000 died.		Total Deaths by Cholera.	Annual Ratio per 1000 died.	Total Deaths by Cholera.	Annual Ratio per 1000 died.	Total Deaths by Cholera.	Annual Ratio per 1000 died.
1825	25	5·5	60	13·7	1	0·5	1825	216	1·4	792	12·7	237	5·8
1826	23	5·2	11	2·4	20	11·5	1826	189	1·2	294	4·0	183	4·6
1827	34	8·9	6	1·2	5	2·6	1827	137	1·0	283	4·0	33	0·8
1828	26	6·2	13	2·4	13	5·8	1828	199	1·6	368	5·7	85	2·5
1829	29	6·4	3	0·5	1	0·4	1829	156	1·4	213	3·5	21	0·6
1830	42	9·2	32	6·0	2	0·7	1830	236	2·5	126	2·2	112	3·6
1831	38	7·8	41	7·6	4	1·7	1831	181	2·1	271	5·3	46	1·4
1832	47	10·8	39	7·7	13	5·3	1832	232	2·9	333	5·6	63	2·1
1833	51	12·0	48	10 1	8	3·5	1833	259	3·2	579	11·6	116	4·4
1834	63	16·5	2	0·4	2	0·9	1834	242	3·0	58	1·1	96	3·5
1835	48	11·7	1	0·2	0	0	1835	217	2·7	2	0·04	28	0·9
1836	43	10·1	1	0·2	1	0·5	1836	223	2·7	27	0 5	2	0·0
1837	39	9 0	19	4·0	12	6·4	1837	189	2·3	351	7·2	113	4·0
1838	75	17·4	7	1·4	7	3·0	1838	187	2·2	502	10·2	12	0·4
1839	65	15·8	27	5·7	31	15·1	1839	249	2 6	249	4·8	148	5·1
1840	51	10·7	26	5·1	24	10·1	1840	136	1·3	122	2·0	131	4·8
1841	81	17·0	5	0·8	4	1·1	1841	291	2·7	241	3·7	24	0·7
1842	47	9·8	41	6·7	90	19·1	1842	259	2·2	741	11·6	158	5·9
1843	107	21·3	13	2·1	2	0·3	1843	361	3·1	905	13·8	109	3·4
1844	87	17·2	37	6·2	48	13·0	1844	329	2·7	519	8·0	79	1·5
Total 20 yrs	1021	11·554	432	4·268	288	5·648	Total 20 years.	4488	2·19	6976	6·03	1796	2·81

The Returns for this disease, from the Year 1845 inclusive, are less complete, but the following information is available :

EUROPEANS.						NATIVES.					
BENGAL.			MADRAS.			BENGAL.			MADRAS.		
Years.	Total deaths by Cholera.	Annual Ratio per 1,000 died.	Years.	Total deaths by Cholera.	Annual Ratio per 1,000 died.	Years.	Total deaths by Cholera.	Annual Ratio per1000 died.	Years.	Total deaths by Cholera.	Annual Ratio per 1000 died.
1843 to 46-7	1177	13·5	1845	124	9·8	1845			1845	708	9·4
1847-48	89	4·8	1846	75	6·7	1846			1846	1208	16·1
1848-49	110	6·7	1847	22	1·9	1847			1847	78	1·1
1849-50	234	12·6	1848	2	0·2	1848			1848	93	1·6
1850-51	8	0·3	1849	26	2·7	1849			1849	104	2·07
			1850	21	2·2	1850-1			1850-1	183	3·6
1851-52	61	2·9	1851-2	15	1·6	1851-2			1851-2	202	4·04
1852-53	260	12·4	1852-3	155	16·9	1852-3			1852-3	125	2·5
1853-54	258	11·9	1853-4	61	7·3	1853-4			1853-4	284	5·9
1854-55	47	2·35	1854-5	65	7·2	1854-5			1854-5	190	4·04
1855-56	55	2·77	1855-6	11	1·4	1855-6			1855-6	59	1·2
1856-57	704	33·05	1856-7	58	7·7	1856-7			1856-7	141	2·9
1858	401	9·16	1857-8	112	11·9	1857-8			1857-8	177	3·6
1859	478	8·67	1858-9	47	3·0	1858-9			1858-9	227	3·9
			1859-60	99	5·8	1859-60			1859-60	260	4·2
1860	589	12·04	1860	42	3·2	1860			1860	150	3·4
1861	1065	23·73	1861	37	2·6	1861	163	4·09	1861	64	1·6
1862	413	9·61	1862	41	3·1	1862	90	2·51	1862	84	2·6
1863	169	4·09	1863	39	3·1	1863	57	1·52	1863	84	2·7
1864	103	2·55	1864	33	2·5	1864	62	1·67	1864	112	3·9
1865	116	3·12	1865	38	2·9	1865	91	2·83	1865	133	5·4
1866	48	1·37	1866	28	2·5	1866	95	2·54	1866	95	3·4
1867	479	13·84	1867	4	0·3	1867	124	3·17	1867	22	0·7
1868	...	...	1868	5	0·5	...	...	...	1868	18	0·6

The above tabular statements show how continuous this disease has been, diminishing in Madras in some years and increasing in others without any apparent sequence. But, in the European forces of Bengal, in the years 1843 to 1846-7, the rate of Cholera deaths per 1,000 of the strength was 13·5. The next two years the rate was 4·8 and 6·7, and then, in 1849-50, it rose to 12·6per 1,000. Two years of great quiescence were followed in 1852-3 and 1853-4 by the high rates of 12·4 and 11·9. Then again there followed two years of great quiet, succeeded by six years of activity, during which the rates were 33·05; 9·16; 8·67; 12·04; 23·73, and 9·61, and finally four quiet years were followed in 1867 by a rate of 13·84 per 1,000. The Bengal European Army is suffering

much more from Cholera than that of Madras. In the 26 years 1843 to 1867, there died from this disease in Bengal 6,864 European Soldiers, and in Madras in the 24 years 1845 to 1868, the deaths were 1,165 in number. A European Regiment's strength has fallen in Bengal once in every three or four years. There died 682 of the Native soldiers of Bengal in the seven years 1861 to 1867 ; and in the 24 years 1845 to 1868, of the Madras Native soldiers, there died 4,801 from this disease, numbers equal to the strength of a Native Regiment of Infantry once in every seven and every three and a half years. With such a loss of life from this single ailment, to aid in its prevention is a public duty.

European Soldiers are more frequently attacked with Cholera than Native Soldiers.

From these tables it would also appear that cholera has carried off a greater proportion of the strength of the European soldiers than of the native army, and it is a curious matter to observe that while from 1825 to 1844 the Europeans in the Bengal army have suffered from it most of all the Presidencies, the natives of that army suffered the least, a circumstance which will be observed by placing the totals of the columns together :

Table II.	European Soldiers.		Native Soldiers.	
Presidencies.	Total Deaths from Cholera in 20 years.	Average Annual Ratio per 1,000 of mean strength died in the 20 years.	Total Deaths from Cholera in 20 years.	Average Annual Ratio per 1,000 of mean strength died in the 20 years
Bengal,.....	1,021	11·554	4,488	2·19
Madras.....	432	4·268	6,976	6·03
Bombay.....	288	5·648	1,796	2·81

The Returns, however, afford no means of ascertaining the cause of the difference in the rate of mortality from cholera, with the European and native soldiers, and as the cantonments in which the bulk of the two classes of troops are distributed are often, even when in the same command, many hundred miles apart, doubts might arise as to whether the greater number of deaths among the Europeans had been caused by their being located in stations where Cholera was more frequent, or whether it had occurred from their

being more susceptible to the disease,—but the following table, which has been obtained from the Reports on the Madras Army and from Dr. Macgregor's papers in the Madras Journal, will throw some light on this point.

TABLE III, Showing the Average annual ratio per 1,000 of mean strength, of the European and Native soldiers in the same cantonments admitted for cholera :

	Aggregate Strength.	Total. Admissions from Cholera.	Total. Deaths by Cholera.	Average Annual Ratio per 1,000 of mean strength admitted by Cholera.
Kamptee, Europeans of all Arms, 10 years from 1829 to 1838...	9,574	153	39	15·98
Kamptee, Natives of all Arms, 10 years from 1829 to 1838...	49,313	148	87	3·00
St. Thomas' Mount, European Horse Artillery, 9 years, from 1829 to 1838 exclusive of 1831.....	1,721	23	5	13·36
St. Thomas' Mount, European Foot Artillery 10 yrs from 1829 to 1838.....	5,182	13	3	2·50
St. Thomas' Mount, Native Foot Artillery, 9 yrs. from 1829 to 1838 exclusive of 1832.....	4,417	17	5	3·84
Bellary, inside the fort, European Artillery, 13 yrs. from 1827 to 1839.....	1,478	44	16	29·7
Bellary, outside the fort, Native Infantry, ½ mile distant, 13 yrs. from 1827, to 1839	33,283	302	143	9·0
* Madras, Europeans, within Fort St. George, for 10 yrs. from 1829 to 1838.....	13,981	392	136	28·03
Madras, Natives, without Fort St. George, for 10 yrs. from 1829 to 1838.	60,142	263	140	4·37

From the different proportions in which it has attacked the two classes of troops in these four cantonments it would appear to be owing to a

* There probably were a few soldiers of this garrison who did not reside inside the Fort but their numbers are too small to affect the results. In the 7 years from 1832 to 1838 the average annual ratio per 1,000 of mean strength of H. M. Regts. attacked, inside of Fort St. George, with Cholera, was 27·37.

greater susceptibility in the European constitution that the rate of mortality per 1,000, has been so much higher among them than in the native army. In Kamptee 15·9 per 1000 of the European soldiers were admitted, but only 3·0 per 1,000 of their native comrades, and in the town and fort of Madras this greater liability has been very marked, 28·0 per 1,000 of the Europeans having been attacked inside the fort, while of the native soldiers, about a mile distant, at Perambore, Black Town and Vepery, only 4·3 per 1,000 have been seized with it.

A visitation of Epidemic Cholera increases the mortality of the year in which it occurs above that of other years.

There is an opinion prevalent amongst unprofessional men in India, as well as in Great Britain, that a visitation of epidemic cholera does not increase the rate of mortality above the average of a series of years, and it has been stated, as the reason for forming such an opinion, that when cholera prevails other diseases are in abeyance. These returns enable us to test the accuracy of this statement, and they show that in the Bengal and Bombay Presidencies, in the greater number of those years that the proportion of deaths from ordinary diseases was above the average of the period from 1825 to 1844, the ratio of mortality from cholera was, also, higher, and in the majority of the years that cholera deaths were more than the average rate, the deaths from ordinary diseases were so likewise ; but the same Returns likewise show that there has been no such corrrespondence in the Madras Presidency, for, in it, in the greater number of the years when the proportion of the deaths from cholera was more than the average, there was no increase in the deaths from ordinary diseases, nor was the proportion of deaths from cholera generally greater in years when the mortality from ordinary diseases was above the average rate. These points can be observed from the following Table—

EUROPEANS.

TABLE showing the Ratio per 1,000 of mean strength that died from ordinary diseases during the years that the Ratio of deaths from Cholera was above the average of the 20 years.

Bengal.			Madras.			Bombay.		
Years.	Cholera.	Ordinary diseases.	Years.	Cholera.	Ordinary diseases,	Years.	Cholera.	Ordinary diseases.
1833	12.0	64.4	1825	13.7	104.5	1826	11.5	103.6
1834	16.5	74.8	1830	6.0	26.4	1828	5.8	66.0
1835	11.7	66.1	1831	7.6	37.1	1837	6.4	54.2
1838	17.4	65.3	1832	7.7	28.0	1839	15.1	65.5
1839	15.8	61.9	1833	10,1	35.2	1840	10.1	53.9
1841	17.0	60.4	1839	5.7	21.7	1842	19.1	35.0
1843	21.3	59.4	1840	5.1	27.5	1844	13.0	53.0
1844	17.2	57.6	1842	6.7	26.3			
			1844	6.2	19.7			
Average.	16.3	63.3	Average.	7.5	34.8	Average.	12.79	56.43

TABLE showing the Ratio per 1,000 of mean strength that died from Cholera during the years that the Ratio of deaths from ordinary diseases was above the average of the 20 years.

Bengal.			Madras.			Bombay.		
Years.	Cholera.	Ordinary diseases.	Years.	Cholera	Ordinary diseases	Years.	Cholera.	Ordinary diseases.
1825	5.5	119.4	1825	13.7	104.5	1825	0.5	45.0
1827	8.9	76.6	1826	2.4	70.5	1826	11.5	103.6
1833	12.0	64.4	1827	1.2	51.5	1827	2.6	70.7
1834	16.5	74.8	1828	2.4	43.9	1828	5.8	66.0
1835	11.7	66.1	1831	7.6	37.1	1829	0.4	47.3
1838	17.4	65.3	1833	10·1	35.2	1835	0.0	46.2
1842	9.3	62.3	1834	0.4	35.2	1837	6.4	54.2
						1839	15.1	65.5
						1840	10.1	53·9
						1843	0.3	53 7
						1844	13.0	53.4
Average.	11,6	75.8	Average.	5.3	53.0	Average.	5.82	58.45

The following table, also, taken from Dr. Murray's Report on the treatment of Epidemic Cholera, will show the admissions and deaths from cholera, fevers, and other diseases, in the Bengal Presidency.

Europeans.	Years.	Strength.	Cholera.		Fevers.		Other diseases.		Total.	
			A.	D.	A.	D.	A	D.	A.	D.
1852-3 to 1857	5	103,305	2,643	1,794	113,737	888	122,696	3,224	239,076	5,406
1858 to 1862	5	255,265	5,105	2,946	196,074	1,755	234,644	7,019	535,823	11,720
1863 to 1867	5	187,743	1,322	909	104,635	686	198,533	2,658	304,490	4,154
Native Troops.										
1861 to 1862	2	57,724	586	253	51,190	306	44,460	614	96,236	1,173
1863 to 1867	5	185,350	839	429	113,576	644	128,562	1,393	262,977	2,468
Native Prisoners.										
1859 to 1862	4	196,867	6,196	2,471	100,206	6,065	158,312	8,918	264,714	17,454
1863 to 1867	5	271,620	6,141	2,557	136,775	3,590	180,343	10,883	323,259	17,030

NATIVES.

TABLE showing the Ratio per 1,000 of mean strength that died from ordinary diseases during the years that the ratio of deaths from Cholera was above the average of the 20 years.

Bengal.			Madras.			Bombay.		
Years.	Cholera.	Ordinary diseases.	Years.	Cholera.	Ordinary diseases.	Years.	Cholera.	Ordinary diseases.
1830	2.5	17.8	1825	12.7	30.6	1825	5.820	11.910
1832	2.9	16.6	1833	11.6	15.6	1826	4.640	13.390
1833	3.2	20.5	1837	7.2	14.3	1830	3.610	10.930
1834	3.0	23.8	1838	10.2	14.5	1833	4.490	5.510
1835	2.7	15.7	1842	11.6	18.0	1834	3.590	4.670
1836	2.7	17.8	1843	13.8	12·9	1837	4.00	8.000
1837	2.3	11.7	1844	8.0	14.5	1838	4.770	10.550
1838	2.2	20.3				1839	5.16	18.690
1839	2.6	20.0				1840	4.95	12,96
1841	2.7	13.3				1842	5.98	11,43
1842	2.2	16.7				1843	3.42	3.49
1843	3.1	13.7						
1844	2.7	11.7						
Average.	2·7	16.6	Average.	10,9	17.4	Average.	4·5	10·3

TABLE showing the Ratio per 1,000 of mean strength that died from Cholera during the years that the Ratio of deaths from ordinary diseases was above the average of the 20 years.

Bengal.			Madras.			Bombay.		
Years.	Cholera.	Ordinary diseases.	Years.	Cholera.	Ordinary diseases.	Years.	Cholera.	Ordinary diseases.
1825	1.4	17.3	1825	12.7	30.6	1825	5.82	11.91
1830	2.5	17.8	1826	4.1	25.1	1826	4.64	13.39
1831	2.1	18.3	1834	1.1	19.5	1827	0,84	12.18
1832	2.9	16.6	1836	0.5	24.7	1830	3,61	10.93
1833	3.2	20.5	1842	11,6	18.0	1838	4.77	10.55
1834	3.0	23.8				1839	5,16	18.69
1835	2.7	15.7				1840	4.95	12.96
1836	2.7	17.8				1841	0,78	12.16
1838	2.2	20.3				1842	5.98	11.43
1839	2.6	20.0				1844	1.58	11.93
1842	2.2	16.7						
Average.	2.4	18·5	Average.	6·4	23·7	Average	3·3	12·6

It would appear from Table, IV that when the ratio of mortality from cholera was above the average of the 20 years,

Amongst the Europeans,
- There were 4 years out of 8 that the rate from ordinary diseases, likewise, was in excess in Bengal.
- There were 3 years out of 9 that the rate from ordinary diseases, likewise, was in excess in Madras.
- There were 6 years out of 7 that the rate from ordinary diseases, likewise, was in excess in Bombay.

being a total of 13 years out of 24 in the three presidencies.

Amongst the Natives,
- There were 9 years out of 13 that the rate from ordinary diseases, likewise, was in excess in Bengal.
- There were 2 years out of 5 that the rate from ordinary diseases, likewise, was in excess in Madras.
- There were 6 years out of 10 that the rate from ordinary diseases, likewise, was in excess in Bombay.

being a total of 17 years out of 28 in the three presidencies.

And when the rate of mortality from ordinary diseases was above the average of the 20 years.

Amongst the Europeans,
- There were 4 years out of 7 that the rate from cholera, likewise, was in excess in Bengal.
- There were 3 years out of 7 that the rate from cholera, likewise, was in excess in Madras.
- There were 6 years out of 11 that the rate from cholera, likewise, was in excess in Bombay.

being a total of 13 years out of 25 in the three presidencies.

Amongst the Natives,
- There were 9 years out of 11 that the rate from cholera, likewise, was in excess in Bengal.
- There were 2 years out of 5 that the rate from cholera, likewise, was in excess in Madras.
- There were 7 years out of 10 that the rate from cholera, likewise, was in excess in Bombay.

being a total of 18 years out of 26 in the three presidencies.

It will be observed from the above that in the Bengal and Bombay armies an unusual prevalence of cholera has been occasionally attended with a greater mortality from other diseases, whilst the mortality from Cholera and other diseases, among the Europeans and Natives of the Madras army have rarely been thus associated, although in the series of years the average rate of mortality has been greater in all the Presidencies. This will be observed by the following numerical statement taken from the preceding Tables to allow a more ready reference :

TABLE VI.—Showing the average annual Ratio per 1,000 of mean strength that died.

Average annual ratio per 1,000 of mean strength that died.	OF EUROPEANS.								OF NATIVES.							
	BENGAL.			MADRAS.			BOMBAY.		BENGAL.			MADRAS.			BOMBAY.	
	Cholera.	Ordinary Diseases.	Total.	Cholera.	Ordinary Diseases.	Total.	Cholera.	Ordinary Diseases.	Total.	Cholera.	Ordinary Diseases.	Total.	Cholera.	Ordinary Diseases.	Total.	Cholera.	Ordinary Diseases.	Total.
In the 20 years from 1825 to 1844.....	11·5	62·3	73·8	4·2	34·3	38·4	5·6	45·1	50·7	2·1	15·7	17·9	6·0	15·6	21·6	2·8	10·1	12·9
During the years when the ratio of deaths from ordinary diseases was above the average of the 20 years.	11·6	75·8	87·4	5·3	53·0	58·4	5·8	58·4	64·2	2·4	18·5	20·9	6·4	23·7	30·1	3·3	12·6	15·9
During the years when the ratio of deaths from cholera was above the average of the 20 years.	16·3	63·3	79·6	7·5	34·8	42·4	12·79	56·4	69·1	2·7	16·6	19·3	10·9	17·4	28·3	4·5	10·3	14·9

It may be observed from the previous table that in the average of the series of years when cholera deaths were in excess, the mortality from all other diseases was somewhat increased above the average of the 20 years, both among the Europeans and Natives in all the three presidencies, and

an examination of the most recent tabular statements available shows that this correspondence continues to the present day.

What are the admissions from all "diseases" during years when the ratio of deaths from cholera is above the average?

The following table will enable an opinion to be formed as to the frequency of admissions into hospital in the years that the ratio of deaths from cholera has been greater than in the period under review.

TABLE VII.—Showing the ratio per 1,000 of mean strength admitted into hospital from "all diseases" in the three Presidencies during the years that the ratio of deaths from cholera was above the average of the 20 years.

EUROPEANS.										NATIVES.									
	Bengal.		Madras.		Bombay.			Bengal.			Madras.			Bombay.					
Years.	Total admissions from all diseases.	Ratio per 1,000 of mean strength admitted.	Years.	Total admission from all diseases	Ratio per 1,000 of mean strength admitted.	Years.	Total admissions from all diseases.	Ratio per 1,000 of mean strength admitted.	Years.	Total admissions from all diseases.	Ratio per 1,000 of mean strength admitted.	Years.	Total admissions from all diseases.	Ratio per 1,000 of mean strength admitted.	Years.	Total admissions from all diseases.	Ratio per 1,000 of mean strength admitted.	
1833	6979	1653·7	1825	7842	1802·	1826	4764	2758·	1830	47,138	503·	1825	73,273	1182,	1825	39,041	958·	
1834	8738	2295·8	1830	6300	1196·5	1828	6178	2774·	1832	46,622	591·	1833	35,915	720.	1826	37,161	942.	
1835	7589	1858·2	1831	5786	1086·	1837	5530	2971·	1838	38,183	479·	1837	36,793	757.	1830	28,537	980.	
1838	8514	1978·6	1832	5234	1042·	1839	3157	1545·	1834	63,805	807·	1838	37,490	766.	1833	20,652	801.	
1839	6449	1573·6	1833	7288	1537·	1840	3606	1518·	1835	53,584	677·	1842	53,170	833.	1834	24,350	910.	
1841	11202	2357·8	1839	5332	1135·	1842	2039	433·2	1836	34,116	426·	1843	47,508	727.	1837	21,838	773.	
1843	9339	1861·8	1840	7590	1504·	1844	6266	1708·	1837	39,626	490·	1844	48,599	753.	1838	22,675	866.	
1844	8929	1773·8	1842	8099	1331·				1838	46,354	659·				1839	30,104	1049.	
			1844	5744	976·				1839	42,632	451·				1840	29,956	1131.	
									1841	73,636	696·				1642	30,465	1151.	
									1842	98,936	876.				1843	28,550	896.	
									1843	95,323	830·							
									1844	91,751	757·							
8 years	67,729	1918 2	9 years	59,215	1276·4	8 years	31,540	1695·2	13 years	771,706	641.6	7 years	332,748	826.7	11 years	318,329	946·	
Average Annual Ratio per 1,000 in the 20 years.		1857			1341.			1724·			587·			782·			917·	

It is possible that the existing opinion, alluded to at page 8, that a visitation of cholera in an epidemic form does not increase the mortality of the year above the average of a period, may have been entertained from drawing general conclusions from the number of admissions in some particular country. But the erroneous belief may also have been entertained from regarding sickliness and mortality as always coincident, as it will be observed from the preceding table that on the average of the years when cholera was more than usually prevalent, the ratio of admissions from all diseases, among the Europeans in the Madras and Bombay Presidencies, has been even lower than the average of the 20 years ; and even in the Bengal Presidency, the average annual proportion of admissions was very triflingly increased.

Colonel Tulloch, at page 52 of the Ceylon Report, notices as a feature in cholera that of making its appearance at the otherwise unhealthy periods of the year. Cholera, has generally occurred, as an epidemic, in that colony in the months of April and May, or again in November and December, and he remarks that "the out-breaks of remittent fever and cholera in these months have only been in accordance with the usual law of epidemics which generally make their appearance at those seasons of the year which are otherwise the most unhealthy." If disease generally be alluded to, here, this feature is not observable as a characteristic of cholera as it occurs in the Madras Presidency, where, whether the year be examined in half yearly or quarterly periods, cholera seems often to have been more frequent when diseases generally were less so.

Is disease generally more prevalent when cholera appears ?

The Madras Reports show that in the 10 years from 1829 to 1838, cholera occurred among the Madras troops as follows :

TABLE VIII.

EUROPEANS. AGGREGATE STRENGTH 103,431								NATIVES. AGGREGATE STRENGTH 568,403.							
1ST HALF-YEAR.				2ND HALF-YEAR.				1ST HALF-YEAR.				2ND HALF-YEAR.			
Total Admitted by		Ratio per 1,000 of mean strength admitted by		Total admitted by		Ratio per 1,000 of mean strength admitted by		Total admitted by		Ratio per 1,000 of mean strength admitted by		Total admitted by		Ratio per 1,000 of mean strength admitted by	
Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.	Cholera.	All other diseases.
1757	87,142	16·9	841·	1076	96,890	10·4	936·	3255	169,627	5·7	298·	2091	172.354	3·6	303·

TABLE IX.—Showing the Ratio per 1,000 of mean strength of H. M. Regiments, serving in the Madras Presidency admitted by cholera and by all diseases in the four quarters of the year.

And the quarterly Reports of Dr. Nicholson's Tables demonstrate the same.

STATIONS. PERIOD.	Average Ratio per 1,000, of admissions by Cholera.					Average Ratio per 1,000 of mean strength admitted from all diseases.				
	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Average of the year.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Average of the year.
Bangalore,.....for 18 years, from 1826 to 1843 inclusive...	1.5	12.5	1.4	1.4	17.4	386.2	455.6	400.3	377.6	1023.9
Moulmein,.....for 17 years, from 1827 to 1843	2.1	2.9	0.3	0.06	5.3	333.3	443.4	383.5	406.6	1572.6
Arnee,..... .....for 7 years, from 1828 to 1830; 1835 to 1836; 1838, and from October 1842 to February 1843	40.3	2.1	1.5	2.6	48.6	404.3	358.3	370.1	404.7	1546·1
Fort St. George,...for 18 years, from 1826 to 1843.....	2.8	2.0	7.7	5.6	18.7	374.7	508.2	495 9	512.3	1905.2
Bellary.....for 18 years, from 1826 to 1843	6.7	23.0	2.5	13.8	47.0	490.3	576.7	528.9	593.1	2192.0
Belgaum..... .....for 6 years, from 1827 to 1828, and from January 1839 to October 1842.....	0.0	0.0	0.0	0.27	0.1	543.0	559.4	428.0	528.7	3057.6
Secunderabad.....for 16 years, from 1826 to 1840 and from February to December 1843.....	1.1	1.5	1.2	0.0	3.9	573.6	513.6	535.2	572.0	2191.6
Trichinopoly,.....for 18 years, from 1826 to 1843.....	9.1	1.6	1.2	2.1	13.9	422.4	486.9	485.0	482.5	1878.1
Kamptee,... ... ...for 2 years, for 1840 and from February to December 1843.....	0.8	0.3	0.4	1.9	3.6	406.9	556.7	615.3	557.7	2168.5
Cannanore,.....for 18 years, from 1826 to 1843.....	0.2	0.08	1.8	0.2	2.4	415.2	382.3	419.2	460.2	1661.2
Arcot,.....for 8 years, from July 1826 to March 1828 and from September 1842 to February 1843.....	1 8	6.8	3.1	58.9	93.4	754.5	513.6	510.7	696.7	2438.1

In two out of eleven stations in the Madras Presidency, viz. in Bangalore and Moulmein, the greatest proportion of admissions from cholera and from all diseases, occurred in the same quarter of the year, and in Arnee the two quarters preceding the great cholera quarter were very unhealthy; but in the remaining eight stations there has been no coincidence.

Are particular classes of diseases more frequent at the time when cholera appears?

Colonel Tulloch's remark regarding cholera making its appearance at the unhealthy periods of the year is, however, probably in allusion to other of the severer diseases. Indeed formerly writers have maintained that cholera, rheumatism, dysentery and fever, are modifications of disease, or at least that these all arise from the same cause; Though such a doctrine seems untenable, when Dr. Nicholson's tables are examined to ascertain the prevalence of other severer diseases, while cholera is present, there is a degree of connexion observable as to the seasons of the year at which they occur.

Amongst the European soldiers in the Madras cantoments, for instance, as will be observed from the following table, an unusual prevalence of cholera, has in nine stations out of eleven, had, in the quarter preceding, accompanying, or following the out-break, a greater than the average quarterly proportion of fevers, liver-disease, dysentery and diarrhœa:

TABLE X.—Showing the Average Annual Ratio per 1,000 of Mean Strength admitted.

Stations.	Diseases.	In the Quarter.				Total of the year.
		1st.	2nd.	3rd.	4th.	
Arcot	Cholera	1.8	6.8	3.1	58.9	93.4
	Fevers	61.3	131.4	57.3	78.1	302.1
	Liver-disease	74.0	61.4	35.9	47.0	193.5
	Dysentery	106.5	56.3	54.7	109.9	325 7
	Diarrhœa	1.8	1.7	19.5	39.7	87.8
	Rheumatism	28. 9	30.7	20.1	23.8	96.3
Arnee	Cholera	40.3	2.1	1.5	2.6	48.6
	Fevers	44.8	63.1	44.3	75.0	237.9
	Liver-disease	27.2	25.1	22.1	19.6	94.2
	Dysentery	44.3	48.3	52.7	55.5	200.4
	Diarrhœa	23.2	24.0	20.1	30.5	101.4
	Rheumatism	23.7	14.2	10.0	22.3	74.7
Bellary	Cholera	6.7	23.0	2.5	13.8	47.0
	Fevers	124.9	176.6	81.9	160.4	545.8
	Liver-disease	25.4	24.3	30.4	23,9	104.2
	Dysentery	31.5	33.2	46,0	56.4	166.4
	Diarrhœa	12.3	27.3	21.7	26.0	88.1
	Rheumatism	29.9	31.6	38.5	30.4	130.8
Fort St. George	Cholera	2.8	2.0	7.7	5.6	18.7
	Fevers	62.9	126.0	88.5	99.8	380.6
	Liver-disease	20.3	27.7	26.3	22.2	96.9
	Dysentery	50.8	53.5	68.2	76.5	251.5
	Diarrhœa	21.2	26.1	33.0	37.0	119.0
	Rheumatism	23.9	30.0	25.8	25.7	105.6
Bangalore	Cholera	1.5	12.5	1.4	1.4	17.4
	Fevers	42.3	52.0	42.4	40.4	177.7
	Liver-disease	24.4	30.4	25.7	23.6	104.6
	Dysentery	24.1	47.0	39,0	25.5	137.6
	Diarrhœa	5.2	20.2	7.2	51,5	38.9
	Rheumatism	17.0	18.2	18.8	17.4	71.6

Stations.	Diseases.	Quarter. 1st	2nd.	3rd.	4th.	Total of the year.
Trichinopoly	Cholera.....	9.1	1.6	1.2	2.1	13.9
	Fevers	74.5	92.4	98.6	107.1	372.1
	Liver-disease	20.4	24.6	25.8	19.6	90.9
	Dysentery.....	37.5	48.6	47.9	46.2	180.6
	Diarrhœa	17.2	21.6	15.6	15.9	70.4
	Rheumatism.....	20.2	15.9	19.8	23.0	78.9
Moulmein..	Cholera.....	2.1	2.9	0.3	0.06	5.3
	Fevers.....	76.8	113.4	93.8	80.8	365.8
	Liver-disease ...	19.1	24.5	20.6	16.9	81.3
	Dysentery	25.6	52.2	54.1	38.9	171.8
	Diarrhœa.....	19.0	45.8	27.2	31.7	124.5
	Rheumatism....	18.2	17.2	20.7	16.5	72.8
Secunderabad ...	Cholera.....	1.1	1.5	1.2	0.0	3.9
	Fevers.....	362.3	143.5	154.2	227.0	684.1
	Liver-disease.....	43.2	38.8	39.5	39.9	161.5
	Dysentery.....	69.2	55.1	89.8	78.7	291.3
	Diarrhœa	19.4	23.5	31.9	25.0	100.1
	Rheumatism.....	23.6	20.8	22.4	20.8	87.7
Kamptee.	Cholera.....	0.8	0.3	0.4	1.9	3.6
	Fevers.....	86.5	238.5	263.3	251.4	852.1
	Liver-disease	14.2	17.0	16.9	12.0	60.1
	Dysentery	20.2	20.2	54.7	27.4	123.5
	Diarrhœa.....	24.9	32.1	31.9	18.8	107.5
	Rheumatism.....	34.4	23.4	37.5	31.1	122.3
Belgaum	Cholera.....	0.0	0.0	0.0	0.27	0.1
	Fevers..... ...	66.6	63.5	44.6	91.03	369.3
	Liver-disease.....	41.6	37.03	32.6	26.3	135.8
	Dysentery.....	53.1	75.3	60.1	67.1	256.7
	Diarrhœa	27.4	37.3	16.1	46.9	130.1
	Rheumatism.....	43.3	49.1	44.6	44.1	181.1
Cannanore	Cholera.....	0.2	0.08	1.8	0.2	2.4
	Fevers.....	50.6	50.5	49.3	54.2	204.7
	Liver-disease.....	26.4	26.4	23.3	23.9	100.1
	Dysentery.....	62.3	73.7	84.3	72.9	293.0
	Diarrhœa	13.9	20.6	13.8	13.0	61.5
	Rheumatism.....	16.4	22.7	21.5	17.8	78.4

In five cantonments, the great cholera quarters of the year were preceded by the quarters of greatest fever ; in four cantonments, the greatest fever quarters and greatest cholera quarters were coincident ; and only in two cantonments there was no apparent correspondence. In four cantonments, the quarter of greatest rate of liver-disease preceded the greatest cholera quarter ; in three cantonments, the highest rates of liver-disease and of cholera were coincident ; in three cantonments, the quarter of greatest rate of liver-disease followed that of cholera, and only in one cantonment no coincidence is observable ; and, pursuing this subject, we observe that in 10 stations out of 11, the quarters of the year in which most cholera occurred were either immediately preceded, accompanied, or immediately followed by the quarters in which the greatest rate of dysentery and diarrhœa occurred. Among the European soldiers in the Madras Presidency, then, it would seem that there is a certain connexion, as regards season of the year, in the occurrence of the severer classes of diseases, viz. fever, liver-disease, dysentery, diarrhœa, and cholera.

The same result is obtained by an examination of the Appendix F. which is given by Inspector General Macpherson in Vol. ii of the Royal Commission. That tabular statement gives sixteen years of admissions and deaths from the severer diseases in the Madras European Army (See Appendix F.) In those 16 years, there were six years viz. 1842 ; 1843 ; 1845 ; 1846 ; 1852-3 and 1857-8, in which the attacks and deaths from cholera were greater than the average of the period ; and in all those six years, the deaths from diseases generally and from fevers were also above the average ; in five of the six years, the deaths from liver-disease, diarrhœa dysentery and dropsy were also above the average —There were ten years in which cholera deaths were under the average, in nine of which the deaths from all diseases and fevers were also under ; in eight out of the ten years, diarrhœa deaths were less numerous : and in seven out of the ten, the deaths from dysentery and liver-disease, were less numerous The subject merits further and more minute investigation, as it bears on several important questions which are constantly discussed connected with this disease, its cause or causes, its communicability, and the means of curing it.

The valuable cholera report on the Madras Native army, by Assistant Surgeon Lorimer, furnishes the ratio per 1,000 of their mean strength admitted and died from cholera, fevers, dysentery and diarrhœa, and other diseases, and the following table has been arranged from that report to assist in determining if fevers and bowel-complaints be more frequent amongst native soldiers in those divisions of the Madras army where cholera is more prevalent, than in the divisions where the proportion admitted from cholera is small.

Tabl to 1844, inclusive,—th and the ratio of deaths to admissions.

	Total Death			of mean Strength.					
				ntery and arrhœa.		All other Diseases.		Total from all Diseases.	
	Fevers.	Dysentery and Diarrhœa.	Admitted. Died.	Died.	Admitted.	Died.	Admitted.	Died.	
Not s	64	23	·	2·4	117·	1·3	740·	27·7	
Field	143	109	·	1·8	286·	5·1	604·	18·8	
Ceded	276	99	.	0·9	292·	4·8	550·	17·5	
Hyde	790	304	·	1·3	275·	4·7	598.	17·1	
South	427	349	·	2·1	340·	5·3	531·	17·7	
South	76	37	·	0·8	428·	3·9	651·	13·2	
Centr	494	392	·	2·1	301·	8·8	510·	18·1	
Myso	898	424	·	2·1	289·	5·3	664·	17·1	
North	1148	431	·	2·0	339·	8·6	699·	20·5	
Presid	306	382	·	2·5	303·	6·4	485·	14·7	
Trava	33	19	·	0·9	423·	5·3	560·	9·6	
Malal	141	144	·	1·9	496·	5·9	632.	11·2	
Nagp	468	90		0.7	234·	5·1	593·	11·6	
Easte and	682	1195							
	5946	4098	18	2·4	331·5	6·8	639·	18·2	

We observe then, from the above table, that there is a correspondence in the frequency of the attacks of cholera and the frequent occurrence of fevers, amongst the native soldiers of the Madras army. This point cannot be duly examined, however, by a table such as the preceding, for that which is really determined by its means is the frequency of cholera, fevers, &c., &c., in one cantonment compared with another, which is not the subject under investigation; the question being whether, when cholera breaks out in a place, the out-break be or be not preceded or accompanied by an unusual prevalence of other acute diseases; for that there are great differences in the frequency of particular classes of disease in one country compared with another has been known for ages.

In every station of the Madras Presidency, however, cholera has been more or less prevalent every year, and the previous table may, therefore, be of some assistance in forming an opinion on this matter.

The admissions by cholera and one class of the recorded diseases—fevers, in the different divisions, are here contrasted.

TABLE XII.

Division or Command.	Period.	Average Annual Ratio per 1,000 of mean strength admitted by	
		Cholera.	Fevers.
Division not specified	6 years...	56.	471·
Field Force Doab	10 years...	23.	251·
Ceded Districts	24 years ..	23.	209·
Hyderabad Subsidiary Force	24 years...	20.	275·
Southern Division	24 years...	17.	198·
Southern Mahratta Country	7 years..	17.	172·
Centre Division	24 years...	12.	161·
Presidency Division	24 years...	8.	142·
Travancore Province	6 years..	7.	108·
Malabar and Canara	19 years..	4.8	102·
Nagpore	24 years...	3.5	337·
Northern Division	24 years...	10.	321·
Mysore Division	24 years...	11.	328·

It would appear from the preceding table that where the native soldiers have been most numerously attacked with cholera, they have likewise been subject to the greatest number of admissions from fevers; and, as in Malabar and Canara, where there have been

the fewest admissions from cholera there have been the fewest from fevers; Indeed (excepting in the Mysore, Northern and Nagpore Divisions) the proportion annually attacked with cholera and with fever seems to increase and decrease together. Is this a mere casual coincidence or is there some unknown connection between fevers and cholera? Taking into consideration what was observed from Dr. Nicholson's tables,—viz. that out of the eleven stations of which they furnish the diseases, in five of them, the quarters of the year of greatest cholera had the greatest fever quarters immediately preceding; in four, the quarters of greatest cholera and of greatest fever were coincident, and only in two stations was there no correspondence,—it may, at least, be allowed that this coincidence as to seasons of the year in the occurrence of much febrile disease with cholera, amongst the European and native soldiers of the Madras army, has been sufficiently frequent to induce the subject being further investigated. To be correctly determined, however, the monthly admissions and deaths in each Cantonment should be examined one month with another, for it may justly be objected that quarterly periods, besides being too extended for such a delicate inquiry, are given above for a series of years, and therefore no correct deductions can be drawn from them. The subject merits further investigation, however, and some one in possession of the necessary documents might, with advantage, undertake it.

Intensity of cholera.

On examining the Returns from the European soldiers this disease appears to have been increasing in virulence from the period of its last out-break. In the case of the native soldiers of the Madras army the proportion of deaths to admissions continues nearly the same as in the earlier years of its re-appearance.

Its intensity in the two classes of troops viz: the European and native soldiers.

In the 26 years from 1821 to 1846, of 8382 European soldiers of the Madras army admitted with cholera, 2494 died, or one death occurred in every 3·3 admissions; and 26,716 native soldiers were attacked in the same period of whom 10,752 died, being one death in every 2·4 admissions.

The recent Reports from the various Sanitary Commissioners show that the intensity of the attacks and the liability to be attacked vary with race, age, and sex but that latterly its severity has been on the increase with Europeans.

The per centage of deaths from cholera, amongst the European Troops, is quoted as having risen in Bengal between 1818 and 1854, from 26·7 to 42·0; in Bombay, during the same period from 18·5 to 43·2; and in Madras between 1829 and 1851 from 27·1 to 62·3.

The action on races can be examined, in the following Statement showing the proportion of deaths to cases of Cholera among European Troops, Native Troops, and Prisoners (Bengal Sanitary Commissioner's Report 1867 p. 126.)

Years.	Died per 1,000 of admissions.			
	European Troops.	Native Troops.	Prisoners in jails.	
1854-5	505·4		392·9	
1855-6	500·0		475·0	
1856-7	536·2		459·5	
1858	543·3		411·8	
1859	501·7	376·7	465·7	
1860	532·5	463·3	375·5	
1861	640·4	419·0	416·3	
1862	612 8	502·8	363·6	
1863	751·1	570·0	*401·0	*At page 24 of 1864-5 this is given as 365.
1864	*695·9	439·7	373·1	*At page 24 of 1864-5 this is given as 726.
1865	725·0	497·3	456·9	
1866	600·0	546·0	443·3	
1867	660·7	508·2	428·8	
Average	595 or 1 in every 1·6	480·3 or 1 in every 2·08.	420·2, or 1 in every 2·3.	

The above table shows that in Bengal, fewer now recover of the European soldiers who are attacked with cholera, than of the natives, the rates being 1 in every 1·6, to 1 in every 2·08 : and 2·3 and it also shows that since 1821, inclusive, the disease amongst Europeans has become more fatal. The cause of the increased rate of mortality is not shown. From my own observation, sanitary preventive measures have latterly seemed to be regarded as of primary consideration, and curative means less esteemed.

But the same is shown by the (Bengal Sanitary Commission Report p. 127) following Statement exhibiting the comparative prevalence of cholera among European and Native Soldiers in the Bengal Presidency from 1861 to 1867 ;

Ratio per 1,000 of mean Strength.						
Years.	European Soldiers		Native Soldiers		Prisoners	
	Ad.	died.	Ad.	died.	Ad.	died.
1861	37·1	23·73	9·8	4·09	36·5	15·21
2	15·7	9·61	5·0	2·51	15·2	5·52
3	5·5	4·09	2·6	1·52	35·8	14·33
4	3·7	2·55	3·8	1·67	22·9	8·56
5	4·3	3·12	5·7	2·83	15·8	7·19
6	2·3	1·37	4·7	2·54	27·2	12·10
7	20·9	13·78	6·2	2·96	11·5	4·94

Its action on the sexes, amongst Europeans in Bengal (Bengal Sanitary Reports 1864-5 to 1867) will be seen in the comparative mortality from cholera and all other causes among men and women and children for the four years ending with 1863.

Europeans died in hospital per 1,000 of average strength.			
1860 to 1863.	Men.	Women.	Children.
Cholera.	11·5	17·4	16·4
All other Causes.	18·8	32·2	74·0
Total...	30·3	49·6	90·4

It is shown from the above that while men, compared with women and children, suffered least from all diseases, and while compared with men the mortality amongst women from ordinary diseases is nearly double that of men, and the mortality of children is four-fold that of men, the rate of deaths from cholera with women and children is nearly alike. The details of the above abstract are as follow:

Europeans died from Cholera in Bengal per 1,000 of Strength.			
Years.	Men.	Women.	Children.
1860	12·0	18.27	20·72
1	23·73	27·91	30·53
2	9·61	16·69	13·21
3	4·09	7·57	3·75

The intensity of attacks wit
Statement showing the relat
from all other causes among
during the five years 1863 to 1
p. 123-4.)

Years.	Under 20	20
1863	1·49	4
1864	3·97	1
1865	2·07	1
1866	0·00	1
1867	12·81	15
Average of deaths from cholera during the five years.	4·06	5

With increasing years, the ra
increases, but cholera seems
rate.

The other remarkable point,

Return shewing
among the

Years.	Authority.	E
1817	Madras Medical Board Records.	
1818		
1819		
1820		
1821		
1822		
1823		
1824		
1825		
1826		
1827		
1828		
1829		
1830		
1831		
1832	Madras Printed Reports of 1844.	
1833		
1834		
1835		
1836		
1837		
1838		
1839	Madras Medical Board Records.	
1840		
1841		
1842		
1843		
1844		
1845		
1846		
1847		
1848		
1849		
1850-1		
1851-2		
1852-3		
1853-4		
1854-5		
1855-6		
1856-7	Inspector General Macpherson in Page 658 Vol. ii Commission.	

	2,978,652	35,131	13,697	1 in 2·5
Inspector General's Office.	28,158	40	18	1 in 2·2
	29,650	43	22	1 in 1·95
	27,217	204	95	1 in 2·1
	24,608	278	133	1 in 2·09
	28,116	291	112	1 in 2·6
	30,605	230	84	1 in 2·7
	32,069	197	84	1 in 2·3
	37,975	163	64	1 in 2·5
	43,458	362	150	1 in 2·4
	60,760	691	260	1 in 2·6
	57,653	451	227	1 in 1·98

the average strength, the Total Admissions and Total Deaths from Cholera, European and Native Soldiers of the Madras Army from 1818 *to* 1868.

TABLE XIII.

EUROPEAN SOLDIERS.				NATIVE SOLDIERS.					
Average Strength.	Total admissions from Cholera	Total deaths from Cholera	Proportion of deaths to admissions.	Years.	Authority.	Average Strength.	Total admissions from Cholera	Total deaths from Cholera	Proportion of deaths to admissions.
Returns Incomplete.				1817		Returns Incomplete.			
10,033	1,645	Deaths not exhibited in the returns under the head of Cholera.		1818		50,784	3,038	Deaths not exhibited in the Returns under the head of Cholera.	
8,929	930			1819		73,634	3,651		
9,903	356			1820		81,644	3,332		
10,708	450	36	1 in 12·50	1821	Madras Medical Board Records.	81,468	2,962	841	1 in 3·52
11,197	957	174	1 in 5·50	1822		74,707	559	199	1 in 2·80
11,262	323	50	1 in 6·40	1823		71,378	945	348	1 in 2·71
9,757	727	188	1 in 3·86	1824		68,435	1,675	545	1 in 3·07
10,188	433	172	1 in 2·51	1825		74,922	1,930	717	1 in 2·69
10,423	311	76	1 in 4·09	1826		82,562	938	294	1 in 3·18
11,680	270	110	1 in 2·4	1827		84,128	560	283	1 in 1·98
12,503	434	117	1 in 3·7	1828		76,224	819	368	1 in 2·22
11,640	239	35	1 in 6·82	1829		71,945	501	213	1 in 2·35
11,623	290	45	1 in 6·44	1830		67,106	264	126	1 in 2·09
10,863	289	91	1 in 3·17	1831		61,623	640	271	1 in 2·36
10,580	528	223	1 in 2·36	1832		60,678	808	333	1 in 2·42
9,863	966	233	1 in 4·14	1833		60,099	1,228	579	1 in 2·12
9,321	130	14	1 in 9·28	1834		58,854	115	58	1 in 1·98
9,484	60	2	1 in 30·00	1835		56,777	12	2	1 in 6·00
10,201	36	3	1 in 12·00	1836		56,844	63	27	1 in 2·33
10,068	173	72	1 in 2·40	1837		57,274	702	351	1 in 2·00
9,798	122	52	1 in 2·34	1838		58,320	1,187	502	1 in 2·36
10,330	207	112	1 in 1·84	1839		66,514	530	249	1 in 2·12
10,200	127	50	1 in 2·54	1840		71,188	272	122	1 in 2·22
11,220	44	17	1 in 2.58	1841		72,234	561	241	1 in 2·32
12,080	335	163	1 in 2·66	1842		74,618	1,771	741	1 in 2·39
12,436	443	206	1 in 2·15	1843		73,763	2,139	905	1 in 2·35
13,057	111	54	1 in 2·05	1844		73,577	1,166	521	1 in 2·23
12,548	232	124	1 in 1·87	1845		74,861	1,718	708	1 in 2·42
11,113	146	75	1 in 1.98	1846		74,682	2,699	1,208	1 in 2·23
11,429	32	22	1 in 1·4	1847		67,950	234	78	1 in 3·0
9,679	3	2	1 in 1·5	1848	Madras Medical Board Records.	55,946	237	93	1 in 2 51
9,559	43	26	1 in 1·6	1849		50,030	269	104	1 in 2·5
9,136	35	21	1 in 1·6	1850-1		50,448	484	183	1 in 2·09
9,119	25	15	1 in 1·6	1851-2		49,881	461	202	1 in 2·2
9,170	253	155	1 in 1·6	1852-3		49,747	353	125	1 in 2·6
8,291	121	61	1 in 1·9	1853-4		47,887	652	284	1 in 2·2
9,021	131	65	1 in 2·0	1854-5		46,988	461	190	1 in 2·4
7,599	25	11	1 in 2·2	1855-6		47,938	154	59	1 in 2·6
7,513	136	58	1 in 2·3	1856-7		47,968	314	141	1 in 2·2
[illegible]	[illegible]	112	1 in 2·18	1857-8		47,909	432	187	1 in 2·4

If any change has occurred since 1817 in the intensity of this disease, amongst the Native soldiers of the Madras Army, it has been increasing; the proportion that recover, now, being somewhat smaller than formerly: and we must either suppose (1st) that science has made no progress in the discovery of curative measures; or (2nd) that the agent that induces cholera is becoming more concentrated or less generally distributed; or (3rd) that the soldiers are less exposed to its action, and only those are now being attacked who are unusually susceptible of it, a class amongst whom, as was already, remarked many fatal cases occur.

Value of Medical Treatment in Cholera.

With reference to the first of these hypotheses, it may be remarked, that the efficiency of medical treatment can be proved by comparing the mortality amongst patients who have applied early for assistance, with that amongst men who allowed the disease to remain a longer time on them before seeking relief;—377 cases of cholera occurred in the 5th, 6th and 19th Regiments M. N. I.* in the year 1846, and the period of their application for medical relief at their regimental hospitals was as follows:

TABLE XIV.

	The total duration of the disease, before coming to hospital, was	The average duration of the disease, before coming to hospital, was		
	hours.	hours.	min.	sec.
Of the 377 patients	1,899¾	5	2	4
Of the 176 cases, or 46 per cent that proved fatal	1,001¼	5	41	20
Of the 201 patients, or 53 per cent. that recovered	898½	4	28	12

It appears from the previous table that those patients who recovered applied for medical treatment, on the average, nearly an hour and a half earlier than the men who died, and all who know how rapid the progress of this disease is, and how little can be done for it in its more advanced stages, will acknowledge the advantage that even this short interval gave.

* The 5th Regiment was stationed at Bellary, the 19th Regiment at Cuddapah, and the— Regiment was marching from Madras to Bellary.

With a disease that proves fatal or otherwise in twelve or fifteen hours the difference of an hour and a half is a great matter.

The efficacy of treatment and of early treatment is perhaps better demonstrated by contrasting the rate of mortality among the patients who delayed longer than the average time in coming to hospital with that which occurred among the men who sought assistance earlier.

Of the 377 cases above alluded to

175 patients delayed longer than the average time of whom...	101 died and 74 recovered or...57·7 per cent died.
48 patients came at the average time of whom	25 died and 23 recovered or...52·0 per cent died.
154 patients came sooner than the average time of whom	50 died and 104 recovered or...32·4 per cent died.

Of the patients who delayed longer than the average time more than the half died, but only a third part died of those who received treatment early; the proportions having been 1 death in every 1·7 admissions; 1 death in every 1·9 admissions; and 1 in every 3 admissions as the patients delayed longer, came at, or came sooner than, the average time, respectively.

In connection with this, it may be mentioned that recently, Dr. John Murray, Inspector General of Hospitals of the Bengal Medical Department, sent to the Medical Officers in India 90 questions relating to Cholera and from 481 of the officers he received replies, concurring in or dissenting from the propositions involved in the questions or regarding the subject as still unascertained.

Of those ninety questions, thirty were directed to obtain a knowledge of the prevailing belief as to the communicability of the disease and as to the importance of sanitary and precautionary measures, and sixty of the questions related to treatment.

The aggregate number of replies as to its communicability amounted to 2886, of which 2481, or 85·9 per cent. asserted its communicability; 11·2 per cent. were uncertain, and 2·8 per cent. have denied its communicability. At present, therefore, the Medical Officers in India, who believe in the communicability of this ailment, greatly preponderate. To the direct question, is it communicable? 456 replied in the affirmative, 20 were uncertain and 5 answered in the negative, and the following statement will show that personal communication, the atmosphere, water, locality and the evacuations, are all regarded as media of its propogation:

	Yes.	No.	Uncertain.
2. Communicable.....	456	5	20
3. From person..	363	33	85
4. ,, place.....	415	15	51
5. By atmosphere	391	12	78
6. By water.....	414	11	56
7. Through evacuations	442	5	34
Total..	2481	81	324

Eight questions were directed with a view to ascertain the expediency of sanitary measures generally, the necessity for pure air, and pure water, the importance of avoiding over-crowding, the danger from cholera evacuations, the injury from public latrines and the value of trees as impediments to the dissemination of the disease. The replies affirm the need for pure air and water, the avoidance of over-crowding and the danger from cholera evacuations. But amongst the 481 officers who replied, many have doubts as to injury resulting from the mixture with water of saline or vegetable or animal matters, a considerable proportion are uncertain as to any injury resulting from public latrines, and a large majority doubt whether trees offer any impediment to the dissemination of the disease. These points are well illustrated by the following abstract statement :

	Yes.	No.	Uncertain.		Yes	No.	Uncertain.
8 Necessaries...				12 Addition to water dangerous...			
1 Pure air.....	473	3	7	1 Salts,.....	312	23	146
2 Free Ventilation...	475	0	6	2 Vegetable Matter...	346	9	126
3 Raised buildings....	444	4	33	3 Animal matter ...	356	11	114
	1392	7	46	14 Public latrines spread the disease...	341	9	131
19Malaria injurious, ...	412	20	49	15 Trees impede dissemination.....	188	39	254
10 Crowding dangerous							
1 in buildings	472	1	8				
2 at fairs.....	476	0	5				
11 Water.							
1 Pure water necessary.	469	..	12				
2 Boiling useful... ...	421	6	54				
13 Admixture of choleraic-evacuations cause cholera.....	427	4	50				

Fifteen of Dr. Murray's questions inquire as to possible precautionary measures. Several of these relate to precautions which individuals may exercise, being of personal application, and they consist of avoidance of fatigue, exhaustion, over-eating, unripe or tainted food and of purgatives, and on the value of these points the members of the Medical profession in India are almost unanimous : indeed, except as to the danger from purgatives the concurrence is marked ; yet, as regards the South of India, there is no doubt that saline purgatives cannot safely be administered in cholera seasons.

	Yes.	No.	Uncertain.
16 Avoid Exhaustion... ...	474	0	7
„ Fatigue.....	479	0	2
17 Have diet moderate...	464	0	17
18 Avoid unripe fruit	476	0	5
„ Tainted food..	478	0	3
20 Purgatives dangerous...	434	9	38

The other suggested precautionary measures have a public character ; several of them relating to the importance of early medical care are concurred in by the bulk of the Medical Officers who have sent answers to the questions.

	Yes.	No.	Uncertain.
19 Remedy existing diseases, especially diarrhœa.....	478	0	3
30 Early treatment most important....	470	1	10
29. 1 Distribution of medicines.....	449	9	23
3 House-to-House visitation.....	450	8	23

But, in connection with the use of medicinal substances, as means of curing incipient disease and of warding off an attack of cholera, Dr. Murray asked whether quinine, chiretta or bitter tonics are considered of value as prophylactics. Some Regimental Medical Officers have been largely using quinine as a prophylactic, but none of the three drugs indicated by Dr. Murray have as yet found favour generally, for though 725 who have replied recognise their utility, 718 are uncertain or disbelieve in them.

	Yes.	No.	Uncertain.
21 Useful as prophylactics.			
Quinine.....	258	44	179
Chiretta..	231	52	198
Bitter tonics.....	236	45	200
Total.....	725	141	577

From the answers received to several questions relating to the possibility of protecting the public health, — by avoiding sick people, the articles they used, and localities, in which the disease exists, the importance of keeping aloof from the sick and from the articles and people they have come in contact with, and the value of disinfectants are strongly affirmed. It may be doubted whether any practical scheme for burning the evacuations could be devised. Even to collect them, amongst the people of the South of India, who sleep on the ground, may be said to be impossible, and to bury their excreta very difficult.

		Yes	No.	Uncertain.
16.	1 Avoid dissemination	470	0	11
25.	1 Isolate the infected	467	2	12
	2 Isolate special Hospitals ...	465	3	13
	3 Isolate the attendants	458	7	16
26.	1 Remove from the locality ..	472	3	6
	2 Remove into tents	462	5	14
	3 Remove across a river	450	5	26
27.	1 Exclude affected persons	463	3	15
	2 ,, Clothes	461	3	17
	3 ,, Vehicles	461	3	17
24.	1 Disinfect utensils	472	3	6
	2 Burn clothing	469	2	10
	3 Disinfect buildings..... ...	475	0	6
29.	2 Funeral and Marriage parties in India dangerous	428	12	41
22.	Prevent spreading by evacuations.	468	1	12
23.	Evacuations to be buried	391	17	73
	Do do burned	404	15	62

It may be that the difficulty of carrying out any order either to burn or to bury the evacuations, may account for the many replies dissenting from or uncertain as to the practical value of any such recommendations.

It will be observed, above, how unanimously the Medical Officers in India commend the disinfecting of utensils, of clothing and of buildings, it will therefore be well to ascertain what materials are considered the most useful, and the preponderance is in favour of carbolic acid.

	Yes	No.	Uncertain.
28. Disinfectants preferred :			
4 Iron.....	245	8	228
6 Zinc.....	268	7	206
5 Charcoal.....	285	9	187
7 Lime.....	290	18	173
1 Sulphur.....	337	7	137
2 Chlorine.....	376	7	98
3 Carbolic acid	412	1	68

Dr. Murray in his report on Cholera, makes a numerical examination of the question of treatment. He has not, however, done so by exhibiting the results of certain modes of treatment applied to certain numbers of sick. The data necessary for such a form of investigation can never be available, because no medical man will feel justified in rigidly prescribing any certain series of drugs, regardless alike of the varying forms which every disease assumes and of the peculiar features which every case presents, as modified by the age, the sex, the race and the constitution of the patient under his care.

Dr. Murray has done nearly all that is possible in such an inquiry. He sent out to all medical men in India sixty-nine leading questions which he classed under five headings, viz. (D) General indications of treatment ; (E) Treatment during the first stage or Malaise ; (F) of the 2nd stage or Diarrhœa ; (G) of the 3rd stage or Collapse; and (H) of the 4th stage or Re-action, and to each of his questions he received 481 replies.

These replies are arranged below under four heads, and it will be observed that a great majority of the medical men have affirmed his views as to the general indications of treatment: certain remedies, regarding the utility of which he inquired, have been declared by very large majorities to be valuable : his questions as to other drugs have only small numbers reporting favourably of them, and others are distinctly pronounced against or are even declared dangerous. These points will be observed in the following Abstract Statement:

D. General Indications of treatment.	Yes.	No.
31, Remove the poison from the system	389	16
32, Support the organs affected and general strength..... ..	459	2
33, Restore the secretions of the....		
1 Liver	448	5
2 Kidneys ...	453	4
3 Lungs.....	446	5
4 Skin...	446	4
34, Remove....	..	..
1 Effete constituents retained in the system.....	399	11
2 Impurities in the blood...	399	8
35, Guard against.... ..		...
1 Checking reaction	467	2
2 Violent reaction, by avoiding strong stimulants during collapse..... ..	461	4
36, Remove local complications...	468	1

Remedies pronounced against—even declared dangerous	Yes.	No.	Uncertain.
E. 1st. Stage or Malaise.			
45, Purgatives dangerous. ...	421	7	53
46, 2 Exposure and fatigue.	468	1	12
F. 2nd. Stage or Diarrhœa.			
51, Brandy partly useful...	409	23	49
52, Brandy and Opium apt to induce dangerous reaction ...	354	31	96
62, Bleeding			
1st. Stage ...	13	391	77
2nd. Stage.....	12	393	76
3rd. Stage.....	23	385	73
4th. Stage.....	11	390	80
63, 4 Cold effusion....	89	155	237
64, 1 Purgatives dangerous ..	365	37	79
2 Castor oil	227	106	148
3 Hot saline enemata.	174	76	231
65, Fatigue dangerous...	471	2	8
G. 3rd Stage, or Collapse.			
68 Vomiting			

It will be seen from the above that the medical practitioners in India have formed very decided opinions as to certain lines of treatment and as to the values of certain remedial measures, and it is probable that a further series of questions would secure even more decided replies.

Is the cholera Agent becoming more concentrated, or are the European soldiers less exposed to its influence ?

Considering that we are still unacquainted with the cause of this disease, it seems useless to enter into the discussion of the second question ; and in asking whether the agent that induces cholera be now less abundant than formerly or the soldiers be less exposed to its action, it may be remarked that in the 48 years from 1821 to 1868 inclusive, the strength of the Madras Army and the admissions and deaths from cholera were as follow :—

TABLE XV.

CHOLERA.

Period 48 years 1821 to 1868.	European Soldiers.			Native Soldiers.		
	Aggregate Strength.	Total Admissions.	Total Deaths.	Aggregate Strength.	Total Admissions.	Total Deaths.
In the first 13 years viz. from 1821 to 1833.....	142,277	6217	1550	935,275	13,829	5117
In the second 13 years viz. from 1834 to 1846....	141,856	2166	944	869,506	12,935	5635
In the 11 years from 1847 to 1857-8.....	99,912	1049	548	562,685	4051	1636
In the 11 years from 1858-9 to 1868.....	142,406	883	413	400,154	2950	1249
Total.....	526,451	10315	3455	2767,620	33,765	13,637

The ratio per 1,000 of the strength admitted, and the proportion of deaths to admissions in these four periods have been as follow :

TABLE XVI.

CHOLERA

Period 48 years, 1821 to 1868.	European Soldiers.		Native Soldiers.	
	Ratio per 1000 of mean strength admitted.	Proportion of deaths to admissions.	Ratio per 1000 of mean strength admitted.	Proportion of deaths to admissions.
In the first 13 years viz. from 1821 to 1833.	43·6	1 death in 4·01 admissions.	14·7	1 death in 2·7 admissions.
In the second 13 years viz. from 1834 to 1846.	15·2	1 death in 2·2 admissions.	14·8	1 death in 2·2 admissions.
In the 11 years, from 1847 to 1857-8.	10·4	1 death in 1·9 admissions.	7·1	1 death in every 2·4.
In the 11 years, from 1858-9 to 1868.	6·2	1 death in every 2·1 admissions.	7·3	1 death in every 2·3.
Average of 48 years 1821 to 1868.	19·5	1 death in 2·98	12·2	1 death in 2·47

It will be observed that the number of the native soldiers who have been attacked scarcely varied in the first two periods, the annual admissions having been 14·7 per 1,000 in the thirteen years from 1821 to 1833, and 14·8 per 1,000 in the thirteen years from 1834 to 1846 ; the proportion of deaths to admissions, also, was almost the same, having been one death in every 2·7 admissions in the first of those periods and one death in every 2·2 in the second period.

In the subsequent twenty-two years, however, there was a great diminution in the numbers of Native Soldiers attacked, the rate per 1,000 falling from 14·7 to 7·2.

A very great change has likewise taken place in the proportion of the European soldiers attacked with it ; for in the 13 years from 1821 to 1833, 43· per 1,000 of the strength were annually admitted, only 15· per 1,000 in the second thirteen years 1834-1846 ; only 10·4 per 1,000 in the next eleven years, and only 6·2 in the eleven years ending 1868.

There is an impression abroad that the Cholera patients who recover are fewer now than formerly; but that popular belief is not supported as regards the Madras Army by the records of half a century: and, with an aggregate strength in that time of 772,298 Europeans, and 2,767,620 natives; and a mortality in that time from this sole ailment of 3,429 Europeans and 13,697 natives, accurate averages may be struck.

Years.	Of the attacked there died amongst the	
	Europeans one in every	Natives one in every
1821 to 1833	4·01	2·7
1834 to 1846	2·2	2·2
1847 to 1857-8	1·90	2·4
1858-9 to 1868	2·1	2·3
Total period of 48 years.	2·98	2·47

To what cause, then, are we to attribute the decreasing numbers of attacks, alike amongst the European and the Natives Soldiers of the Madras Army? there have in the time under review been improvements in the pay, diet, dress, and dwellings of both arms of the service, and the conservancy in and near their barracks and lines, has been more closely attended to; but the most marked change in the Madras Presidency has been the less frequent marches of regiments and the increased facilities and comforts which steam-vessels, rail-roads and horse and bullock transit carriage have afforded when moving. Its prevalence is still great amongst the Civil population in every part of the Madras Presidency, and in some Collectorates the mortality from it amounts, in some years, to one-third or one-half of all the deaths.

48 years.	Ratio per 1,000 Admitted of strength.	
	Europeans.	Natives.
1821 to 1833	43·6	14·7
1834 to 1846	15·2	14·8
1847 to 1857-8	10·4	7·1
1858-9 to 1868	6·2	7·3

The agent causing this disease is as virulent and, perhaps, is as abundant as ever; but the European and native soldiery of Madras may be less exposed to it.

The records of the Bengal European Army present several remarkable features in the occurrence and intensity of this disease and that they may be fully understood, it seems advisable to give here a tabular

Statement Showing the Admissions and deaths from Cholera among European troops in the Bengal Presidency from 1818 to 1867 from pages 103-4, Bengal Sanitary Commissioner's Report for 1867.

Period.	Strength.	Admitted.	Deaths.	Ratio per 100		Of the Admissions one died in every
				Admitted.	Died.	
1818 to 1822	47,017	1,018	272	21·6	5·7	3·7
1823 to 1827	54,168	2,005	625	37·0	11·5	3·3
1828 to 1832	62,800	2,495	544	39·7	8·6	4·5
1833 to 1837	57,549	1,561	420	27·1	7·2	3·7
1838 to 1842	68,238	2,406	855	35·2	12·5	2·8
1843 to 1846-47	87,086	2,599	1,177	29·8	13·5	2·2
1847 to 1848	18,228	262	89	14·3	4·8	2·9
1848 to 1849	16,235	377	110	23·3	6·7	3·4
1849 to 1850	18,524	507	234	27·3	12·6	2·1
1850 to 1851	21,063	23	8	1·09	0·3	2·8
1851 to 1852	20,710	168	61	8·1	2·9	2·7
1852 to 1853	20,865	708	260	33·9	12·4	2·7
1853 to 1854	21,505	423	258	19·6	11·9	1·6
1854 to 1855	20,046	92	47	4·6	2·35	1·9
1855 to 1856	19 885	100	55	5·5	2·77	1·8
1856 to 1857	21,304	1,313	704	61·6	33·05	1·8
1858	43,771	738	401	16·8	9·16	1·8
1859	55,104	924	478	16·8	8·67	1·9
1860	48,901	1,106	589	22·6	12·04	1·8
1861	44,879	1,663	1,065	37·1	23·73	1·5
1862	42,980	674	413	15·7	9·61	1·6
1863	41 351	225	169	5·5	4·09	1·3
1864	40,385	148	103	3·7	2·55	1·4
1865	37 210	160	116	4·3	3·12	1·3
1866	35 013	80	48	2·3	1·37	1·6
1867	34,603	722	479	20·9	13·84	1·5
49 years.	999,420	22,495	9,580	22·5	9·58	2·3

In the 49 years of the above record, there died from this disease 9,580 European soldiers, out of an average strength of 20,396. Reckoning the present strength of a Regiment at 800, Cholera has carried off the strength of a regiment once in every four years. In each of the years 1858, 1859, 1862, and 1867, upwards of four hundred died: in the year 1860, the deaths were 589; in 1856-7 there were 704 deaths, or 33 per 1000 of the strength, and in 1861, the great number of 1,065, or 23·73 per 1000 of the strength. An enemy such as this may well occupy intellects of a high order.

The Bengal record fully bears out the prevailing opinion that fewer than formerly of those attacked, recover from this disease. In four successive periods, in the 49 years, of the attacked, there died one in every 3·82 ;—2·67 ;—2·17 and 1·66. In the same periods, however, fewer of the soldiers have been attacked as we approach the present, time, the rate per 1000 admitted having been successively, 33·5 ;—30·8 ;—20·1 and 15·1 in the four large portions of the 49 years. These points will be observed in the following abstract of the above statment :

EUROPEAN SOLDIERS.

Period. 49 years 1818 to 1867.	Aggregate Strength.	Cholera.		Ratio per 1000 of mean Strength.		Of the attacked there died one in every
		Admitted	Died.	Admitted.	Died	
15 years 1818 to 1832	163, 985	5518	1441	33·5	8·7	3·82
14 ? ,, 1833 to 1846-7	212, 873	6566	2452	30·8	11·5	2·67
10 ,, 1847-8 to 1857	198, 365	3973	1826	20·01	9·2	2·17
10 ,, 1858 to 1867	424, 197	6440	3861	15·1	9·1	1·66
Total.....	999, 420	22497	9580	22·5	9·58	2·34

The intensity of Cholera varied but little wherever it appeared.

Another interesting fact connected with this disease is that up to late years, its intensity continued almost the same as after its re-appearance, in 1817, and varied but little in whatever country and under whatever circumstances it appeared. Amongst large bodies of troops, comfort and ease, or labour and privations had exercised considerable influence on the liability to be attacked and on the extent of the out-break, but when once it had broken out the proportion of deaths to admissions has not, in the Madras Presidency, greatly varied. Thus the native soldiers of the Madras Army when at ease in cantonments have had a smaller proportion of their strength attacked than when marching from station to station, but the proportion of deaths to sick have been the same in either case ; so whether it has appeared amongst them in a sporadic or epidemic form, or whether regiments were attacked when marching through villages already affected with it, or in districts where no cholera prevailed, there was much difference in the proportion of the strength attacked, but little or none as to the proportion of deaths to admissions. This will be observed from the following table extracted from Dr. Lorimer's cholera report :—

TABLE XVII.

Showing the Aggregate Strength and the total admissions and total deaths from Cholera amongst the Native Soldiers of the Madras Army in the 24 years from 1821 to 1844.

		Aggregate strength.	Total admissions by Cholera.	Total deaths by Cholera.	Ratio per 1,000 of mean strength		Proportion of deaths to admissions.	Authority. Report on Cholera
					Admitted.	Died.		
When living in cantonments.....		1, 608, 830	13, 686	5, 261	8·5	3·2	1 in every 2·6	page 36
When marching.....		413, 946	8, 661	3, 575	20·9	8·6	1 in every 2·4	36
83 times	Attacking Troops on the march in an epidemic form when prevalent in the villages through which the troops were marching.....	62, 758	7, 357	3, 016	117·	48·0	1 in every 2·4	8 & 9
5 times	Attacking Troops on the march in a sporadic form when prevalent in the villages.....	894	13	5	14·5	5·5	1 in every 2·6	8 & 9
28 times	Attacking Troops on the march epidemically when not prevalent in the villages.....	20, 748	1, 367	550	6·5	26·5	1 in every 2·4	8 & 9
23 times	Attacking Troops on the march sporadically when not prevalent in the villages.	14, 160	110	43	7·7	3·0	1 in every 2·5	8 & 9
10 times	Attacking Troops on the march (other circumstances not detained) epidemically.	9, 245	652	267	70·5	28·8	1 in every 2·4	8 & 9
3 times	Attacking Troops on the march (other circumstances not detailed) sporadically.	1, 515	21	9	13·8	5·9	1 in every 2·3	8 & 9

It will be observed that the liability to be attacked differed greatly according to circumstances, but once ill, there was little or no difference in the number of recoveries. But, as was remarked, this unchanging intensity is not peculiar to the countries in which the Madras native soldiers are employed, though they occupy 370,000 square miles of territory, for returns demonstrate that it has but slightly varied amongst the British soldiers, who have been attacked with it in countries wide apart, a fact which is well shown by the following table :—

TABLE XVIII.

	COUNTRY AND FORCE.	YEARS OR PERIOD.	No. of admissions	No. of deaths.	Proportion of deaths to admissions.
a	Moulmein. H. M, Regiments	for 11 years, from 1829 to 1840 exclusive of 1834	4	1	1 in 4·
b	Berhampoor. European Soldiers	for 10 years, for 1823 and from 1826 to 1834	642	169	1 in 3·79
b	Chinsura. European Soldiers,	for 8 years, from June 1826 to June 1827 and 1830 to 1836	235	64	1 in 3·67
b	Calcutta, European Soldiers,	for 10 years, from 1827 to 1838	240	75	1 in 3·20
a	Masulipatam, H. E. I. Co's Artillery,	for 2½ years, from 1st March 1832 to 31st August 1833 and M. E. Regiments from 1st July 1826 to 30th June 1832.	113	32	1 in 3·53
a	Fort Saint George, Madrás, H. M. Regiments and H. E. I. Co's Artillery	for 10 years, from 1829 to 1838	392	136	1 in 2·8
a	Saint Thomas' Mount, H. E. I Co's H. A. and Foot Artillery	for 9 years, from 1829 to 1838 exclusive of 1831	30	8	1 in 4·5
		for 10 years, from 1829 to 1838			
a	Nagpore. H. E. I Co's European Regiment	for 10 years, from 1829 to 1839 exclusive of 1831	155	40	1 in 3·8
	Nagpore. H. E. I Co's European Horse Artillery	for 10 years, from 1829 to 1839			
	Nagpore. H. E. I Co's European Foot Artillery	for 10 years, from 1829 to 1838			
a	Jaulnah. H. E. I. Co's European Horse Artillery	for 11 years, from 1829 to 1841 exclusive of 1831 and 1835	17	7	1 in 2·4
a	Secunderabad. H. M. Regiments	for 10 years, from 1829 to 1839 exclusive of 1833	81	31	1 in 2·6
	Secunderabad. H. E. I Co's Foot Artillery	for 12 years, from 1829 to 1840			
c	Bellary. H. E. I. Co's Foot Artillery	for 13 years, from 1827 to 1839	44	16	1 in 2·8
	Bellary. H. M, Regiments	for 22 years from 1818 to 1839	869	276	1 in 3·1
a	Bangalore, H. M Hussars	for 9 years, from 1830 to 1838; H. M. Infantry for 8 years 1831 to 1838, H. E. I. Co's Horse Artillery for 11 years from 1829 to 1842; Foot Artillery for 12 years from 1830 to 1841	292	79	1 in 3·6
a	Trichinopoly, H. M. Regiments	for 9 years viz., 1829, 1831, 1833 to 1837 and 1839: and H E. I Co's Foot Artillery from 1832 to 1841	53	29	1 in 1·8
a	Cannanore H M. Regiments and H. E I. Co's Artillery	for 10 years, from 1829 to 1838	76	13	1 in 5·4
d	Ceylon, H. M. Regiments	for 15 years, from 1818 to 1832	788	257	1 in 3·0
d	Great Britain, Dragoon Guards and Dragoons	for 3 years, 1832 1833 and 1834	171	54	1 in 3·05
d	Gibraltar, H. M. Regiments	for 1 year, 1834	459	131	1 in 3·48
d	Nova Scotia and New Brunswick, H. M. Regiments	for 1 year, 1834	210	59	1 in 3·5
d	Canada H. M. Regiments	for 2 years, 1832 and 1834	356	127	1 in 2·80
e	American Army, American Soldiers	for 4 years, from 1832, 1834 and 1835	686	191	1 in 3·59

a Report on the Madras Army. b Johnston and Martin on Tropical Climates. c Madras Journal. d Colonel Tulloch's Statistical Reports on the British Army. e Dr. Forry's Reports.

It will be noticed from the preceding table that although cholera in its westerly progress took fifteen years to reach Britain and the continent of America, the proportion among the British soldiers of the Madras Army from 1821 to 1846 was one death in every 3·3 admissions; in Great Britain from 1832 to 1834 it was 1 death in every 3·05 admissions;—and in the same years from 1832 to 1835, according to Dr. Forry, the American soldiers lost 1 in every 3·5 admissions.

Since the year 1818, the British troops serving in Ceylon have suffered on seven occasions from cholera and the following statement will determine if any material change has occurred in the intensity of the disease in that Island:

TABLE XIX.

YEARS:	1818	1819	1820	1821	1825	1829	1832	Total.
Number of admissions from Cholera.....	4	236	42	3	111	48	344	788
Number of deaths from Cholera.....	2	89	12	2	31	14	107	257
Proportion of deaths to admissions, 1 in every	2	2·6	3·5	1·5	3·6	3·4	3·2	3·0

Influence of Age on recovery.

In bodies of men, such as the native regiments are composed of, the majority of the men in the ranks being from 25 to 29 years of age, it is difficult for an individual to obtain a sufficient number of cases to ascertain the mortality amongst patients at different periods of life. Of the 377 cases, however, already alluded to (at page 29) their total ages amounted to 10,559 years and their average age to 28·00 years; 201 of them recovered, whose total ages amounted to 5,406 years, their average age to 26·89 years and 176 of them died, whose total ages amounted to 5,153 years, and their average age to 29·27 years.

The average age of the fatal cases was greater than that of all the 377 patients by 1·27 years, and greater, by 2·38 years, than the average age of the men who recovered. It was comparatively upon the older soldiers, therefore, that the mortality fell.

The influence of age on mortality may also be ascertained by comparing the proportion of deaths among patients at different ages. Of these 377

cases, whose average age was 28.00 years, 141 of the patients were above the average age, of whom 78 died and 63 recovered, being 55.31 per cent. of deaths. 12 of the patients were at the average, of whom 3 died and 9 recovered, being 25.00 per cent. of deaths. 224 of the patients were below the average age, of whom 95 died and 129 recovered, being 42.41 of deaths.

The deaths among the older patients was 13 per cent. higher than among the younger men, the proportion of deaths to admissions being one death in every 1.8 admissions and one in every 2.3 respectively, showing, thereby, the greater powers of rallying (the stronger liability) in the younger soldiers.

When cholera broke out in Colombo in 1832 "the influence of length of residence in the Island as a means of protection against the disease has been thus demonstrated" (*Ceylon Report p.* 21.)

TABLE XX.

	There were at that time in the Garrison.	Whereof attacked.	Whereof died.	Proportion of deaths to admissions.
"Of those who arrived in Ceylon with their Corps some years before.....	926	186	35	1 in 5.3
Of recruits subsequently arrived	147	41	4	1 in 10.2

"Of the former class one-fifth only were attacked but nearly 4 per cent died, of the latter one in $3\frac{1}{2}$ were attacked but only $2\frac{3}{4}$ per cent died: being for the most part younger men it is probable superior vigour of constitution enabled a greater proportion of them to overcome the disease." —p. 21.

Influence of habits of life on recovery.

"The following calculations have also been made from the same source with the view of determining whether the liability to, or mortality from the disease was in any way influenced by the character of the individuals:

TABLE XXI.

	There were at that time in the Garrison.	Whereof attacked.	Where-of died.	Proportion of deaths to admissions.
"Of regular, sober and well-conducted soldiers.	853	172	27	1 death in 6.3
Of drunken and irregular habits.....	220	55	12	1 death in 4.5

" Of the drunken and irregular a fourth part was attacked and from 5 to 6 per cent died, while of the sober and well-conducted only a fifth part was attacked, and from three to four per cent died, thus showing a marked exemption in favour of the latter."—*Ibid* p. 21.

Influence of Age, Sex, and rank of life on susceptibility and recovery.

The Reports on the Madras Army also supply some information which may assist in forming an opinion as to the liability to be attacked and the mortality amongst the sick of different ranks and ages. From these Reports, the following is extracted, showing the aggregate strength and the total admissions and deaths from cholera amongst the officers, men, women and children of H. M. Regiments in the Cantonments of Fort St. George, Bangalore, Trichinopoly, Cannanore, Bellary, Secunderabad, and Moulmein :

TABLE XXII.

	Officers.			Men.			Women.			Children.		
	Aggregate Strength.	Total. Admitted from Cholera.	Total. Died from Cholera.	Aggregate Strength.	Total. Admitted from Cholera.	Total. Died from Cholera.	Aggregate Strength.	Total. Admitted from Cholera.	Total. Died from Cholera.	Aggregate Strength.	Total. Admitted from Cholera.	Total. Died from Cholera.
	2319	21	9	54 3 49	762	257	6557	109	38	9877	109	53
Proportion of admissions to strength 1 in every...		110			71·			60.			90.	
Proportion of death to admissions 1 in every.....		2.3			2.9			2.8			2.0	

The officers have suffered the least from the attacks of this disease ; the children next ; and after them the men, and then the women ; but of the deaths in proportion to the admissions, first the children, then officers suffered most, and the men and women least.

The Report for 1867 of the Bengal Sanitary Commissioner furnishes similar information for that Presidency for that year, of which the following are abstracts. The information given is, however, for far too limited a period to admit of any reliable deductions being drawn, but may be useful for future inquirers:

Statement showing the Rate per 1,000 of admissions and deaths and the deaths to admissions in the officers, soldiers, women and children, of each body of European soldiers at Peshawar in 1867.

Battery or Regiment	Ratio per 1,000.	
	of strength died.	of admissions died.
E. Bat. F. Brig. R. H. A..	106·0	538·4
F. „ F. „ „ „	86·6	687·5
E. „ 19th Brig. R. A...	121·9	517·2
4 „ 22nd „ R. A.....	86·2	833·3
42nd Highlanders	100·8	548·3
77th Regiment.....	58·3	675·8
Total.....	82·6	601·3

Also, the following cases of cholera and choleraic-diarrhœa occurred at Meerut in the Royal Artillery in the 19th Hussars and 1st Battalion of the 3rd Buffs:—

	Cholera.		One death in every	Choleraic-Diarrhœa.		One death in every
	Admitted	Died.		Admitted.	Died.	
Officers ..	1	1	1·	...	...	...
Men	111	107	1·03	12	4	3.
Women....	15	13	1·15	3	...	none in 3.
Children, .	30	25	1·2	2	...	„ „ 2
Total...	157	146	1·07	17	4	1 in 4·2

For the Bengal European Army, in 1867, the following information is given as to the Cholera attacks: (p. 122.)

Strength			Admitted per 1,000 of strength.			Died per 1,000 of strength.			Of the attacked there died one in every		
Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.	Men.	Women.	Children.
22946	2162	3529	31·0	42·0	34·0	20·5	27·2	27·2	1·5	1·5	1·2

In 1861, during an epidemic in the Bengal Presidency, it was shewn that cholera was very severe when attacking patients in hospitals. In that year, the per-centage of cases to strength was 7·7 amongst the healthy men of the European Regiments : but, amongst the patients in hospitals attacked, it was 14·7 : and the deaths to strength, which were 5·1 among the healthy men were 11·6 among the sick in hospital. In that year, amongst the European troops many of the first cases occurred in the hospitals, and the hospitals were reported to be the source where the attacks in a large proportion of the healthy men had their origin. (*Report of Sanitary Commissioner of Government of India* 1865 p. 12).

Among the Native Troops composing the Bhootan Field Force, in 1865, the admissions from Cholera amounted to 37·6 per 1,000, but the ratio in the Native Army generally was only 5·7. In that year, the liability to be attacked and the relative severity of the attacks, in the two races were as per margin.—Compared with the Natives, fewer of the Europeans were admitted, but more of their sick died,—725 per 1,000 of the admissions of the European soldiers, but only 497 of the Native soldiers, having died.

	Ratio per 1,000 of mean strength.		Ratio per 1,000 of admissions died.
	Admitted	Died.	
Europeans.	4·3	3·1	725
Natives.	5·7	2·8	497

BENGAL PRESIDENCY : JAILS.

Years.	Average strength.	From all causes, Ratio per 1000 of mean strength.		From Cholera Ratio per 1,000.	
		Admitted.	Died.	Admitted.	Died.
1859	46,733	1336·3	827·7	18·4	8·58
1860	46,348	1491·8	1108·1	57·7	21·66
1861	50,915	1314·2	966·5	36·5	15·21
1862	52,87[illegible]	1346·1	667·5	15·2	5·52
1863	52,401	1368·8	858·4	35·8	14·33
1864	52,598	1227·3	701·9	22·9	8·56
1865	54,337	1154·0	576·6	15·8	7·19
1866	...	...	..	27·2	12·10
1867	...	...	...	11·5	4·93

Statement showing the comparative prevalence and intensity of cholera among European and Native Soldiers and Native prisoners in the Bengal Presidency.

Years.	Ratio per 1000 of mean strength of European Soldiers.		Native Soldiers.		Prisoners.		Deaths per 1000 of Admissions.		
	Admitted	Died.	Admitted	Died.	Admitted.	Died.	European Soldiers.	Native Soldiers.	Prisoners.
1854-5	4·6	2·35	..	...	...	...	505·4	...	392·9
1855-6	5·5	2·77	...	...	...	...	500·0	...	475·0
1856-7	61·6	33·05	...	...	...	...	536·2	...	459·5
1858	16·8	9·16	...	...	...	...	543·3	..	411·8
1859	16·8	8·67	...	..	18·4	8·58	501·7	376·7	465·7
1860	22·6	12·04	...	...	57·7	21·66	532·5	463·3	375·5
1861	37·1	23·73	9·8	4·09	36·5	15·21	640·4	419·0	416·3
1862	15·7	9·61	5·0	2·51	15·2	5·52	612·8	502·8	363·6
1863	5·5	4·09	2·6	1·52	35·8	14·33	751·1	570·0	401·0
1864	3·7	2·55	3·8	1·67	22·9	8·56	695·9	439·7	373·1
1865	4·3	3·12	5·7	2·83	15·8	7·19	725·0	497·3	456·9
1866	2·3	1·37	4·7	2·54	27·2	12·10	600·0	546·0	443·3
1867	20·9	13·78	6·2	2·96	11·5	4·94	660·7	508·2	428·8

(Bengal Sanitary Commissioner's Report 1867 Pages 126, 128)

The influence of fatigue, exhaustion, and other physically depressing circumstances on the susceptibility and recovery.

It has been already pointed out (at page 40) that the native soldiers of the Madras Army have had a much larger proportion of their strength attacked when marching, than when living at ease in Cantonments; and the following table will show that the proportion of their strength attacked has increased with the length of their journey, with the number of days they were occupied on the journey, and the number of men congregated together :

What this proportion amounted to will be ascertained from the following tables, extracted from Dr. Lorimer's valuable report.

TABLE XXIII.

1st. With reference to the distance marched ; vide Report p. 3.

Distance of each march.	Under 200 miles	200 to 400 miles	400 to 600 miles	600 to 800 miles	800 to 1050 miles.	Total.
Number of marches in each distance	176	274	99	45	8	602
Number of times attacked	15	93	33	21	6	144
Ratio of attacks to marches per cent.....	8·5	33·9	33·3	46·6	75·0	23·9

2nd. With reference to the number of days on the march. p. 3.

Number of days on the march.	Under 20 days.	20 to 40 days.	40 to 60 days.	60 to 80 days.	80 to 100 days.	100 to 120 days.	120 days & upwards.	Total.
Number of marches	137	219	120	74	18	14	20	602
Number of times attacked.....	11	39	39	30	8	7	10	144
Ratio of attacks to marches per cent.....	8·0	17·7	20·2	4·05	44·4	50·0	50·0	23·9

3rd. With reference to the numbers congregated together. p. 38.

Effective Strength.	100 to 300 men.	300 to 500 men.	500 to 700 men.	700 to 900 men.	900 to 1100 men.	1100 to 1534 men.	Total.
Number of times attacked.....	17	15	21	54	35	9	151
Ratio per 1000 of the strength attacked...	61·6	68·0	58·1	89·0	86·2	132·1	86·9

As a marked difference was observed to exist between the proportion of the strength attacked when in Cantonments and when marching, it was to be expected that whatever tended to exhaust the physical powers of the soldiers would be found to increase their liability to be attacked.

The proportion of regiments attacked has been smallest when the distance marched, the number of days the march occupied, and the assemblage of human beings have been least; and, as the length of the journey, the period occupied on it, and the numbers congregated together, have increased, the liability to have cholera breaking out increased likewise.

This information, derived from Dr. Lorimer's very valuable report on cholera, is fully borne out by the results he obtained from examining the returns from the smaller bodies of men moving on treasure detachments, but the above details are so satisfactory, it is not necessary to examine the occurrences among these smaller bodies.

In connection with these remarks on the influence exercised by the physical condition of the troops and their liability to be attacked when marching, it would appear that the different branches of the native army have been attacked in unequal proportions. In the 13 years from 1832 to 1844 the ratio of attacks to marches was 11·7 per cent. in the sappers and miners; from 1820 to 1844, it was 20·2 per cent. in the Cavalry, and 24·6 per cent. in the Infantry; and it was 50 per cent. in the Artillery from 1831 to 1844, "the Sappers and Miners having been the least liable to this disease, and the Artillery the most obnoxious to it." *Ibid* p. 2.

The following tables obtained from the same source, (page 6) will point out the connection that exists between the out-breaks of cholera among the troops, when marching, and the state of the weather, and season of the year:

TABLE XXIV.

Nature of the weather recorded on the march.	Cool and Dry.	Hot and Dry.	Cool and Rainy.	Hot and Rainy.	Variable.	Not given.	Total.
Number of marches made.....	228	136	89	53	19	77	602
Number of out-breaks.....	40	26	32	19	13	14	144
Ratio of attacks to marches per cent	17.5	19.1	35.9	35.8	68.4	18.1	293.

Fewest out-breaks occurred in dry weather, whether the temperature was cool or hot. In rainy weather, the proportion of out-breaks was doubled, and most occurred when the weather was variable, the attacks, then, being quadruple the rate that occurred during dry weather, As connected with this, the season of the year seems, likewise, to influence the occurrence of this disease, p. 7, but this subject will be further examined, hereafter.

TABLE XXV.

Months.	August.	November.	December.	February.	October.	April.	March.	September.	July.	January.	June.	May.	Total.
Number of marches commenced in each month.....	21	44	79	84	49	49	73	32	13	98	22	38	602
Number of Epidemic attacks.....	2	5	11	15	9	9	14	7	3	23	6	14	118
Number of Sporadic attacks.....	0	2	4	0	4	3	2	2	1	5	1	2	26
Ratio of Epidemic attacks to marches per Cent	9.5	11.3	13.9	17.8	18·3	18.3	19.1	21.8	23.0	23.4	27.2	36.8	19.6

The 26th question put by Dr. Murray was to ascertain the views of Medical Officers as to the advantages of removing from the invaded locality, either into tents or across a river, and the replies which he received show very few dissentients from the belief that these measures are valuable. But, Dr. Murray furnishes a statement showing the result in each instance of 80 removals of bodies of Europeans, of Native troops and of Native prisoners from Jails. Of 57 removals of European troops, in 26 instances cases of cholera occurred after the fifth day after removal: of 14 removals of Native troops, in 2 instances cases of the disease occurred after the fifth day, and, of 9 instances where the Native prisoners were removed from Jails, in five occasions cases of the ailment appeared after the fifth day. Of the total 80 removals, cases occurred after the fifth day in 33, or 41·2 of the removed.

	Yes.	No.	Uncertain
26 Removal from the locality	472	3	6
2 Removal into tents.... ...	462	5	14
3 ,, across a river	450	5	26

Table showing the admissions from Cholera during the Epidemic of 1867, after removal into Camp, amongst the European and Native Troops and Prisoners in the Presidency of Bengal.

	Regiments and Detachments moved into Camp in consequence of Cholera.	RESULT IN EACH INSTANCE OF REMOVAL.						Total number of removal.	Remarks.
		Removal into Camp.	No fresh case after.						
			1st Day.	2nd Day.	3rd Day.	4th Day.	Cases occurred after 5th.		
Europeans.	Troops from 12 Stations.....	17	3	4	1	1	25	51	Dr. Beatson's Report.
	Detachment, Ajmeer	1	...	...	...	...	...	1	Ajmeer Report.
	H. M's 90th Regiment Subathoo.....	3	1	...	...	...	1	5	Dr. Munro's Report.
	Native Troops and Detachments from 8 Stations.....	10	2	...	...	...	2	14	Regimental Reports.
Natives	Prisoners from 9 Jails.....	3	1	...	...	...	5	9	Civil Surgeon's Report.
	Total...	34	7	4	1	1	33	80	

In another tabular statement, Dr. Murray contrasts the sickness in the Bengal troops moved into a free cholera camp with that of those who remained in Cantonments during epidemic attacks in 1863 and 1867, and the results of the contrast may be thus shown :

Stations.	Troops removed into Cholera-Camp or remained in Stations.	Strength.	Date of removal and return and remained in Cantonments.	Date of sickness subsequent.	Fevers.		Other diseases.		Total		Average Ratio per annum to strength	
					Ad.	Died.	Ad.	Died	Ad.	Died	Admitted.	Died.
Agra.	H. M 23rd Regiment			4 Months from Sept to Dec. 1863.	...	...	...	...	269	3	199·2	1·842
	,, 5 Companies.....	405	Removed | Returned	do	...	...	...	...	459	2	303·9	13·23
	,, 5 do	453	31st July | 27th August	5 Months June to October 1867...	199	1	220	7	419	8	185·0	3·53
	,, 94th Regiment	566	Remained.	do	114	...	82	...	196	...	190·6	...
Umballa	Royal Artillery...	257	21st April | 12th May	do	76	...	239	3	315	3	199·3	1·89
	H. M. 21st Hussars	439	Remained	2 Months from Sept. to Oct, 1867.	72	...	48	...	120	...	232·2	.....
	Royal Artillery	310	do	do	617	...	103	1	720	1	583·7	0·81
Meean-Meer.	H. M. 106th Regiment ...	740	May & June | August	do	69	...	31	1	100	1	416·6	4·16
	Fort Garrison of Lahore ,....	144	do | do	3 Months Sept. to Nov 1867.....	58	...	151	4	209	4	153·1	3·00
	Royal Artillery	546	Remained								Cholera	omitted
			August | September	do	155	3	225	19	380	22	248·7	14·4
Meerut	H. M. 3rd Buffs ...,..... ...	611		do	50	...	123	1	173	1	186·5	1·0
	,, 19th Hussars.....	371	do | do	6 Months July to December 1867...	77	...	26	...	103	...	115·0	.....
	,, 19th Regiment 2 Cos	179	Remained	do	416	1	150	6	566	7	187·1	2·31
Nowshera	,, do do 7 do	605	20th June | 27th June	4 Months from July to Oct. 1867...	246	1	149	7	395	8	346·8	7·20
Peshawur, European Troops	Royal Artillery	333	Remained	do	61	...	212	18	273	18	140·5	9·26
	H. M. 42nd Regiment.....	583	21st May | 30th June									
	,, 77th do.	488	20th May | 1st July went to Chera	do	562	...	148	8	710	8	435·0	4·91
Peshawur, Native Troops.	Detachments of 27th 28th and 45th Bengal Native Infantry	700	do | 30th June	8 Months from May to Dec 1867...	1061	3	272	13	1333	16	285·6	3·42
	Rest of the corps	1615	20th May | 30th June	do	2858	5	617	14	3475	19	324·7	1·7
	3rd and 13th Bengal Cavalry Sappers and Miners.....	1007	Remained do	do	...	...	...	...	2358	19	351·2	2·8

The rate of mortality amongst those who remained was on the average less than amongst those who were moved out, whether Europeans or Natives, and markedly less amongst Native troops, the European rate being 4·497 of the moved to 3·780 of the remained and the Native rate 3·427 of the moved to 2·297 of the remained.

This step of leaving a Cantonment has been prominently put forward as of great value, but the above data do not support the opinions of those who have recommended it. With European soldiers, prisoners and those of the Native soldiery of the Bengal army and Contingent levies, who leave their families in their native villages, it would be possible to make the move. But with many of the Bombay Native Regiments and with all the Madras Army it is impracticable, as every Madras soldier, on the average, has 3 followers in his house and to supply tents or provisions for such a number would be impossible. In the South of India, the move into tents of any body of men, on the appearance of cholera in their barracks, their huts or their jails, will be deemed by Medical Officers, as a doubtful step ; in that part of India the cholera agent is so generally diffused that the chance of avoiding it by a move is small. Even in the Bengal Presidency, where moving out into camp was once strongly advocated, there has been a large restriction made.

The Government of India, in September 1865, ordered the Sanitary Commissioner for Bengal to suggest such Sanitary measures as would likely prevent the spread of epidemic diseases within jails. These consisted in care over the healthy ; in preserving the purity of the drinking water ; boiling it ; in moving into camp ; disinfecting the walls and floors of the infected barracks and out-houses and grounds : the bedding and clothing of individuals ; segregation of the cholera sick and attendants ; disinfecting the dejecta ; and similar rules to these were issued in the 9th Report of the Medical Officer of the Privy Council. Subsequently, in the Bengal Presidency, troops in Cantonments attacked with cholera, were ordered to be moved into camp, and further efforts were ordered in G. O. C. C., of India of the 26th August 1867 No. 159 of 9th May 1868, but the following paragraph 481, greatly modified the injunction to move ; " All therefore that need be laid down as an invariable rule is that the particular body of men among whom cholera has appeared in an epidemic form must be removed from the Cantonments. If, for example, this body consist only of the inmates of some one building, the measure need only be applied to them ; if some particular company or

troop be attacked it will be similarly dealt with. A whole regiment or the whole of the troops at the station need only be sent into camp, when it is found that the measures already adopted have not stopped the progress of the disease, or there is reason to fear that they will be insufficient.

With the sanction of Government, His Excellency the Commander-in-Chief begged General Officers and the Chief Administrative Medical Officers to adopt in practice the principle contained in the foregoing paragraph and on no account during the hot and rainy seasons to vacate whole suits of barracks, because one or two or even more have been infected with cholera. It is necessary only to evacuate such buildings as have actually presented cases. During the hot and rainy seasons if other buildings are available, they should be used in preference to placing the men in camp. In short, at such seasons of the year the camp must be held to be the last resource. This is more especially necessary when the ground is either covered with water or when it is drying up in the months of August and September."

At pages 114 and 115 of the 1867 Report from the Sanitary Commissioner with the Government of India, are remarks on the value of moving out: twelve instances are given of movements into camp, in 1867, from Mean-Meer, Subathoo, Meerut, Seetapore, Bareilly, Morar, Gwalior and Allahabad, followed by an entire disappearance of the disease and also of eight other moves of troops from the same places and from Moradabad and Ferozepore, in which no fresh seizures occurred after the third day ; but, in that year also, there were instances in which no movement was considered necessary, yet the disease did not spread, and in spite of removal into camp of the Royal Artillery, 42nd and 77th Regiments from Peshawur of the 106th from Mean-Meer ; of the 1st Battalion of the 3rd at Meerut: of the 107th Regiment from Allahabad, and the 36th from Shahjehanpore, all of them suffered more or less severely. These remarks seem to be the details of the statement at page 53, from which however these details differ.

On the whole, the existing data on this point are too few to admit of reliable conclusions being arrived at ; but, the present evidence in the matter of a move when cholera occurs in barracks is opposed to such a step.

In the years 1821 to 1844, of the 152 Madras Native Regiments attacked with cholera when marching, the numbers of the out-breaks are recorded on the margin. The Ceded Districts, as will be observed, have been the most perilous. Indeed, at one time, a regiment moving through that central tract of the Peninsula of India, which is composed of the Collectorates of Bellary, Cuddapah and Kurnool, was deemed particularly fortunate if it escaped an attack of this disease. Even individual travellers were averse to cross that middle part of the Peninsula, certain towns in which, Cuddapah, Ghooty, Kurnool, Bellary and others near, had an extreme ill-fame.

DIVISION.	No. of out-breaks.
Presidency	1
Nagpore	2
Northern	12
Southern [Mahratta Country	12
Mysore	19
Hyderabad Sub-Force ...	24
Southern	24
Centre	26
Ceded Districts... ...	32
Total...	152

At page 603, Vol. ii of the Report by the Royal Commission, there is a Statement by Dr. George Pearse showing the mortality in Bellary from cholera and from all diseases, for a period of 25 years. In that period, of the total deaths there, 38.82 per cent of Europeans and 50.39 per cent of Native Soldiers were cut off by cholera.

Bellary years.	Europeans.		Natives.		Per centage of Cholera deaths to whole Mortality.	
	Total deaths.	Cholera deaths.	Total deaths.	Cholera deaths.	Europeans.	Natives.
1829 to 1838	285	62	581	283	21·75	48.7
1842 to 1856-7	359	201	937	488	55·9	52.08
Total...	644	263	1518	771	38.82	50.39

At page 660 of the same volume is another Return furnished by Dr. D. Macpherson from which the marginal Abstract Statement has been drawn: and, from it will be observed the large numbers of deaths by cholera in the central districts of the Peninsula of India. In seventeen years, numbers equal to a third of a regiment of Europeans and to three regiments of native soldiers were swept away by this fatal disease, in three military divisions of the Madras Presidency.

DIVISIONS.	EUROPEANS.			NATIVES.		
	Total died.	Cholera.	Deaths from other diseases.	Total deaths.	Deaths from Cholera.	Deaths from other diseases
Southern Mahratta Country 5 years 1842 to 1846 ...	52	12	40	892	468	424
Hyderabad Subsidiary Force 17 years 1842 to 1858-9. ...	846	56	790	1942	1028	914
Ceded Districts 17 years 1842 to 1858-9 ...	417	208	209	987	498	489
Total ...	1315	276	1039	3921	1994	1927

In the Peninsula of India, the neighbourhood and banks of rivers seem particularly dangerous. In 152 marches of Madras Native Soldiers in which cholera broke out, 106 out-breaks occurred within 15 miles of rivers (the average distance was $3\frac{1}{8}$ miles): and, of those 106, 47 occurred on the banks. Of 10 out-breaks near the Pennar river in the Centre Division and Ceded Districts, 3 occurred on its banks. Of 5 out-breaks near the Cauvery river, 1 was on its banks. Of 9 near the Palaur river, 2 were on its banks; of 8 near the Tumbudra and its affluent the Toonga, 6 were on their banks: and of 7 near the Kistna 6 were on the banks. The delay on the banks of rivers and the labours in crossing them may render soldiers more lia-

DIVISION.	Numbers of Out-breaks.	Number under 15 miles of a river.	Number on the banks of a river.
Presidency Division ...	1	...	...
Centre Division ...	26	20	6
Southern Division ...	24	21	13
Mysore Division ...	19	14	3
Ceded Districts ...	32	22	9
Northern Division ...	12	6	4
Hyderabad Subsidiary Force..	24	16	9
Nagpore Force	2	2	1
Southern Mahratta Country..	12	5	2
Total ...	152	106	47

ble to be attacked with cholera but near rivers the contaminating agent seems to be more abundant. The water used from them may be polluted, or the cholera agent may seek the low, moist beds of rivers or the valleys in which they run, or, if it be a thing with life, moisture may be needed for its development.

There are only a few points remaining to be noticed from the sources of information available. The first, obtained from the Madras Reports, exhibits the intensity of the disease at two periods of the year.

In the ten years from 1829 to 1838 the admissions and deaths among the European and Native soldiers of the Madras army were as follows :

	1st six months of the years.					2nd six months of the years.				
	Total.		Ratio per 1000 of mean strength		Proportion of deaths to admissions	Total.		Ratio per 1000 of mean strength.		Proportion of deaths to admissions
	Admitted.	Died.	Admitted.	Died.		Admitted.	Died.	Admitted.	Died.	
Europeans...	1·757	396	16·9	3·8	1 in 4·4	1·076	374	10·4	3·6	1 in 2·8
Natives.....	3·255	1·438	5·7	2·5	1 in 2·2	2·091	975	3·6	1·7	1 in 2 1

It will have been noticed, previously, when examining the quarterly record from Dr. Nicholson's tables, that cholera occurred more at some quarters of the year than at others, and the preceding table affords further proofs of the influence of the seasons on the prevalence as well as on the intensity of this disease. More European soldiers were admitted in the first than in the second half of the year, the proportion of the strength admitted being 16.9 and 10·4 per 1,000, at these two seasons respectively; but as only one death took place in every 4.4 of the admissions in the first half of the year, while one in every 2·8 of the patients died in the second half, this greater intensity made the actual loss of lives nearly alike at both seasons, 3.8 per 1,000 of the strength having died in the first-half of the year and 3·6 per 1,000 in the second-half.

It is in the Bengal Presidency, apparently, that cholera has, at present, chiefly taken its seat, and the Records and Returns from that part of India afford the largest means of examining various questions connected with this disease. The Records of the Bombay European and Native Army and native prisoners are of less value but they may be here examined, to ascertain what they show as to the intensity of cholera among the various races.

Statement showing the Strength, also the Admissions and Deaths, from Cholera, which have occurred amongst the European and Native Troops, and Jails of the Bombay Presidency, from the years 1840-41, to 1867-68, (Received from the Office of the Inspector General of Hospitals I. M. D. Bombay, in letter dated 30th September 1869, from Surgeon Major Johnstone, Secretary to the Inspector General.)

	EUROPEANS.						NATIVES.						JAILS.					
	Strength.	Admissions.	Deaths.	Per centage of Deaths to strength.	Per centage of Deaths to admissions.	Proportion of Deaths to attacks.	Strength	Admissions	Deaths.	Per centage of Deaths to strength.	Per centage of Deaths to admissions.	Proportion of deaths to attacks.	Strength.	Admissions.	Deaths.	Per centage of Deaths to strength.	Per centage of Deaths to admissions.	Proportion of deaths to attacks.

The above Statement furnishes the means of comparing the occurrence of cholera, amongst different races, of an aggregate of 1,447,372 persons, for 28 years, in the Bombay Presidency.

In the 28 years 1840-1 to 1867-8 Ratio per 1000 of Strength.	SOLDIERS		NATIVE.
	EUROPEANS	NATIVES	PRISONERS
	Aggregate Strength 309, 877.	Aggregate Strength 957, 611.	Aggregate Strength 179, 884.
Admitted ...	16·1	5·04	22·6
Died ...	7·3	2·2	8·4
Proportion of deaths to admissions:	1 death in 2·1	1 death in 2·3	1 death in 2·6

The rate of mortality amongst those who have been attacked has varied but little, being one in every 2·1, one in every 2·3; and one in every 2·6 respectively amongst the European soldiers, Native soldiers and Native prisoners: But the rates per 1000 of strength admitted and died have very greatly varied amongst the two races, the European soldiers being the more susceptible to this disease: and with them, too, the intensity of the attacks was greater.

INTENSITY.—Dr. Bryden notices (p. p. 233,234) the intensity of the attacks of cholera, on the European soldiers of the Bengal Army, and gives, in the marginal table, the rates of death amongst them, during the 42 years 1827 to 1868. He quotes Dr. Macpherson, showing that while, in the epidemic of 1818-1821, the loss was 25·92 out of each 100 attacked with Cholera, it was about 41·00 per cent, in the sixteen years ending with 1854. Between 1827 and 1840, the loss was, in no year, over one-third,—the maximum, in the year 1837, being 33·42. But between 1841 and 1852, the minimum was 38-46, in 1841, and the maximum 48·67 in 1845. Since 1853, the ratio has never fallen below 50 per cent, and, in the past ten years two-thirds have died of all the European Soldiers in whom the collapse of

Died per 1000 treated.	Died per 1000 treated.	Died per 1000 treated.
1827...281·3	1840...312·5	1862...612·8
8...297·7	1...384·6	3...751·1
9...228·9	2...434·6	4...695·9
1830...261·3	3...397·7	5...725·0
1...235·0	4...448·1	6...600·0
2...211·2	5...486·7	7...608·7
3...319·6	1846 to 1852 407·4	8...655·2
4...323·1	1853...610·0	
5...260·4	4...505·4	
6...161·7	5...500·0	
7...334·2	6...578·5	
8...277·0	7	
9...185·0	8...543·4	
	9...501·7	
	1860...532·5	
	1861...640·4	

cholera has been manifested. The smaller number who now recover from this disease was shown in a former part of this work.

Race.—Dr. Bryden at pages 221 to 223, contrasts, as under, the loss from cholera amongst European and Native Regiments at the same stations in the invading cholera epidemics of various years, between 1845 and 1867

	Europeans.	Natives
Strength at date of the invasion.....	63,409	93,648
Number admitted.....	5656	895
„ died.....	3404	385
Proportion relation to Strength treated.....	1 in 11	1 in 105
„ „ „ „ died.....	1 in 19	1 in 243
Affected per 1000 of strength.....	89·20	9·56
Died „ „ „ „ ...	53·68	4·11
Died out of each 1000 affected.....	601·9	430·2

This, he considers proves what I showed in 1849, that when true epidemic malaria is abroad in Upper India, the European soldiers have always suffered more than Native soldiers. He thinks that though the care taken of the European soldier ensures him protection against contagious disease—such as typhus in all its forms, small-pox, erysipelas, or hospital infection, they are not as yet generally adapted to secure his exemption from air-conveyed miasmata. There is, he observes, no reason to doubt that the amount of the cholera miasm, present in the native portion of an affected cantonment, is as great as that diffused over the European portion ; but, he remarks, the grand fact is that the miasm present is powerless to affect the Native Regiments as bodies, and is weak, even in the worst epidemics, in relation to individuals unless these be of some race foreign to the plains of India. He discusses the possible causes of such disparity, between Europeans and Natives : he advocates trees and groves near Europeans, as a screen against advancing malaria ; he discusses the question whether the new barracks of Upper India will elevate the European soldier above the cholera miasm, which, in the monsoon is not a ground-seeking and insidious miasm ; and he infers that the depth of the stratum in which it is conveyed, will be found in some degree proportionate to its lateral extension. He states that it is during the night or early in the morning that men seem to be affected. He further states that cholera loves to abide in excavations, and in the lowest strata of air of any locality, and that elevated situations and good drainage are powerful in preventing the localization of cholera. He discusses the question whether the European custom of resorting to gene-

ral latrines may be a cause of their greater cholera, compared with Natives, who are individualized. He points out that the native soldier in his hut is individualized while the European soldier in his barracks however large the space is massed. He remarks that no condition can be more favourable to the local spread of such a pestilence as cholera, among any population, than that which is furnished by a dead moist atmosphere. But, with all this, he attributes much to one race being more liable than another, and he gives the following statement to illustrate the loss of the different races in the epidemic area of 1861, at the 9 stations of Morar, Agra, Delhi, Meerut, Deyrah, Umballah, Ferozepore, Meean-Meer, and Umritsur in the year 1861. This disparity he attributes to race : Dr. Bryden further illustrates the race influence by contrasting, at page 231, the climatic diseases in the European and Native army, for the five years, 1864 to 1868, as under

	Europeans Strength 11,898	Goorkhas Strength 1447	Hindustanees Strength 6172
Died	939	52	32
Died per 1000	78.92	35·94	5·18

	Europeans Av. St. 35590				Natives Av. St. 38,349			
	Total		Ratio per 1000 of Strength		Total		Ratio per 1000 of Strength	
Remittent & continued fevers.....	Ad. 22588	died. ...	Ad. 127	died. ...	Ad. 2811	died. ...	Ad. 15	Died. ...
Heat Apoplexy	...	396	...	2·23		35	...	0·18
Hepatitis. ...	...	541	...	3·04		35	...	0·18

but, in thus illustrating his remarks, as to race, he does not appear to have seen what I wrote in 1844 and 1849, on the Health of Soldiers and on cholera : and at page 213, when he states that " it is the British soldier in himself, or in his domestic relations that fixes the ratio of attack," he repeats the fact that one race is more susceptible to attacks of this ailment than another race.

TABLE of Monthly admissions and deaths from Cholera, among the European Troops, in the Bengal Presidency, in the six years 1859 to 1864, with cases from the General Hospital, Calcutta with which Inspector General Murray has obligingly favored me from the Records in the Office of the Principal Inspector General I. M. D. Calcutta. Simla 15th May 1866.

For six years, in the months,	Calcutta & Bengal proper. Latitude 22° to 25° Longitude 85° to 91° Strength 20424.		Benares. Latitude 25° to 27° Longitude 83° to 85° Strength 30,731.		Allahabad. Latitude 25° to 28° Longitude 79° to 83° Strength 55,270.		Agra. Latitude 26° to 30° Longitude 77° to 79° Strength 67,124.		Lahore. Latitude 30° to 33° Longitude 71° to 77° Strength 63,707.		Peshawur. Latitude 33° to 35° Longitude 72° to 74° Strength 32,087.		Bengal Presidency. Latitude 22° to 25° Longitude 71° to 91° Strength 269,443.		Total.		Proportion of deaths to attacks.
	Admitted	Died	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	A.	D.	Admitted	Died	
January	11	4	4	1	5	0	0	0	1	0	0	0	21	5	42	10	1 in 4·2
February	54	26	5	1	14	5	2	0	4	0	0	0	79	32	158	64	1 in 2.4
March	99	63	73	40	51	27	5	1	3	0	0	0	240	131	471	262	1 in 1·7
April	61	32	180	106	128	72	36	20	2	0	0	0	410	230	817	460	1 in 1·7
May	52	34	34	20	203	105	6	2	10	4	0	0	305	165	610	330	1 in 1·8
June	25	15	51	30	39	29	16	5	4	0	2	0	137	79	274	158	1 in 1·7
July	16	8	73	41	120	65	480	279	12	7	73	31	774	430	1548	861	1 in 1·5
August	173	96	44	27	301	217	663	407	870	524	17	13	2069	1284	4137	2568	1 in 1·6
September	14	5	4	5	131	90	124	77	196	140	15	10	474	327	958	654	1 in 1·4
October	35	23	8	3	19	13	17	5	3	7	64	42	164	93	310	186	1 in 1·6
November	25	11	9	4	9	3	1	0	3	0	5	4	52	22	104	44	1 in 2·3
December	12	11	4	0	3	1	1	0	1	0	0	0	21	12	42	24	1 in 1·7
Total	577	328	489	278	1023	627	1351	796	1109	682	176	100	4746	2810	9471	5621	1 in 1·684

The influence of seasons is, likewise, well shown by the following:

The above table is only for six years ; but, it shows that cholera was less frequent and less severe in the four dry, cold months of the year ; more frequent and more severe, in the moist hot months of July and August ; and that the intensity of the attacks increased with the frequency.

No. of Months.	Season of the Year.	Admissions.	Deaths	Proportion.
4	November, December, January and February.	346	142	1 in 2·437
6	March, April, May June September, October . .	3440	2050	1 in 1·678
2	July and August.	5685	3429	1 in 1·657
	Total...	9471	5621	1 in 1·684

Inspector General Murray has favoured me with another table bearing on this question. It is a Table of Monthly admissions and deaths from cholera, at Agra, among the European Troops, from 1837 to 1865, and the Native Prisoners from 1856 to 1865, from the Records of the Office of the Deputy Inspector General Agra.

Table of Monthly admissions and deaths from cholera at Agra among the European Troops from 1837 to 1865 and the Native prisoners from 1856 to 1865, from the Records of the Office of the Deputy Inspector General Agra.

	European Soldiers. for 29 years 1837 to 1865. Aggregate Strength 30,569.				Native Prisoners. for 10 years 1856 to 1865. Aggregate Strength 24,135.				Total. Aggregate Strength 54,704.				Proportion of deaths. to attacks.
	Total.		Ratio per 1,000 of mean strength		Total.		Ratio per 1,000 of mean strength		Total.		Ratio per 1,000 of mean strength		
	Ad.	died.	Ad.	died.	Ad.	died.	Ad.	died.	Ad.	died.	Ad.	died.	
January	2	0	0·065	0·00	0	0	0·0	0.0	2	0	0·036	0·0	0 in 2
February	1	1	0·032	0·032	1	0	0·041	0·0	2	1	0·036	0·018	1 in 2·0
March	10	2	0·327	0·065	8	0	0·331	0·0	18	2	0·339	0·036	1 in 9·0
April	10	3	0·327	0·098	3	0	0·124	0·0	13	3	0·237	0·054	1 in 4·3
May	15	3	0·490	0·098	13	3	0·538	0·124	28	6	0·512	0·109	1 in 4·6
June	162	69	5·297	1·991	444	167	18·394	6·908	606	236	11·077	4·314	1 in 2·5
July	205	97	6·550	3·171	351	137	14·541	5·665	555	234	10·145	4·277	1 in 2·3
August	325	160	10·628	5·232	910	214	37·660	8·865	1235	374	22·576	6·826	1 in 3·3
September	70	45	2·289	1·471	7	10	0·280	0·414	77	55	1·396	1.005	1 in 1·4
October	17	9	0·556	0·294	0	2	0·00	0·083	17	11	0·309	0·210	1 in 1·5
November	8	4	0·261	0·131	2	0	0·083	0·0	10	4	0.183	0·073	1 in 2·5
December	4	—	0·131	0·0	0	0	0·0	0·0	4	0	0·073	0·0	0 in 4·
Total	829	393	27·109	12·753	1739	533	71·104	34·722	2568	932	36·943	17·038	1 in 2·7

From the above table it will be seen that, in the 29 years, 1837 to 1865, amongst the European Soldiers at Agra, whose aggregate Strength was 30,569, there occurred 829 cases of cholera of which 393 or 1 in 2·109 died. But, of all the 829 attacks, only 67 took place in the cold dry and hot dry months from October to May, of whom only 1 in every 3·045 died; but 762 occurred in the hot moist months of June, July, August and September, of whom 1 in every 2·053 died. It is in the humid, hot, period of the year, in the Bengal Presidency, that the races are most liable to cholera; and, with the increase of cases, the intensity of the disease has increased.

Season.	Ad.	Died	Proportion.
8 Months of October, November, December, January, February, March, April and May.	67	22	1 in 3·045
4 Months of June, July, August and September.	762	371	1 in 2·053
Total...	829	393	1 in 2·109

Amongst the Native prisoners, of an aggregate strength of 24,135, in the 10 years, 1856-1865, there occurred 1739 cases of cholera of which 533, or 1 in every 3·262, died. But, of the 1739 cases, only 34 cases took place in the 9 months of September to May, of whom 1 in every 2·266 died; and 1705 happened in the three months June, July and August, of whom 1 in every 3·291 died. But, and in this the result differed from that of the Europeans to the extent, that, with the increase of cases, the intensity of the disease decreased. At page 48, there was a brief allusion to the varying intensity of this disease, according as it attacked different races, and the last table gives further information on that point.

	Ad.	Died	Proportion.
9 Months September, October, November, December, January, February, March, April, May.	34	15	1 in 2·266
3 Months June, July, August.	1705	518	1 in 3·291
Total...	1739	533	1 in 3·262

In the central tract of the Dekhan, also, the greater prevalence of this disease, during the hot, moist, period of the year, is very marked. The Hyderabad country and Berar are within the range of the South-West monsoon, which brings the rains of that season during the months of

May, June, July, and August. The information obtained from this central part of Peninsular India is imperfect and, in some instances, is evidently erroneous; but, of the total of 6380 recorded deaths, 3782 occurred in the four months of May, June, July, and August. This fact will be seen from the subjoined table which likewise points to Secunderabad and Hyderabad as places where cholera is endemic or centres from which this disease is diffused.

. IN EACH MONTH, IN CIVIL AND MILITARY STATIONS OF THE

1869.

From Bolarum to Hingolee.	H. M. 4th M. N. I. from Madras to Secunderabad.	Hyderabad City and Vicinity.								At a Distance from Hyderabad State.			
		Bolarum.		Chudderghat.		Hyderabad. Inside.		Hyderabad. Outside.		Secunderabad.		Berhampore.		Thayetmeo.	
68	1865	1859 1865 1868 1869		1868 1869		1868 1869		1868 1869		1861 1864 1865 1866 1867 1868 1869		1859 1860 1861		1865	
Died.	Admitted	Admitted	Died.	Admitted	Died.	Admitted	Died.	Admitted	Died.	Admitted	Died.	Admitted	Died.	Admitted	Died.
...	...	3	..	3	2	..	132	..	..	39	22	..	...	..	..
...	98	44	..	..	..	..	2	...	..	5	2	..	...	...	...
...	5	2	..	..	..	...	..	...	..	16	36	..	..	1	...
...	1	...	..	...	..	..	36	?	..	26	21	11	4	...	...
...	...	...	79	37	..	..	..	373	..	129	83	39	7	2	..
..	..	...	50	20	..	..	...	251	...	123	42	17	...	..	..
...	1	...	7	3	..	..	..	708	..	249	90	44	20	6	..
..	...	..	2	2	..	..	..	943	..	292	550	310	3	3	..
..	..	..	..	..	..	..	...	51	..	10	32	62	..	...	...
..	..	...	16	8	..	...	...	..	..	...	10	15	..	..	...
...	...	..	...	..	55	26	...	60	..	92	160	100	..	...	...
82	...	..	25	7	80	34	..	558	...	916	44	50	..	...	..
82	105	46	182	77	138	62	?	3,114	?	1,811	1,097	718	41	15	1

There are known facts which seem to indicate that cholera has long been occurring in particular localities in India, and from time to time spreading abroad. I have remarked above that Secunderabad and Hyderabad in the Dekhan are places where cholera is endemic, forming a centre from which this disease spreads. In the Peninsula of India, the Ceded Districts comprising the Collectorates of Bellary, Kurnool and Cuddapah, the northern part of Mysore, the town of Madras, all the Southern Mahratta Country and Akolah in Berar, seem to be centres, as also all the countries in the watersheds of the river Toonga, Bhudra, Toombudra, Gutpurba, Malpurbah, of parts of the Kistnah and Godavery and their affluents, and of the Cauvery, Pennar and Palar rivers. Dr. Macnamara, in his work on cholera when writing on this point is quoted as of opinion, that, "if we draw an imaginary line to the North East, through Saugor, Allahabad, and Gorruckpore to the foot of the Himalayas, throughout the whole of the plains to the East of this line, cholera is endemic, the intensity of the disease increasing as we approach the sea-board of the Bay of Bengal, the cities of Dacca and Calcutta being pre-eminently the strong-holds of this terrible malady. Cholera, he adds, is less frequently met with as we advance to the North-West and West from the line I have above indicated, until the disease may, with certainty, be said not to be endemic in the Punjab, in Rajpootanah and Sind. But, along the valley of the Nerbuddah and Taptee rivers and throughout a very considerable part of the Bombay Presidency, cholera is endemic." Dr. Bryden has also writtten largely on this subject and indicates the countries near the lower course of the river Ganges, as centres of diffusion and an abstract of his views may be here given. Calcutta is regarded by Dr. Bryden as typical of the endemic tract, and cholera is never absent from it, though it assumes a more active state in March, April and May, as will be seen by the marginal statement of deaths from cholera there. Dr. Bryden also gives tabular statements illustrating the seasons in which cholera occurs in the Eastern and Western divisions of the epidemic area.

Cholera Deaths.

Months.	Calcutta General population for 26 Yrs. Macpherson.	General Hospital 9 years 1860-1868 Brougham.	Native Troops Calcutta Barrackpore. Dum-Dum 10 years 1858-1867.
January	7150	11	13
February	9346	40	33
March	14710	93	70
April	19382	75	64
May	13335	96	83
June	6325	78	43
July	3979	27	28
August	3440	33	26
September	3935	20	24
October	6211	33	29
November	8323	33	34
December	8159	8	25
Total	104295	547	472

	Total. Ad.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November	December.
Jail Population.													
(a) Of the Eastern Division of the epidemic or invaded area 1859 to 1865	3334	5	30	438	653	390	321	629	522	151	100	83	12
European Army do. 1854 to 1867.	1023	4	4	59	219	131	64	127	278	110	18	8	1
Jail Population.													
(b) Of the Western Division of the epidemic or invaded area. 1860 to 1867	2462	...	...	...	17	43	55	379	1842	97	27	2	...
European Army do. 1859 to 1866.	1688	...	...	...	1	8	5	339	1007	257	61	10	...

From the above table, obtained from Dr. Bryden's Report, it is shown that in the Eastern division of the epidemic area, cases of cholera occur, both amongst Europeans and Natives, in every month of the year, though from March to April and July and August are the months of their greatest frequency. But in the Western division of the epidemic area, the bulk of the cases occur in June to September, and no cases for the six or seven years under review occurred in December to March.

The Bhaugulpore Jail in the valley of the Ganges, is mentioned by Dr. Bryden as 154 feet above the level of the sea. He regards the cholera of Bhaugulpore Jail, as very intimately related in season to that of Midnapore. In the 12 years for which he gives the return there was no case in January or December, only one in February and three in October but nearly half the cases occurred in April,

Period	Total. Ad.	Total. died	March.	April.	May.	June.	July.	August.	September.	November.	Remaining 5 months.
12 years 1856 to 1867	571	240	63	212	57	96	31	89	19	16	4

The Patnah and Deegah Jail he describes as built on the great kunkar clay formation, 185 feet above the sea-level, and also typical for the valley of the Ganges. In the same 12 years period, out of 624 cases and 246 deaths only 4 cases occurred in December, January, and February, and 24 in May and June, the remainder being pretty equally distributed through the other months, which he regards as illustrative of the spring and the monsoon cholera.

Allahabad Jail is considered by Dr. Bryden as typical of the Eastern

division of the epidemic area, Its cholera has occurred all through from March to September.

Period.	Total.		March.	April.	May.	June.	July.	August.	September.	5 Remaining Months.
	Ad.	died								
11 years, viz. 1856 and 1858 to 1867.	338	153	25	17	106	132	17	24	14	3

In Backergunge Jail, built on the diluvium of the Sunderbuns, the occurrence of cholera seems to take place twice a year, in the months March to June and again in November and December, and, for twelve years, no case appeared in August and September. Dr. Bryden describes this Jail as typical of the endemic basin, in which cholera predominates at the two seasons March to June and from the end of October to December : out of 333 cases in twelve years 301 occured in six of the months, March to June and November and December.

Period.	Total.		March.	April.	May.	June.	November.	December.	other 6 months.
	Ad.	died.							
12 years 1856 to 1867	333	156	68	70	38	14	55	56	32

The Midnapore Jail is built on laterite and but little elevated above the sea. It is regarded by Dr. Bryden as illustrative of the cholera seasons in the districts bordering on the endemic basin. In the 12 years, 1856 to 1867 no case occured in January or September, and 495 out of the 505 seizures occurred in the five months of the year February to April and June and July. He regards that jail and its district as subject to the spring cholera and the cholera of June and July as the homologue of the monsoon cholera of the epidemic area

Period.	Total.		February.	March.	April.	June.	July.	The other 7 months.
	A d	died						
12 years. 1856 to 1867	505	238	24	108	90	258	15	10

Dr. Bryden at p. 2 39 gives the marginal Statement of cholera admissions into the Pilgrim Hospital at Pooree in each month of the 25 years 1842 to 1866, in which out of a total of 2,431 cases, 1,793 occurred in the two months June and July.

Period. 25 years.	Total Admitted.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
1842 to 1866	2431	66	127	313	28	15	1255	538	13	5	15	53	13

A record is given by Dr. Bryden (p. 208-9) of the deaths from cholera at Cawnpore, during the 43 years 1826 to 1868. In that period, there were 888 deaths, of which only 53 occurred in the 7 months October to April, inclusive, the heaviest mortality occurring in June, July, August and September, but culminating in August.

In Meerut, during the 6 years, 1856, 1857, 1858, 1861, 1862 and 1867, 383 cases occurred amongst the European troops, of which 377 were admitted in the three months July August and September.

North West Provinces.		Punjab
January.....	516	48
February...	290	26
March.....	1202	31
April..	1593	44
May.....	2381	71
June..	2565	64
July.....	2507	43
August.....	2260	41
September..	1438	37
October.....	828	85
November..	361	24
December .	251	17
Total...	16,192	531

The North West Provinces has an estimated population of 29,588,653, amongst whom, in 1868, there were 16192 deaths March to September being the period of greater prevalence. Also, in the Punjab, the population of which is estimated at 17,586,232, there were 531 deaths in that, which was a non-epidemic, year.

Nagpore Jail is 935 feet above the sea-level, and other jails in Central India are at Bhandara, Chanda and Raepore, and it is in March to October

that cholera cases have occurred there. Dr. Bryden regards the relation of the Nagpore locality to cholera, to be the same as that of the Bengal districts bordering on the endemic area, as typically shown in the cholera of the Midnapor jail or of the jails low down in the valley of the Ganges.

Period.	Total.		March.	April.	May.	June.	July.	August.	September.	October.	November.	3 other months
	Ad. *	Died										
11 years 1856 & 1858 to 1867	685	327	66	54	115	68	264	49	7	15	1	0

He also regards the central jails in the North West of India at Agra, Meerut, Bareilly and Lahore, as typical of the western division of the epidemic area, in which the monsoon cholera predominates and he shows that it is during the continuance of the monsoon that the epidemic manifestation occurs in its intensity in those regions.

Period.	Total.		June.	July.	August.	September.	Other 8 months.
	Ad.	Dd					
8 years 1855, 1860, 1861, 1862, 1863, 1865, 1866, & 1867.	3318	1337	444	602	2034	202	36

Dr. Bryden, at page 115 of his report, gives the following table, to show, from the cholera deaths registered in the 18 years 1848 to 1865, in the Island of Bombay, the periods of the year in which cholera is most active there :

* Note.—The total of admissions at page 37 of Dr. Bryden's report, does not correspond with the total of the monthly figures,—there are only 639.

Year.	January.	February.	March.	April.	May.	June.	July.	August.	Septr.	October.	Novr.	Decr.	Total.	Remarks.
1848	0	11	7	17	10	9	6	2	2	0	5	0	69	Invading epidemic of 1819
9	0	0	1	4	1	0	0	121	690	369	260	682	2128	
1850	141	53	269	607	296	259	324	348	143	51	53	453	2997	
1	1873	905	1013	601	373	339	73	37	25	19	20	207	5485	
2	408	91	160	271	149	151	165	66	19	10	6	24	1520	
3	23	3	13	5	16	9	6	6	56	250	571	240	1148	,, ,,
4	214	299	372	724	520	950	317	68	14	11	9	9	3507	,, 1853
5	60	22	22	302	585	273	167	52	75	46	21	20	1645	
6	154	266	241	358	280	197	89	22	19	38	40	142	1846	,, ,,
7	469	165	306	363	249	302	157	86	32	31	18	13	2181	,, 1856-57
8	19	9	8	15	11	9	5	8	11	6	7	7	115	
9	9	10	9	7	69	843	329	170	41	85	131	282	1985	,, ,,
1860	289	332	396	321	163	107	89	128	51	47	29	9	1961	,, 1859
1	15	18	5	4	12	18	13	10	11	34	35	466	641	
2	625	240	339	260	367	218	117	95	161	272	201	269	3164	
3	189	50	89	161	153	161	412	240	178	181	176	319	2309	
4	622	401	302	680	837	395	371	351	232	88	137	431	4847	,, ,,
5	363	540	522	356	624	206	116	62	31	32	22	13	2887	,, 1863-4
Total....	5463	3415	4074	5056	4715	4456	2756	1872	1741	1570	1741	3586	40,445	

It will be observed from the above that cholera has occurred in Bombay in every month of the 18 years for which this tabular statement is given. The disease begins to slumber there in July and remains comparatively quiet till the end of November. In December of the mortality, at once, doubles; almost doubles again in January and ebbs and flows at a very high rate until the end of June, falling very considerably again in July

In the 8 months of the 18 years, from December to July inclusive, out of 40,445, deaths, 33,521 of them occurred, or at the average monthly rate of 4190·1 deaths, the average of the other four months August to November being at the rate of 1731 deaths per month.

At several places in his book Dr. Bryden records his opinions as to the value of prophylactic and curative and quarantine measures for this disease, and the value of disinfectants and conservancy.

At p. 219, he is of opinion that the utmost that is to be hoped for, in all efforts to diminish the attacks of cholera amongst Europeans, is to reduce their rates of attack and death to that of the Native army.

He (page 232) cites mental depression as a great exciting cause of the cholera miasm taking effect on individuals.

At page 213, noticing the value of abortive measures, he remarks that "there is no reason to question the truth of the statement that cholera "may be cut short in its earliest stage by sedatives and antispasmodics."

He is of opinion (p 214) that "no one" "would hesitate to recommend "the use of prophylactic measures when threatened. But the general use of "prophylactic measures, will not, in very many cases, prevent the deve- "lopment of the out-break, although some, perhaps not a few, lives will "be saved by the fact of the individual being carried over the critical "point which must be surmounted if he is to escape cholera and death."

On the question of the contagious nature of this disease he remarks p. (214) "that the tainted stratum of air, over a sleeping mass may be "selected by the cholera miasm" * * "But the empirical assertion "that, because cholera is a contagious disease its ravages can be con- "trolled by precautions directed against contagion, is a grave error; and "not the less so because it has been so universally assented to of late."

Writing (p.214) on the theory that the emanations from those already affected are of a poisonous character, Dr. Bryden does "not go so far as to say "that the evidence against the presence of the cholera germ in the evacua- "tions is decisive." "On the contrary" he thinks it probable that latrines "are occasionally infected, and especially hospital latrines" * * But, he adds, "in this country we do not hold, except as a theory, the trans- "mission of cholera by means of the evacuations, although we recognise "the destruction of such materials to be a duty incumbent upon all who "are called on to treat cholera."

Writing of disinfectants (p. 217) Dr. Bryden remarks that he "can form "no very high estimate of the practical utility of disinfectants towards

"lessening the intensity of an out-break, even granting that all that has "been said in their favour be true."

A point remaining to be alluded to is the duration of an attack of cholera when occurring in an epidemic form amongst native soldiers when marching. At p. 10 of the Cholera Report by Doctor Lorimer, is the following:

Return showing the number of days the cholera continued, with corps marching, in each epidemic attack from 1820 to 1844 inclusive.

Duration of each out-break	Under 10 days	From 10 to 20 days	From 20 to 30 days	From 30 to 40 days	From 40 to 50 days	From 50 to 60 days	From 60 to 80 days	Total.
Number of Regiments attacked	18	42	28	18	6	6	3	121

Of 121 epidemic attacks, the disease disappeared in 60 corps within 20 days, and, within 40 days, it disappeared from 106 corps out of 121.

It would moreover appear, from a table at the same page, that this disease, when it assumes an epidemic form, presents three stages, viz: 1st, that of its accession, which lasts four or five days, during which the cases that occur are few in number and of little severity; 2nd, the virulent stage then commences, and lasts for 8 or 9 days, during which numerous cases occur; 3rd, the disease then declines in frequency, and within the next ten days it disappears, the average duration of the epidemic being only 24 days.

The history of 20 of the more severe epidemic attacks is thus recorded:

Period 1821 to 1844.	Duration of Epidemic.							Virulence of Epidemic.					
	Number of Regiments.	Strength.	Days.	Number Attacked.	Number died.	Per day. Admitted.	Per day. Died.	No of days before the disease became virulent.	Duration of virulence.	Number attacked.	Number died.	Per day. Admitted.	Per day. Died.
19 Regiments, were 20 times attacked.													
Total		17,878	483	2,706	1,181	120	51	93	174	2,104	959	227	100
Average.		893·9	24·1	135·3	59·0	6	2·6	4·6	8·7	105	47·9	11·3	5

In those 19 regiments 4½ days elapsed on the average before the disease assumed its virulent character; for the nine succeeding days the disease was both more frequent and somewhat more intense: and in the following eleven days, on the average, it disappeared. Another arrangement of these data will make the intensity of the different stages more apparent.

	There were attacked	There died	Proportion of deaths to attacks.
Amongst the 19*Regiments, during the continuance of the Epidemic.....	2706	1181	1 in 2·29
Deduct the numbers recorded as having occurred in the 8·7 days of the virulent stage.....	2104	959	1 in 2·19
Leaving the numbers that occurred previous and subsequent to the period of virulence.....	602	222	1 in 2·71

It will be observed that 2104 or three-fourths of all the admissions took place in the 9 days that the virulent stage lasted, the remaining 602 admissions having occurred during the 15 preceding and succeeding days. It will be observed, also, that the disease was then virulent both as to the numbers attacked and as to the intensity of the disease, the proportion of deaths to admissions having been 1 in every 2·1 or 44 per cent, while the virulence continued, while only one death in every 2.7 admissions or 36 per. cent of deaths occurred amongst the patients admitted during the 4½ days before and the 11 days after this virulent period.

Each of these two tables contain data from which important deductions may be drawn. They show the value of curative measures to be different during the periods of accession, virulence, and decline; they show that with regiments marching even the severest epidemics have not, on the average, continued longer than 24 days, and this, combined with the knowledge of its three stages, will enable us to regulate our measures of prevention.

Dr. Bryden, also, at pages 194 and 195, gives two tabular statements to show the duration of the disease after an out-break.

In the 11 years 1856 to 1866, there were 104 out-breaks among the

* The Regiments were the 3rd, 4th, 9th, 10th, 11th, 15th, 16th, 19th, 23rd, 24th, 30th 36th, 38th, 32d, 43d, 46th, twice, 47th, 48th, and 52nd, M. N. I.

European troops in the Bengal Presidency, in the months of February to October, but upwards of half the deaths occurred in the two months July and August.

Number of fatal cases out of the admissions of each day.																											
Day...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Deaths.	184	143	147	131	155	138	119	130	132	102	107	72	62	73	65	56	43	43	48	31	27	34	20	23	7	11	11	8

Also on the first day of the out-break the deaths were most numerous. the deaths decreased for two days and remained stationary or increased for one day and no fatal case occured after the twenty-eighth day. In commenting on this table Dr. Bryden observes that the out-break may have three special aspects each significant of a different phase :—*first*, the out-break may be typical, comprised within ten days from the date of poisoning ; *second*, it may be supplemented by conditions of locality, so that it may endure from the date of attack up to the date of the reproduction : and in the *third* aspect while the type presented is evidently that normal for the minimum, the affection of the body is maintained to about the 16th and 17th day." * * "I have, he adds, written the history of the cholera miasm as that of a thing individualized and appreciable, due at a certain date in a certain situation; budding forth from the soil because it has been sown there ; revitalized in relation to what it is as a thing organized, and advancing, when invading, with a front as wide stretching as is the breadth of the natural province which is being covered. I have described the persistence between two definite dates as due, not to any meteorological reason, and certainly not to any contingency secondary to human infection ; but as a leaf, or a flower, or an insect has a temporary existence absolutely defined and yet manifested in obedience to a known meteorology so has the vitalized cholera its life-period which no combination of conditions (however powerful these may be) can prolong."

Dr. Bryden (p. 87) considers three conditions to be essential for manifest epidemic progress, viz: (1) the presence of the cholera miasm : (2) a humid atmosphere, which is in every case its vehicle : and (3) a prevailing wind giving direction and limitation to this humid atmosphere:

When examining the returns from bodies of troops in the same or neighbouring cantonments, the attention is almost immediately arrested by observing the difference in the ratio of admissions from cholera in places closely adjoining each other. It will be observed, for instance, in the

following table, that the Europeans stationed in Fort St. George, from 1829 to 1838, had 28.03 per 1,000 of their strength admitted from cholera, while the Europeans at Poonamallee, 13 miles distant, had only 4·36 per 1,000 of their strength admitted during the same period.

A similar difference is observable in the Returns from the Europeans at St. Thomas' Mount, a station 10 miles distant from Fort St. George, the European Horse Artillery there having had 13.36 per 1,000 admitted from cholera in the 10 years from 1829 to 1838, while the European Foot Artillery, a few hundred yards off, had only 2·5 per 1,000 admitted during the same period ; and these instances are so numerous, that they may be arranged in the following

Table, showing the ratio per 1,000 of mean strength of troops in adjoining localities, attacked with cholera.

	Average annual Ratio per 0000 of mean strength admitted.
Fort St. George.—European Infantry and Artillery for 10 years 1829 to 1838.....	28·03
Poonamallee.....(13 miles distant) Europeans, 10 years 1829 to 1838.....	4·3 6
St. Thomas' Mount—(10 miles from Fort St. George) European Horse Artillery 9 years 1829 to 1838 exclusive of 1831,.....	13·36
European Foot Artillery 1¼ mile distant, from the Horse Artillery 10 years 1829 to 1838....	2·50
Secunderabad..H. M. European Infantry 10 years 1829 to 1839 exclusive of 1833.....	9·91
H.E. I. Co.'s European Foot Artillery 1¼ mile distant, 1829-to 1840.....	4·34
Kamptee....H. E. I. Co.'s Madras European Regiment, 10 years 1829 to 1839 exclusive of 1831.	19·26
H. E. I. Co.'s European Horse Artillery 1829 to 1839 inclusive	11·12
H. E. I. Co.'s European Foot Artillery, 1829 to 1839	8·26
Trichinopoly....H. M. European Infantry for 1829 to 1831, 1833, to 37 and 39	8·02
H. E. I. Co.'s European Foot Artillery from 1832 to 1841.....	3·14

		Average annual Ratio per 1000 of mean strength admitted.
Bangalore....	H. M. European Infantry, 8 years 1831 to 1838	34·61
	H. M. Dragoons (contiguous to above) 9 years 1830 to 1838	13·16
	H. E. I. Co.'s Foot Artillery ¼ mile distant, 12 years 1830 to 1841	9.00
	H. E. I. Co.'s Horse Artillery contiguous to Foot Arty. 11 years 1829 to 1842	4.81
Bellary.....	H. E. I. Co.'s Foot Artillery, 9 years 1833 to 1841	28.93
	H. M. European Infantry, contiguous, 10 years 1829 to 1838	19·36
Madras.....	Native Infantry 10 years 1829 to 1838	4.37
St. Thomas' Mount—	10 miles distant, Native Golundauze, 9 years, 1829 to 1868, exclusive of 1832	3.84
Palaveram..	13 miles distant, Native Infantry (period not specified)	0.25

While alluding to the occurrence of cholera in Northern India during the hot, moist period of the year, there are facts observable which show that the agent influencing the out-breaks of this disease, is neither heat alone nor heat and moisture combined. For instance, as Dr. Pearse writes, Malabar and Canara, on the Western coast of India, is clothed with trees and covered with a humid atmosphere, from May to October, during which the rains of the South-west monsoon are falling.

The Ceded Districts, on the other hand are hot, but arid.

These two districts or provinces, differ widely in their geological formation, elevation, temperature, moisture, rain-fall &c. The per-centage of deaths from cholera to the total mortality for a period of 15 years was

In Malabar and Canara Europeans.....4.6
,, Natives 12.4
In the Ceded Districts Europeans 55.9
,, Natives 52.8

If the mortality from cholera be excluded, the deaths in Bellary for the 10 years to which the above refer amounted only to 13.2 per thousand of Europeans, and 6·1 per thousand of native troops. But for the occasional out-break of epidemic cholera in Bellary, that station would have stood very

high in the sanitary list. It has however been visited from time to time very severely by this disease. The death-rate of Europeans stationed in the Ceded Districts from 1829 to 1838 was 31 per thousand, and of native troops 16 per thousand. For a later period of 14 years viz. from 1842 to 1856-7, it was 34 per thousand in European troops, and the native mortality remained exactly the same viz. 16 per thousand. The diminished value of European life in the later period was the result of losses from epidemic cholera, as will be seen from the following table :—

		Aggregate strength.	Total Deaths.	Deaths from Cholera.	Per centage of Cholera Deaths to whole Mortality.
From 1829 to 1838.	European.	9,000	285	62	21·75
	Native.	35,999	581	283	48·7
From 1842 to 1856-7.	European.	10,400	359	201	55·9
	Native.	56,437	937	488	52·08

Dr. Pearse adds that although the station of Bellary itself does not show the above high rate of cholera mortality, yet for the 10 years to which his remarks and the foregoing tables refer, the cholera deaths were 26·6 per cent. of the whole, a very high rate for any cantonment or station.

Dr. Macnamara writing on this point (p. 293) asserts " that no wide-" spread epidemic has ever occurred in India unless during or immediate-" ly after rain." And, at page 292, he observes that this point was noticed by the Bengal Medical Board, in their Report on the out-break of 1817 and 1818, in which, when alluded to the accompanying meteorological phenomena, they clearly demonstrated that the out-bursts " of the disease in almost every instance, was preceded" " by a long course of unusually humid and sultry weather ; and that its subsequent periods of increase and decline were always modified by changes of the weather."

Dr. Macnamara's book, contains a monthly tabular statement of the deaths in Madras town from cholera, for the ten years 1855 to 1864.

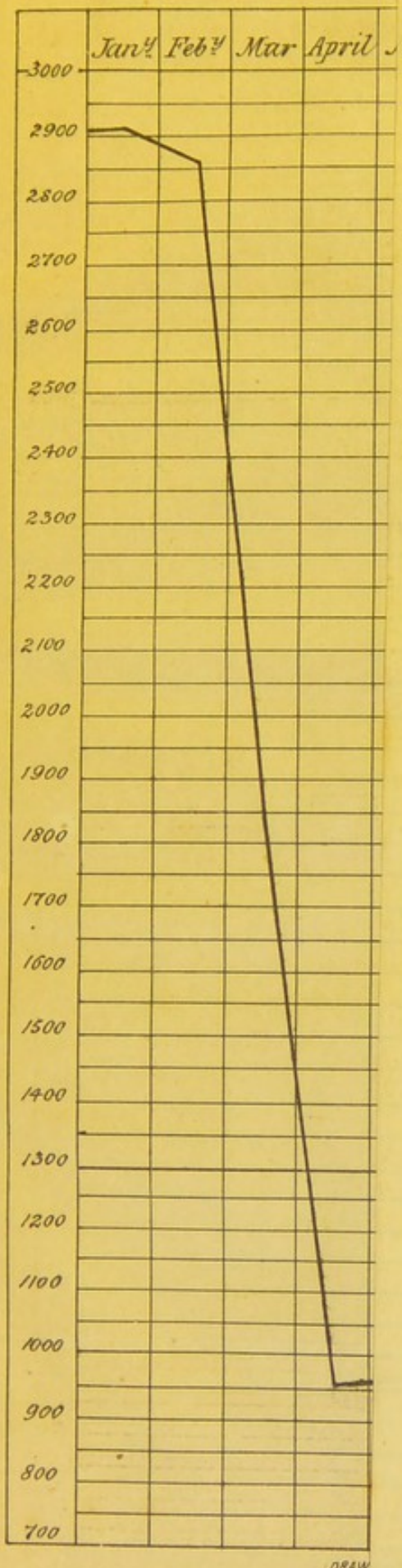
On applying to Dr. Cornish, Sanitary Commissioner for Madras, he has obligingly furnished me with the following :—

Return showing the deaths in Madras, from Cholera, in each month of the fifteen years 1855 to 1869.

Years.	MONTHS.												Total.
	January.	February.	March.	April.	May.	June.	July.	August.	Septr.	October.	Novr.	Decr.	
1855	305	351	136	30	14	2	6	45	390	358	207	112	1956
1856	167	128	181	132	147	29	12	2	1	3	1	2	805
1857	4	152	161	135	81	126	114	74	117	115	138	160	1377
1858	433	323	126	28	116	92	94	111	128	128	137	249	1965
1859	349	463	130	72	20	10	12	7	6	3	2	8	1082
1860	3	2		6	22	87	1218	637	276	160	91	76	2580
1861	38	75	54	150	204	76	183	599	786	343	107	161	2776
1862	425	485	229	102	189	267	126	222	242	501	519	328	3636
1863	372	452	455	154	84	19	5	8	2	46	10	77	1684
1864	133	110	106	45	3	4	4	97	38	15	9	10	574
1865	121	72	54	20	10	4	33	302	120	118	45	45	944
1866	99	73	149	83	77	160	577	544	534	283	93	312	2984
1867	361	178	58	1	1	0	0	1	0	1	0	10	614
1868	7	2	2	0	0	0	0	0	0	0	2	0	13
1869	0	0	0	2	5	8	80	226	147	73	16	11	568
Total...	2820	2866	1843	960	973	884	2464	2875	2787	2147	1377	1561	23557

The information here given may be shown in the following diagrams :

Diagram Showing total



DRAW

Dr. Cornish, when sending the Table and diagram, which are given in page 83 observed :—

"There are two cholera seasons in Madras—the cholera of the cold "weather, and the cholera of the S. W. monsoon. The cold weather cho- "lera begins to be active after the termination of the N. E. monsoon rains, "when the weather is bright, clear, and cold at nights with the wind from "N. E; N. or N. W. This cold weather cholera begins to decline in "March and with the setting in of the southerly winds about the end of "that month it dies out with great rapidity.—The season in which the "southerly winds blow, from mid March and mid June, is the period of "year in which cholera is at its lowest. These southerly winds come up "pure from the Indian ocean—They have had no terrestrial contamina- "tion, and according to my experience, cholera is unable to become epide- "mic in Madras, while they blow steadily and persistently. These same "winds, however, before they reach the latitude of Calcutta, become a "vehicle for the propagation of cholera. Our period of minimum is Cal- "cutta's maximum of cholera.

"The breezes which are life-giving to Madras are deadly to Calcutta. "In the one case they have blown over hundreds of miles of ocean : in the "other they have blown over a still longer distance of sea, but also some "miles of a moist vapoury and pestilence-breeding soil.

"The southerly winds of Madras are probably fuller of moisture than "the same winds at Calcutta. I dwell on this to show that a moist air "alone will not give rise to cholera. It must be an air which has been in "contact with the earth, or with vapours arising from the earth. Imme- "diately the S. W. monsoon sets in about the middle of June, cholera in "an epidemic form may be looked for, if it should be prevailing in neigh- "bouring districts. The winds in this season only reach Madras after "blowing across the Peninsula. During this transit over the heated "plains of the Carnatic, the monsoon winds lose all, or nearly all, their "moisture, reaching Madras as scorching dry winds. Rain falls at this "season with great irregularity. It is generally scanty in June, but more "marked in July and August. A heavy shower has the effect of cooling "the earth and air temporarily, but the period of the South West mon- "soon in Madras is one usually of atmospheric heat and dryness, and a "season also when cholera has a great tendency to spread in epidemic "fashion. I notice the point particularly here, because Dr. Bryden has "laid great stress on the element of moist air as a carrier of cholera.

"The South West monsoon where it impinges on the Malabar Coast is "loaded with moisture but, coming up from the sea (which never breeds "cholera) it becomes a vehicle for cholera only after contact with the soil "of an endemic area. Thus the period of the South West monsoon on "the Malabar Coast, is the period of minimum prevalence of cholera in "that locality. In 1859 and 1865 cholera prevailed and badly too in Ma- "labar all through the monsoon period on the Western Coast but as a "rule all the civil and military Stations on the coast are singularly exempt "during the S. W. winds and rains.

"The general law with reference to the seasonal prevalence of cholera "in Madras I believe to be this: The diffusion of the disease is not so "much a question of moisture in the air, and direction of the wind, as of "the antecedents of the wind. A wind coming straight from the sea can- "not bring cholera to Madras but a land-wind either from the N. or S. W. "is not unfrequently coincident with a development of cholera. The ac- "tual part which the winds play in the diffusion of cholera is a question "that would occupy too much space to enter upon here."

Authors have, however, examined into the connection of atmospheric phenomena with cholera, and the previous pages have established the fact of the seasonal occurrence and of the seasonal rise and fall of cholera and it may be proper, for the assistance of future investigators, to furnish here such meteorological observations as are available:

TABLE showing the average monthly rain fall at Madras for the 60 years ending 1866, also the monthly rainfall there and monthly deaths from cholera, for the 15 years 1855 to 1869. See Appendix F.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Average monthly Rain-fall for 60 years.	0·89	0·22	0·48	0·68	2·26	1·65	3·46	4·38	4·58	10·90	12·90	5·42	47·82
Total monthly cholera deaths 1855 to 1869.	2918	2866	1843	960	973	884	2464	2875	2787	2150	1396	1561	23677

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Average monthly Rain-fall for 15 years 1855 to 1869.	0·63	0·06	0·14	0·76	0·80	2·08	3·77	4·34	2·64	10·42	1047	4·99	42·14
Total monthly cholera deaths 1855 to 1869.	2918	2866	1843	960	973	884	2464	2875	2787	2150	1396	1561	23677

It will be observed from the above that the severest cholera occurrences in Madras are in two periods of the year, possessing very dissimilar physical characters. There are seven months in which cholera deaths in Madras are above the monthly average of 1578. The December's amount, viz. 1561, is quite close to the average, and that month with January, February and March may be styled the cool dry weather. But July to October, in all of which months the average is exceeded, is decidedly hot and dry or hot and humid. The present statistical information available does not warrant further remark than that in the past fifteen years cholera has occurred in Madras in every month of the year : that it swells twice, the two distinct rises being in the cool dry weather of January to February and during the hot, close, humid, dead atmospheres of July to October : and that there is a distinct abatement of the ailment in the hot, arid months of April May and June and another fall in the rainy month of November.

Madras cholera deaths, 15 years, 1855 to 1869.	
Total deaths.....	23677
Average monthly deaths....	1578
Months with deaths above the average :	Months with deaths under the average.
Jan...	2918
Feb.	2866
March	1843
July...	2464
Aug...	2875
Sept...	2787
Oct...	2150
April...	960
May...	973
June...	884
Nov.	1396
Dec...	1561

If we now examine the second diagram, in which are shown the annual numbers of deaths in Madras from cholera, rises and falls are observed in it, but, as was remarked at page 51, destitute of any such regularity of sequence as would justify a belief that there is at Madras a periodicity in the recurrence of out-breaks of this disease.

We may now turn to Bombay. Colonel Sabine has minutely examined the meteorology of Bombay, and he read a paper on it before the British Association at the meeting of 1845. In it, as he observes, with regard to the annual variations which are shown in the subjoined table, "we perceive that the leading features of the phenomena are

"clearly analogous to those which present themselves at Toronto, "Prague, and Greenwich; viz. a correspondence of the maximum of "vapour-pressure and a minimum of gaseous-pressure with the maximum "of temperature; and of the minimum of vapour-pressure and maximum "of gaseous-pressure with the minimum of temperature; and a pro- "gressive march of the three variations from the minimum to the max- "imum, and back to the minimum again. The epochs, or turning "points, of the respective phenomena are not in every case strictly iden- "tical; but their connexion, which is the subject immediately before us, "is most obvious.

"We have thus, he adds, a further illustration of the universality of "the principle of the dependence of the regular periodical variations, an- "nual as well as diurnal, of the pressure of the dry air and of the vapour "on those of the temperature.

1843.	Total Cholera deaths.	Temperature.	Vapour-Pressure.	Gaseous-Pressure.	Barometer.	Humidity.	Monthly Means greater (+) or less (—) than the Annual Means.		
							Temperature	Vapour Pressure.	Gaseous Pressure.
	‡	Deg.	Deg.	Inch.	Inch.		Deg.	Inch	Inch.
January	5463	76·4*	0·578*	29·352	29·930	67	—4·7	—0·202	+0·329
February	3415	77·7	0·648	29·246	29·894	71	—3·4	—0·132	+0·223
March	4074	79·7	0·710	29·128	29·838	74	—1·4	—0·070	+0·105
April	5056	84·2	0·853	28·961	29·814	76	+3·1	+0·073	—0·062
May	4715	85·9†	0·921	28·743	29·664	78	+4·8	+0·141	—0·280
June	4456	85·4	0·935†	28·718*	29·653	80	+4·3	+0·155	—0·305
July	2756	82·1	0·896	28·737	29·682*	85	+1·0	+0·116	—0·286
August	1872	81·2	0·859	28·869	29·728	84	+0·1	+0·079	—0·154
September	1741	81·1	0·859	28·920	29·779	84	0·0	+0·079	—0·103
October	1570	82·2	0·819	29·026	29·845	78	+1·1	+0·039	+0·033
November	1741	80·5	0·675	29·213	29·888	67	—0·6	—0·105	+0·190
December	3686	76·6	0·592	29·368†	29·960†	67	—4·5	—0·188	+0·345
Total	40445								
Mean	...	81·1	0·780	29·023	29·803	76			

"The humidity exhibits also a single progression; but may, perhaps, be "rather characterized as evidencing a very dry season from November to "February, and a very humid one from June to September, the latter sea- "son being that of the rains.

"The average degree of humidity in the year is very slightly lower than "either at Toronto or at Greenwich, but is still closely approaching to a

* Signifies 'minimum.' † Signifies 'maximum.'

‡ This column has been added by me, to the columns given by Colonel Sabine, to facilitate the examination of the subject. E. B.

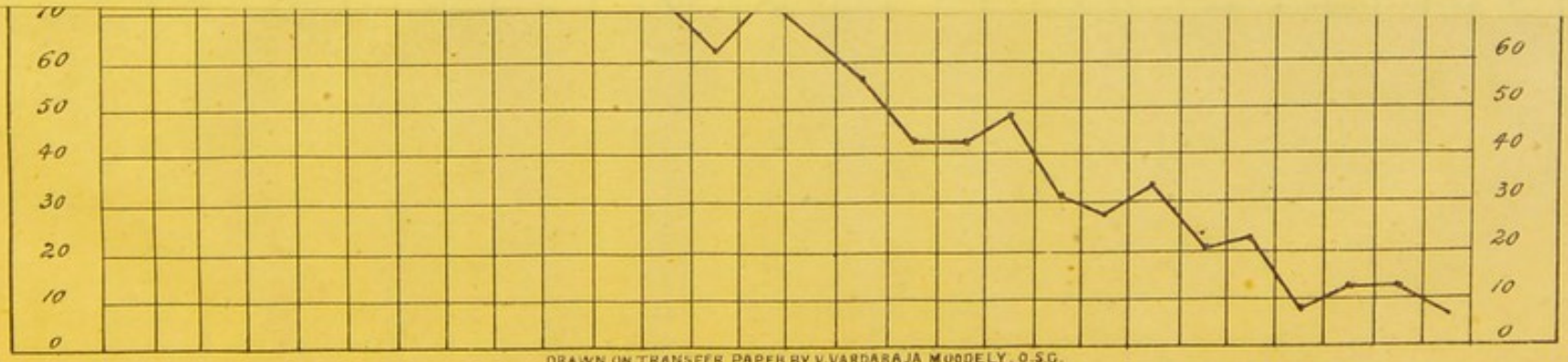
" value expressing the pressure of three-fourths of the quantity of vapour " required for saturation."

With reference to Colonel Sabine's remarks on his tabular statement (side by side of which I have placed the monthly cholera deaths) it may be remarked that, in Bombay, in the 18 years 1848 to 1865, there died from cholera 40,445 people, and, in that period, every one of the twelve months had cholera. But, in the five months July to November, cholera has been, of all the year, the least prevalent, for in them the number of deaths continued below the monthly average. In four of these months the temperature was equal to or above the annual mean and in the four months vapour pressure was above the annual mean. In the December's the numbers of cholera deaths increased above the monthly average and continued at a high rate up to the end of June, all through the dry cool and dry hot months of the year when land and sea breezes blow, and into the first rains. These points can be shown by the marginal statement; and the diminution of the number of cholera deaths in the very humid months July to November, merits notice; because, at Madras, there was a fall from 2150 deaths in the October's to 1396 in the heavy monsoon November months again to increase to 1561 in the drier Decembers and to continue above the average in all the cool dry weather till the end of March. But there seems no other point of resemblance, between Madras and Bombay.

Bombay cholera deaths in the 18 years, 1848 to 1865.	
Total deaths.....	40.445
Average monthly deaths	3370
December.....	3576
January.....	5463
February.....	3415
March.....	4074
April.....	5056
May.....	4715
June.....	4456
Average 3370.	
July.....	2756
August.....	1872
September.....	1741
October.....	1570
November.....	1741

It is a prevailing belief that when cholera first invades a locality or appears as an epidemic amongst bodies of soldiers, there are at first a few scattered cases, of little severity; then many severe cases occur and the out-break thereafter begins to decline. In the Madras Native Army this was the usual course when it broke out amongst marching corps and at page 77, it was remarked on the examination of a tabular statement given by Dr. Lorimer that " this disease, when it assumes an epi- " demic form, presents three stages, viz: 1st that of its accession, which " lasts four or five days, during which the cases that occur are few in num- " ber and of little severity; 2nd the virulent stage then commences, and " lasts for 8 or 9 days, during which numerous cases occur; 3rd the

"disease then declines in frequency, and within the next ten days, it "disappears, the average duration of the epidemic being only 24 days." By a tabular statement furnished by Dr. Bryden, of 104 cholera epidemics amongst European soldiers, a summary of which I have given at page 79, it is shown that the cases were most numerous on the first day of the out-break and that the disease disappeared from the 28th day ; The features of the Bengal epidemics amongst Europeans are shown in Diagram No. 3, and the cases will be observed to be most numerous on the first day of the out-break, and to decrease from the first to the 28th day by almost equal daily falls. There are rises every second day, but the successive rises are less than the previous and subsequent falls. As this is the result of the examination of the great number of 104 cholera out-breaks, amongst the European soldiers of the Bengal Army, such large decreasings with slighter rises may be regarded as a law, there, in the action of the agent causing out-breaks of this disease.

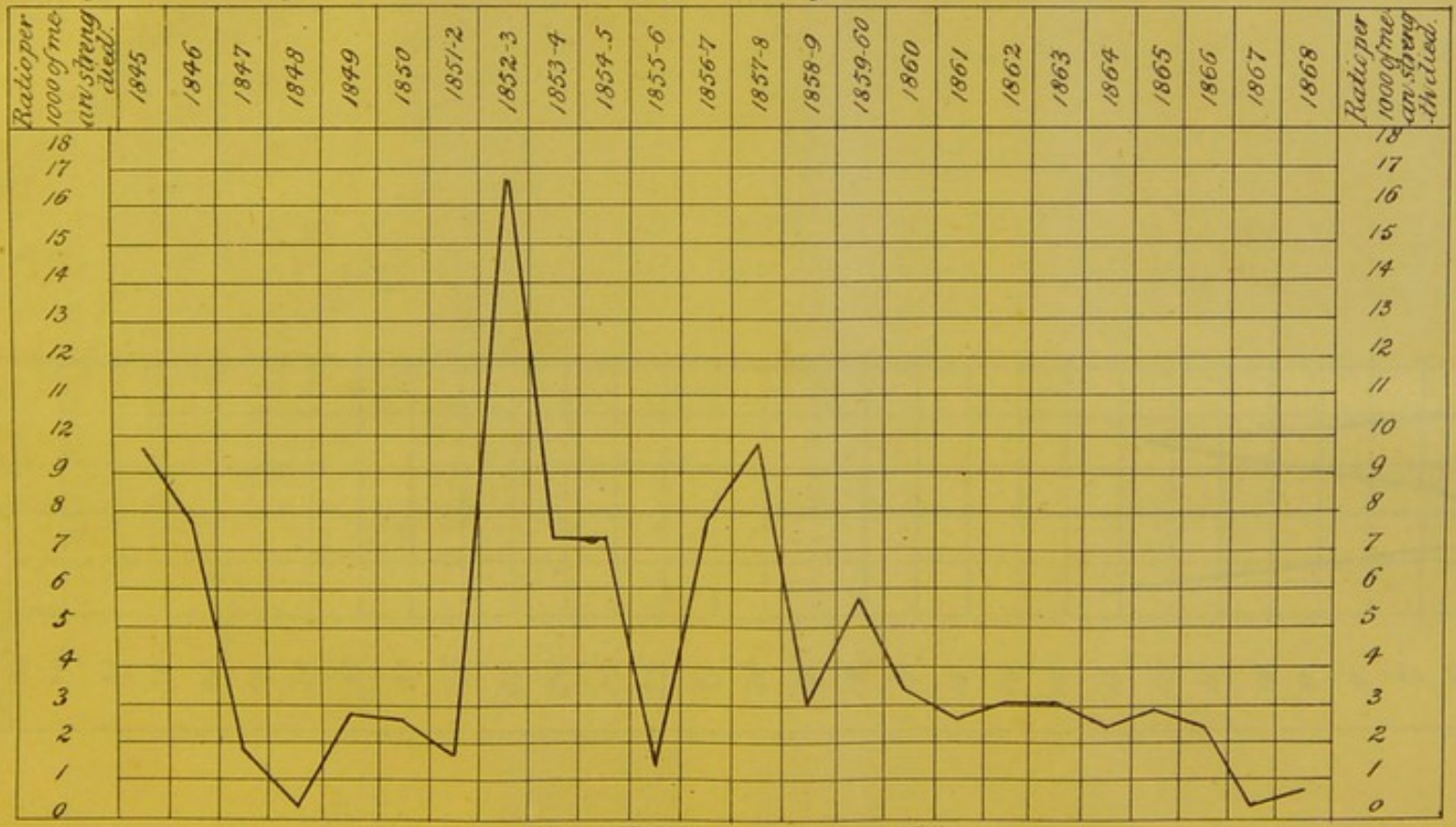


DRAWN ON TRANSFER PAPER BY V. VARDARAJA MOODELY, O.S.G.

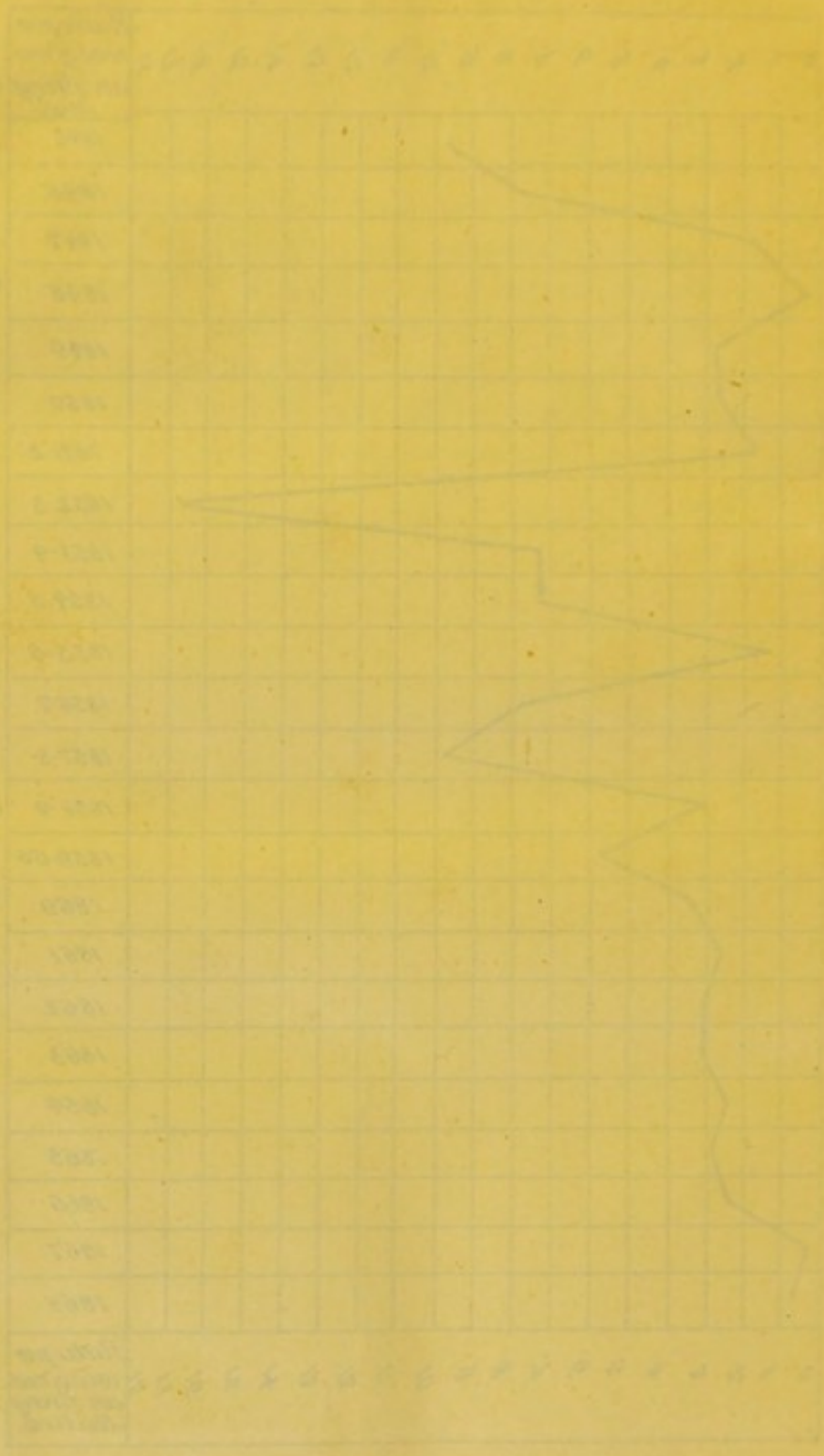
At page 5 it was remarked how "continuous this disease had been in "Madras, diminishing in some years and increasing in others without any "apparent sequence. But in the European army of Bengal, in the years "1843 to 1846-7 the rate of Cholera deaths per 1000 of the strength was "13·5. The next two years, the rate was 4·8 and 6·7 and then, in 1849-"1850, it rose to 12·6 per 1000. Two years of great quiescence were fol-"lowed in 1852-3 and 1853-4 by the high rates of 12·4 and 11·9. Then "again there followed two years of great quiet, succeeded by six years of "activity, during which the rates were 33.05, 9·16, 8·67, 12·04, 23·73 and "9·61 and finally four quiet years were followed in 1867, by a rate of 13·"84 per 1000." These two features of the Madras and Bengal cholera are well shown in diagrams 4 and 5: No. 4, for Madras gives no indication of periodicity, but in the European Army of Bengal, in the years 1843 to 1867, there has been a semblance of periodicity, with occasional exacerbations.

№4.

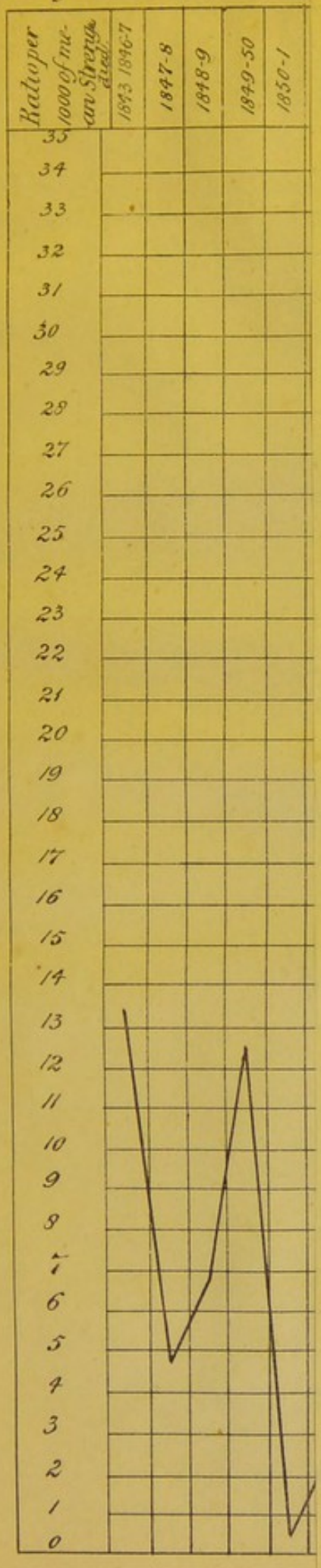
Diagram Showing the Ratio per 1000 of mean Strength of the European Force of the Madras Army that died from Cholera in each of the 24 years from 1845 to 1868.



DRAWN ON TRANSFER BY V. VARDARAJA MOODELY.



No 5. *Diagram Showing the*
Bengal Army that die



Appendix A.

Notices by European Writers of Morshi, Mordeshin, Mort-de-Chien, or Cholera-Morbus, before 1817, *chronologically arranged.*

Calicut	1503	Lendes da India by Gasper Correa
Goa (Great epidemic)	1543	do do do.
Goa	1563	Garcia D'Orta.
Goa	1580	A. Costa.
Goa	1589	Linschot.
Java	1629	Bontius.
India, Arabia, and Morocco	1632	Zacutus Lusitanus.
Goa	1638	Mandelsloe
Boorhampore to Surat	1666	De Thevenot.
Surat	1674	Dr. Fryer.
Common in Western India	1676	Dellon,
Madura and Coromandel Coast	1703	Père Martin.
Mentioned as a disease in Bengal	1709	Père Papien.
Mentioned as a disease of India	1736	Paxmanu.
Tinnevelly	1747	Orme.
First campaign in Madras country	1756	Dr. Paiseley.
Near Pondicherry	1769-71	Sonnerat.
Amberpet and Arcot	do	Madras Report.
Bombay	1772	Clarke.
Trincomalee before	1774	Dr. Paiseley.
Madras	1774	
Mauritius	1775	Dr. Burke.
Malabar Coast	1778	Fra Bartolomeo.
Coromandel Coast (bad epidemic)	1776-8 ?	Sonnerat.
In East Indies	1780	Lind.
Ganjam, Calcutta, Sylhet (epidemic)	1781	C. Wilkins, Jameson. W. Hastings, Lindsay.
Madras, Trincomallee	1782	Curtis, Girdlestone.
Tranquebar	do	Konig.
Malabar Coast (epidemic)	do	Fra Bartolomeo.
Bombay	do	Clarke.
Along the whole Madras Coast	1783	Madras Report.

In Travancore country..... ....1783 Hay, M. R.
Great out-break at Hurdwar... ..... do Bengal Report.
Vellore and Arcot.....1787,8,9 Madras Report.
Ganjam..... ....1790 Bengal Report.
Malabar Coast, ever since..... ..... do Dr. Macrae.
Travancore..... ....1792 Hay M. R.
Backergunge..... ....1797 Taylor, Topog : of Dacca.
Trincomalee..... ....1804 J. Johnson.
At various stations in Bengal... ... ...1808,9,11,12,13,14 Records of Bengal Medical Board.
Jaulnah..... .....1814 Madras Report.
Purneah..... .....1816 Calcutta newspaper.
Kishnaghur and Mymensing, May and June... ...1817 Bengal Report.
Jessore.....August..1817 do do

Notices of Cholera not fully verified.

Aurungzebe's army at Beejapore... ...1689 Khafee Khan.
Nadir Shah's army..... ....1735 mere Native Reports.
Epidemic, with sudden deaths near Tinnevelly.....1747 Orme, Vol. II p. 201.
Arcot..... ....1756-7 French Writers.
Bengal..... .....1762 French Writers, disproved from Lind.
Bundelkund..... ....1780 Bengal Report.
General Andree's army..... .....1781 French Writers.
Mahratta Country..... ....1790 Mr. Tuke in Bombay Report.

The above is taken from Dr. John Macpherson's "Cholera in the East," pamphlet, London, 1869.

Appendix B.

Names for Cholera.

1 Alm Maida, Arab.
Haiza or Haida, Arab.
Marad-ul-aswad, Arab. or Marz-ul-aswad, Arab.
Halgi ; also, Palki ; also Rog, Bhaka.
5 Ola Utha, Bengalee ; Ultha-Dast, Bengalee.

Wati bedi, Canarese.
Dakee, Cashmeree.
Volt, Concan.
Cholera, Cholera-Morbus ; Malignant Cholera ; sporadic, endemic or spasmodic Cholera ; Epidemic Cholera, English.
Mort-de-Chien, Choleéree : Choleraggie ; Trousse galant : French.
Brech-ruhr : Die Gallen ruhr, German.
Hagok, Guzeratee.
Koganla, Guzeratee.
Ukhal Julab, do
Waba, Ar. Hind. of Dekhan.
Kai Julab, Hind. do. do.
Wakal Julab, do. do. do.
Bara lagna, do. do. do. (literally the wind to strike.)
Gharbar hona, do. do. do. (literally creating a disturbance.)
Dank lagna, do. do. do.
Kala Marri, Hind. of Hindustan.
Uparwai tarwai do. do.
Cholera : Cholera-Morbus : Passio Cholerica ; Diarrhæa Cholerica ; Latin.
Modshi, Mahr, provincially Modavasi and said to be corrupted into "Mordshi" "Mordeshim," "Mort-de-Chien," "Mordexym," "Morxi" "Mordeshi," "Mordeshin."
Morshi, Mahr, of Goa.
Tural, Mahr.
Ukari Julab, Mahr.
Tao of Malwa.
Ukari Julab, Marwaree.
Ulti Julab, do.
Marri, do.
Jharoti of Nepal.
Kai Julab, Persian, Hind.
Kai Dast, do. do.
Bad Howai, do. do. (literally, bad air).
Visu chika, Sansc. ,, ,,
Mari, do.
Churdie Rogam, do. ? ?
Uri Katha, Tam.
Ennerum Vandi, Tam ? Kasapoo, Tam. Doom, Tam.
Wandi Bedi, Tam, Tel.
Wanti Bedeo, Tel.

Several of the above names are given in Dr. J. Macpherson's pamphlet "Cholera in the East." A few of the names, Nos. 4,8,12,13,22,24,26, and 36 need to be examined.

Appendix C.

Return showing the mortality from Cholera and other causes in the several Collectorates of the Madras Presidency for the years 1866-1867 and 1868.

Districts.	1866.				1867.				1868.			
	Population.	Cholera.	Other Diseases.	All Diseases.	Population.	Cholera.	Other. Diseases.	All Diseases.	Population.	Cholera.	Other Diseases.	All Diseases.
Ganjam	702,239	15,549	23,313	38,862	11,82,349	548	14,163	14,711	12,27,757	207	14,343	14,540
,, Zemindary ...	314,026	9,380	8,587	17,967								
Vizagapatam	798,877	11,695	17,510	29,205	14,24,652	145	15,504	15,649	15,03,164	121	18,488	18,609
Godavery	779,902	7,560	14,198	21,758	1,401,762	575	24,399	24,974	14,23,436	9	20,554	20,563
,, Zemindary ..	594,724	8,712	11,738	20,450								
Kistna	792,744	5,591	18,478	24,069	726,398	3,700	18,341	22,041	11, 27,075	21	19,685	19,706
Nellore	613,899	1,884	12,927	14,811	1,060,932	1,090	15,082	16,172	11 61,442	6	18,676	18,682
,, Zemindary ..	365,838	3,790	7,331	11,121								
Cuddapah	1,040,878	14,823	18,251	33,074	1,091,920	323	13,270	13,593	10,92,266	14	18,289	18,303
Bellary	1,2 0,316	22,833	27,452	50,285	1,312,705	10	17,710	17,720	10,96,235	0	22,852	22,852
Kurnool	718,865	7,685	13,716	21,401	740,614	368	12,164	12,532	7,70,728	0	14,938	14,938
Madras	664,836	9,294	13,575	22,869	664,836	2,283	12,404	14,687	6,56,945	24	15,566	15,590
North Arcot	1,069,685	10,475	21,472	31,947	1,147,896	2,511	19,328	21,839	17,33 238	322	30,773	31,105
South Arcot .. .	1,100,266	8,932	18,259	27,191	1,172,902	4,547	14,885	19,432	9,66,579	550	13,608	14,158
Tanjore	1,572,703	8,978	26,599	35,577	1,580,602	8,394	25,155	33,549	17,19,479	2508	30,784	33,392
Trichinopoly	835,887	7,168	15,501	22,669	890,673	1,639	12,868	14,507	9,98,395	2201	13,865	16,066
Madura	1,737,495	8,229	13,284	21,513	827,554	2,056	16,933	18,989	19,44,010	293	19,096	19,389
Ramnad Zemindary (Madura)	491,883	3,772	6,624	10,396								
Tinnevelly	1,363,051	3,186	18,163	21,349	13,63,051	2,254	16,123	18,377	15,24,121	94	19,116	19,210
Coimbatoor	1,209,740	9,377	15,765	25,142	12,78,482	603	11,693	12,296	14,14,252	168	15,629	15,797
Salem	1,493,221	12,593	19,415	32,308	14 93 221	812	14,930	15,742	15,25,945	1071	17,471	18,542
SouthCanara	781,767	2,429	14,388	16,817	809,150	462	22,246	22,708	8,31,927	114	17,437	17,551
Malabar	1,716,852	4,042	31,402	35,444	17,28,041	271	29,992	30,263	18,50,329	10	29,754	29,764
Totals....	21,959,694	197,977	388,248	586,225	21,897,740	32,591	327,190	359,781	245,67,323	8023	370,734	378,757

NOTE.—In some years population returns from some places, not received. E. B.

APPENDIX D 1.

From the Records of the Office of the Inspector General Madras. Obtained 8th September 1869.

Return showing the Strength of the Madras Army, Europeans and Natives, from 1845 to 1868 inclusive, also the Admissions and Deaths from Cholera and from all other diseases, for the same period :

Europeans.

Years.	Strength	Cholera.		Other Diseases.		All diseases.		Cholera, Ratio per 100 of mean strength died	From cholera one death in every
		Ad.	Died	Ad.	Died.	Ad.	Died.		
1845	12,548	232	124	20,164	367	20,396	491	9·8	1·8
1846	11,113	146	75	16,495	327	16,641	402	6·7	1·9
1847	11,429	32	22	17,863	315	17,895	337	1·9	1·4
1848	9,679	3	2	17,287	172	17,290	174	0·2	1·5
1849	9,559	43	26	15,546	219	15,589	245	2·7	1·6
1850-1	9,136	35	21	14,611	205	14,646	226	2·2	1·6
1851-2	9,119	25	15	14,066	201	14,091	216	1·6	1·6
1852-3	9,170	253	155	16,658	323	16,911	478	16·9	1·6
1853-4	8,291	121	61	14,732	263	14,853	324	7·3	1·9
1854-5	9,021	131	65	15,334	235	15,465	300	7·2	2·0
1855-6	7,599	25	11	12,283	189	12,308	200	1·4	2·2
1856-7	7,513	136	58	11,390	157	11,526	215	7·7	2·3
1857-8	9,396	245	112	15,346	273	15,591	385	11·9	2·1
1858-9	15,482	85	47	29,946	608	30,031	655	3·03	1·8
1859-60	16,921	216	99	...	...	...	...	5·8	2·1
1860	13,037	107	42	20,306	172	20,413	214	3·2	2·5
1	14,164	77	37	19,576	155	19,653	192	2·6	2·0
2	13,096	80	41	17,278	167	17,358	208	3·1	1·7
3	12,333	80	39	15,314	161	15,394	200	3·1	2·0
4	12,792	98	33	19,795	193	19,893	226	2·5	2·9
5	12,675	76	38	18,513	220	18,589	258	2·9	2·0
6	11,179	45	28	16,238	199	16,283	227	2·5	1·6
7	10,793	12	4	14,956	184	14,968	188	0·3	3·0
8	9,934	7	5	13,785	157	13,792	162	0·5	1·4
Total..	265,979	2310	1,160	387,482	5,462	389,576	6.524	4·3	1·9

APPENDIX D 2.

NATIVES.

Return showing the strength of the Madras army, Europeans and Natives, from 1845 to 1868, inclusive, also the admissions and deaths from cholera and from all other diseases, for the same period : *from the Records of the Madras Inspector General's Office. Obtained 8th September* 1869.

Years.	Strength	Cholera.		Other diseases.		All diseases.		Cholera ratio per 1000died	One death from cholera in every
		Ad·	died.	Ad.	died.	Ad.	died.		
1845	74,861	1,718	708	48,152	836	49,870	1,544	9·4	2·4
1846	74,682	2,699	1,208	54,550	794	57,249	2,002	16·1	2·2
1847	67,950	234	78	52,503	802	52,737	880	1·1	3·0
1848	55,946	237	93	48,011	597	48,248	690	1·6	2·5
1849	50,030	269	104	43,516	506	43,785	610	2·07	2·5
1850-1	50,448	484	183	38,803	529	39,287	712	3·6	2·09
1851-2	49,881	461	202	37,063	456	37,524	658	4·04	2·2
1852-3	49,747	353	125	49,080	614	49,433	739	2·5	2·6
1853-4	47,887	652	284	43,055	660	43,707	944	5·9	2·2
1854-5	46,988	461	190	47,584	555	48,045	745	4·04	2·4
1855-6	47,938	154	59	44,673	631	44,827	690	1·2	2·6
1856-7	47,968	314	141	50,185	644	50,499	785	2·9	2·2
1857-8	47,902	432	177	58,405	895	58,837	1,072	3·6	2·4
1858-9	57,653	451	227	64,134	781	64,585	1,008	3·9	1·98
1859-60	60,750	691	260					4·2	2·6
1860	43 458	·362	150	41,640	482	42,002	632	3·4	2·4
1861	37,975	163	64	24,836	326	24,996	390	1·6	2·5
1862	32,069	197	84	22,083	207	22,280	301	2·6	2·3
1863	30,505	230	84	20,762	203	20,992	287	2·7	2·7
1864	28,116	291	112	21,125	240	21,416	352	3·9	2·5
1865	24,608	278	133	19,685	227	19,963	360	5·4	2·09
1866	27,217	204	95	21,931	247	22,135	342	3·4	2·1
1867	29,650	43	22	22,200	227	22,243	249	0·7	1·95
1868	28,153	40	18	19,885	226	19,925	244	0·6	2·2
Total...	1,112,382	11,418	4,801	893 861	11,685	854,585	16,236	4·3	2·3

Appendix E I.

Commission Vol. II. P. 660.

Table showing the Strength, sickness and deaths in the Madras European Army for 17 years, 1842—1858-9.

EUROPEANS.

Division.	Aggregate Strength.	Total		Deaths from Cholera.	Deaths from other diseases.
		Treated.	Died.		
Presidency Division	17017	26324	469	85	384
Centre	22497	35677	988	212	776
Southern	15670	28035	455	116	339
Mysore	28423	39445	617	159	458
Malabar and Canara	16145	24718	346	17	329
Ceded Districts	12273	20752	417	208	209
Hyderabad Sub. Force	22571	41771	846	56	790
Nagpore Force	9415	18282	334	37	297
Northern 12 years 1842 to 1851 and from 1857-8.	1364	1490	75	2	73
Southern Mahratta Division 5 years 1842 to 1846	1132	2609	52	12	40
Saugor 12 years 1846 to 1857	7068	14957	308	15	293
Tenasserim Provinces Pegue 6 years from 1852-1857-8.... Amalgamated in 1858-9.	17816	29889	789	176	613
Straits	954	1189	25	,,	25
Aden 11 years from 1844 to 1854-5	2248	3530	86	19	67
China ..... 4 years from 1842 to 1845.	539	1846	27	1	26
Labuan .. 4 years from 1852-3 to 1855-6 ...	47	123	5	,,	5
Bengal..... Presidency. for 1857-8....	1445	3023	206	91	115
Scind for 1842	,,	,,	,,	,,	,,
General Hospital	,,	,,	88	11	77
Total..	176,629	293,690	6133	1217	4916

APPENDIX E 2.

Table Showing the Strength, Sickness and deaths in the Madras Native Army during the years 1842—1858-9.

NATIVES.

Division.	Aggregate Strength.	Total.		Deaths From Cholera.	Deaths From other diseases.
		Treated.	Died.		
Presidency	47114	32161	843	353	490
Centre	63821	42710	1471	397	1074
Southern	88472	69383	1836	1075	761
Mysore	89087	71330	1636	841	795
Malabar and Canara	55018	33915	568	82	486
Ceded Districts	63266	48187	987	498	489
Hyderabad Sub. Force	127052	100286	1942	1028	914
Nagpore Force	79061	51731	1052	322	730
Northern Division	126897	119441	2421	549	1872
Southern Mahratta Division	52668	38860	892	468	424
Saugor from 1846	63358	54451	606	77	529
Tenasserim Provinces Pegu from 1852-3 (Amalgamated in 1858-9)	73421	105211	1743	172	1571
Straits	24508	22288	404	6	398
Aden from 1844 to 1854-5	14062	9546	253	30	223
China (7 years from 1842 to 1847 and 1857-8)	11880	27481	1042	15	1027
Labuan. (10 years from 1848)	1484	4634	48	1	47
Bengal Presidency (Europeans 4 years for 1848 to 1850-1 and 1857-8.)	10042	10727	132	22	110
Scind for 1842	162	18	3	..	3
General Hospital	...	...	253	8	245
Total	991379	842360	18132	5944	12188

NOTE. In this Tabular Statement there seem to be some misprints from the original document, as printed in the Report of the Royal Commission, as the totals of the columns do not correspond.

E. B.

APPENDIX F.

Table of the Monthly and Yearly results of the Observations of the Rain Guage, at the Madras Observatory from 1855 to 1869.

Years.	MONTHS.												Total of each year.
	January.	February.	March.	April.	May.	June.	July.	August.	Septr.	October.	Novr.	Decr.	
1855	0·94	0·68	0·26	0·07	—	1.12	2·69	1·65	3·75	10·61	1·47	9·08	32·32
1856	—	0·03	—	0.01	5·51	0·82	3·32	5·68	1·06	3·88	16·97	9·71	46·99
1857	0·32	—	0·10	0·12	0·07	2·93	2·39	0·92	1·55	37·73	5·82	1·00	52·95
1858	—	0·02	—	0·83	3·03	1·63	3·08	2·11	3·61	12·07	22·12	—	48·50
1859	0·62	—	—	4·92	0·85	2·51	8·04	2·46	8·56	7·72	19·46	—	55·14
1860	—	—	—	—	—	1·75	2·07	2·47	4·97	14·07	2·08	0·23	27·64
1861	—	—	1·04	—	1·28	0·66	3·18	7·88	9·25	1·54	12·32	0·04	37·19
1862	0·49	—	0·01	—	0·60	3·67	4·53	4·56	3·60	8·20	5·52	7·00	38·18
1863	1·95	—	0·67	5·05	0·12	1·07	7·07	3·14	3·04	17·09	2·03	13·38	54·61
1864	—	—	—	0·23	0·03	1·95	2·20	7·32	0·83	13·76	18·48	2·43	47·23
1865	0·20	—	—	0·02	0·38	1·62	2·02	7·19	1·28	5·82	17·76	5·57	41·86
1866	—	0·21	—	—	0.08	0·56	1·47	4·17	2·47	8·70	11·93	21·80	51·39
1867	0·17	—	—	0·11	0.07	1·86	1·89	6·70	2·43	3·39	7·37	0·38	24·37
1868	4·77	0·03	—	—	—	7·19	7·50	4·50	3·66	8·28	4·98	0·52	41·43
1869	0·02	—	0·04	0·12	—	1·94	5·19	4·40	4·57	3·45	8·85	3·73	32·31
Total...	9·48	0·97	2·12	11·48	12·02	31·28	56·64	65·15	54·63	156·31	157·16	74·87	632·11
Average	0·63	0·06	0·14	0.76	0·80	2·08	3·77	4·34	3·64	10·42	10·47	4·99	42·14

THE STATISTICS OF CHOLERA.

Madras Medical Board to Madras Government in letter dated 9th August No. 171 *of* 1849.

* * "by Assistant Surgeon Balfour of this establishment, and to state that in the opi-"nion of the Board, the performance is highly creditable, and testifies to the ability and zeal "of that officer; it is a paper, in every point of view, well worthy of publication."

Extract from the Minutes of Consultation of the Right Hon'ble the Governor of Madras in Council dated 21st August No. 3055 *of* 1849.

"Grants authority for printing the work by Assistant Surgeon Balfour submitted "with the foregoing letter"

* * * "The Right Hon'ble the Governor in Council notices the favorable testimony borne by the Medical Board to Assistant Surgeon Balfour's ability and zeal."

The Hon'ble the Court of Directors in letter dated 9th April No. 39 *of* 1850.

"These proceedings have our sanction. We notice with satisfaction the testimony borne to Assistant Surgeon Balfour's zeal and ability."

Lancet London, April 20th 1850.

* * * "As a contribution to the Statistics of Cholera the pamphlet of Mr. Balfour is "the most important work that has appeared for a long time."

Registrar General's Report on Cholera, London 1852—p. xcix.

"The fact is placed beyond doubt by the Statistical Analyses of Assistant Surgeon "Balfour. * * * See some good observations on the movement of Troops in the Statistics of "Cholera by Assistant Surgeon Edward Balfour."

Price Rs. 5 or 10 Shillings. 1 vol. 8vo.

THE LOCALITIES IN INDIA EXEMPT FROM CHOLERA,

BY EDWARD BALFOUR, L. R. C. S. E.

MADRAS, 1856.

From the Witness Edinburgh, Wednesday. December 3. 1856.

Dr. Balfour, an able Surgeon at Madras has just published a curious volume of Reports on Cholera. He started some years ago a theory that there were many places absolutely exempt from the scourge. Investigation has confirmed this opinion. In Madras alone there are thousands of villages which have never felt the visitation, though surrounded by infected districts. Minute lists are supplied and each place is to be separately examined. * * *

From the Friend of India.

We require, however, further facts and it is to their collection that the attention of Doctors and Statists all over the earth should be directed. One volume of such data has reached our hands. It has been prepared by Dr. Balfour of Madras, one of the Surgeons who show us what the Company's Service under favourable circumstances might become. With an Industry none the less creditable from the sameness of the task, he has hunted up the facts of the case from every Zillah of his own Presidency. Mysore furnishes a most valuable mass of statistics, and even Scinde and the Dekhan contribute a few figures not without their value. We have not space or indeed time to condense the mass of tables furnished by Dr. Balfour, but * * * the enquiry is of the highest importance and the Madras Government would confer a benefit on humanity by enabling Dr. Balfour to devote himself to this especial end.

From the Fort St. George, Gazette, No. 3055, *Dated 5th September* 1856 *p.* 339. *The following Notification is published for the information to the Authorities concerned:*

NOTIFICATION.

Deeming the investigation into the remote and proximate causes of Cholera, upon which Dr. Balfour is engaged, to be one of great interest and importance, the Right Honorable the Governor in Council is pleased to direct that all Civil, Political, Military and Medical authorities will afford to that Officer every assistance in their power, and supply him with such information as he may seek in the prosecution of his enquiries. By Order of the Right Honorable the Governor in Council. (Signed) T. PYCROFT, *Chief Secretary.*

From the Bombay Times.

A very interesting work has just been published by Dr. Balfour of the Madras Army, on the Localities in India exempt from Cholera, and this forms an element for an addition to our physical Atlases, we were not prepared for. A set of cholera or pestilence maps for India * * * would bring under the eye at once in graphic form the vast mass of facts here appearing as statistics. * * Dr. Balfour does not confine himself to dry Tables or abstracts; but gives in his narrative an account of the geological and other leading features of the country. * * The work is one of the many Dr. Balfour has given to the world where the mass of printed matter affords a very inadequate idea of the amount of labour expended on its preparation for the press, or the very great value of the facts comprised within the narrowest limits that can be assigned to them.

Madras Quarterly Journal of Medical Science, No. VI, October 1861, *p.* 423.

"Some years since, Mr. Balfour of the Madras Medical Service, collected a great amount of information shewing the localities exempted from cholera. So far as we are aware he did not attempt to theories on the causes of exemption. His investigations went to prove that certain localities, and most of these were unimportant villages, out of the way of trunk roads, and uncontaminated by the stream of human intercourse, had never been visited by epidemic cholera, and that a few localities subjected to the influences of contagion, were notorious for their exemption from its epidemic visitations." * * We think it is to be regretted that the line of investigation here indicated, has not been followed up with more perseverance, because we are of opinion that it is the only method of proceeding, calculated to throw any light upon the true nature of the cholera poison, and the conditions under which it attains the virulence, such as the unhappy experience of the last few months, has made us familiar with.

CYCLOPÆDIA OF INDIA AND OF EASTERN AND SOUTHERN ASIA, COMMERCIAL INDUSTRIAL AND SCIENTIFIC, PRODUCTS OF THE MINERAL, VEGETABLE AND ANIMAL KINGDOMS, USEFUL ARTS AND MANUFACTURES.

EDITED, BY EDWARD BALFOUR, L. R. C. S. E. SURGEON MADRAS ARMY.

Extract from the Minutes of Consultation of the Right Honorable the Governor in Council Madras, 18*th June No.* 812 *of* 1857.

"The work offers to supply much useful information and is, in the opinion of Government, worthy of encouragement."

Madras Journal of Literature and Science, of the Madras Literary Society and Auxiliary Royal Asiatic Society, 314, *New Ser. Vol. II No. VI. Old Series Vol. XVIII No.* 43.

"The Library of the Society has been furnished by Government with a copy of the Cyclopædia of India and Eastern Asia, By Edward Balfour L. R. C. S. E, Surgeon, Madras Army. * * *

"There is no question but that his long residence in India, his Scientific researches and his very variety of duties eminently fit him for a work of this character, which, however imperfect and incomplete as a whole, will be of great utility and prove a valuable aid to others."

The Athenæum, Madras, Thursday April 1*st* 1858.

Balfour's Cyclopædia.—"This is unquestionably one of the most important works that have hitherto been published in India. * * * Few men in India are more likely to do justice to such an undertaking. * * *

Calcutta Review Vol. XXX, March 1858 *No. LIX.*

"We have no hesitation in saying that concealed in the soil of India, there are treasures a thousand fold more precious than all the gold and diamonds her mines have hitherto supplied, * * and the man who effectually aids in developing these treasures must be considered a benefactor to our race. Now, such a benefactor, the laborious and accomplished compiler of the work before us, must be acknowledged by all to be. * * p. 33.

"We believe it to be the first work of the kind in India and the projecting of it must have been the result of a happy thought" p. 36. * * "Mr. Balfour's Official connection with it has placed him in the very focus of information on all points relating to the products, the Arts and Manufactures of India." (p. 37.)

The work may be considered a national one. (p. 43.)

This Cyclopædia, collecting, as it does into one convenient repository, the varied information scattered piece-meal over a thousand works. (p 51)

But we must take leave of Mr. Balfour and his work, and in doing so we would tender him our hearty thanks for the abundant information he has provided us and express at the same time our sense of the deep obligations under which he has laid the public. p. 65.

Bombay Standard, Saturday May 1st 1858.

* * * Madras took up a similar set of subjects long after Bombay, but the benighted entrusted the work to individual hands, and the results are before the world. A museum crowded by tens of thousands monthly has nearly now for four years been open. The Madras people have had, if we mistake not, three splendid exhibitions. The greatest of their triumphs is now before us in a work we casually mentioned about a month ago. "Balfour's Cyclopædia of India and of Eastern and Southern Asia," * * it is a wonderful monument to the talent, learning and industry of Dr. Balfour. * *

The Morning Post, London, June 21st 1858.

Dr. Edward Balfour's Encyclopædia of Indian Products * * is a work of great merit and infinite labour * * affords an amount of information on Indian Products hitherto unknown. * *

The Indian Field, Calcutta Saturday, September 18th 1858.

* * A Cyclopædia of India and of Eastern and Southern Asia, treating on the products of the Mineral, Vegetable and Animal Kingdoms, useful Arts and manufactures, under the editorship of Dr. Edward Balfour of the Madras Medical Establishment. A work like this has long been a *desideratum*. * * * Dr. Balfour having undertaken it, and carried it through the press has laid many under obligation in various walks of life; for, when well known, it cannot fail to be appreciated by the botanist, the zoologist, merchant, manufacturer, agriculturist and the student of science, all of whom will be glad to resort to its pages for the amount of reliable information it affords on the multifarious subjects included therein.

THE INFLUENCE EXERCISED BY TREES ON THE CLIMATE AND PRODUCTIVENESS OF A COUNTRY;

BY EDWARD BALFOUR, L. R. C. S. E.,
MADRAS, 1848, 8VO.

FROM SIR HENRY CONYNGHAM MONTGOMERY, BART., *Secretary to Government Fort St. George, Revenue Department, Fort St. George, 8th September, No. 982 of* 1848.

To E. G. BALFOUR, ESQ., *Assistant Surgeon,*

SIR,—I am directed by the Right Honorable the Governor in Council to acknowledge the receipt of your letter dated 31st March 1848, transmitting copy of Notes taken by you on the 'Effect of Trees on the Climate and Productiveness of a Country.' The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting information contained in this paper, and in transmitting for your information the resolution passed on the occasion, desires to convey the thanks of this Government for your communication. (Signed) H. C. MONTGOMERY, *Secretary to Government.*

Revenue Department, No. 981, *Extract from the Minutes of Consultation under date the 8th September* 1848. *Read the following letter from Assistant Surgeon Edward Balfour. (Here enter 31st March No.* 701, 1848.)

Para 1. The Right Honorable the Governor in Council has perused with much pleasure and satisfaction the valuable and very interesting report furnished by Assistant Surgeon Balfour

on the "Effect of Trees on the Climate and Productiveness of a Country," and deeming it of importance that the Local Revenue Officers should be in possession of information so intimately connected with the welfare of the Districts under their respective charges, he resolves to direct that copies of the same be printed at the Fort St. George Gazette Press for general distribution and for transmission to the Government of India and the Government of Bengal, Bombay, and Agra, and the Honorable the Court of Directors. * * * * The Governor in Council resolves to furnish to Assistant Surgeon Balfour a copy of the foregoing proceeding and to convey to him at the same time the thanks of Government for his interesting communication.

(Signed) H. C. MONTGOMERY, *Secretary to Government.*

Letter from Major (now Colonel) REID, C. B., Secretary to the Madras Agri-Horticultural Society ; To the Secretary to the Board of Revenue.

3. The Committee are happy to have it in their power to forward a very ably written paper on this subject (*vide Printed Report already before the Government of India*) from the pen of Assistant Surgeon Edward Balfour of the 6th Regiment N. I. This document was originally intended by Mr. Balfour to have been sent direct to Government; but; changing his mind, he forwarded it to the Secretary of the Horticultural Society to be finally sent through them to its original destination. The Committee would beg the Board to bring this document to the especial notice of Government. * * * (Signed) F. A REID, *Secretary.*

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THE GOOLDUSTEH-I-SOOHN, BEING SELECTIONS FROM THE PERSIAN AND HINDUSTANI POETS, MADRAS, 1851.

BY EDWARD BALFOUR, L. R. C. S E.,

From Madras Athenæum, January, 16.

We have received a grateful present of a curious and pretty book. It is a collection of passages from the Hindostanee and Persian poets all in the Persian character, so long and so universally admired for its great beauty, and engraved on richly ornamented pages. The origin of this fine volume is due to Dr. Balfour the Government Agent at Chepauk. Having for some years past, employed his leisure hours in collecting what appeared to him to be the finest passages in Eastern poetry, Dr. Balfour resolved to have the collection published in an Eastern style. He therefore gave copies of the verses which he had gathered to the Mussulman Syed Hoosain, known as "Koosh Navees," or "the beautiful writer," by whom they were copied into the elegant and flowing hand writing of Persia. The whole work lithographed by the Hakeem Syed Mahomed consists of two hundred and fifty-two octavo pages, luxuriantly ornamented by two Hindoos, Rung Rajoo and Wakand Rajoo, after Mussulman fashion, with designs of flowers and fruits, and such other illustrations as a follower of the Arabian Prophet—forbidden to draw the likeness of any living creature, for fear of furnishing a hint or seduction to idolatry,—may indulge his pencil in pourtraying. Each page has its own distinct design, and both the position and the space occupied by the writing, are regulated by the form and profuseness of these fanciful and beautiful illustrations. We have here then a pure specimen of Eastern ornamental writing, the designs being left to the taste of the writer and the ornamentors, lithographed by a mussulman and bound up after mussulman fashion. The title of the work is Gool-Dusteh-i-Soohn, or "the Bouquet of Language." We learn that parties desirous of possessing themselves of copies of this volume which is valuable both as a great curiosity and on account of its real merits as a work of art, will have an opportunity of supplying themselves at the *Athenæum* Office.

From the Madras United Service Gazette, January 17.

We have been favoured by Dr. Balfour with a copy of his Selections from the Persian and Hindostani poets, being a collection of the finest passages in Eastern Poetry, compiled by this accomplished Orientalist in the course of his reading, and now published in a volume appropriately entitled Gooldusta-i-Sukhoon or the "Persian Anthology." The work does infinite credit to Dr. Balfour's taste as an Oriental Scholar. It is in the Persian character from the pen of Syed Husseiyn ; known as "Khoosh Navees," lithographed by Syed Mahomed, the pages richly ornamented with Arabesques of infinitely varied design, and appropriately bound in the Mahomedan fashion. To Oriental Students we commend this volume of "Elegant Extracts," as such in the truest sense of the word, and acquaint them that it is procurable at the *Athenæum* Library.

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CONQUEST'S OUTLINES OF MIDWIFERY, IN DIGLOT HINDUSTANI AND ENGLISH, MADRAS, 1850.

BY EDWARD BALFOUR, L. R. C. S. E.

Extract from the Minutes of Consultation, dated 13th June, No. 500 of 1850. Read the following letter from the Secretary to the Medical Board. Here enter 4th May 1850.

Para 1. The Right Honorable the Governor in Council observes that very favourable testimony is borne, both by the Council of Education in Bengal and by the Principal of the Delhi College to the merits of Dr. Balfour's translation into Hindustani of Dr Conquest's Outlines of Midwifery and * * * it is a work calculated to promote the extension of much useful knowledge among Hindustani students in an important branch of the Medical Department. * * * True Extract. (Signed) H. C. MONTGOMERY, *Chief Secretary.*

From the Secretary Council of Education (Bengal) ; To J. P. GRANT Esq., Secretary Government of Bengal, Fort William, 1st December 1849.

2. The Council are of opinion that the work would be most valuable to the Hindustani students of the Medical College and to the Native Doctors generally throughout the country, and beg strongly to recommend that it be published upon the terms mentioned by Dr Balfour.

5. The Council are of opinion that great credit is due to Dr. Balfour for the ability with which he has executed a very difficult task. The diffusion of sound principles connected with the practical departments of medicine cannot fail to be most useful when made known in a vernacular language current among so large a portion of the population of Hindustan. All such attempts to be useful as that of Dr. Balfour are therefore deemed by the Council to be most deserving the patronage and encouragement of the Government of India. *Vide letter from the Secretary to the Council of Education of Bengal to the Secretary to the Government Bengal, dated 1st December* 1849.

Letter From Dr. A. Sprenger, Principal of the Delhi College to the Secretary to the Council of Education of Bengal, dated 18th October 1849.

" Considering that this is the first attempt of translating a work on Midwifery into Oordoo, the manner in which it is executed reflects the highest credit on Dr. Balfour. It is every where intelligible and many passages are elegant as far as the subject admits, and every friend of Native Education will be delighted to see so useful a book published."

From Dr. F. J. Mouat, Secretary Council of Education, To J. P. GRANT, Esq., Secretary to the Government of Bengal, Fort William, 4th February, No. 238 *of* 1850.

The difficulty of procuring such works may be estimated from the fact that although they have for some years been sanctioned by Government the only one in progress is the Manual of Anatomy by Dr. Mouat: a mere fragment of the Treatise on Medicine and Surgery having been prepared at Delhi. (Signed) F. J. MOUAT M. D. *Secretary Council of Education.*

From the Medical Board, Madras, in Letter from Dr. Lorimer, Secretary, dated 13th September 1852.

* * * Assistant Surgeon Balfour's Hindustani translation of Dr. Conquest's Midwifery, is a work which is highly creditable to him as a Medical Officer and a Hindustani scholar.

(Signed) A. LORIMER, *Secretary Medical Board.*

FORT ST GEORGE, *13th September* 1852.

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BY EDWARD BALFOUR, L. R. C. S. E.

MADRAS, 1853.

The objects and aim of the above publication will be gathered from its preface.

The publication of these Barometrical Sections has been undertaken with the hope of assisting the inquiries of the Geologist, the Engineer, and the Statesman, and it has been thought desirable to bring them into a connected form, for the benefit of the English public, by an outline of the physical features of this country and a short description of its Military and Civil divisions : an Index Map is likewise given to allow the eye to catch, at a glance, the different Sections in the volume. It is hoped that this outline may ultimately be filled in by detailed descriptions of Provinces, for the vast Empire of British India will not receive justice until the examination of its various features be undertaken on a scale commensurate with their magnitude. Its climate, and its Agricultural and Manufacturing Industries have had some attention paid to them, and a few scientific men have described parts of its animal, vegetable and mineral productions: but its geology, its flora and fauna, as a whole, have yet to be attended to, and its hydrography is a great want. No general description has ever been given of the many nations, races and wandering tribes that we rule over, here, nor of their varied manners, their dwellings and physical character: nor of their languages, dress or food, though the value of any one, or all of these, if treated as a whole, would be inestimable, and it is to be hoped that, in addition to their immediate advantages, the Barometrical Sections may assist those who have leisure to undertake inquiries from which so much general benefit would result.

Proceedings of the Geographical Society, Bombay.

"It was remarked on Dr. Balfour's Barometric sections, which gave rise to these observations,—the Bombay Government having requested the opinion of the Society as to their merits,—that they furnished a very valuable contribution to Physical Geography for which the Meteorologist and Geologist must feel most grateful. The Society were not in a position to test their accuracy, but from the fame of Dr. Balfour, there could be no doubt that every precaution had been taken to render them correct."—Proceedings Bombay Geographical Society, of 21st, as published in *Bombay Times*, 27th. August 1856.

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Revenue Board, Fort St. George, Revenue Consultation No. 54. *of 2nd June* 1857.

* * The paper compiled by Dr. Balfour will be a useful record for reference in the Office of the Board and the several Maritime Collectors. * * The arrangement adopted by Dr. Balfour is clear and precise. * * *

From the Madras Athenæum.

An unpretending publication has just been issued from the Scotch Mission Press, containing in a small compass, much information of interest to all whose pursuits require

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* * * These are some of the thoughts which have occurred to us from a hasty glance at these Commercial Tables, which we received yesterday; we will refer to them again at leisure, as the matter they contain is of great general importance. * * We consider they supply a general want which we ourselves have often felt.—*Madras Athenæum, March* 3, 1857.

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