

**Contributions to the etiology of continued fever, or, An investigation of various causes which influence the prevalence and mortality of its different forms / by Charles Murchison.**

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*Aberdeen.*  
*with D. His kind regards.*  
CONTRIBUTIONS

TO THE

ETIOLOGY

OF

CONTINUED FEVER:

OR

AN INVESTIGATION OF VARIOUS CAUSES WHICH INFLUENCE  
THE PREVALENCE AND MORTALITY OF ITS  
DIFFERENT FORMS.

BY

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ASSISTANT-PHYSICIAN TO KING'S COLLEGE HOSPITAL, AND TO THE LONDON  
FEVER HOSPITAL.

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AMONG the greatest benefits which medicine has conferred upon the human race are, undoubtedly, those which have reference to the prevention of disease. The truth of the adage, "Prevention is better than cure," is now fully recognised, as shown by the increased attention bestowed upon the subject of hygiene. At the present day, then, I need offer no arguments in proof of the importance of an investigation into the causes influencing the prevalence and mortality of a disease, which, during the last twenty years, has destroyed upwards of 350,000 of the population of England and Wales, and the annual mortality from which, in London alone, averages about 2500.

I purpose, in this essay, not only to investigate the causes which influence the prevalence and mortality of continued

fever, regarded as a single disease, but also to examine these causes in reference to the different *forms* of fever, and thereby, if possible, to throw some light upon a question which many regard to be still *sub judice*, viz., the specific identity or non-identity of these different forms. Much has of late years been written on the symptomatology and pathology of the various fevers; but probably the subject will ultimately receive the greatest elucidation from an investigation of their etiology. It would be well, however, if some, who are in the habit of asserting the identity of the different fevers, had, in the first place, studied more carefully their symptoms and morbid appearances. The vagueness upon these points, which is exhibited in their descriptions, neutralizes the value of the facts which they adduce, and invalidates the opinions which they advocate.

I do not pretend that the facts which I am about to bring forward are all of them novel, or sufficient to decide the disputed question. It is hoped, however, that they may be regarded as a contribution in the right direction towards the solution of the problem. Most of them are derived from statistics which I have collected from the records of the London Fever Hospital; and I have endeavoured, as often as possible, to compare the results thus obtained with those arrived at by observers in other quarters.

During the last ten years careful records of the diagnosis of all the cases of fever admitted into this hospital have been kept. Many cases of symptomatic fever are also constantly sent into the hospital; but all these have been excluded from the numerical statements which follow. The fevers have been divided into the four following: typhus, typhoid, relapsing, and febricula. These terms I shall, from their convenience, adopt, without pledging myself to the belief that I regard them all as indicating distinct species of disease. Even the most sceptical on this matter must allow that the first three, at all events, constitute well-marked *varieties* of fever; and it is obviously no less important to investigate their etiology, whether we consider them as varieties or species. A short definition of what is

meant by each of these terms may not be here out of place.

1. *Typhus*.—A disease often commencing more or less suddenly with rigors or chilliness, and attended by frequent, soft pulse; dry, brown tongue, and in most cases by constipation; headache; delirium, often appearing early, and generally low and wandering; contracted pupils; great prostration; in most cases a *mulberry rash*, showing itself between the fifth and eighth days, and continuing till death or recovery; the disease generally terminating by the fourteenth, and seldom protracted beyond the twenty-first day. No characteristic lesion found after death; but great congestion of all the internal organs.

2. *Typhoid*.<sup>1</sup>—A disease often commencing insidiously, or ushered in with rigors, chilliness, or profuse diarrhœa, and characterised by frequent, but variable, soft pulse; red and fissured tongue, ultimately becoming dry and brown; tympanites and abdominal tenderness; gurgling in the iliac fossæ; diarrhœa and frequently melæna; increased splenic

<sup>1</sup> Although I have employed the term "typhoid" throughout this essay, it is not without a deep conviction that it is a most unfortunate one, and that it is one which has been productive of much confusion on the whole subject of fever, among the great body of the profession. At the same time, none of the numerous synonyms appear to me to be free from objection. For example, it would not be desirable to have any name derived from the abdominal lesion, tending, as this would do, to revive, in the minds of many, the exploded doctrines of Broussais. An appropriate distinctive name for the disease remains a *desideratum*; and, after having devoted much thought and attention to the question, I would venture, with some diffidence, to propose one derived from what I believe to be the *cause* of the fever. In the course of this essay I shall bring forward what I consider positive proofs that this fever is produced by emanations from decaying organic matter; and I would therefore suggest for it the appellation of "*pythogenic fever*"—*πύθογενής*, from *πύθων* (*πύθομαι*, *putresco*) and *γεννάω*; under which I would include the so-called "gastric fever," which I believe to be merely a variety of the same affection. ('Edin. Med. Journ.,' Oct., 1858.)

dulness; epistaxis; headache; delirium, active, or often absent; dilated pupils; prostration coming on late, and often slight; an eruption of successive crops of elevated rose-coloured papules, appearing from the seventh to the fourteenth day, each crop lasting only for two or three days: the disease often protracted to the thirtieth day or beyond, and sometimes followed by a relapse of all the symptoms, including the eruption. After death, enlargement of the mesenteric glands and ulceration of Peyer's patches.<sup>1</sup>

3. *Relapsing fever*.—A disease commencing very abruptly with coldness and rigors, and attended by quick and often incompressible pulse; white tongue; tenderness at epigastrium; vomiting; enlarged liver and spleen; occasionally jaundice; constipation; high-coloured urine; great heat of skin, but no eruption of any sort; severe headache and pains in the back and limbs; restlessness; rarely slight delirium. An abrupt cessation of all these symptoms, with free sweating, between the fourth and seventh days, usually on the fifth. After a complete apyretic interval, during which the patient may get up and walk about, an abrupt relapse on the fourteenth day from the first commencement, running a similar course to the first attack, and terminating on the third day of the relapse. Rarely, sudden syncope and death. After death no specific lesion; but, in most cases, enlargement of the liver and spleen.

4. *Febricula or Ephemeral fever*.—Febrile symptoms, with no eruption, lasting for a few days (one to ten) and subsiding with some critical discharge. It is not contended by many that this is a specific fever. Many of the cases entered under this head have been the result of fatigue, exposure to cold, or intemperance. Others again have been associated

<sup>1</sup> During ten years, no case has been observed at the London Fever Hospital in which there were rose-coloured spots during life without ulceration of Peyer's patches after death. On the other hand, in no case in which there has been a mulberry rash has the intestine been found diseased.

with herpes labialis, or derangement of the stomach and bowels, while not a few have undoubtedly been mild cases of some of the first three forms, in which the symptoms have not been sufficiently characteristic to establish their diagnosis. An accurate discrimination of the real nature of the complaint is, in some of these cases, difficult; and hence the term "febricula" is a convenient one, although the cases composing this class will not require much attention in the following remarks.

#### A. PREVALENCE OF CONTINUED FEVER.

##### I. *On the prevalence of Continued Fever in Great Britain and Ireland during the present century.*

Some idea of this may be obtained from Table I, in which I have collected the number of admissions for fever into several of the principal hospitals in the United Kingdom during the last forty-one years. I could have wished that this table had been more complete; but I find that the records of few hospitals have been kept with sufficient accuracy to render them available for the purpose. To supply in some measure this deficiency, I have introduced two columns, showing the number of deaths from fever in England and Wales, and in London, during the last eighteen years, as furnished by the Registrar-General, and multiplied these by ten, which, as will afterwards appear, gives a fair approximation to the total prevalence of the disease. The last column gives the number of fever admissions into the principal hospital at Stockholm during twelve years.

A glance at this table shows that fever is never absent from any of the large towns specified; but that its prevalence varies very greatly in different years. Some authors have endeavoured to demonstrate a periodicity in the occurrence of these epidemics. Among others, Dr. Orr, of Glasgow, thought that they recurred about every ten years.<sup>1</sup> This regular periodicity is hardly borne out by the table—

<sup>1</sup> 'Edin. Med. and Surg. Journ.,' vol. lxxix, p. 375, 1858.



TABLE I, showing the prevalence of Fever at different places during the last forty-one years.

Years.	England and Wales. <sup>1</sup>	London. <sup>1</sup>	London Fever Hospital.	Edinburgh Royal Infirmary. <sup>2</sup>	Glasgow Royal Infirmary. <sup>3</sup>	Aberdeen Royal Infirmary. <sup>4</sup>	Dublin. <sup>5</sup> Fever Hospital, Cork Street.	Cork Fever Hospital. <sup>6</sup>	Stockholm Seraphim Hospital. <sup>7</sup>
1817	...	...	760	485	714	...	6542	3440	...
1818	...	...	599	1546	2336	...	25502	6054	...
1819	...	...	524	1088	1594	...	3873	2398	...
1820	...	...	437	638	289	...	2994	1177	...
1821	...	...	232	327	234	...	2976	1047	...
1822	...	...	246	355	229	...	2300	1159	...
1823	...	...	283	102	269	...	2668	1596	...
1824	...	...	444	177	523	...	4679	1405	...
1825	...	...	503	341	897	...	4353	2809	...
1826	...	...	582	450	926	...	10612	4341	...
1827	...	...	611	1875	1084	...	6500	4312	...
1828	...	...	534	2013	1511	...	2964	1381	...
1829	...	...	472	771	865	...	3170	838	...
1830	...	...	475	346	729	...	3170	1024	...
1831	...	...	619	758	1657	...	3602	1278	...
1832	...	...	444	1394	2733	...	3991	2183	...
1833	...	...	249	878	1589	...	3332	840	...
1834	...	...	360	690	2003	...	4524	1196	...
1835	...	...	250	826	1359	...	4672	1924	...
1836	...	...	264	652	3125	...	5585	4076	...
1837	...	...	896	1224	5387	...	6595	3163	...
1838	187,750	40,780	976	2244	2228	515	4042	1585	...
1839	156,660	18,190	530	1235	1529	1200	5358	1970	...
1840	171,770	12,620	234	782	3385	575	4329	2441	211
1841	148,460	11,510	250	1372	2578	437	2872	1467	326
1842	162,010	11,740	252	842	1194	282	2375	1225	443
1843	...	20,830	1385	2080	3467	1280	2529	1162	238
1844	...	16,960	578	3339	1468	780	2863	1340	222
1845	...	13,010	477	683	535	378	2954	2799	199
1846	...	17,960	506	693	1565	377	4555	3262	518
1847	303,200	31,840	1259	3688	5244	683	5875	5693	132
1848	214,060	35,840	907	4693	1515	1648	2472	1249	104
1849	179,020	24,820	401	726	570	584	2977	2565	66
1850	142,960	19,290	361	520	597	255	2096	1756	284
1851	171,210	21,400	614	959	1385	218	2133	2307	443
1852	178,450	20,200	561	691	1721	148	2354	1731	...
1853	180,130	24,830	787	574	1938	121	1388	1643	...
1854	183,320	26,940	714	168	1058	304	2069	1096	...
1855	160,320	23,420	622	201	656	345	2204	907	...
1856	...	...	1300	180	591	225	1606	1067	...
1857	...	...	561	126	543	145	...	827	...

<sup>1</sup> The first two columns contain the number of *deaths* from fever, as reported by the Registrar-General, multiplied by 10.

<sup>2</sup> From a paper by Dr. Christison in the 'Edinburgh Medical Journal,'

before us. Thus, although there have been great epidemics in 1827, 1837, and 1847, yet, in Scotland there was an epidemic in 1843, and in Glasgow in 1853. Again, in conformity with such an opinion, we should expect to have an epidemic at present in Edinburgh; but that city has never, within the memory of its oldest physicians, been so free from fever as for the last four years. Another circumstance exhibited by the Table is, that the epidemics in the various towns have, to a certain extent, been simultaneous. This remark applies especially to the great epidemics of 1817, 1827, 1837, and 1847. A closer scrutiny of the figures shows that the epidemics apparently commenced and reached their acme in Dublin before Glasgow, in Glasgow before Edinburgh, and in Edinburgh before Aberdeen. There is no reason to believe that this circumstance is due to the spread of an epidemic influence travelling from West to East, and, indeed, such an opinion is negatived by the fact, that the greatest epidemic at Stockholm occurred in 1846 before that of Great Britain. On the contrary, it is more probable, as will subsequently appear, that the disease originating in Ireland is propagated to Britain by contagion.

Which of the forms of fever now is it of which these great epidemics are composed? In order to answer this question, I proceed to consider :

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for January, 1858. Previous to 1826, the annual report was made up to December 31st, afterwards to the end of September, so that the number for 1826 represents only nine months. The number for 1857 represents the admissions from January 1st to December 31st.

<sup>3</sup> Compiled from Cowan's 'Vital Statistics of Glasgow;' papers by Dr. Orr, in the 'Edin. Med. and Surg. Journ.,' vol. lxxv, p. 343, and vol. lxxix, p. 365; by Dr. McGhie, in the 'Glasgow Med. Journ.,' vol. ii, p. 161; and from private communications from Dr. McGhie.

<sup>4</sup> From the Annual Reports of the Infirmary.

<sup>5</sup> Communicated by the Registrar of the Hospital. Up to the end of 1831, the Hospital year terminated on January 4th of the following year; afterwards on March 31st of the following year, so that the entry for 1832 includes five quarters. The numbers for the first two years (1817-18) include the admissions into the "House of Industry."

<sup>6</sup> Communicated by Dr. McEvers, of Cork.

<sup>7</sup> Professor Magnus Huss, 'Statistique du Typhus,' &c., p. 29.

II. *The annual prevalence of the different forms of Continued Fever in London, as compared with other towns.*

Whatever objections may be raised to the returns of the London Fever Hospital, as indicating the total prevalence of fever, the same will not apply to them as a fair test of the relative prevalence of the various forms of fever at different periods.

Table II contains the numbers of each form of fever admitted into the London Fever Hospital during the last ten years.

TABLE II.

Years.	1848. <sup>1</sup>	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	Total.
Typhus.....	526	155	130	68	204	408	337	342	1062	274	3506
Typhoid .....	152	138	137	234	140	211	228	217	149	214	1820
Relapsing ...	13	29	32	256	88	16	5	1		1?	441
Febricula .....	16	79	62	56	129	152	144	62	89	72	861
Total .....	707	401	361	614	561	787	714	622	1300	561	6628

With this I would contrast Table III, showing the corresponding admissions into the Glasgow Royal Infirmary during twelve years, for which I am indebted to Dr. McGhie, the Medical Superintendent. It is the more valuable, as I believe the Glasgow Infirmary is the only other institution from which such a return could be obtained.

TABLE III.

Years.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	Total.
Typhus.....	500	2399	980	342	382	919	1293	1551	760	385	385	314	10,210
Typhoid ...	?	127	7	?	?	44	134	45	92	145	163	157	914
Relapsing...	777	2333	513	168	174	255	192	72	68	22	0	0	4574
Febricula ...	?	385	15	60	41	167	102	270	167	104	43	72	1426
Total .....	1565	5244	1515	570	597	1385	1721	1938	1087	656	591	543	17,124

<sup>1</sup> About 200 additional cases, admitted during this year, and marked "doubtful," have been omitted. They were probably, for the most part, cases of "febricula," and mild cases of typhus.

One of the most remarkable circumstances to be observed in these tables, is the extreme variation in the prevalence of relapsing fever in different years. In 1846, no fewer than 2333 cases were admitted into the Glasgow Infirmary, and in 1851, it constituted the largest number of the admissions into the London Fever Hospital. Since 1851 it has gradually disappeared, and for the last few years, none, except one or two doubtful cases, have been observed either in London, Glasgow, or Edinburgh. There is also a synchronism in the prevalence of this fever at different places. In 1843, it was epidemic in London,<sup>1</sup> Edinburgh,<sup>2</sup> Aberdeen, and Glasgow,<sup>3</sup> and greatly preponderated over all the other forms of fever. Thus in the Glasgow infirmary there were 2871 cases of relapsing to 142 of typhus. In 1847, it was again epidemic at all of these places,<sup>4</sup> but with a preponderance of typhus. A careful study of the history of fever in Great Britain and Ireland, will show that relapsing fever, for upwards of a century, has been almost constantly observed during the great epidemics.<sup>5</sup>

The prevalence of typhus appears, from its entire history, to be also of an epidemic character. Thus, in the London Fever Hospital, the number of cases gradually decreased from 1848 to 1851, in which year there were only 68; after this, the number continued to rise till 1856, when it amounted to 1062. Since then it has almost entirely disappeared. During the last six months (October, 1858), not a single case of spotted typhus has been admitted; and I believe this fact accords with the experience of medical

<sup>1</sup> 'Report of London Fever Hospital,' for 1843, p. 15.

<sup>2</sup> Cormack on the Epidemic Fever of 1843.

<sup>3</sup> Dr. McGhie, 'Glasgow Med. Journ.,' vol. ii, p. 161.

<sup>4</sup> Dr. Jenner, 'Med. Times,' vol. xxiii, p. 117. Dr. Paterson, 'Edin. Med. and Surg. Journ.,' vol. lxx, p. 371.

<sup>5</sup> Rutton, 'History of the Weather and Diseases of Dublin,' 1770, p. 75; and pref., p. viii. Barker and Cheyne's 'Report of the Fever Epidemic in Ireland in 1817-19,' vol. i, p. 7, &c. Reid and O'Brien in 'Trans. Queen's Col. Phys. of Ireland,' vol. v, 1828. Christison, 'Edin. Med. Journ.,' January, 1858.

men all over London. Again, in Edinburgh, while typhus constituted the great proportion of the 8381 cases admitted into the Infirmary in 1847 and 1848,<sup>1</sup> during the year 1857 Dr. W. T. Gairdner writes me, only 56 cases were admitted, and in January of the present year, I am informed by Dr. Haldane, that the building did not contain a single male fever-patient.<sup>2</sup> In Glasgow, also, the diminution of typhus has been obvious although not so great. Here, as in Ireland, it appears to be constantly lurking, every now and then, apparently under the influence of external circumstances, breaking out into an epidemic. It is also to be noted, that relapsing and typhus fevers occur as epidemics simultaneously.<sup>3</sup> The relative prevalence, however, of the two varies greatly at different times; and we may have epidemics of typhus without the coexistence of relapsing, but not, as far as I am aware, of relapsing without typhus. Thus, in the Glasgow Infirmary, the number of cases of relapsing fever in 1843 was 2871, of typhus only 142; and in 1853 the proportion was reversed, or there were of typhus 1551 cases, and of relapsing 72. Again, in the London Fever Hospital, the greatest number of relapsing cases in one year corresponded with the smallest number of typhus, and the largest number of typhus with a complete absence of relapsing. Another circumstance worth observing, is, that in an epidemic of both forms, relapsing seems to constitute the greater proportion of the cases at the commencement, and typhus towards the close. This is obvious by referring to the numbers of each in the Glasgow epidemic of 1846-49; and in the London Fever Hospital, the numbers of relapsing and typhus, for three successive years, were, respectively, 256 and 68; 88 and 204; 16 and 408. A similar observation was made in Dublin in 1826.

<sup>1</sup> Christison, *loc. cit.*, p. 592.

<sup>2</sup> Since writing the above, I have myself had an opportunity of visiting the Edinburgh Infirmary (May, 1858). There were several cases of typhoid fever in the building; not a single case of typhus.

<sup>3</sup> This circumstance was also noted in the epidemic of fever in Silesia, in 1848. See 'Brit. and For. Med.-Chir. Rev.,' vol. viii, p. 36, 1851.

Typhoid fever, as regards its annual prevalence in London, presents a remarkable antithesis to the two forms already considered. The number of cases from year to year has varied no more than is the case with most diseases, or than might be attributed to the influence of local causes. In Glasgow, it will be seen that it formed no constituent of the great epidemic of 1847, there being only 127 cases out of the 244 fever-patients treated in the infirmary. In that city also, as in London, the numbers of late years have varied slightly as compared with those of the other two fevers. Before typhoid attracted much notice in this country, there can be little doubt that many cases of it were overlooked. It has been asserted that typhoid was unknown in Glasgow previous to 1856; but Dr. McGhie has shown that, for many years before, cases were recorded in the hospital books, under the name of "Muco-enterite," corresponding in all their symptoms to this disease.<sup>1</sup> There are no grounds whatever for the belief, that typhoid fever has only of late years appeared in this country;<sup>2</sup> and it seems not improbable that many of the cases described by Cullen and his contemporaries, as *enteritis erythematica*, were examples of this disease.<sup>3</sup> From the circumstances above mentioned, it is reasonable to conclude that typhoid is quite independent of those epidemic agencies which appear to influence so greatly the prevalence of typhus and relapsing fever, and that in some places it is constantly endemic. I do not mean to deny, that, in places where typhoid is endemic, it may prevail more at one time than another, or even that outbreaks of it may occur at any place, and then disappear entirely. Many such outbreaks will be afterwards alluded to; but in all the instances with which I am acquainted, the disease, from the very isolated sphere of its prevalence, has appeared to be attributable to causes of a

<sup>1</sup> 'Glasgow Med. Journ.,' vol. ii, p. 159.

<sup>2</sup> See letter by author in 'Med. Times and Gaz.,' Dec. 19th, 1857; also Rutty, op. cit., pp. 87, 320, &c.

<sup>3</sup> See the description of this affection given by Dr. Alison, 'Outlines of Path. and Pract. of Phys.,' p. 322.

local nature. In addition to the examples of this nature, which I shall have occasion to bring forward in a subsequent part of this paper, I may here mention that many such outbreaks, appearing in limited localities of the United States, have been described by Dr. Bartlett.<sup>1</sup> One of the most remarkable instances of this nature, also, has been recorded by the late Dr. John Reid, of St. Andrews.<sup>2</sup> During the years 1838 and 1839, while typhus was very prevalent in Edinburgh, Dr. Reid, then pathologist to the infirmary, found that in scarcely a single case which proved fatal was there any morbid appearance in the intestines; while, at the same time, at Anstruther, a village on the opposite coast of the Frith of Forth, Mr. John Goodsir found ulceration of Peyer's patches, and of the solitary glands of the ileum, in every fatal case of fever which he examined.

Again, while epidemics of typhus and relapsing fever are for the most part limited to the United Kingdom, and the North of Europe, typhoid may occur in any part of the globe. It is the ordinary fever of the Continent and of America, and is even met with in the East Indies,<sup>3</sup> and in Burmah.<sup>4</sup>

Typhus, then, and relapsing fever appear to be essentially epidemic diseases; but typhoid, to depend upon causes of a more constant, although more circumscribed and local, character.

The contrast between the annual prevalence of typhoid fever on the one hand, and of typhus and relapsing on the other, is well illustrated by diagram No. I.

### III. *The Prevalence of the different forms of Continued Fever according to the Months and Seasons.*

Table IV gives the numbers of typhus and typhoid fever admitted during each month of ten successive years, into the London Fever Hospital.

<sup>1</sup> 'Fevers of the United States,' fourth edit., pp. 99 and 106.

<sup>2</sup> 'Anat. and Path. Researches,' p. 470.

<sup>3</sup> Dr. Ewart in the 'Ind. Ann. of Med. Sc.,' part vii, p. 65.

<sup>4</sup> Mr. Scriven, 'Med. Times and Gaz.,' vol. xxix, p. 79.

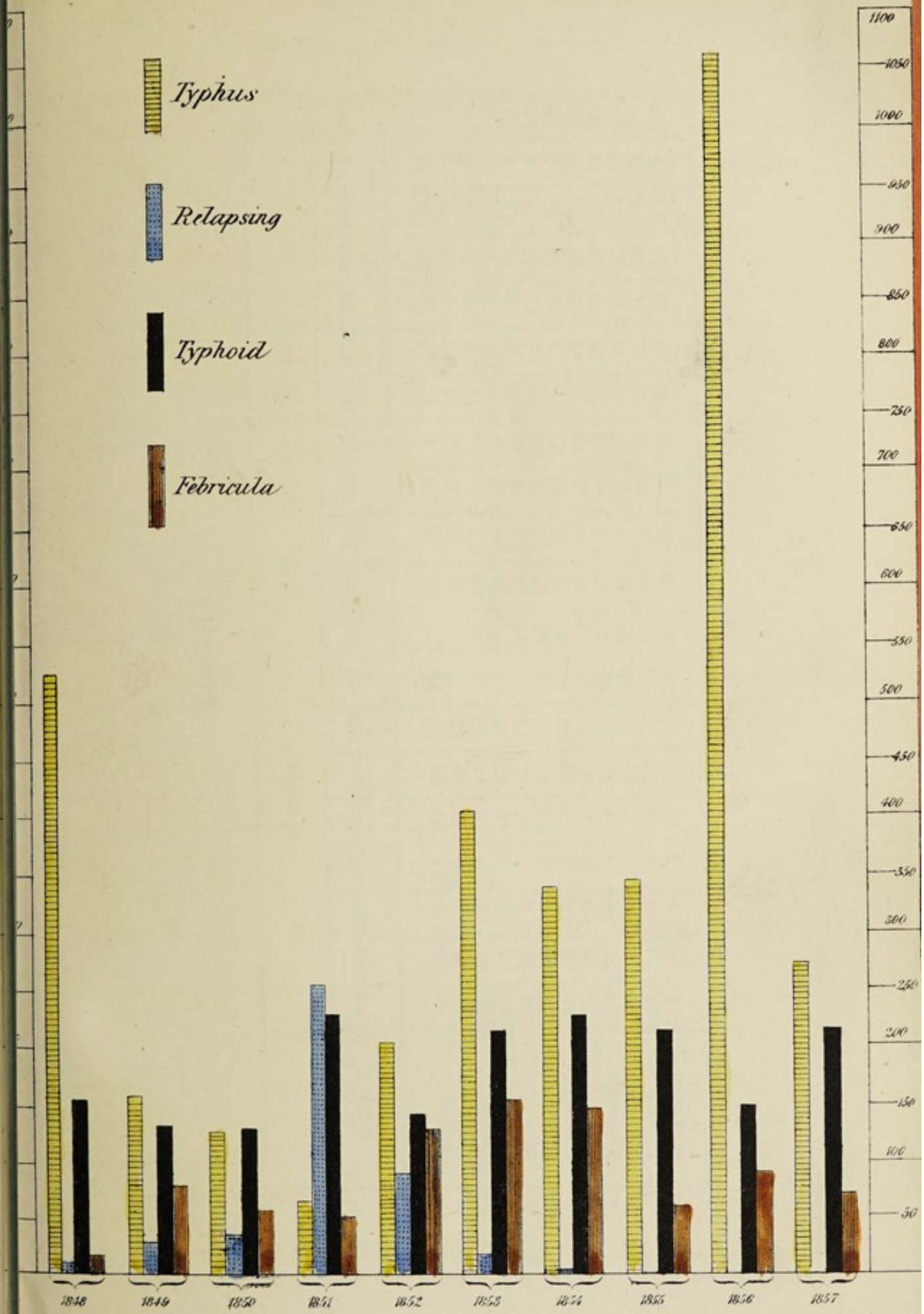


Diagram I. shows the annual number of admissions of each form of Fever into the London Fever Hospital, during ten years.



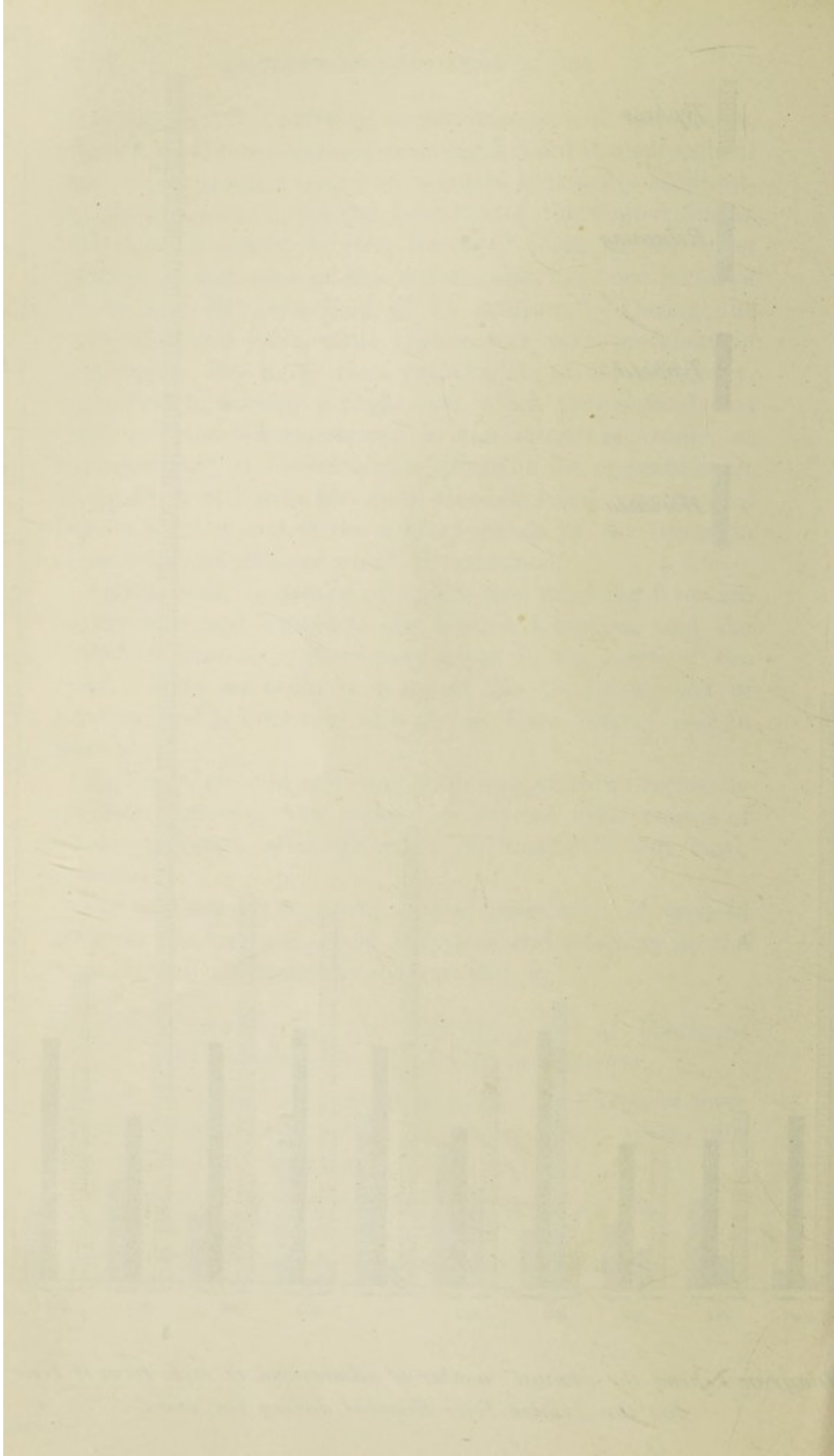


TABLE IV.

Years.	TYPHUS.										TYPHOID.								
	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.
January .....	43	27	2	11	30	31	11	19	157	54	9	6	13	10	17	13	16	12	8
February .....	37	19	5	11	8	26	15	20	124	35	7	5	8	12	7	13	9	10	5
March .....	66	25	4	8	28	47	38	9	140	24	5	5	12	6	14	7	5	8	8
April .....	65	14	9	3	41	47	38	6	134	23	3	7	8	7	5	6	8	8	4
May .....	66	17	9	0	34	42	73	17	96	42	4	14	16	9	6	8	10	7	1
June .....	43	13	13	3	15	43	50	27	87	18	13	11	24	9	17	10	7	7	9
July .....	48	7	22	2	13	23	32	30	68	35	16	15	29	4	11	15	25	7	19
August .....	32	9	20	7	2	51	21	42	39	16	12	13	18	22	33	20	40	29	26
September ...	39	11	16	9	4	32	13	29	39	14	19	13	27	19	33	49	26	14	34
October .....	22	6	13	3	6	36	12	51	55	10	17	17	24	12	29	51	25	15	38
November ...	44	4	9	7	8	13	17	38	70	1	16	17	30	12	26	20	22	28	33
December ...	21	3	8	4	15	17	17	54	53	2	6	14	25	18	13	16	24	5	29

Table V gives the number of admissions of all the four forms for the months and seasons<sup>1</sup> of the ten years taken collectively.

TABLE V.

	Typhus.	Relapsing.	Typhoid.	Febricula.	Total.
January .....	385	22	113	68	588
February .....	300	27	85	67	479
March .....	389	17	77	69	552
April .....	380	46	60	69	555
May .....	396	46	79	57	578
June.....	312	43	119	75	549
July .....	280	31	157	75	543
August.....	239	44	233	81	597
September ...	206	23	260	76	565
October .....	214	56	253	77	600
November ...	211	49	223	80	563
December ...	194	37	161	67	459
Spring .....	1069	90	222	205	1586
Summer .....	988	120	355	207	1670
Autumn .....	659	123	746	234	1762
Winter.....	790	108	497	215	1610
Total .....	3506	441	1820	861	6628

From the fact that relapsing and typhus prevail for the most part as epidemics, continuing for one or two years, and then almost disappearing for several years, it was scarcely to have been expected that month or season of the year would have much influence over their numbers, and this anticipation is verified by the results before us. Out of the total 441 cases of relapsing fever, 328 were admitted between the beginning of February, 1851, and the end of March, 1852. From February, 1851, the numbers gradually increased up to the end of the year, when they began to decline. If this epidemic be excluded, the remaining

<sup>1</sup> Under "Winter," I have included the three months, January, November, and December.

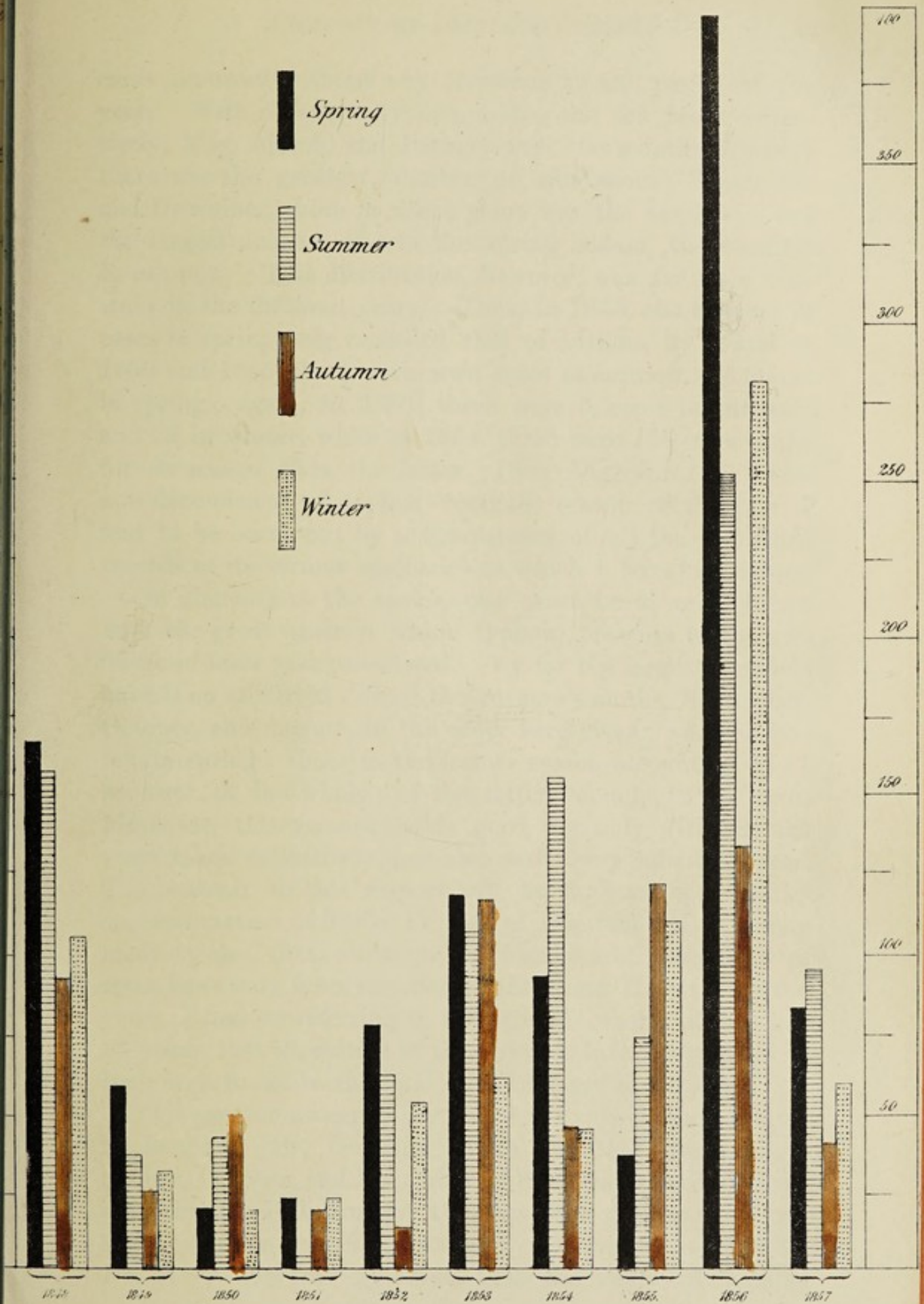
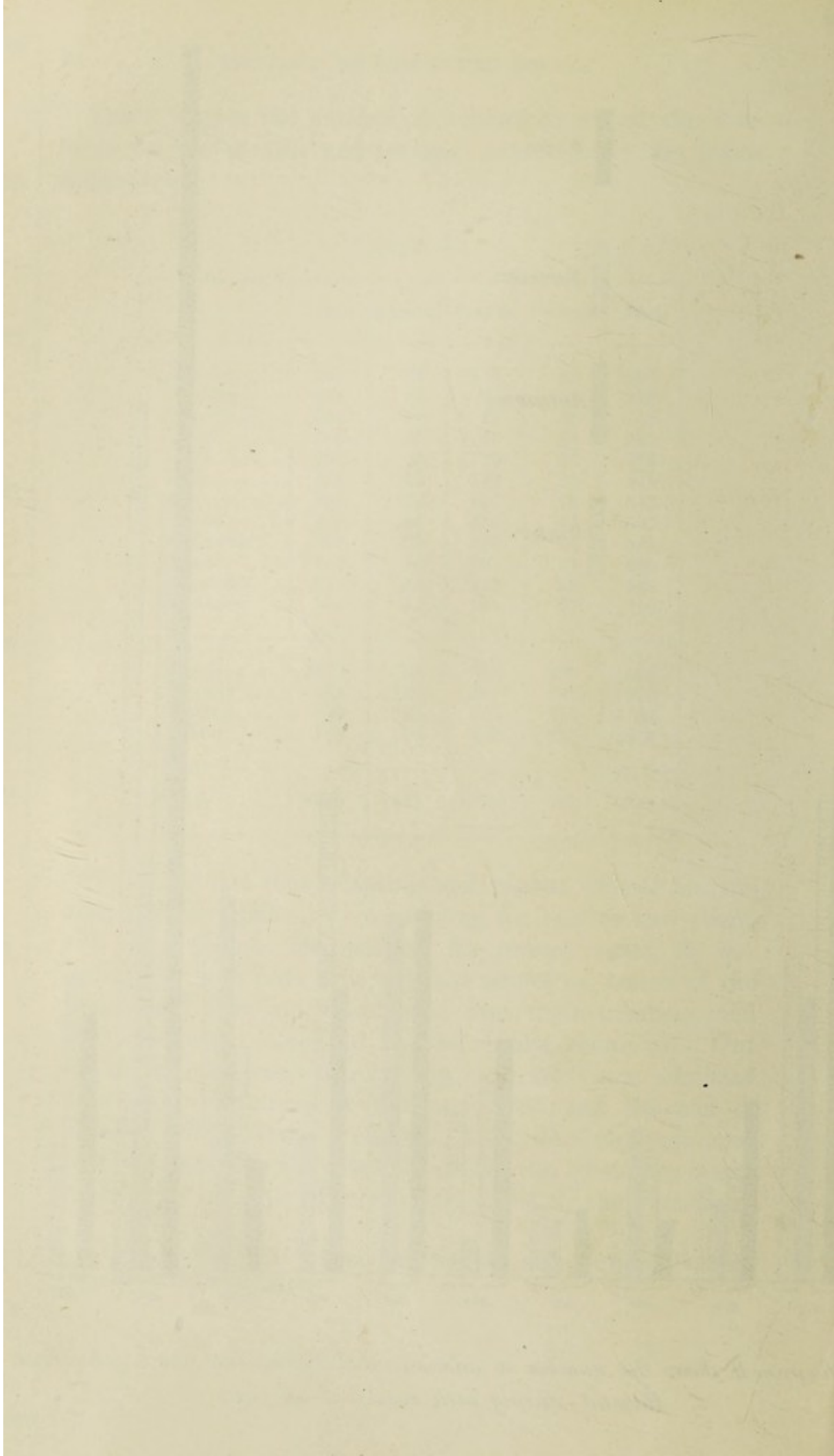


Diagram II shows the number of admissions of Typhus into the London Fever Hospital, during each season of ten years.



cases occurred without any reference to the period of the year. With regard to typhus, taking the ten years collectively, May, March, and January were the months in which there was the greatest number of admissions; September and December, those in which there was the smallest; and the largest number was in the spring season, the smallest in autumn. This distribution, however, was far from constant in the different years. Thus, in 1853, the number of cases in spring only exceeded that of autumn by 1, and in 1850 and 1855, there were most cases in autumn, and fewest in spring; again, in 1851, there were 5 cases in summer, and 22 in winter, while in 1854, there were 155 cases in the former season, 45 in the latter. (See Diagram II.) This non-dependence of typhus upon the season of the year, I find to be borne out by a comparison of all the published records of its various epidemics to which I have had access.

On glancing at the tables, one must be at once struck with the great contrast which typhoid presents to the two forms of fever just considered. By far the largest numbers have been admitted during the autumn months, September, October, and August, in the order here given; and the fewest in spring; those in the former season amounting to 41 per cent. of the whole; of the latter, to only 12 per cent. Moreover, this remark holds good not only with the ten years taken collectively, but also with every individual year. The contrast in this respect will be at once apparent by an examination of Table IV and of Diagram III. I may mention also, that, although the numbers of each form of fever have only been recorded at the Fever Hospital for ten years, I find on referring to the printed reports of the last 25 years, that ulceration of the bowel is invariably stated to have been found in the fatal cases oftenest in autumn.

This greater autumnal prevalence of typhoid is not limited to London. Dr. Gairdner writes me that, during September, October, and November, of 1857, there were admitted into the Royal Infirmary 18 cases, but during the three spring months, only 6. Speaking of Glasgow, in 1836-37, Dr. A. P. Stewart observes, that the cases of typhoid

admitted into the Infirmary were very numerous in the latter part of summer and in autumn, very few in winter and spring.<sup>1</sup> Almost all the great outbreaks of typhoid which have been reported in the various journals, as occurring in the provincial towns and villages of England, have been during the autumn. References will be found to a number of these in a foot-note.<sup>2</sup> These outbreaks were particularly numerous during the autumn of 1846, the summer of which year had been remarkable for its unusually high temperature. In the Report of the Fever Hospital for this year, I find the following statement. "In the unusually hot weather that prevailed in the summer and autumn months of this year, diarrhœa occurred in almost every case of fever; and the intestines were found, in a very large proportion of the fatal cases, extensively diseased."

Again of 183 cases at Strasbourg, reported by Forget,<sup>3</sup> 60 were in autumn, 49 in summer, 38 in spring, and 36 in winter. In the United States, Dr. Bartlett informs us, that his impression is, that typhoid is most prevalent in autumn: of 645 cases admitted into the Lowell Hospital during seven years, 250 were in autumn, only 104 in spring.<sup>4</sup> Again in New England, Dr. Austin Flint observes that typhoid exhibits such a manifest predilection for the autumn, that it is there known by the name of the "Autumnal" or "Fall Fever."<sup>5</sup> Lastly, from the descriptions of the "Autumnal Fever" in this country during the

<sup>1</sup> 'Edin. Med. and Surg. Journ.,' Oct., 1840.

<sup>2</sup> At Newcastle, in 1822, 'Edin. Med. and Surg. Journ.,' vol. xix, p. 225. At Nottingham, in 1846, 'London Med. Gaz.,' vol. xxxix, p. 59. At Minchinhampton, 1846, 'Lond. Med. Gaz.,' vol. xlii, p. 157. Various villages in Berkshire, 1846, 'Lond. Med. Gaz.,' vol. xxxviii, p. 1083. Old and New Lenton, 1846, 'Med. Times,' vol. xv, p. 159. Croydon, 1852, 'Lancet,' 1853, vol. i, p. 536. Tewkesbury, 1853, 'Assoc. Journ.,' 1853, p. 793. Clergy Orphan Asylum, St. John's Wood, 1856, 'Lancet,' November 15th, 1856.

<sup>3</sup> 'Traité de l'Enterite Follic.,' p. 409.

<sup>4</sup> Bartlett, *op. cit.*, p. 101.

<sup>5</sup> 'Clinical Reports on Continued Fever,' 1852, p. 20.

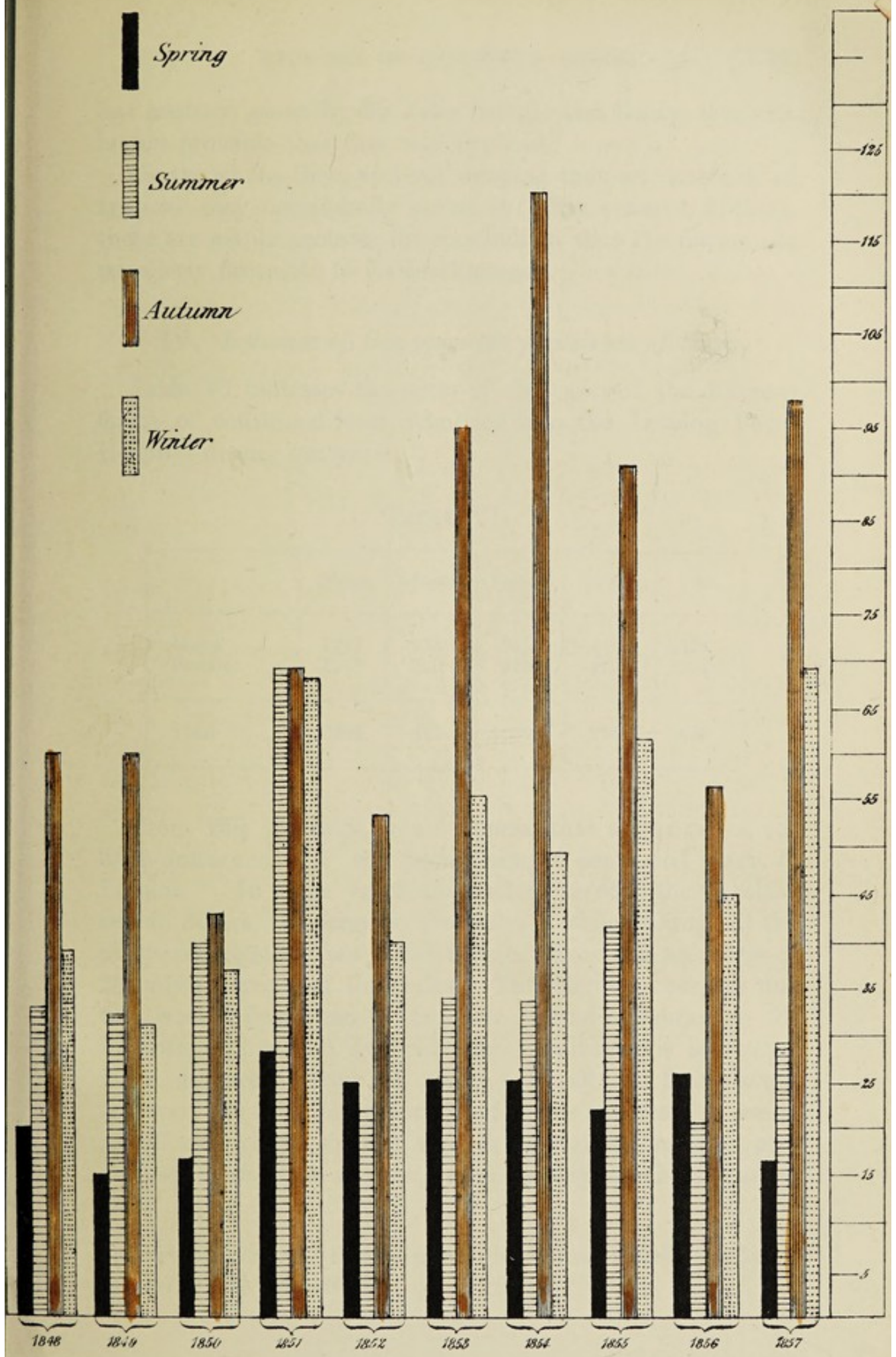
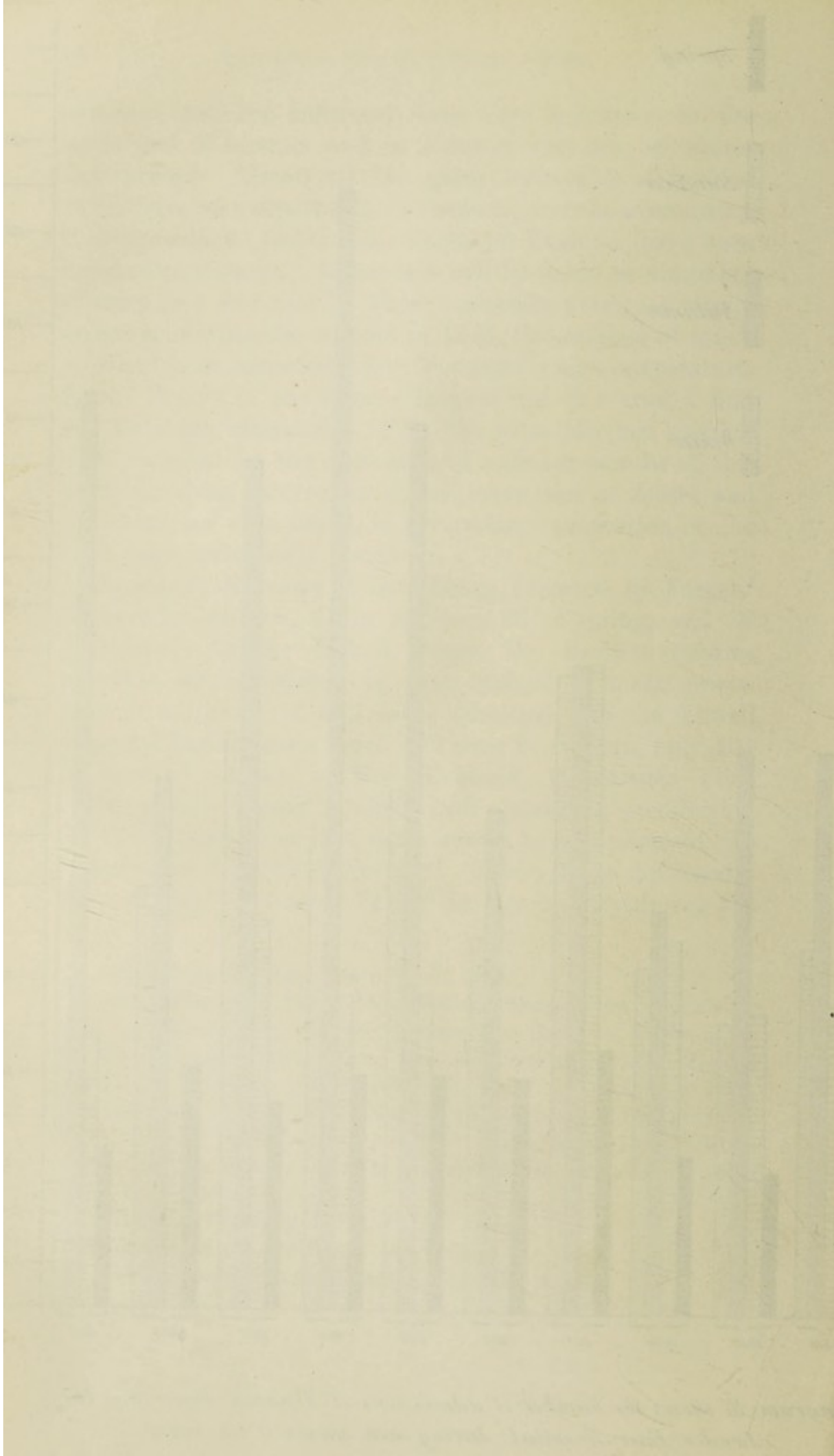


Diagram III. shows the number of admissions of Typhoid Fever into the London Fever Hospital, during each season of ten years.





last century, given by Sir John Pringle and Ratty, it seems highly probable that this was Typhoid.<sup>1</sup>

On the whole, then, without denying that an outbreak of typhoid may occasionally occur at other seasons, I think there are ample grounds for concluding, that the autumn is peculiarly favorable to its development.

#### IV. *Influence of Sex upon the prevalence of Fever.*

Table VI indicates the sexes of the cases of the different forms of continued fever, admitted into the London Fever Hospital during ten years.

TABLE VI.

	Typhus.	Relapsing,	Typhoid.	Febricula.	Total.
Males .....	1737	233	905	449	3324
Females .....	1769	208	915	412	3304
Total .....	3506	441	1820	861	6628

From this Table it would appear that sex exercises but little influence over the prevalence of continued fever in London. In some years, the males exceeded the females; and in others, the females, the males; while taking all the ten years together, out of 6628 cases, there was an excess of 20 only in favour of the males. This slight excess was due to relapsing fever, and to the cases entered as febricula; for in both typhus and typhoid, the females were somewhat more numerous than the males. In all the four classes, however, the relative proportion of males and females varied in different years, so that one sex cannot be said to predispose more than another, even to any of the forms of fever.

<sup>1</sup> Sir John Pringle, 'Diseases of Armies,' first ed., p. 226; and Ratty, *op. cit.*, pp. 196, 202, 320, &c.

Some observers have thought that continued fever was more prevalent among females. Dr. Harty, in his statistical account of the Irish epidemic of 1817-20, says, that there were 34,398 females, to 32,144 males;<sup>1</sup> and Dr. Orr ascertained that of the cases admitted into the Glasgow Infirmary, between the years 1831 and 1845, inclusive, there were 16,834 females, to 15,863 males. Dr. Orr, however, showed that this difference was more than accounted for by the excess of females in the population of Glasgow.<sup>2</sup> On the other hand, of the cases of fever treated in the Edinburgh Infirmary, during the two years 1846-7, there were (excluding febricula) 4798 males, to 3061 females;<sup>3</sup> and, out of 3186 cases, in the Seraphim Hospital, at Stockholm, more than one half, or 2181 were males.<sup>4</sup> Dr. Huss, however, ascribes this minority of females at Stockholm to a larger proportion of them being treated at their own homes. With respect to typhoid individually, Louis<sup>5</sup> found only 32 females out of 138 cases observed by him; but he accounts for this circumstance in the same way as Dr. Huss does at Stockholm: and out of a number of cases collected by Dr. Bartlett, from several sources, there were 1345 males, to 1229 females;<sup>6</sup> while the same author mentions several instances in which the females suffered more extensively than the males.

There are always circumstances which at different places influence the admission into hospitals of one sex more than the other; but, from what has been stated, sex appears to be of little or no importance as a predisposing cause of fever, or of one form of it more than another.

#### V. *Influence of Age upon the prevalence of Fever.*

The influence of age upon the prevalence of fever, and of

<sup>1</sup> 'Historical Sketch of the Fever-Epidemic in Ireland,' Dublin, 1820.

<sup>2</sup> 'Edin. Med. and Surg. Journ.,' vol. lxxv, p. 345.

<sup>3</sup> 'Statist. Tables, Edin. Infirmary,' sixth and seventh ser.

<sup>4</sup> Huss, 'Statistique du Typhus,' 1855, p. 42.

<sup>5</sup> Louis, 'Fièvre Typhoïde,' vol. ii, p. 354.

<sup>6</sup> Op. cit., p. 109.

its different forms, has been arrived at in two ways; by taking the average age of all the cases, and by ascertaining the numbers in each period of life.

Table VII gives the average age of each sex, of all the cases of each form of fever, admitted into the London Fever Hospital during ten years.

TABLE VII.

	MALES.		FEMALES.		MALES and FEMALES.	
	No. in which age was noted.	Average Age.	No. in which age was noted.	Average Age.	No. in which age was noted.	Average Age.
Typhus.....	1714	28.38	1742	30.27	3456	29.33
Relapsing...	231	22.98	206	26.01	437	24.41
Typhoid ...	878	21.45	894	21.06	1772	21.25
Febricula ...	440	21.56	405	24.18	845	22.82
Total .....	3263	25.22	3247	26.7	6510	25.96

Thus, the average age of all the cases of continued fever being not quite 26, that of typhus was  $29\frac{1}{3}$ ; of relapsing  $24\frac{2}{5}$ ; and of typhoid only  $21\frac{1}{4}$ .

Table VIII (see next page) shows the number of each fever in each quinquennial period of life for either sex. (See also Diagram IV.)

In continued fever, taken as a whole, and also in each of its individual forms, the three most common lustra of life appear, from Table VIII, to be 15 to 20 years, 20 to 25, and 10 to 15, in the order here given. The relative excess of cases, however, belonging to these lustra, varies greatly, being greatest in typhoid, and least in typhus. Thus, more than one half (52 per cent.) of the cases of typhoid are included in the two most common lustra, or between 15 and 25 years of age; but only  $38\frac{1}{2}$  per cent. of the cases of relapsing fever, and less than one third (30 per cent.) of the cases of typhus. Again, one fifth of the cases of typhoid,

TABLE VIII.<sup>1</sup>

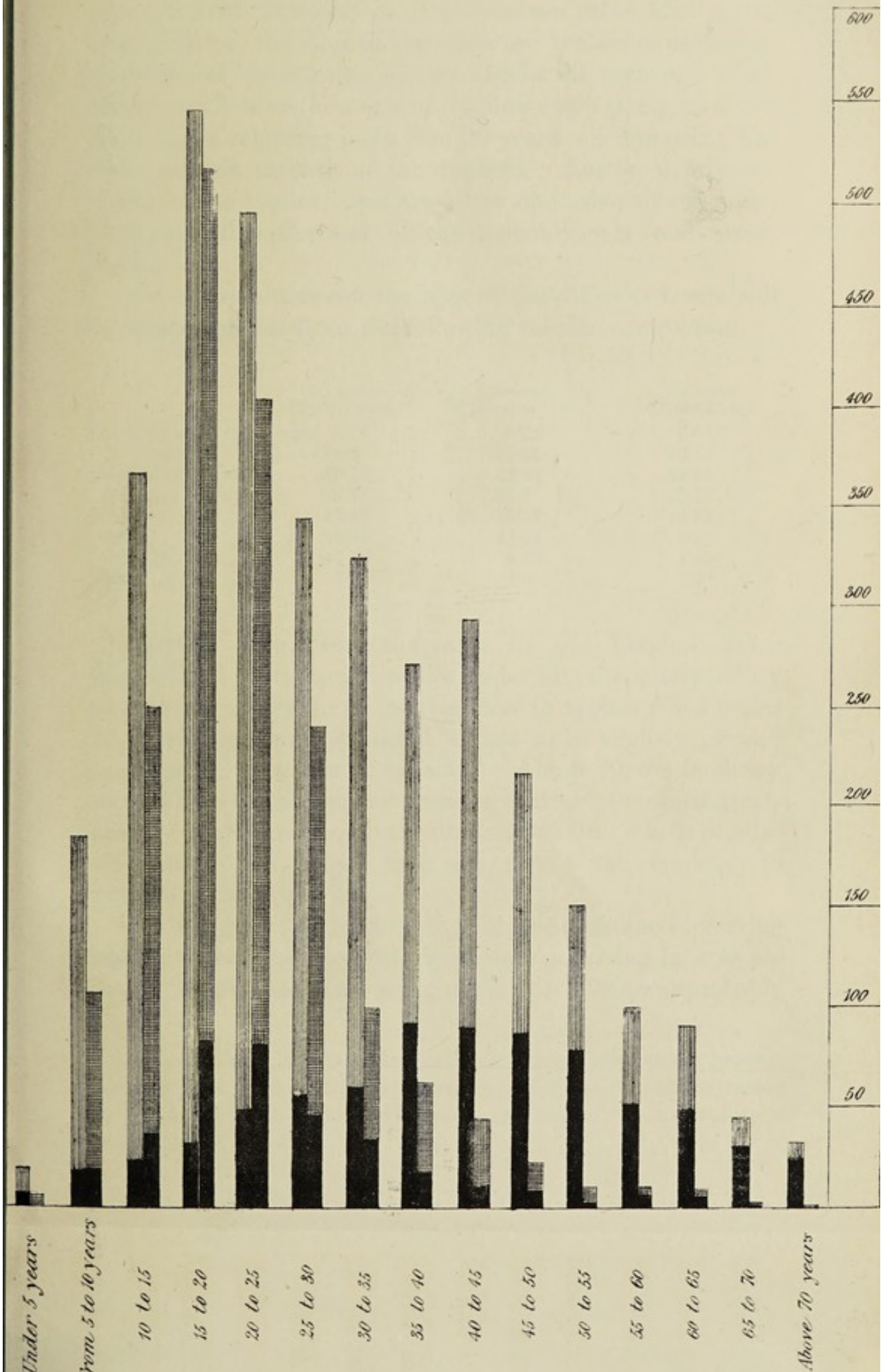
	TYPHUS.			RELAPSING.			TYPHOID.			FEBRICULA.			TOTAL CONTINUED FEVER.		
	M.	F.	M.&F.	M.	F.	M.&F.	M.	F.	M.&F.	M.	F.	M.&F.	M.	F.	M.&F.
	Under 5 years .....	9	8	17	2	2	4	2	2	4	4	4	4	17	16
From 5 to 10 years...	88	95	183	18	14	32	70	33	103	43	40	83	219	182	401
" 10 to 15 "	175	188	363	41	22	63	121	129	250	77	56	133	414	395	809
" 15 to 20 "	295	251	546	54	38	92	237	282	519	108	78	186	694	649	1343
" 20 to 25 "	287	208	495	40	36	76	191	213	404	85	78	163	603	535	1138
" 25 to 30 "	185	158	343	16	21	37	123	117	240	35	25	60	359	321	680
" 30 to 35 "	157	166	323	18	19	37	50	50	100	30	37	67	255	272	527
" 35 to 40 "	121	149	270	8	11	19	31	29	60	18	27	45	178	216	394
" 40 to 45 "	109	183	292	16	24	40	28	18	46	17	27	44	170	252	422
" 45 to 50 "	98	114	212	4	4	8	9	11	20	9	11	20	120	140	260
" 50 to 55 "	71	79	150	8	7	15	5	3	8	3	9	12	86	99	185
" 55 to 60 "	48	52	100	5	2	7	6	3	9	3	6	9	63	62	125
" 60 to 65 "	40	48	88	...	5	5	3	4	7	3	3	6	46	60	106
" 65 to 70 "	17	25	42	...	1	1	1	...	1	4	1	5	22	27	49
" 70 to 75 "	9	15	24	1	...	1	...	...	...	...	3	3	10	18	28
" 75 to 80 "	4	2	6	...	...	...	1?	...	1?	1	...	1	6	2	8
Above 80 years .....	1	1	2	...	...	...	...	...	...	...	...	...	1	1	2
Age doubtful .....	23	27	50	2	2	4	27	21	48	9	7	16	61	57	118
Total, omitting doubtful cases	1714	1742	3456	231	206	437	878	894	1772	440	405	845	3263	3247	6510

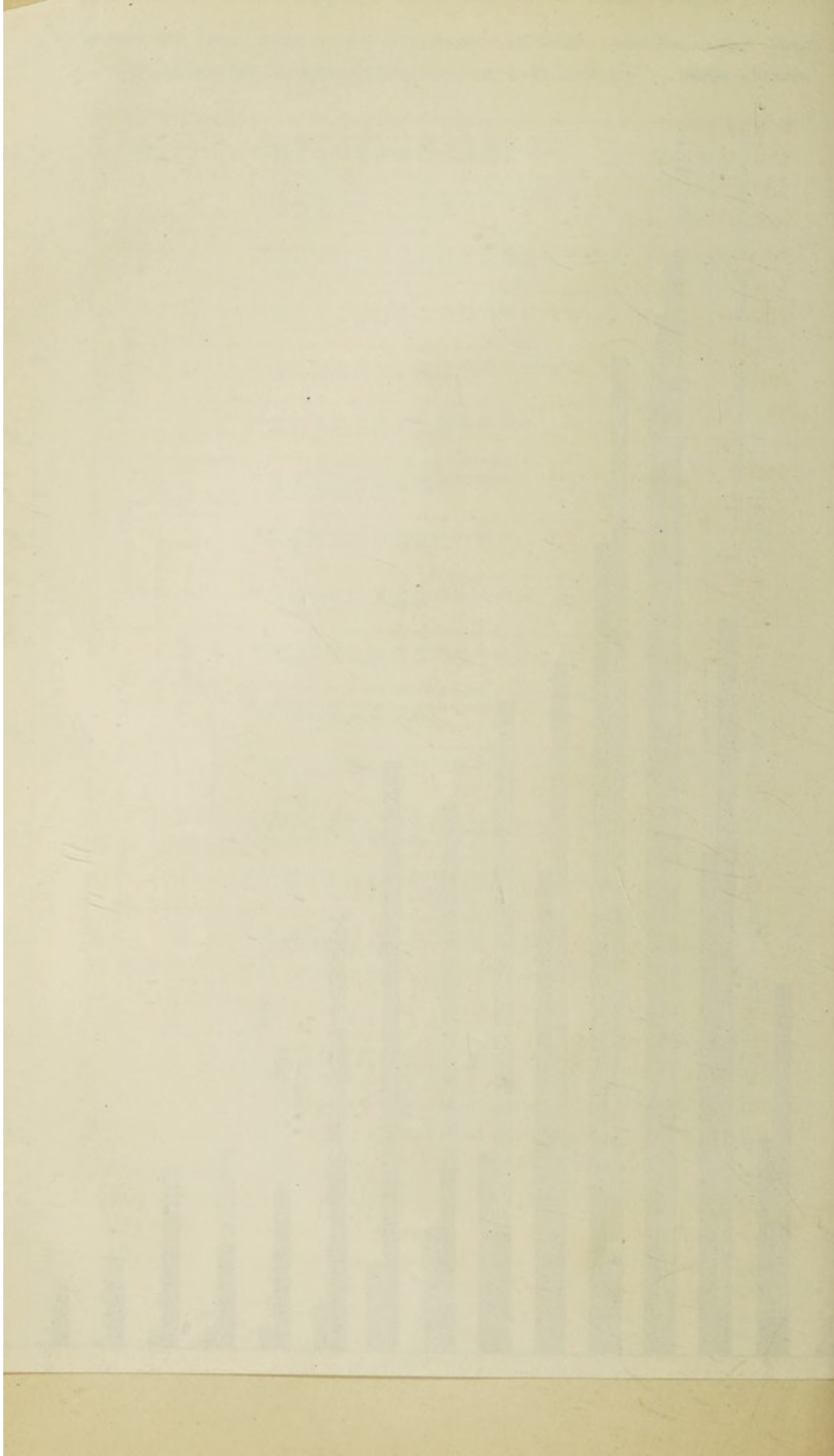
<sup>1</sup> In this Table, a patient who had completed his fifth or tenth year was reckoned as being between 5 and 10, and 10 and 15 years, respectively; and so on, for all the other periods of life.

of deaths of Typhus in each quinquennial period of life

The right hand columns show the number of cases with the number of deaths of Typhoid fever in each quinquennial period of life.

to face Page 238.





a little more than one fifth of the relapsing cases, but less than one sixth of the cases of typhus, are below 15. As we advance in life the most of the cases are typhus or relapsing, and those of an extreme age are almost all typhus. Thus, nearly one half of the cases of typhus (43·6 p. c.), and one third of the relapsing cases are 30 years or upwards; but less than one seventh of the typhoid. Lastly, nearly one eighth of the typhus cases are 50 or upwards; of the relapsing one fifteenth; and of the typhoid, only one sixty-eighth.

The contrast between the ages of the different fevers will be more apparent from the following tabular comparison.

	Per cent. of Typhus cases.	Per cent. of Relapsing cases.	Per cent. of Typhoid cases.
Under 10 years there were	5·78	8·23	6·04
„ 15 „ „	16·3	22·65	20·14
From 15 to 25 years „	30·12	38·44	52·08
25 years and upwards	53·58	38·9	27·76
30 „ „	43·66	30·43	14·22
40 „ „	26·47	17·62	5·19
50 „ „	11·92	6·63	1·46
60 „ „	4·68	1·6	·5

Judging, then, from the cases in the London Fever Hospital, at every period of life under 30, the susceptibility to typhoid is very much greater than to typhus; but under 15 years, the tendency would appear to be slightly greater to relapsing, than even to typhoid.<sup>1</sup> Above 30, the tendency to typhus is almost as great as below that age, (or much greater if we take into account the proportion of the whole population above and below that age); but the tendency to typhoid is infinitely less.

With regard to febricula, the only circumstance deserving notice, is the large proportion of cases occurring in extreme youth, almost one ninth being under 10. This was probably

<sup>1</sup> The proportion of typhoid cases in early life would be still greater, were it not that many children labouring under this disease are treated at dispensaries, and at their own homes, as cases of "Infantile Remittent Fever."



owing to some of the milder cases of the other forms not being recognised at that early age, and hence included under this head.

The youngest case of typhus was a male infant under twelve months, the oldest, a man aged 84. The youngest case of relapsing fever was a female aged 2; the oldest, a man aged 74. The youngest cases of typhoid were three children aged 4; two cases are noted as above 65. One of these, a man, had rose-spots, and called himself 76, but he did not look more than sixty. The other was a man aged 65, who had no eruption. (M. Lombard, of Geneva, relates a case of typhoid in a woman aged 73; and Gendron, four cases between 60 and 75.<sup>1</sup>)

As regards the ages of either sex, there are one or two points worth mentioning. Advancing age would appear to lessen the susceptibility to typhus and relapsing fever to a greater extent in males than in females. Thus, in every one of the ten years, the average age of the females exceeded that of the males, in both these forms. Again, of typhus,

Out of a total of 3506 cases, 1737 were males; 1769 females.			
Below 15 years of age	. 272	„	291 „
Between 15 and 30	. 767	„	617 „
Above 30	. 675	„	834 „

In relapsing fever,

Out of a total of 441 cases, 233 were males; 208 females.			
Of cases below 25 years	. 155	„	112 „
Of cases above 25	„ . 76	„	94 „

In typhus also, but not in relapsing, the excess of males was limited to between 15 and 30.

As to the period of life most susceptible to typhoid, there is little difference between males and females. In some years the average age of the males was greatest; in others, that of the females; and for the whole ten years, the mean age of the two sexes was almost equal. Again, of 1620 cases

<sup>1</sup> Bartlett, *op. cit.*, p. 108.

below 30 the females exceeded the males by 32 ; and of 252 cases above 30 the males exceeded the females by 16 ; so that on the whole we have a result somewhat contrary to what occurs in typhus and relapsing fever.

The various statements just made, under the head of age, confirm, on a great scale, most previous observations ; the only exception being the greater prevalence of typhus and relapsing fever, above 30, in females than in males. Dr. Cowan, of Glasgow, found precisely the contrary ;<sup>1</sup> so that perhaps much stress must not be laid upon this circumstance.

#### VI. *Predisposition to Fever from Occupation and Station in Life.*

In Table IX the occupations of the patients belonging to each form of fever, admitted into the London Fever Hospital, during ten years, have been classified, and the percentage of each occupation upon the total number in which it was known, calculated. (See next page.)

It is not probable that many of the occupations specified in this table in themselves predispose to fever, or to one form of it more than another. I would, however, call attention to the circumstance, as important in connexion with facts to be subsequently adduced, that out of 10 *cow-keepers* admitted with fever, in 9 the fever was typhoid. I have also ascertained that, in several instances, patients entered as "labourers" had been employed in the drains ; in every such case the fever was typhoid.

But the chief point which this table illustrates is the fact, that most of those who may be supposed to have occupied the better conditions of life, have been admitted with typhoid fever, whereas typhus and relapsing have been rare among them, and most common amongst the lowest classes. It would occupy too much time to enter minutely into the details of the table : a few of the most striking circumstances illustrative of the statement just made will

<sup>1</sup> 'Vital Statistics of Glasgow,' 1838.

	Total.	TYPHUS.		RELAPSING.		TYPHOID.		FEBRICULA.	
		No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Female Servants...	958	321	11·82	38	12·42	461	31·64	138	22·29
Male ditto ...	36	10	·36	...	...	20	1·37	6	·96
Artizans <sup>1</sup> .....	662	380	13·1	23	7·51	186	12·76	73	11·79
Shoemakers .....	204	138	5·08	10	3·26	41	2·81	15	2·42
Tailors .....	62	37	1·36	6	1·96	11	·75	8	1·29
Sempstresses .....	372	242	8·92	10	3·26	91	6·24	22	4·68
Bakers .....	39	12	·44	1	·32	20	1·37	6	·96
Householders .....	14	10	·36	...	...	4	·27	...	...
Shopmen .....	145	60	2·21	6	1·96	67	4·59	12	1·93
Schoolmasters ...	10	8	·29	...	...	2	·13	...	...
Scholars .....	90	31	1·14	2	·65	40	2·74	17	2·74
Clerks.....	32	11	·40	...	...	17	1·16	4	·64
Butchers.....	33	18	·66	1	·32	11	·75	3	·48
Barmen .....	32	12	·44	2	·65	14	·96	4	·64
Policemen .....	45	10	·36	...	...	30	2·05	5	·8
Soldiers and Sailors	51	22	·81	6	1·96	10	·68	13	2·1
Milkmen and Wo-									
men .....	21	12	·44	1	·32	6	·4	2	·32
Travellers .....	4	3	·11	...	...	1	·06	...	...
Porters and Errand									
Boys .....	146	63	2·32	13	4·24	52	3·57	18	2·9
Hawkers and Street									
Musicians .....	247	136	5·01	54	17·64	24	1·64	33	5·32
Shoeblocks.....	7	4	·14	...	...	1	·06	2	·32
Cabmen and Ostlers	97	53	1·95	3	·98	35	2·4	6	·96
Cowkeepers .....	10	1	·03	...	...	9	·61	...	...
Labourers <sup>2</sup> .....	837	436	16·07	87	28·43	184	12·62	130	21·
Dustmen ....	12	9	·33	1	·32	...	...	2	·32
Sweeps .....	6	4	·14	1	·32	1	·06	...	...
Charwomen .....	171	125	4·61	9	2·94	16	1·09	21	3·34
Laundresses .....	208	154	5·67	9	2·94	31	2·12	14	2·22
Vagrants.....	64	44	1·62	12	3·92	...	...	8	1·29
"Paupers" <sup>3</sup> .....	106	83	3·05	3	·98	8	·54	12	1·93
Nurses in Work-									
houses.....	54	46	1·79	...	...	1	·06	7	1·11
Bridewell and Ho-									
of Correction ...	14	13	·47	...	...	...	...	1	·16
Nurses, London									
Fever Hospital...	40	25	·92	1	·32	3	·20	11	1·77
Married Females <sup>4</sup> ..	266	180	7·73	7	2·28	60	4·11	19	3·02
Total of which oc-									
cupation known. )	5095	2713	100·	306	99·9	1457	99·82	619	99·7

<sup>1</sup> These include all in-door workers, except those otherwise specified, such as smiths, carpenters, printers, &c.

<sup>2</sup> These include all out-door workers, such as masons, dock-labourers, gardeners, &c.

<sup>3</sup> These have been entered in the Register as "paupers." Many who were really so have been entered under the occupations which they previously followed. See Table XII.

<sup>4</sup> Many other married females have been entered as following some occupation.

suffice. Thus, the proportion of female servants admitted with typhoid has been three times that of typhus; of policemen six times; and of shopmen more than double. On the other hand, the proportion of street hawkers affected with typhoid has been less than one third that of typhus, and scarcely more than one eleventh of that of relapsing. The number of cases of relapsing fever belonging to this class is remarkable. Of charwomen, the proportion with typhoid has been considerably less than one third that with typhus, or than one half that with relapsing. Among "paupers," typhus and relapsing fever, taken together, have been eight times as frequent as typhoid, and of 64 "vagrants" admitted with fever, in not a single instance was this typhoid.

There are one or two apparent exceptions to the general rule, as, for example, in the case of those entered as "schoolmasters," and "soldiers and sailors." The former, however, have been for the most part teachers in ragged schools, where they may have contracted the disease by contagion: the latter have been almost invariably discharged or out of employment; moreover, most of the individuals belonging to both classes have been in destitute circumstances.

The recorded occupation, however, of a patient, it must be remembered, is not always a certain index of the amount of worldly comfort which he has enjoyed. A female may be brought direct from one of the fashionable squares of the west end, or from one of the crowded courts of Holborn; and yet, in both instances, be entered as a "servant." Another test, therefore, becomes desirable for the accuracy of the statement which I have made; and, fortunately, such a test is available. The patients admitted into the London Fever Hospital may be divided into four classes, viz.—1. The servants of subscribers, and those who are able to pay (£2 2s.) for admission. 2. Persons in destitute circumstances, but not receiving parochial relief. This is a somewhat mixed class: some have been very destitute, but many have been in tolerably easy circum-

stances, previous to their illness. 3. Persons receiving parochial relief, but not actually inmates of a workhouse. And 4. Those who, for a greater or less period, have been inmates of a workhouse. Now, I have determined the number of cases of each form of fever, in each of these four classes. The results are given in the following tables.

Table X gives the numbers and proportion of each form of fever in the first class for ten years. I have included in this table the policemen, as they are paid for by the police authorities, and none of them can be said to be destitute.

TABLE X.

CLASS I.	Paying Patients.	Servants of Subscribers	Police-men.	Total.	Per centage of each Fever on total paid cases.	Per centage of paid cases on total of each Fever.
Typhus.....	80	4	10	94	23·06	2·68
Relapsing.....	2	...	...	2	·47	·45
Typhoid .....	242	9	30	281	65·96	15·44
Febricula .....	42	2	5	49	11·5	5·69
Total .....	366	15	45	426	99·99	6·43

The proportion of typhoid cases in this class is thus seen to be six times that of typhus, and more than thirty-four times that of relapsing fever.

Table XI gives the fever-patients admitted during ten years, who were unable to pay, although not receiving parochial relief.

TABLE XI.

CLASS II.	Total "Free" cases.	Per centage of each Fever on total free cases.	Per centage of free cases on total of each Fever.
Typhus.....	130	29.75	3.7
Relapsing.....	9	2.06	2.04
Typhoid .....	245	56.06	13.46
Febricula .....	53	12.13	6.15
Total .....	437	100.	6.59

Here the proportion of typhoid cases is still predominant, although not to such an extent as in the former class; being only four times in excess of that of typhus, and six times of that of relapsing.

Lastly, in Table XII, we have the patients paid for by the various parishes; a distinction being made between those sent direct from their own homes, and the inmates of workhouses.

TABLE XII.

	CLASS III. Sent from own homes, by Parishes.			CLASS IV. Inmates of Workhouses.			CLASSES III AND IV. Total paid for by Parishes.		
	Number.	Per centage of each Fever on total of Class III.	Per centage of Class III on total of each Fever.	Number.	Per centage of each Fever on total of Class IV.	Per centage of Class IV on total of each Fever.	Number.	Per centage of each Fever on total of Classes III and IV.	Per centage of Classes III and IV on total of each Fever.
Typhus .....	2544	53.26	72.56	738	74.62	21.05	3282	56.93	93.61
Relapsing ...	383	8.02	86.85	47	4.75	10.65	430	7.46	97.5
Typhoid ...	1209	25.31	66.	85	8.59	4.67	1294	22.44	71.1
Febricula ...	640	13.4	74.33	119	12.03	13.82	759	13.16	88.15
Total .....	4776	99.99	72.06	989	99.99	14.92	5765	99.99	86.98

The relative proportion of the different fevers is in this table reversed; that of typhus and relapsing being in considerable excess of typhoid. The gradual change in the prevalent fever, as we pass from one class to another, is strikingly brought out by the following tabular comparison :

	Per cent. of Typhus and Relapsing.	Per cent. of Typhoid.
Of the paying patients . . .	22·5	65·96
Of the "free" patients . . .	31·8	56·06
Of those sent from homes by parishes	61·28	25·31
Of the inmates of workhouses . . .	79·37	8·59

This contrast would be the more striking, if we had the means, which, unfortunately, the Fever Hospital does not afford, of comparing with the above the fevers which prevail in the upper classes of society. I believe, however, that there would not be much difficulty in establishing the fact, that such fevers are almost exclusively typhoid. Typhus, among the rich, except as the result of contagion, is excessively rare, while cases of typhoid, originating without any traceable contagion, are far from uncommon. I find, by inquiry, that this is in accordance with the experience of every one of the physicians in London, who, for many years, have had the best opportunities of judging.

Moreover, in the account of every outbreak of typhoid with which I am acquainted, all classes of the community are stated to have suffered alike. Two instances out of many with which I am familiar will suffice. In an account of an outbreak of typhoid, which occurred at Nottingham, in 1846, Dr. Sibson remarks that "very many were in good circumstances of those who were attacked."<sup>1</sup> Again, in what was called the Croydon Fever, in 1852 (which, as we shall find, was unmistakably typhoid), we are told that the victims were "not, as usually the case, among the poor, but among the gentry and principal tradesmen of the town."<sup>2</sup>

<sup>1</sup> 'Lond. Med. Gaz.' vol. xxxix, p. 59.

<sup>2</sup> 'Med. Times and Gaz.,' Jan. 29th, 1853.

I think, then, it may be concluded that typhus and relapsing fever are, for the most part, confined to the poor ; but that typhoid makes no distinction between one class and another.

VII. *Localities of London in which each form of Fever is most prevalent.*

In order to form some opinion upon this point, the returns of no hospital could be better suited than those of the London Fever Hospital, inasmuch as its patients are derived from every district of the metropolis. It is true that, from various circumstances, some districts send in a larger proportion of their fever cases into the hospital than others, so that the returns do not correctly indicate the *amount* of fever prevalent in each district ; yet those cases which are admitted from each locality, furnish a very fair criterion for judging of the form of fever there most prevalent. In order, then, to render the returns of the Fever Hospital available for the purpose in question, I have constructed Table XIII, in which London is divided into districts, and the number and proportion of the different forms of fever admitted from each district are given. The area and population of each district are also shown in the table.<sup>1</sup>

<sup>1</sup> These have been copied from the Weekly Returns of the General Board of Health.



TABLE XIII.

	Divisions and Districts of London.	Area in Statute Acres.	Population in 1851.	Total Fever Cases from each district.	Number and per centage of each Fever in each District.							
					TYPHUS.		RELAPSING.		TYPHOID.		FEBRICULA.	
					No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
I. (a.)	Kensington .....	1,942	44,053	74	53	71.62	...	...	16	21.62	5	6.75
" (b.)	Paddington .....	1,277	46,305	14	1	7.14	...	...	12	85.71	1	7.14
" (c.)	Fulham .....	4,155	29,646	29	14	48.27	...	...	8	27.58	7	24.13
II.	Chelsea .....	865	56,538	26	9	34.61	...	3.84	10	38.46	6	23.07
III. (a.)	St. George's, Hanover Sq. ....	581	33,196	9	1	11.11	...	...	7	77.77	1	11.11
" (b.)	Belgravia .....	580	40,034	6	1	16.66	...	...	4	66.66	1	16.66
IV.	Westminster .....	917	65,609	119	92	77.31	...	...	21	17.64	6	5.04
V.	St. Martin's in Fields .....	305	24,640	180	104	57.77	...	3.88	27	15.	42	23.33
VI.	St. James's, Westminster	164	36,406	103	53	51.45	...	.97	35	33.98	14	13.59
	WEST DIVISION .....	10,786	376,427	560	328	58.57	9	1.61	140	25.	83	14.82
VII.	Marylebone .....	1,509	157,696	257	152	59.14	5	1.94	77	29.96	23	8.95
VIII.	Hampstead .....	2,252	11,986	16	4	25.	...	...	10	62.5	2	12.5
IX.	St. Pancras .....	2,716	166,956	503	275	54.67	11	2.18	165	32.8	52	10.33
X.	Islington .....	3,127	95,329	596	237	39.76	16	2.68	252	42.28	91	15.26
XI.	Hackney .....	3,929	58,429	83	20	24.09	2	2.41	53	63.85	8	9.63
	NORTH DIVISION ...	13,533	490,396	1455	688	47.28	34	2.33	557	38.28	176	12.09

XII.	St. Giles's.....	245	54,214	19	8	42-1	...	9	47-36	2	10-52
XIII.	Strand .....	174	44,460	293	195	66-55	3-07	53	18-09	36	12-28
XIV.	Holborn .....	196	46,621	781	443	56-72	21-12	91	11-65	82	10-5
XV.	Clerkenwell.....	380	64,778	365	222	60-82	2-47	95	26-02	39	10-69
XVI.	St. Luke .....	220	54,055	140	116	82-85	...	17	12-15	7	5
XVII to XIX.	City of London .....	723	129,128	744	406	54-57	13-71	133	17-87	103	13-84
	CENTRAL DIVISION ...	1,938	393,256	2342	1390	59-35	12-17	398	17	269	11-49
XX.	Shoreditch .....	646	109,257	33	4	12-12	...	28	84-84	1	3-03
XXI.	Bethnal Green .....	760	90,193	30	12	40	6-66	15	50	1	3-33
XXII.	Whitechapel .....	406	79,759	44	16	36-36	38-63	8	18-18	3	6-82
XXIII.	St. George's in the East..	243	48,376	541	343	63-4	5-36	100	18-48	69	12-75
XXIV. (a)	Limehouse .....	576	54,173	9	2	22-22	...	7	77-77	...	...
" (b)	Mile-End.....	681	56,602	74	56	75-67	...	14	18-92	4	5-4
XXV. (a)	Poplar .....	1,490	28,384	1	...	...	...	1	100	...	...
" (b)	Bow.....	1,428	18,778	6	...	...	...	5	83-33	1	16-66
	EAST DIVISION .....	6,230	485,522	738	433	59-67	6-5	178	24-12	79	10-7

	Divisions and Districts of London.	Area in Statute Acres.	Population in 1851.	Total Fever Cases from each District.	Number and per centage of each Fever in each District.											
					TYPHUS.		RELAPSING.		TYPHOID.		FEBRICULA.					
					No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.				
XXVI.	St. Saviour .....	250	35,731	22	18	81·81	...	...	4	18·18	...	...	...			
XXVII.	St. Olave .....	169	19,375	50	31	62·	8·	7	14·	16·	8	16·	...			
XXVIII.	Bermondsey .....	688	48,128	64	43	67·18	1·56	15	23·44	7·81	5	7·81	...			
XXIX.	St. George, Southwark..	282	51,824	34	27	79·41	8·82	2	5·88	5·88	2	5·88	...			
XXX.	Newington .....	624	64,816	199	80	40·2	10·55	51	25·62	23·61	47	23·61	...			
XXXI.	Lambeth .....	4,015	139,325	593	284	47·89	1·51	190	32·04	18·55	110	18·55	...			
XXXII. } (a., b.) }	Clapham and Wands- worth .....	3,711	25,901	186	67	36·02	3·22	83	44·62	16·12	30	16·12	...			
" (c)	Battersea.....	2,343	10,560	24	3	12·5	...	17	70·83	16·66	4	16·66	...			
" (d)	Putney.....	2,176	5,280	3	1	33·33	...	2	66·66	...	...	...	...			
" (e)	Streatham .....	...	...	6	1	16·66	...	5	83·33	...	...	...	...			
" (f)	Tooting .....	561	2,122	1	1	100·	...	...	...	...	...	...	...			
XXXIII.	Camberwell.....	4,342	54,667	177	62	35·02	10·17	75	42·37	12·43	22	12·43	...			
XXXIV.	Rotherhithe .....	886	17,805	4	...	...	...	2	50·	50·	2	50·	...			
XXXV(a)	Greenwich .....	3,771	66,998	9	4	44·44	...	4	44·44	11·11	1	11·11	...			
" (b)	Woolwich .....	1,596	32,367	2	1	50·	...	1	50·	...	...	...	...			
XXXVI.	Lewisham .....	17,224	34,835	...	...	...	...	...	...	...	...	...	...			
	SOUTH DIVISION.....	45,542	616,635	1374	62	45·34	4·51	458	33·33	16·81	231	16·81	...			
	Beyond London Districts	...	...	51	8	15·7	...	36	70·6	13·73	7	13·73	...			
	Doubtful .....	...	...	108	36	33·33	2·77	53	49·07	14·81	16	14·81	...			
	TOTAL .....	78,029	2,362,236	6628	3506	52·89	6·55	1820	27·46	12·99	861	12·99	...			

The districts, it will be seen, which I have selected are those into which London has been divided under the new "Metropolitan Local Management Act." To each of the districts specified a medical officer of health has been appointed; and I have thought that the information contained in the table might enable these officers to throw some light on the causes of each fever in the respective districts to which they belong, as none can be better acquainted than they with the sanitary condition of these districts. To the attention of these gentlemen, therefore, I shall submit the consideration of the prevailing fevers in each district; and shall confine myself at present to some remarks on one or two individual localities, and to a few general observations on the conclusions to which my investigations have brought me.

In the first place it is obvious that, in some districts, one form of fever is more prevalent than in others. Typhus and relapsing fever only prevail to any extent in certain districts, while typhoid appears to be confined to none. Hence it follows that, in some districts, typhoid is almost the only form of fever met with. The districts in which typhus and relapsing fever have prevailed most, are those which are the most overcrowded, and which are inhabited by the poorest classes of the population. Typhoid again is met with, not only in the districts just alluded to, but also in those which are considered the most favoured in the metropolis. As a general rule, the relative proportion between typhus (together with relapsing fever) and typhoid, diminishes as we proceed from the centre of London towards the suburbs, until at last the two former nearly disappear, and we have mostly the latter.<sup>1</sup> Thus, of the cases admitted from the central district of Holborn, there were of typhus and relapsing fever 608 cases, and only 91 of typhoid; and from the whole

<sup>1</sup> Kensington appears to be an exception to this rule, but the majority of the cases of typhus admitted into the London Fever Hospital from this district were from the workhouse, during the single year 1848.

central division of London there were 1,675 cases of the two former fevers, to 398 of the latter. The predilection of relapsing fever for this part of London was very remarkable. Of the total 441 cases, more than one half came from the central division; and considerably more than one third from the single district of Holborn.

There are certain small courts in the vicinity of Gray's Inn Lane, and other parts of the central division of London, which have long been justly regarded as the hot-beds of epidemic fever. They were noticed as such by Dr. Bateman more than forty years ago;<sup>1</sup> and they still maintain their unenviable reputation. One or two of these may be mentioned. From Pheasant Court, Holborn, there were admitted into the Fever Hospital, during the years 1851 and 1852, sixty-six cases of relapsing fever and eight of typhus; from Tyndall's Buildings, during the same period, thirty-two cases of relapsing fever and ten of typhus; and from Field Lane, in the City of London, in a corresponding period, twenty-three cases of relapsing fever and thirty-nine of typhus. Among other localities for typhus and relapsing fever may be mentioned Gray's Inn Lane and Spread Eagle Court in Holborn; Plum Tree Court, in the city of London; Brill Place and Court, in St. Pancras; Devonshire Street, in Marylebone; Old Gravel Lane in St. George's in the East, and many courts and lanes in Lambeth.

This predominance of typhus and relapsing fever in the overcrowded dwellings of the poor has been a matter of universal observation in all places. In Edinburgh, where there is a greater separation between the dwellings of the rich and of the poor than in almost any city I know, typhus, even in the midst of the greatest epidemics, is for the most part confined to the most wretched closes of the "old town." Dr. Christison even informs us that out of about a hundred instances, in which he had known typhus introduced into the dwellings of the better classes by medical

<sup>1</sup> On 'Contagious Fever,' Lond., 1818.

students who had contracted it by contagion, he was not acquainted with one in which the disease had been propagated.<sup>1</sup>

Typhoid fever, on the other hand, exhibits no such predilection for overcrowded localities. It prevails in the less populous districts equally with the most crowded, and consequently, as we approach the suburban districts of London, the number of cases of typhoid equals or exceeds that of typhus. Thus, of 16 cases from Hampstead, 4 were typhus and 10 typhoid; of 83 cases from Hackney, 22 were typhus or relapsing, 53 typhoid; of 6 cases from Bow, 5 were typhoid and none typhus; and of 177 cases from Camberwell, 80 were typhus or relapsing, 75 typhoid; while of 51 cases admitted from beyond the London districts, 8 were typhus and 36 typhoid.

Of the London districts Paddington and Belgravia may be regarded as two of the least populous, and at the same time as inhabited by the better classes of the community. Now of 6 cases of fever from Belgravia, 4 were typhoid and 1 typhus; and of 14 cases from Paddington, 12 were typhoid and 1 typhus. That typhoid is the prevailing fever in each of these districts is also shown by the cases admitted into their local hospitals. By the published reports of St. George's Hospital,<sup>2</sup> situated in Belgravia, I find that out of 44 fatal cases of fever dissected during three years, there was ulceration of Peyer's patches in 29, and in 5 only were the intestines perfectly healthy. With regard to Paddington, the following table shows the forms of fever admitted into St. Mary's Hospital during the last five years from that parish. From this table, for which I am indebted to the kindness of Dr. Sanderson, the medical registrar to the hospital, all the cases of fever admitted from other districts, except Paddington, have been excluded.

<sup>1</sup> 'Edin. Monthly Journ. of Med. Sc.,' May, 1850, p. 267.

<sup>2</sup> Vide 'Brit. For. Med.-Chir. Rev.,' 1855-6.

TABLE XIV.

	1853.	1854.	1855.	1856.	1857.	Total.
Typhus.....	...	1	1 <sup>1</sup>	2	1	5
Typhoid .....	15	20	12	14	14	75
Febricula .....	1	6	5	3	5	20
Doubtful cases...	11 <sup>1</sup>	1	1	1	3	17
Total .....	27	28	19	20	23	117

It appears from this table, then, that during five years, 75 cases of typhoid fever have been admitted from Paddington into St. Mary's Hospital, and only 5 of typhus. Also, in the year 1856, only 2 cases of typhus were admitted, while in the same year, there were admitted into the London Fever Hospital, 1062 cases.

Shoreditch is another district where typhoid fever appears to be most prevalent; yet its population is considerable, and it is certainly not one of the most aristocratic quarters of the Metropolis. Of 33 cases of fever admitted from this district, 28 were typhoid, and only 4 typhus. Dr. Barnes, also, who has been medical officer of health of the district for two years writes to me "the form of fever I have seen is always typhoid." I have reason to believe, however, that this district does not escape epidemics of typhus, and the explanation why such a small proportion of typhus cases should have been admitted into the Fever Hospital probably consists in the fact that the majority of the pauper fever cases have been treated in a fever hospital attached to the workhouse, and only those sent to the Fever Hospital who were able to pay for admission. Still the prevalence of typhoid fever in this district is remarkable, and, as will shortly be shown, there appear to be local causes sufficient to account for it.

<sup>1</sup> Of the majority of the cases marked "doubtful," no records have been preserved.

In connection with the subject of locality, I may also mention, that a careful study of a great number of recorded outbreaks of fever in country towns and villages throughout England, has convinced me that these outbreaks are almost invariably typhoid. It is also a fact worthy of notice, that several instances have come under my own observation of typhoid fever making its appearance in an isolated house in the country, in a family living in easy circumstances without any traceable source of contagion; of its attacking several individuals, and then disappearing without spreading beyond that house. Dr. Bartlett, also makes similar observations, as the results of his experience in America.<sup>1</sup> On the other hand, I am acquainted with no instances of typhus or relapsing fever originating in this way.

Such cases as those just alluded to point to the probability of some local cause being capable of generating typhoid. This probability is still further confirmed by such facts as the following. It not unfrequently happens, that isolated cases of typhoid fever originate in the *same house* year after year, quite independently of any prevalence or absence of epidemic typhoid in the neighbourhood. I have come across several curious instances of this sort, in going over the list of residences of the cases admitted during the ten years into the Fever Hospital. One of the most remarkable is the following. Six cases of typhoid fever have been admitted, during the period above mentioned, from a single house in High Street, Shoreditch; one, in June 1849; one in October, 1851; one in February, 1854; one in November, 1855; one in November, 1856; and a sixth in July, 1857. There are of course many instances of a number of cases of typhus, coming from the same house within a few days, weeks, or even months of each other;<sup>2</sup> but I have met with no instance in which cases were

<sup>1</sup> Bartlett, *op. cit.*, p. 90.

<sup>2</sup> For example, in 1857, seven of one family were admitted with typhus on the same day. Their ages varied from 8 to 50, and all had well-marked mulberry rash.



admitted at lengthened intervals from the same house, in the manner just specified with regard to typhoid fever.

My investigations also, quite bear out the results arrived at by Dr. Jenner, in an able paper recorded in the thirty-third volume of the 'Transactions of the Royal Medical and Chirurgical Society,' as regards the origin of typhus and typhoid fever from different foci of infection. In no single instance during the ten years, have I met with a case of typhus and typhoid fever admitted from the same family or even from the same house, except (and the exceptions have been only one or two) after the lapse of many months or even years.<sup>1</sup> I am aware that this is contrary to the asserted experience of some physicians, who would have us believe that they are frequently observing both these forms of fever simultaneously in the same family; but I am not acquainted with any observations of this nature, sufficiently complete or authentic in their details to warrant their being relied on.

On the other hand, I am convinced, that the same law does not hold good with regard to typhus and relapsing fever. We have already found that both these forms frequently coexist as epidemics; so also they may occur simultaneously in the same localities, houses, and even families. Instances of this nature I know have occurred to the Scotch physicians, who have had such ample experience in both fevers;<sup>2</sup> and they

<sup>1</sup> To this statement there were two exceptions, but both of these tended to confirm the rule laid down rather than otherwise. One of these will be found in Dr. Jenner's paper above alluded to. The circumstances of the other were as follows. In November and December, 1851, four servants were admitted from an hotel in the Haymarket, all with typhoid, and in the following January, a servant was admitted from the same house with typhus. This typhus patient, however, was one of the same four who had been admitted in the previous year with typhoid. She had only left the Fever Hospital about ten days previous to her re-admission; and she had no doubt contracted typhus there during her convalescence.

<sup>2</sup> Dr. Alison, speaking of the Edinburgh Epidemic of 1843, remarks that he had seen two cases of typhus, "with the characteristic eruption,

are not wanting in the records of the London Fever Hospital.

Many of the cases entered as "Febricula" have come from the same houses as one of the other forms of fever; but more especially from the houses furnishing relapsing and typhus cases.

Perhaps I cannot better illustrate the remarks just made, than by the following tabular arrangement of the admissions from certain limited districts during the year 1852. The numbers are those of the houses in the different courts or streets; their frequency of repetition denotes the number of cases. (R.S. means Ragged School.)

	TYPHUS.	RELAPSING.	TYPHOID.	FEBRICULA.
Pheasant Court, Holborn, 1852.	March, 3, 3, 7. April, 7, 7.	April, 3, 6. May, 6. June, 7, 3. July, 6, 7.	.....	March, 2. April, 7. May, 6.
Tyndall's Buildings, Holborn, 1852.	Jan., 14. Feb., 9. March, 1, 9, 5. April, 9, 14, 9. June, 14.	Feb., 11, 17, 17. March, 6, 6, 6, 17, 6. May, 12. July, 6.	.....	March, 14. April, 9, 9, 9, 6, 9. July, 1.
Field Lane, City, 1852.	March, R.S., R.S., R.S., R.S., R.S., R.S., R.S., R.S. April, R.S., R.S., R.S., R.S., R.S., R.S., R.S., R.S. May, 27. June, 27, 27. July, R.S., R.S. Oct., 27. Nov., R.S.	Jan., R.S., R.S., Feb., R.S., R.S., R.S., R.S., R.S., R.S., R.S., R.S., March, R.S., R.S. April, R.S., May, R.S.	.....	April, R.S. May, R.S., R.S. June, 26. Dec., R.S.
High Street, Shoreditch, 1852.	May, 84.	.....	August, 61, 61, 152, 178. Sep., 152.	.....
Paddington, 1851.	.....	.....	Six cases from different houses.	.....

brought from the same room in which a succession of relapsing cases had occurred at the same time." ('Edin. Monthly Journ. of Med. Sc.,' vol. iv, p. 253.) Dr. Henderson's observations, however, of the same epidemic were of an opposite nature.

VIII. *Overcrowding, with Deficient Ventilation and Destitution.*

After what has already been said under the head of locality, it would be superfluous to add much in proof of the influence of overcrowding on the prevalence of typhus and relapsing fever.

It is a fact, which is universally admitted, that overcrowding of human beings has an immense influence over the propagation of typhus by contagion;<sup>1</sup> but there are some, who maintain that the specific poison must first be introduced from without, and that it cannot in this way be generated *de novo*; among whom I may mention more particularly the name of Bancroft,<sup>2</sup> whose opinions have more recently been endorsed by Dr. Watson.<sup>3</sup> The arguments, however, which have been brought forward in support of this view, are for the most part of a negative character; and it is not a little curious to observe, that Bancroft has endeavoured to contort the same facts in his favour, which other writers have adduced to show that typhus was not contagious, but *always* originated from impure air. In such a question, a few positive facts are worth a thousand arguments. Now, there are many instances on record, of typhus originating in jails, hospitals, armies, and transport ships, in which every source of contagion would seem to have been next to impossible.

Any one who will take the trouble of studying the records of the "black assizes," held at Cambridge in 1522, at Oxford in 1577, at Exeter in 1586, at Taunton in 1730, at Launceston in 1742, and at the Old Bailey in 1750, must, I think, be convinced, that the "jail fever," so far from being introduced from without, was generated *de novo* by

<sup>1</sup> See Graves's 'Clinical Lectures,' vol. i, p. 92.

'Essay on the Yellow Fever, and on Febrile Contagion,' 1811.

<sup>3</sup> 'Lectures,' fourth ed., 1857, vol. ii, p. 831.

the overcrowding of the prisoners, and by them was communicated to all who came near them.<sup>1</sup>

The distinguished writers on camp and jail fevers, during the last century, show, by their descriptions, that this disease was what we now called typhus, while they were all of opinion that overcrowding of itself could generate it.

Sir John Pringle, in his work on 'The Diseases of the Army,' makes the following statement, as the result of his extensive and acute observations: "The hospitals of an army when crowded with sick, or at any time when the air is confined, produce a fever of a malignant kind, often mortal. I have observed the same sort to arise in full and crowded barracks, and in transport ships, when filled beyond a due number, and detained by contrary winds, or when the men have been long at sea, under close hatches, in stormy weather." Pringle's description of this fever, including that of the eruption, shows clearly that he meant typhus.

Lind, also, notwithstanding his belief that typhus might in most cases be traced to contagion, has given several instances in which, without any traceable contagion, it originated in transport ships during long voyages, owing to overcrowding, and to the hatchways being kept down;<sup>2</sup> and the typhus which raged among the troops landed in England after the battle of Corunna, was attributed to a similar cause.<sup>3</sup>

But again, what other cause can be assigned for that murderous epidemic of typhus, which broke out in the ships in which the unfortunate French prisoners were confined at Plymouth, in the spring of 1810? Here there were no sources of contagion. The seclusion of the prisoners could hardly have been more complete, and the disease did not appear among them until after they had been confined for a lengthened period, and crowded together to such a degree,

<sup>1</sup> In a paper published in the current volume of the 'Edinburgh Medical Journal' (vol. iv), I have given an account of these six "black assizes," and of many other outbreaks of typhus.

<sup>2</sup> 'Two Papers on Fevers and Infection,' Lond., 1763.

<sup>3</sup> 'Edin. Med. and Surg. Journ.,' vol. v, p. 402.

that each individual had barely a space measuring five feet by two to lie upon; while the air of the deck, where they remained for thirteen hours out of the twenty-four, was so thick that a lighted candle appeared in it as through a thick mist. Certainly there was some justice in the epithet of "floating tombs" bestowed on these ships by the French.<sup>1</sup>

In the winter of 1829-30, true typhus raged with much severity on board the French convict hulks at Toulon. The disease, by no means a common one in France, was unknown at the time in the town of Toulon, there not being a single case even among the workmen in the part. Overcrowding and deficient ventilation were the causes to which it was attributed.<sup>2</sup>

For numerous other illustrations bearing upon this point, I would refer to the elaborate treatise of Gaultier de Claubry;<sup>3</sup> to a paper by Dr. Peebles;<sup>4</sup> and to Dr. A. P. Stewart's memoir already quoted. I shall conclude with one other, the circumstances of which are in the memory of all. After the capture of Sebastopol, typhus ravaged the French and Russian armies with a fury which is described as unknown since the great epidemics of the imperial wars. We are told that this fever was attributed to two causes, overcrowding and a scorbutic diathesis; and one celebrated Russian physician asserted that, "in all cases overcrowding must be recognised, if not as the unique, yet as the essential and most active cause, of the epidemic."<sup>5</sup> Jacquot, also, after his extensive observations among the French troops, remarks: "Le typhus nait toujours de l'encombrement, de la concentration des masses."—"On peut faire naitre le typhus à volonté, pour ainsi dire."<sup>6</sup>

<sup>1</sup> Gaultier de Claubry, 'Analogies et différences entre le Typhus et la Fievre typhoide,' Paris, 1838.

<sup>2</sup> 'Archiv. gén. de Méd.', sér. i, tom. xxii, p. 265.

<sup>3</sup> Op. cit.

<sup>4</sup> 'Edin. Med. and Surg. Journal,' vol. xlv, p. 356.

<sup>5</sup> 'Brit. and For. Med.-Chir. Rev.,' July, 1857, p. 34.

<sup>6</sup> Felix Jacquot, 'Du Typhus de l'Armée d'Orient,' Paris, 1858, p. 305.

If typhus can only arise from a specific contagion, how are we to account for its origin in troop-ships, prisons, and armies, under the circumstances above mentioned, unless we are to believe, what seems impossible, that the specific poison of the disease is always and everywhere present, ready to manifest itself whenever, through the unwitting instrumentality of man, the conditions favorable to its propagation are presented to it. I cannot support the view which I advocate by a greater authority than that of one, whose opinion on such a matter must always be regarded with veneration and respect. I allude to Dr. Alison, of Edinburgh, who, in speaking of foul air and destitution in regard to typhus, says that it is highly probable that these causes are adequate not only to the extensive diffusion, but even to the generation of the disease, which is afterwards propagated by contagion.<sup>1</sup>

Destitution is a most powerful predisposing cause of typhus, as has already been shown. Dr. Peebles has collected a number of instances of epidemics of typhus in Italy, immediately following great famines;<sup>2</sup> and it is well known that most of the great epidemics which have devastated Ireland, and spread to Britain, have supervened upon seasons of scarcity and want; such, for example, as the epidemics of 1741, 1803, 1817, 1827, and 1847.<sup>3</sup> In Dublin, in 1847, it was observed that those first attacked with typhus were those who had been reduced by insufficient food; while in many instances the fever first set in immediately on recovery from the effects of starvation.<sup>4</sup>

After a careful study of numerous records of fever, I feel perfectly convinced that typhus may be generated *de novo*

<sup>1</sup> 'Pathology and Practice of Medicine,' 1844, p. 429.

<sup>2</sup> 'Edin. Med. and Surg. Journ.,' vol. xlv, p. 367.

<sup>3</sup> See Barker and Cheyne's 'Reports,' vol. i, p. 17. Dr. Harty, *op. cit.*, p. 186. Bateman on 'Contagious Fever,' p. 8. Dr. Milroy, 'Journ. of Pub. Health,' vol. ii, p. 62. And Dr. Christison, in 'Edin. Med. Journ.,' Jan., 1858, p. 592.

<sup>4</sup> 'Dublin Quarterly Journal,' new ser., vol. viii, p. 3.

through the contamination of a confined portion of air by the pulmonary and cutaneous exhalations of numerous individuals; that the influence of this contamination is most marked when the body has been debilitated by want or previous disease; and that, consequently, seasons of famine have generally been followed by great epidemics of typhus among the poor.

Mere overcrowding for a limited period will not generate the poison of typhus. All experience goes to show, that a considerable time is necessary for its production. Hence typhus was not generated in the black hole of Calcutta in 1756, or on board the Irish steamer 'Londonderry' in 1848.

Relapsing fever never occurs in the epidemic form, except as the companion of typhus, and appears to originate from similar causes.

I am not, however, acquainted with any authenticated facts, to prove the influence of the conditions just enumerated over the prevalence of typhoid fever. We have found that it prevails among the wealthy, as well as among the poor; in country villages, as well as in the heart of populous cities. Every one who has paid any attention to the subject is well cognisant of such facts. Louis, the great French authority on typhoid fever, observes, that densely inhabited places cannot be regarded as producing it. Only one in eighteen of the patients, whose cases are given in his work, had been so circumstanced. We must therefore seek for the causes of its origin elsewhere. What these causes are Louis does not attempt to explain. Dr. Stewart remarks, in reference to them, "all is vague and uncertain;" and Dr. Tweedie, in the Lumleian lectures, delivered at the Royal College of Physicians during the present month, spoke of them as obscure and unknown. (March, 1858.) I have already shown that the causes of typhoid, whatever they may be, differ from those of typhus, in being for the most part of a very limited and circumscribed character. What these causes really are, I shall endeavour to explain under the following head.

IX. *Putrid Emanations from decomposing organic matter in Drains, Cesspools, Churchyards, &c.; and Organic Impurities in Drinking-water.*

Many of the older medical writers have recorded cases of fever as originating from exposure to the effluvia from decomposing organic matter;<sup>1</sup> but, generally, the symptoms of the fever have not been detailed with sufficient clearness to enable us to decide on what was its nature. Within the last ten or twelve years, however, many outbreaks of fever attributed to such a cause have been reported, while the symptoms of the fever have been recorded with such minuteness as to render its nature unmistakable. I find, on careful examination, that in every instance where this has been the case the fever has been typhoid; in none is there the slightest indication that it was typhus or relapsing. A brief *résumé* of the evidence bearing upon this point may be of service.

Many years ago, MM. Gaspard and Majendie<sup>2</sup> showed that, by injecting putrid substances into the veins of animals, symptoms very similar to those of typhoid fever might be induced; and that, after death, the intestines were much congested; and more recently the same results have been obtained by M. D'Arçet, by injecting into the veins putrid pus.<sup>3</sup> Louis,<sup>4</sup> however, denies that in Gaspard's cases the characteristic lesions of typhoid fever were present; but he himself mentions the case of a man who, for six months, had been in the habit of drinking large quantities of a very putrid infusion of straw, for the cure of a gleet. At the end of this time he died, with symptoms of typhoid fever; and, after death, Peyer's patches were found enlarged and ulcerated. Louis seems to attach great importance to this

<sup>1</sup> A collection of such cases will be found in Sir John Pringle's 'Diseases of the Army,' pp. 324, 328.

<sup>2</sup> 'Journal de Physiologie,' vol. ii, p. 1, and vol. iii, p. 81.

<sup>3</sup> 'Recherches sur les Abscès multiples, et sur les Accidents, qu'amène la présence du Pus dans la Système Vasculaire,' par Felix D'Arçet, M.D., Paris, 1842.

<sup>4</sup> Louis, op. cit., tom. ii, p. 361.



case, although he is inclined to regard the disease and its alleged cause as mere coincidences.

In the first volume of the 'Transactions of the French Royal Academy of Medicine,' an outbreak of fever, which occurred in 1749 among the girls of the 'Maison d'Enfant Jesus' is recorded. It was generally admitted to have resulted from the disgusting effluvia which proceeded from an adjoining field, in which a number of cattle had been buried, scarcely beneath the surface of the earth. That the fever was typhoid there seems little doubt from the following symptoms which characterised it, viz., fever, with great prostration, tympanites, abdominal pain, diarrhoea, and melæna. Thirty of the girls were seized all at once, shortly after the interment of the cattle.<sup>1</sup>

In the 'Gazette Médicale' for 1834, M. Ruef gives the details of an epidemic of typhoid fever, which occurred at Bischofsheim, in the department of the Lower Rhine, during the autumn of 1832. The disease first showed itself without suspicion of being transmitted in the upper, best aired, and, as is expressly said, "the most healthy part of the village," which is situated partly on, and partly at the foot of, a rising ground, and it spread successively to the middle and lower quarters. The disease was attributed to two causes: first to the cemetery which was situated in the centre of the village, and in the immediate vicinity of which the greatest number of cases occurred; and secondly, to the pipes conveying the water to two fountains, one in the centre of the village, and the other at the bottom of the hill. These pipes were of wood, and passed at but little depth below the cesspools of the place.

Dr. Southwood Smith, in evidence given in 1843, before the Health of Towns Commission, stated: "I have been struck with the number of cases of fever in houses opposite gully holes." He adds, that servants were being continually admitted into the London Fever Hospital from houses of the upper class so situated; and that he had generally found that only they who had slept on the ground-

<sup>1</sup> M. de Lassone, 'Mém. de la Soc. Roy. de Méd.,' tom. i, p. 97.

floor were attacked.<sup>1</sup> Although Dr. Smith says nothing as to the nature of the fever, yet, from what has already appeared in the course of this paper, there can be little doubt that the cases he alluded to were typhoid. Out of the total servants admitted from houses of the better class into the London Fever Hospital, during ten years, there were 118 cases of typhoid to 13 of typhus.

On the 14th of July, 1845, M. Ançelon, a French physician, communicated to the Academy of Sciences at Paris some remarkable facts connected with epidemics of typhoid fever observed in the commune of Guermange, in the duchy of Lorraine. Many years before, typhoid fever had been constantly endemic in this place, making its appearance every year during the hot season; but for twenty-five years, it had entirely disappeared from the northern part of the commune; and its disappearance had been simultaneous with the suppression of a stagnant pond in that locality. At the southern part of the commune, however, there had been epidemics of typhoid fever every third year, viz., in 1830-33-36-39 and 42, always in the hot weather. Now, at this part of the commune there was a large lake, called the "Indre-basse," which, every third year, was emptied and cultivated, and afterwards the water was allowed to collect again for two years more. The appearance of the epidemics coincided with the second year, in which the lake was full of water, and the author endeavoured to account for the phenomenon by the action of the heat and moisture upon an immense quantity of animal and vegetable débris, which, during the two years, had been collecting upon the banks of the lake. The houses also in the commune were not sufficiently elevated, damp, and badly drained.<sup>2</sup>

Mr. Shearman has given an account of an outbreak of fever which occurred at Rotherham in 1845, and which, from the symptoms, was undoubtedly typhoid. The fever

<sup>1</sup> 'Report of Health of Towns Commission,' 1844, vol. i, p. 22.

<sup>2</sup> 'Compt. Rend. de l'Acad. des Sciences,' tom. xxi, p. 158, "Notes sur les maladies endemiques périodiquement développées par les émanations de l'étang de l'Indre Basse."

was attributed to the imperfect drainage and deficient supply of water. It commenced in July, and for several months before, the drains had been open for repair, and had emitted a suffocating stench. Moreover, in the overcrowded churchyard, situated in the centre of the village, bodies were often exposed half decayed, and frequently large quantities of a horridly-smelling liquid were taken out of a newly-made grave and poured down into the street-sewers. In July, 1841, an outbreak of the same fever had occurred in the vicinity of this churchyard, immediately after the opening of fifty graves. The fever occurred in the same localities where cholera had prevailed in 1832.<sup>1</sup>

A remarkable instance of a limited outbreak of fever was recorded by Dr. Christison in 1846. It occurred in an isolated farm-house in the thinly-peopled county of Peebles, N.B. Every one of the fifteen residents of the house were seized with fever, and three died. Many also of the servants who worked during the day at the farm were also affected, but none of them communicated the disease to their families, who did not visit the farm. The only explanation of this outbreak—which, however, Dr. Christison considered satisfactory—was that “the drains and sewers were found all closed up, and obstructed with the accumulated filth proceeding from the privies and farm-yard,” the effluvia from which were very offensive. In this fever there was no diarrhœa nor abdominal tenderness; but both these symptoms may be absent in typhoid fever, and Dr. Christison observes that its “want of resemblance to the habitudes of ordinary epidemic typhus struck the attention as something very remarkable;” and that “the leading symptoms were those of great gastro-intestinal derangement,” so much so, that suspicions of poisoning were entertained. Moreover, the lengthened duration of the cases, the clearness of the intellect, and the marked absence of prostration, oppression, and delirium, seem to leave little doubt that the fever was typhoid. This affection, it should be noted, had not at that period attracted much attention in this country.<sup>2</sup>

<sup>1</sup> ‘Lond. Med. Gazette,’ vol. xxvii, p. 370.

<sup>2</sup> ‘Edin. Monthly Journal,’ vol. vii, p. 1.

During the autumn of 1846, numerous outbreaks of undoubted typhoid fever were recorded as occurring in many small towns and villages throughout England. The summer and autumn of this year were remarkable for their excessive heat, which favoured the decomposition of organic matter in open drains and privies. In every one of the published accounts of these outbreaks distinct mention is made of this circumstance. Dr. Sibson, in his notice of the outbreak at Nottingham, says that "the infected districts were offensive to the smell."<sup>1</sup> Mr. Taylor, in his account of the fever at Old Lenton, says that there were stagnant pools loaded with decaying organic matter, and sending up the most filthy emanations; and that at New Lenton, where the fever also prevailed, "there were nuisances innumerable—stagnant pools of water, privies pouring out their offensive and bad air."<sup>2</sup> Mr. Alfred Turner writes that at Minchinhampton the privies at the back of the houses in which many of the fever cases occurred "exhaled an intolerable stench."<sup>3</sup> With regard to this last place, also, another circumstance deserves to be mentioned. In the middle of the hot weather about a thousand cartloads of earth had been taken from the churchyard, and scattered as manure over the neighbouring fields and gardens. The fever first appeared immediately after this; and, among others, the rector's wife, daughter, and gardener died of it. Mr. Daniel Smith, who was then practising at Minchinhampton, informs me that he has no doubt in his own mind that this was the cause of the fever. Mr. Smith also tells me that, during the same year, he knew of several instances of typhoid fever, originating in isolated houses, in some of the most elevated districts of Gloucestershire, and that he invariably succeeded in accounting for them by some glaring defect in the drainage or cesspools. Towards the end of this same autumn, an unusual number of typhoid cases were

<sup>1</sup> 'Lond. Med. Gaz.,' vol. xxxix, p. 59.

<sup>2</sup> 'Med. Times,' vol. xv, p. 159; and 'Med. Gaz.,' vol. xxxviii, p. 727.

<sup>3</sup> 'Lond. Med. Gaz.,' vol. xlii, p. 157. See also the 'Lancet' for Dec. 25th, 1846.

observed in Edinburgh and Glasgow, along with the typhus at that time epidemic. It is important to notice that typhoid was at the same time very prevalent in the country towns of England, without any typhus.

About Easter, 1848, a formidable outbreak of fever occurred in the Westminster School and Abbey Cloisters; and for some days there was a perfect panic in the neighbourhood respecting what was called the "Westminster Fever." Within a little more than eleven days it affected thirty-six persons, all of the better class; and in three instances it proved fatal. Shortly before its first appearance, "there occurred two or three days of peculiarly hot weather," and a disagreeable stench, so powerful as to induce nausea, was complained of in the houses in question. It was found that the disease followed very exactly in its course the line of a foul and neglected sewer, in which fecal matter had been accumulating for years without any exit, and which communicated by direct openings with the drains of all the houses in which it occurred. The *only* exception was that of several boys who lived in a house at a little distance, but who were in the habit of playing every day in a yard, in which there were gully-holes opening into the foul drain. The Metropolitan Sanitary Commission gave it as their decided opinion, that the epidemic "arose from the bad state of the sewers and drains of the precinct, and especially from the foul condition of the large sewer described."<sup>1</sup> Dr. Watson also expresses his belief, that the "Westminster Fever" was due to the effluvia from this drain; but he does not consider that the cases were continued fever at all.<sup>2</sup> Dr. Watson, however, only saw one of the cases; and it is to be remembered that he expressed the above opinion before he recognised typhoid fever as distinct from typhus. Dr. Todd, Dr. Fincham, and Mr. McCann were the other medical men consulted. Dr. Todd, who saw five or six of the cases, tells me that they were unquestionably examples

<sup>1</sup> 'Third Report of the Metropolitan Sanitary Commission,' 1848.

<sup>2</sup> 'Lectures,' third ed., vol. ii, p. 759, and fourth ed. 1857, vol. ii, p. 834.

of typhoid. Dr. Fincham, who, by the way, also saw the case alluded to by Dr. Watson, writes to me that all the cases which he saw "were unquestionably examples of typhoid fever. In all, the bowel complication (the diarrhoea, &c.) was well marked. I believe that every case that occurred exhibited the same symptoms." The same opinion has been expressed to me by Mr. McCann.

Towards the end of the autumn of 1852, a fever broke out at Croydon, which attracted great attention, and was made the subject of various official reports by the Board of Health. That this fever was typhoid, is clearly shown by all the accounts of it which appeared; and also by the expressed opinion of a committee of the Epidemiological Society, consisting of Drs. A. P. Stewart, Jenner, and Sankey. Five cases, moreover, were admitted at this time into the London Fever Hospital, from Croydon: all were typhoid. Dr. Arnott and Mr. Page, C.E., in their report, stated, as their conviction, that the want of proper precautions, during the excavation of the new works connected with the sewerage, had been influential in producing the disease. Numerous instances were mentioned, in which the disease immediately followed exposure to the fetid emanations liberated during the opening and emptying of cesspools, the cleansing of old drains and open ditches, and to the foul gases which were forced into the houses when any obstruction took place in the drain-pipes. Mr. Carpenter, of Croydon, has adduced facts, which render it highly probable that, in many cases, the fever was owing to the contamination of the drinking-water in the wells, from the disturbance of the drains; and the same view has been ably advocated by Dr. Snow.<sup>1</sup>

Dr. Beadle has described a fever which broke out at Tewkesbury, in August, 1853. His description leaves no doubt that it was typhoid. Many of the houses in which

<sup>1</sup> 'Board of Health Reports.' 'Lancet,' 1853, vol. i, p. 536, and vol. ii p. 81. 'Association Journal,' vol. ii, p. 900. 'Snow on Cholera,' p. 129.

the cases occurred were carefully examined, and were invariably found to contain nuisances of the most gross description. A clergyman who was present at the inspection of one of them exclaimed, that it "breathed out typhus."<sup>1</sup>

On April 2d, 1855, Dr. Camps communicated to the Epidemiological Society an account of a very remarkable outbreak of typhoid fever, which had occurred at Cowbridge, in Wales, in November, 1853. Two balls had been held at the hotel of this town, and had been attended by about 140 persons, from all parts of the surrounding country. Shortly after, many of these persons were seized with fever, presenting all the symptoms of typhoid, and about eight died. This fever was not prevalent at the time, and it only attacked those who had attended the balls, some of whom were not taken ill until after their return to their homes in Devon and Somerset. An inspection of the hotel was made by order of the local authorities; and it turned out, that the supper-room was merely a temporary transformation of a loft over a seven-stalled stable; and that the passage between it and the ball-room was built over a large tank, which collected the water from the roof of the house.<sup>2</sup> In this case, also, there were suspicions of poisoning.

At the same meeting of the Epidemiological Society, Dr. Brown read a paper on the prevalence of typhoid fever at Rochester and Stroud, which he attributed to bad drainage. Typhoid, in fact, he considered as nothing else than "night-soil fever;" and he thought that every instance of it might be traced to such an origin.<sup>3</sup>

Dr. Routh mentions an instance in which typhoid fever broke out in a house at Hastings, where at the time the disease was unknown. Six persons in the house were attacked. "The origin of the disease was traced to a direct communication between the cistern of the water

<sup>1</sup> 'Association Journal,' 1853, p. 793.

<sup>2</sup> "Trans. Epid. Soc.," in second vol. of 'Sanitary Review.'

<sup>3</sup> 'Med. Times and Gazette, vol. xxxi, p. 447.

drunk by the inmates and the pipe from the water-closet." The ventilation of the house was perfect.<sup>1</sup>

In October, 1856, typhoid fever made its appearance in the Clergy Orphan School, at St. John's Wood. The school had only just reopened after the holidays. Nineteen of the pupils were taken ill within thirty-six hours. The drains of the building had been taken up for repairs during the holidays; and a "close, damp, oppressive" atmosphere was observed in the house at the time the outbreak commenced.<sup>2</sup>

In the spring, 1857, a number of strangers came to reside at the National Hotel, Washington, in order to be present at the inauguration of Mr. Buchanan as President of the United States. A large number of them were seized almost at the same time with typhoid fever, including the President elect himself. Rumours were rife that they had all been poisoned; at first it was said with arsenic, for some political purpose; and then by copper, from the culinary utensils. A rigorous investigation ensued; and the result was, that both the committee appointed for this purpose and all the medical attendants coincided in the belief, that the disease was due to noxious exhalations from a sewer. At one part of the building there was a direct opening into this sewer, and through this a strong current of fetid air was distinctly perceptible. The fever first appeared after three very warm days, during one of which the rain fell in torrents. The sudden rise of the river Potomac, into which the sewer opened, was thought to have driven back the noxious vapours through the gully-hole.<sup>3</sup>

In the 'Weekly Return of the Health of the Metropolis,' published by the Board of Health, for October 24th, 1857, the following fact is communicated by Dr. Todd: "One day last week, I saw in a *suburban* district four cases of

<sup>1</sup> 'Assoc. Journ.,' 1856, p. 763.

<sup>2</sup> 'Lancet,' Nov. 15th, 1856.

<sup>3</sup> 'Boston Medical and Surgical Journal,' vol. lvi, pp. 305, 371, 422. New York Journ. of Med., new ser., vol. iii, p. 90.



typhoid fever in one house; and of these, one had already ended fatally. Close by were the cuttings of a new railway, which had opened into a large drain." Dr. Todd also informs me, that not long ago he was called to see some cases of typhoid fever at Thames Ditton, a country village fourteen miles from London. Two servants and two young ladies had been seized with it, and one of the former had died. At the bottom of the garden, behind the house, was an open drain, and for some time the wind had been blowing from this in the direction of the house. On another occasion, Dr. Todd saw a gentleman with typhoid fever at Wareham, who afterwards died. At the time he was taken ill the drains in his house were undergoing repairs.

Out of 65 cases of fever, recorded by Dr. Jenner, in only two is there any mention made of the effluvia from drains as a possible cause. Both of these were typhoid. In Case 25 the patient had been taken ill a few hours after working in a cellar, where he had "observed a most offensive odour;" and the house from which Case 26 came, Dr. Jenner found, from personal inspection, to be filthy and offensive, the inhabitants complaining bitterly of the "offensive sewer." Several other cases had occurred in this same house.<sup>1</sup>

According to Dr. Peacock's experience, typhoid fever generally arises "in persons living or working in low, ill-drained localities or houses, and especially in persons working in under-ground cellars, or in the sewers, or in damp situations, near the bank of rivers or canals."<sup>2</sup>

The cases admitted into the London Fever Hospital furnish many examples of typhoid fever, traceable to such causes as those we have been considering.

In November, 1851, a porter and three housemaids were admitted with typhoid fever from a hotel in the Haymarket. The proprietor of the hotel informs me, that the drains in the house were at that time very defective, so much so as to be often offensive. They were shortly after thoroughly

<sup>1</sup> 'Med. Times and Gaz.,' vol. xxi, p. 235.

<sup>2</sup> "Lectures on Fever," 'Med. Times and Gaz.,' 1856.

repaired. The servants slept on the ground-floor, below the level of the street.

Several cases of typhoid fever have been admitted, at long intervals, both into St. Mary's and the Fever Hospitals, from Brooks Mews, Paddington. The houses are built over the course of a large drain, and several of them are cowsheds.

Some years ago, a number of servants were admitted with typhoid fever, both into St. Mary's and the Fever Hospitals, from several of the best houses in Oxford Square and Hyde Park Square. I find that there are gully holes, and that the sewers terminate in *cul de sacs* opposite those very houses which furnished the cases; and that, at the period in question, a quantity of sewage had accumulated in these *cul de sacs*, and that there was a "back vent" from the sewers into the houses.

During 1857, six policemen were admitted into the Fever Hospital from the Peckam Police Station, with typhoid fever: 3 in June, 1 in July, 1 in August, and 1 in September. On inquiry, it was stated that there was no defect in the drainage of the building. The men, however, affirmed that they had often complained of dreadful odours in the room in which they sat. I accordingly applied to Dr. Bristowe, the Officer of Health for the district, to have the building carefully examined. The result of this examination was the discovery that a water-closet on the ground-floor emptied itself, not into the main drain, but into an old well, immediately underneath the passage adjoining the room in question. Here an accumulation of upwards of ten feet of soil had taken place; and the top of the well was merely covered by the flagstones of the passage.

In the beginning of the present month (March, 1858), a mother, with her three children, was admitted with typhoid fever, into the Middlesex Hospital, under Dr. A. P. Stewart. Dr. Stewart and myself visited the house in Dudley Street, Soho, from which they had come. The family had resided in two moderately sized rooms on the street floor. On entering the back room in which they had slept, we were both struck with an overpowering smell; and on going down

stairs, we found that immediately below the bedroom there was a large dust-bin, in which the refuse of all the residents in the house had been accumulating for months; 2d, a water-closet, of which the handle by which the water was let on had been broken a month before; 3d, the water-cistern of the house without any cover; and lastly, we ascertained that a fortnight before, the drain by which the water-closet communicated with the main sewer had been taken up for repairs.

The records of St. Mary's Hospital show that typhoid fever is very common in those streets which are in the immediate vicinity of the Paddington Canal Basin, concerning which I extract the following from Dr. Sanderson's 'Sanitary Report:' "The canal basin may be described as a stagnant fetid pool; its water contains a large quantity of animal and other organic impurities, and from its surface every breeze carries noxious emanations. It receives the offensive drainage from the slop-yards, lay-stalls, and dust-wharves on the banks, and serves as a common cesspool to the numerous inhabitants of the barges. In the dust-wharves just mentioned the refuse of a large portion of the metropolis is collected."

Lastly, we have found that many cases of typhoid fever have been admitted into the Fever Hospital from Shoreditch. Dr. Barnes, in his sanitary report for that district, informs us that the whole surface-soil is composed of foul earth, which he calls the "pest-stratum," and which varies in thickness from one to sixteen feet. "This soil is sodden with fecal matter—the soakage of cesspools; and more or less contamination from this and other sources must necessarily reach the wells;" while many parts of the district are badly drained.

The array of evidence which has been brought forward, in my opinion, demonstrates, as clearly as can be, that typhoid fever is often, if not always, generated by the putrid emanations from drains and other sources, or by decomposing organic matter in drinking-water.<sup>1</sup> If this view be

<sup>1</sup> Since writing the above, I find that Dr. W. Budd, of Bristol, has long been of opinion that typhoid fever may be *propagated* by means of sewers,

correct, it at once explains why typhoid fever attacks the rich as well as the poor ; why it occurs in solitary houses in the country, as well as in the centre of great cities ; and why it should always be most prevalent in the autumn season. *The reason why this cause has not hitherto been generally recognised lies in the circumstance, that typhus and typhoid fever are so very generally confounded together. Those who deny the possibility of "fever" originating from putrid emanations, appeal to thousands of typhus cases as overwhelming negative evidence ; in the same way as there are not wanting a few, who bring forward typhoid cases to prove that "fever" is independent of overcrowding and destitution. One might as well argue that profound coma does not result from an overdose of opium, on the ground that in a host of cases a somewhat similar condition is totally independent of such a cause.*

If, then, overcrowding with deficient ventilation and destitution may generate typhus, and typhoid fever may result from putrid emanations, it comes to be a question whether these several causes combined may not give rise to a disease partaking of the characters of both. I am inclined to think that such may be possible ; but it is certainly very rarely the case. The grounds on which this supposition is based are as yet few, and I would submit them with all deference. At the same time, I consider them of sufficient importance to justify me in bringing them forward.

In the month of December last, a girl, aged 16, was admitted into the Fever Hospital from 17, Windmill Row, Lambeth ; ill a week. Her body was covered with an unmistakable mulberry rash, and she presented all the usual

privies, and water-closets ; yet he believes "that the effluvia from defective sewers have no power to communicate this specific fever, except when they are charged with the specific poison contained in the secretions from the diseased bowels of persons already affected." ('Association Journ.,' 1855, p. 208.) It seems difficult, however, on such a view, to account for the outbreak of the disease in isolated country houses, where there has been no traceable source of introduction, or for the influence of autumn over its prevalence.

symptoms of typhus—dry, brown tongue; confined bowels; heavy confused expression; small pupils; and low, wandering delirium. The case attracted particular notice; as typhus was at that time very uncommon. Two days after, the symptoms underwent a complete change. The mulberry rash (which was certainly not the scarlet rash which occasionally precedes the eruption of typhoid) faded, and was succeeded by rose spots, which came out in successive crops for more than a week, and were accompanied by diarrhœa and abdominal tenderness. The tongue became moist and red; the pupils, dilated; and the drowsiness and wandering vanished. This girl was a hawker; for some weeks had been very destitute, and a fortnight before, she had slept for two or three nights at another house, in the same bed with a girl who had “fever.” This second girl, with her mother and sisters, was admitted into the Lambeth Workhouse; but the father and brother were admitted into the Fever Hospital, with well-marked typhus. On the other hand, Dr. Odling, the officer of health for Lambeth, informs me that the courtway in front of No. 17, Windmill Row, is badly paved and badly drained; and that, although the cesspools in the house have been done away with, the habits of the inmates have rendered the privy arrangements as insalubrious as before. The girl was therefore exposed both to the contagion of typhus, and to the causes which there is reason to believe generate typhoid.

Again, an outbreak of fever occurred last autumn in Dudley Street, Paddington, in which I am assured by Dr. Sanderson<sup>1</sup> that there were some cases which presented the characters of both typhus and typhoid, including the presence of the two eruptions. Now, I have shown that in Paddington there are various causes to account for the generation of typhoid, and that typhus is there extremely rare. It becomes interesting, then, to ascertain under what circumstances typhus, or something resembling it, may there originate. Now, in the houses in which these “mixed cases” occurred, the two causes which I have supposed to generate typhus

<sup>1</sup> Dr. S. has had ample opportunities of studying the two fevers at the London Fever Hospital.

and typhoid were present in a marked degree. First, the residents were principally dustwomen, and the houses were daily stocked with selections from the street sweepings of the metropolis, such as old greese pots, &c., materials sufficiently prone to decomposition in hot weather. But, secondly, these two houses were overcrowded to such a degree, that compulsory measures had to be adopted to diminish the number of inmates. Cases of fever occurred at the same time in other houses of the same street, which were not overcrowded; but these were pure examples of *typhoid*.

Lastly, M. Landouzy<sup>1</sup> has given an account of a remarkable fever which prevailed in the gaol at Rheims, in the autumn of 1840. Many of the symptoms during life, including the eruption, were those of typhus; but the intestines after death presented the lesions characteristic of typhoid. Now, from the locality and the season of the year, one would have expected typhoid fever; and in addition to these causes, we are informed that there was a most disagreeable odour in the gaol, proceeding from the grease of the woollen fabrics manufactured by the prisoners. That the fever was really typhoid is proved by the lesions found after death. On the other hand, a cause was not wanting to account for the symptoms of typhus during life; and, it must be remembered, that a copious mulberry rash would entirely mask a few rose coloured spots, even if these were present. The circumstance to which the fever was mainly attributed was the overcrowding of the prisoners. The number which the gaol was calculated to hold was from 130 to 150; but a month or two previous to the outbreak of the fever, this had been raised to 190.

Such cases as those just brought forward might be urged in support of the view, that typhus and typhoid are merely different manifestations of the same poison. They are, however, of such rarity, while at the same time all other evidence tends to establish the non-identity of the

<sup>1</sup> 'Archiv. Gén. de Méd.,' third ser., vol. xiii, p 7.

poisons of the two diseases, that it seems more probable that they admit of another explanation. In the first place, on the supposition that the two diseases are distinct, there seems no reason why a person may not have both at the same time. It has recently been denied that two of the exanthemata can coexist in the same individual;<sup>1</sup> but the correctness of this assertion may be doubted. Several instances have occurred at the Fever Hospital of scarlet fever and typhoid attacking the same patient, the eruptions of the two diseases being present at one time; and Dr. Walshe has furnished me with the particulars of a case most carefully observed at University College Hospital, in which the eruptions of scarlet fever and smallpox existed at one and the same time.<sup>2</sup> Why, then, may not typhus and typhoid occasionally coexist? But, secondly, there is an important difference between these two fevers and the several exanthemata with which they are so frequently compared, which is this: the poisons of the former, whatever they are, can be produced by agencies which, to a certain extent, are under the control of the human will; but there is as yet no evidence to show that any agencies within our knowledge can generate the poison of scarlatina, measles, or smallpox. Now, if a certain poison can generate one group of symptoms, and another poison generate another, surely it is but reasonable to expect, that a combination of the two poisons may give rise to a morbid condition of an intermediate character, without its being necessary to conclude, from the existence of such a hybrid affection, that the first two morbid conditions have been merely different manifestations of the same poison.

#### X. *Contagion.*

Typhus and relapsing fever have been almost universally regarded as contagious, and some even go so far as to main-

<sup>1</sup> Dr. Chambers, 'Lancet,' Feb. 6th, 1858.

<sup>2</sup> Case of Caroline Lennell, 'Female Case Book, U. C. H.,' vol. ii, p. 217, June 23d, 1847. Since the above was written, the records of several similar cases have been published. See 'Lancet,' Aug. 28th and Sep. 11th, 1858.

tain that they are invariably the product of contagion. On the other hand, much difference of opinion has existed with regard to typhoid. Many French observers, and amongst them Andral, have maintained that it was not contagious, whereas Dr. Nathan Smith,<sup>1</sup> Bretonneau,<sup>2</sup> Gendron,<sup>3</sup> Louis,<sup>4</sup> Gaultier de Claubry,<sup>5</sup> Piedvache,<sup>6</sup> and Bartlett,<sup>7</sup> have considered it contagious. Dr. Peacock<sup>8</sup> observes that he has never known typhoid fever communicated to the attendants in St. Thomas's Hospital; and Chomel remarks, that during the nineteen years he had been connected with the Hotel Dieu, he had only known four cases of typhoid fever contracted in the wards.<sup>9</sup>

What light do the statistics of the London Fever Hospital throw upon this point? During eight years and a quarter those cases of fever have been indicated in the register in which the disease was ascribed by the patients to contagion, or in which others were admitted from the same house with fever. On analysing these cases, I have obtained the following results:

Out of 2811 cases of Typhus there were	729, or 28·13 per cent.
"    440    "    Relapsing    "	171, or 38·86    "
"    1576    "    Typhoid    "	204, or 13·72    "
"    736    "    Febricula    "	83, or 11·02    "

From this it would appear, that relapsing fever is nearly three times, and typhus more than twice, as contagious as typhoid. It is obvious, however, that but little dependence can be placed on a patient's own statement in such a matter. Many may be exposed to contagion without being aware of it; while, on the other hand, a number of patients being admitted from the same house or locality is

<sup>1</sup> Bartlett, *op. cit.*, p. 102.

<sup>2</sup> Louis, *op. cit.*, tom. ii, p. 368.

<sup>3</sup> *Ibid.*

<sup>4</sup> *Ibid.*

<sup>5</sup> *Op. cit.*, 4to. ed., p. 350.

<sup>6</sup> 'Mém. de l'Acad. de Méd.,' 1850.

<sup>7</sup> *Op. cit.*, p. 102.

<sup>8</sup> "Lectures on Fever," in 'Med. Times and Gaz.,' 1856.

<sup>9</sup> 'Med. Times,' vol. xxi, p. 20.



no absolute proof of the contagiousness of the disease. A better criterion of the relative contagiousness of the different forms of fever will result from an examination of the cases which have originated in the hospital. With this object, I have constructed the following table, which shows the form of fever in those cases in which it has originated, during the ten years, among the nurses, medical attendants, or patients admitted with other diseases.

TABLE XV.

Diseases contracted in Hospital in 10 years.	Typhus.	Re- lapsing.	Typhoid.	Febri- cula.
Nurses .....	25	1	2	11
Porters and Servants .....	1	...	2	...
Medical Attendants.....	3?	...	1	...
Patients admitted with Typhus .....	...	...	2	...
"    "    Relapsing ...	1	...	...	...
"    "    Typhoid ...	8	...	...	...
"    "    Febricula ...	4	...	...	...
"    "    Scarlatina...	5	...	1	...
"    "    Pneumonia .	1	...	...	...
Total .....	48	1	8	11

The table shows, that during ten years forty-eight cases of typhus originated in the hospital, but only eight of typhoid fever. It might be difficult to account for the origin of most of these cases of typhoid, except by means of contagion; yet the infinitely (six times) more contagious nature of typhus is at once obvious. At the same time, when compared with other fever hospitals, the number of nurses attacked with typhus has been wonderfully small—a circumstance which is accounted for by the extreme airiness and perfect ventilation of the building. With regard to relapsing fever, the table is hardly a fair test, considering the small number of patients admitted. The records of various epidemics, however, testify to its being eminently contagious.

There can be little doubt, then, that typhoid fever is, in

a limited degree, contagious; and perhaps it may even be more so than the above table would indicate, for it must be remembered, that most of the nurses are beyond the age at which they would be likely to contract the disease. It would be an important question to decide, whether typhoid may not be propagated through the medium of the discharges of the bowels, in the same way, as there is good reason to believe is frequently the case, in cholera and dysentery. Dr. W. Budd, of Bristol, maintains that typhoid is generally propagated in this way; and I believe he has collected many facts (not published) which render the evidence as conclusive upon this point, as he has already shown it to be in the case of cholera. I would here call attention to the fact, that Dr. Austin Flint has recorded a remarkable instance, in which typhoid fever was apparently communicated to a number of families in a village of the United States through the medium of the water of a well, the only families who escaped being three, who derived their water from an independent source.<sup>1</sup> The demonstration that typhoid might be communicated by the dejections, would constitute another marked distinction between it and typhus.

Table XV suggests many other points of interest in connexion with the identity or non-identity of typhus and typhoid fever. On these, time will not allow me to dilate. I would merely observe, that the fact of having passed through either form confers no immunity from the other. Several patients, after having become perfectly convalescent from typhoid, have contracted typhus while still in hospital, or have been re-admitted with it a week or ten days after dismissal. On the other hand, it is generally admitted that it is extremely rare for the same individual to have two attacks of either typhus or typhoid. I, myself, as far as I have been able to ascertain, am the only instance of an individual having had two attacks of undoubted typhus, *on both occasions with a mulberry rash.*

<sup>1</sup> 'Clinical Rep. on Cont. Fever,' Buffalo, 1852, p. 381.

XI. *Recent Residence and Birth-place.*

Louis strongly insists upon recent residence as a predisposing cause of typhoid fever. Out of 129 cases, which he gives in his work, 73 had not resided in Paris more than ten months, and 102 not more than twenty months.<sup>1</sup> Again, of 92 cases of typhoid fever under Chomel, in the Hotel Dieu, one half had resided in Paris only one year, or less.<sup>2</sup>

Table XVI shows the length of residence in London for each of the forms of fever admitted into the Fever Hospital, during the *two* years 1851 and 1857.

TABLE XVI.

RESIDENCE IN LONDON.	TYPHUS.		TYPHOID.		RELAPSING.		FEBRICULA.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Not exceeding 1 week .	1	·32	2	·51	1	·45	...	...
„ 1 month .	2	·64	6	1·53	5	2·25	1	·96
„ 2 months .	7	2·28	16	4·1	7	3·15	3	2·88
„ 3 ditto .	9	2·93	23	5·9	15	6·75	4	3·84
„ 6 ditto .	13	4·23	43	11·02	29	13·06	7	6·72
„ 9 ditto .	16	5·21	56	14·36	38	17·12	7	6·72
„ 1 year .	19	6·19	71	18·2	63	28·38	12	11·53
„ 1½ year .	20	6·51	77	19·74	72	32·43	13	12·5
„ 2 years .	25	8·14	97	24·87	107	48·2	16	15·38
„ 5 ditto .	33	10·75	141	36·15	150	67·57	22	21·15
„ 10 ditto .	49	15·96	168	43·07	164	73·87	34	32·69
Above 10 years .	50	16·28	28	7·18	25	11·26	10	9·61
Life . . . . .	208	67·75	194	49·74	33	14·86	60	57·69
Total known .	307	99·99	390	99·99	222	99·99	104	99·99
Doubtful . . . . .	35		58		35		24	

It would appear, then, that recent residence does predispose to typhoid fever in London; although not to such an extent as the results of Louis' and Chomel's obser-

<sup>1</sup> Louis, *op. cit.*, tom. ii, p. 357.

<sup>2</sup> See Bartlett, *op. cit.*, p. 110.

vation would render probable in Paris. Out of 390 cases, upwards of one ninth had not resided in London more than six months, and almost one fifth not more than a year. On the other hand, of 307 cases of typhus, only one sixteenth had resided less than a year. Of the typhus cases, 68 per cent. had resided in London all their lives; of the typhoid less than one half.

But recent residence would appear from the table to predispose more strongly to relapsing fever even than to typhoid. Thus, out of 222 cases, almost one eighth had not resided in London more than six months, and considerably upwards of one quarter not more than a year; only one seventh had resided in London all their lives. An explanation of this circumstance will be found by referring to the next table, which indicates the countries from which the subjects of each of the forms of fever came during the same two years—1851 and 1857.

TABLE XVII.

BIRTHPLACE.	TYPHUS.		RELAPSING.		TYPHOID.		FEBRICULA.	
	No.	Per cent.	No.	Per cent.	No.	Per cent.	No.	Per cent.
Natives of London .	208	64·6	33	13·31	194	46·86	60	55·55
Ditto of rest of England .	64	19·87	26	10·48	190	45·89	24	22·22
Ditto of Scotland .	2	·62	1	·4	3	·72	...	...
Ditto of Ireland .	40	12·42	184	74·19	18	4·34	24	22·22
Foreigners .	8	2·48	4	1·61	9	2·17	...	...
Total known .	322	99·99	248	99·99	414	99·98	108	99·99
Doubtful .	20		9		34		20	

It is obvious from this table, that the great proportion of the cases of relapsing fever were Irish. Three fourths of the whole cases had come from Ireland; and many of the remainder, from their names, were evidently the children of Irish parents. On the other hand, only one eighth of the cases of typhus were Irish, and not one twenty-third of the

cases of typhoid. Moreover, of the twenty-six patients with relapsing fever who had come from the provinces of England, upwards of one half had lived in London for five years or more, so that it is clear that almost every one of the patients seized with relapsing fever soon after their arrival in London had come from Ireland. The Irish have long been the reputed introducers of epidemic fever into England and Scotland. Dr. Cowan informs us, that out of 2257 cases of fever admitted into the Glasgow Infirmary, about one third, or 715, were Irish.<sup>1</sup> The question then comes to be—What fever is it, which the Irish chiefly import? The number of typhus cases among the Irish in the above table is small; and out of the forty, all but ten had resided upwards of a year in London; so that, as far as London is concerned, typhus does not appear to be imported from Ireland. On the other hand, it seems probable that the vast majority of the cases of relapsing fever which occur in London may be traced to an Irish origin. It will afterwards be shown that a mild form of fever, resembling relapsing fever in its small mortality (and perhaps corresponding to its first stage without the relapse), is at all times more prevalent in Ireland than in Britain. This suggests another question—Whether the same animal poison, which in Ireland more commonly produces a short, mild fever, followed during certain epidemics by one or more relapses, may not, in England, with a change in the external conditions and in the recipient body, generate typhus? I shall not, at present, attempt to give a definite answer to this question; but the following facts have an important bearing upon it. In the last six months of 1851, there were admitted, from Field Lane, in the City of London, into the Fever Hospital, nine cases of relapsing fever, but none of typhus; in 1852, there were, from the same locality, fourteen admissions of relapsing—the last in May, and twenty-four of typhus—the first in March; and in 1853, there were sixteen admissions from the same lane—all typhus. Again, from Tyndall's Buildings,

<sup>1</sup> 'Vital Statistics of Glasgow.'

Holborn, there were admitted in 1851 twenty-two cases of relapsing and one of typhus; in 1852, ten of relapsing and nine of typhus. In several instances, a case of relapsing and of typhus were brought from the same house, within a few weeks or days of each other. Lastly, during an epidemic of relapsing fever at Newcastle, in 1848, which, from its novelty in the place, attracted much attention, and was shown to have been imported by the Irish, many of the clergy and medical men who attended upon the sick were attacked with fever, but in not one of these cases did this assume the relapsing form, being more prolonged, and like the ordinary typhus.<sup>1</sup>

The explanation which has been given of the great proportion of cases of relapsing fever being amongst the newly arrived in London, will not apply to typhoid fever. The most of the patients with typhoid fever, not born in London, came from the provinces of England; and it is worthy of notice, that the majority of those who come up to push their fortunes in the great metropolis, arrive just at that age which is most prone to the affection in question. This greater liability of the newly arrived to contract typhoid, points to the dependence of this disease upon some local cause, which they are less able to resist than those who have for long been habitually subjected to it. This is well known to be the case with ordinary diarrhoea. Mr. Carpenter, of Croydon, in writing some years ago of the bad water at that place, observed, that he knew several houses in which this was used by the ordinary inhabitants with impunity, but in which any visitors or new servants were invariably seized with diarrhoea, soon after their arrival.<sup>2</sup> Several instances of a similar circumstance, as regards typhoid fever, have come under my own notice. One of the most remarkable is the following. In the autumn of 1853, a lady and her two daughters arrived from the country, on a visit to some friends residing at Kennington, in the

<sup>1</sup> Dr. White's 'Report of the Newcastle Fever Hospital,' 1848.

<sup>2</sup> 'Assoc. Journal,' vol. ii, p. 902.

district of Lambeth. Behind the house there was an open sewer, inundated from the Thames by every tide, and often emitting towards evening an intolerable stench. The drinking-water of the house was derived from a well, and required no microscope nor chemical tests to demonstrate its great impurity. All three suffered from diarrhœa, and in about a fortnight one of the daughters took typhoid fever and died. The following autumn, the mother and remaining daughter again came up from the country, and visited the same house. Within a fortnight, the former died from cholera. On both of these occasions, the ordinary dwellers in the house were quite exempt even from diarrhœa.

#### B.—MORTALITY FROM CONTINUED FEVER.

##### I. *The Rate of Mortality from Fever in the London Fever Hospital, as compared with that of other hospitals.*

At but few hospitals is any distinction recorded between the different forms of fever; and consequently a comparison can only be made between the mortality in each, by taking all the forms together. Any such comparison will certainly not be in favour of the London Fever Hospital, where the mortality is unquestionably great. Some, who consider all fever hospitals objectionable on principle, might be inclined to attribute this great mortality to the accumulation of a number of patients in one building, and a consequent concentration of the fever-poison. Before forming such a conclusion, however, it must be remembered, that there are other circumstances peculiar to the London Fever Hospital, which in a great measure account for the large number of cases which terminate fatally; and, if a due allowance be made for these, the mortality will probably not exceed that of other places. In the first place, a much larger proportion of the patients admitted are from the most indigent classes, and of an advanced age, than is the case with any of the other hospitals in London. A large number of them are the aged and decayed inmates of the various metropolitan work-houses. The influence of age and destitution in increasing

the mortality from fever will shortly be made apparent. Again, the mortality is greatly increased by the patients being often brought from the most distant parts of London, in an advanced stage of their complaint—as in the second or third week. The powerful operation of this cause is proved by the fact, that every year a considerable number of the patients are moribund on admission, and die within the first or second day after. Thus, in the year 1855, to quote from the ‘Annual Report,’ “out of the total number of 173 deaths from all causes, sixty-eight occurred before the close of the fourth day, and forty-two before the end of the second. Ten were in a dying state on reaching the hospital; one lived only three minutes after admission; and one was brought in dead.” Lastly, the proportion of the more fatal forms of fever admitted into the London Fever Hospital is greater than in other hospitals; for, as will be shown, the rate of mortality from typhus and typhoid *only* is not greater than has been observed elsewhere.

Table XVIII gives the mortality from all the cases of fever admitted into the London Fever Hospital during ten years, including those which died from various complications.

Thus, for the whole ten years, the mortality has been at

TABLE XVIII.<sup>1</sup>

Years.	Total Fever Cases admitted.	No. of Deaths.	Rate of Mortality per cent.
1848	707	148	20·93
1849	401	65	16·21
1850	361	50	13·85
1851	614	43	7·00
1852	561	50	8·91
1853	787	149	18·93
1854	714	112	15·68
1855	622	113	18·16
1856	1300	230	17·69
1857	561	99	17·64
Total .	6628	1059	15·98
Deducting 61 who died within 24 hours after admission .	6567	998	15·19
And 146, within 48 hours .	6482	913	14·07

<sup>1</sup> In this and the following tables, the deaths for each year have



the rate of almost 16 per cent., or about 1 in  $6\frac{1}{4}$ ; but, deducting the cases which died within twenty-four hours after admission, the mortality falls to 15 per cent.; and, deducting those which died within forty-eight hours, it is only 14 per cent., or rather less than 1 in 7. It will also be observed, that the rate of mortality has varied considerably in different years. In one year, it was only 7 per cent., and in another under 9 per cent., while in a third it rose to

TABLE

Years.	St. George's Hospital. <sup>1</sup>		Newcastle Fever Hospital. <sup>2</sup>		Nottingham General Hospital. <sup>3</sup>		Birmingham Queen's Hospital. <sup>4</sup>		Bristol Royal Infirmary. <sup>5</sup>	
	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.
1840	...	...	...	...	...	...	...	...	125	8·
1841	...	...	...	...	...	...	...	...	105	9·05
1842	...	...	...	...	...	...	...	...	121	12·4
1843	...	...	...	...	54	16·66	...	...	126	7·14
1844	...	...	...	...	43	30·23	...	...	100	8·
1845	...	...	...	...	36	22·22	...	...	100	9·
1846	...	...	...	...	239	9·25	...	...	98	4·08
1847	...	...	...	...	165	12·12	...	...	185	9·73
1848	...	...	698	9·16	121	6·61	...	...	101	8·91
1849	...	...	155	12·9	55	23·63	...	...	91	6·6
1850	...	...	71	7·04	34	14·7	...	...	137	8·76
1851	125	16·	117	5·13	98	10·2	...	...	107	10·28
1852	141	7·09	102	19·6	...	...	23	13·	86	9·3
1853	108	13·88	72	20·83	...	...	21	28·5	83	12·05
1854	185	12·4	52	19·23	...	...	31	13·	137	10·22
1855	188	9·04	77	10·4	...	...	15	6·66	52	7·69
1856	164	10·9	45	13·33	...	...	24	8·33	55	5·45
1857	...	...	92	18·48	...	...	28	14·28	81	16·05
Total	911	11·3	1481	11·54	845	12·78	142	14·08	1890	9·47
	1 death in $8\frac{1}{2}$ .		1 in $8\frac{3}{4}$ .		1 in $7\frac{7}{9}$ .		1 in $7\frac{1}{10}$ .		1 in 10.	

reference only to the patients *admitted* in that year. A patient admitted in December, 1851, and dying in January, 1852, has been entered as a death in 1851.

<sup>1</sup> Printed Reports in 'Brit. and For. Med.-Chir. Rev.'

<sup>2</sup> Communicated by Dr. Robinson, of Newcastle.

<sup>3</sup> Annual Reports of Hospital.

<sup>4</sup> Communicated by the House Surgeon, Mr. Allis Smith.

<sup>5</sup> Communicated by Mr. Crisp, the House Surgeon.

upwards of 20 per cent.<sup>1</sup> This great variation, as will shortly be shown, is partly, but not entirely, due to a prevalence of different fevers in different years.

In Table XIX, the rate of mortality from fever in eleven other hospitals, during the last eighteen years, is compared. One of these hospitals is in London, four in the provinces of England, three in Scotland, two in Ireland, and one in Stockholm.

## XIX.

Edinburgh Royal Infirmary. <sup>2</sup>		Aberdeen Royal Infirmary. <sup>3</sup>		Glasgow Royal Infirmary. <sup>4</sup>		Dublin Cork Street Fever Hospital. <sup>5</sup>		Cork Fever Hospital. <sup>6</sup>		Stockholm Seraphim Hospital. <sup>7</sup>		
No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	No. of Cases.	Mortality per cent.	
}	2188	13·75	575	10·95	...	...	4329	5·63	2441	5·57	211	8·5
			437	7·09	...	...	2872	7·14	1467	5·25	326	11·3
	846	13·59	282	5·32	...	...	2375	7·62	1225	6·0	443	12·1
	817	6·85	1280	3·75	3467	4·53	2529	8·4	1162	4·21	238	8·8
	4642	7·77	780	5·25	1468	8·92	2863	7·78	1340	3·43	222	11·7
	679	11·34	378	6·61	535	11·03	2954	8·8	2799	2·85	199	12·5
	685	12·70	377	8·75	1565	9·71	4555	9·55	3262	4·14	518	7·5
	3771	13·26	683	11·86	5244	13·34	5875	7·3	5693	5·25	132	15·9
	4798	15·09	1648	12·68	1515	11·75	2472	8·01	1249	5·68	104	18·2
	726	12·12	584	8·56	570	13·86	2977	8·33	2565	4·5	66	7·5
	522	12·44	255	11·0	597	19·26	2096	5·44	1756	4·5	284	10·2
	959	3·34	218	15·13	1385	12·79	2133	6·42	2307	4·63	443	10·3
	691	4·84	146	17·8	1721	12·9	2354	6·84	1731	4·45	...	...
	574	7·49	121	6·61	1938	14·86	1388	7·27	1643	3·41	...	...
	168	15·47	304	11·18	...	...	2069	8·07	1096	5·3	...	...
	201	20·39	345	10·43	...	...	2204	6·44	907	4·08	...	...
	187	24·06	225	10·22	...	...	1606	6·1	1067	5·62	...	...
	132	21·21	145	13·10	...	...	...	...	827	3·87	...	...
22,586	11·61	8783	9·14	20,091	11·28	47,651	7·46	34,537	4·3	3186	10·6	
1 in 8 $\frac{3}{4}$ .		1 in 11.		1 in 8 $\frac{6}{7}$ .		1 in 13 $\frac{2}{3}$ .		1 in 23 $\frac{1}{4}$ .		1 in 9 $\frac{3}{7}$ .		

<sup>1</sup> In this year, however, but few cases of febricula were included. See note to Table II.

<sup>2</sup> 'Statistical Tables,' tenth ser., p. 20; and private communication from Medical Superintendent.

<sup>3</sup> 'Annual Reports.'

<sup>4</sup> Dr. McGhie, 'Glasgow Med. Journ., vol. ii, p. 161.'

<sup>5</sup> Communicated by the Registrar of the Hospital.

<sup>6</sup> Communicated by Dr. McEvers, of Cork.

<sup>7</sup> Dr. Magnus Huss, 'Statist. du Typhus,' p. 48.

Speaking in general terms, it would appear from this table that the rate of mortality from fever during a series of years differs but little in the various hospitals of England and Scotland, being about 1 in 8; in some rather more, in others rather less. In the Aberdeen Infirmary, however, the mortality from 8783 cases during eighteen years has only been 1 in 11. This was due, however, to the small mortality of the four years, 1842-45, which will shortly be accounted for. Taking the cases only for the last ten years, the mortality in Aberdeen, as elsewhere, was 1 in  $8\frac{1}{2}$ . Again, in every instance it will be seen the mortality has varied greatly from year to year. In Aberdeen it was under 4 per cent. one year, and in another nearly 18 per cent.; at Nottingham it was one year 30 per cent., in another less than 7 per cent.

The mortality at Stockholm appears to be much the same as in England, or on the whole rather less.

To all of these results, the Irish hospitals present a marked antithesis. Out of 150,939 cases of fever admitted into the Dublin Fever Hospital, since the year 1817, only 10,632, or less than 1 in 14, have died;<sup>1</sup> and during the last eighteen years, it will be seen from the table that the mortality has only been 1 in  $13\frac{2}{3}$ . Again, in the Cork Fever Hospital, the mortality has been even much less. Since the year 1817, out of 82,293 patients only 3222, or 1 in  $25\frac{1}{2}$ , have died;<sup>2</sup> and during the eighteen years contained in the table, the mortality has only been  $4\frac{1}{3}$  per cent., or 1 in  $23\frac{1}{4}$ . Moreover, the rate of mortality has varied much less in different years than it does in England and Scotland. Thus in Dublin, in no year during the last forty has it reached 10 per cent.; and in the Cork Hospital, in only one year of the last forty has it slightly exceeded 6 per cent. In the year 1838, Dr. Cowan, of Glasgow, drew attention to the striking discrepancy in the mortality from fever between the British and Irish hospitals;<sup>3</sup> and I find on referring to

<sup>1</sup> From data furnished to me by the Registrar of the Hospital.

<sup>2</sup> From data furnished by Dr. McEvers, of Cork.

<sup>3</sup> 'Vital Statistics of Glasgow,' p. 21.

Barker and Cheyne's report of the Irish epidemic of 1817-19, that out of 100,737 patients in the hospitals of all Ireland, 4349 died, making a mortality of 4·3 per cent., or of only 1 in 23<sup>1</sup>.<sup>1</sup> No doubt the circumstance to which I have just called attention is partly accounted for by the greater facilities afforded to mild cases for entering the hospitals in Ireland; but whether this be the case or not, it plainly shows that there is a form of fever constantly present in Ireland, which is much milder, and the mortality from which is much less, than is the case with the fever we more generally meet with in this country. I shall endeavour further to explain this discrepancy, in my remarks under the following head:

II. *Rate of Mortality in the different forms of "Continued Fever."*

The mortality from the different forms of continued fever admitted into the London Fever Hospital, during ten years, is given in Table XX.

TABLE XX:

Years.	TYPHUS.			RELAPSING FEVER.			TYPHOID.		
	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.
1848	526	106	20.15	13	1	7.69	152	41	26.97
1849	155	39	25.16	29	0	0	138	26	18.84
1850	130	24	18.46	22	2	12.5	137	24	17.51
1851	68	6	8.82	256	7	2.73	234	30	12.82
1852	204	24	11.76	88	1	1.13	140	25	17.85
1853	408	90	22.06	16	0	0	211	59	27.96
1854	337	68	20.18	5	0	0	228	44	19.3
1855	342	82	24	1	0	0	217	31	14.28
1856	1062	207	19.49	...	...	...	149	23	15.43
1857	274	69	25.18	1	0	0	214	30	14.02
Total . . .	3506	715	20.39	441	11	2.49	1820	333	18.29
Deducting 49 who died within 24 hours . }	3457	668	19.32	441	11	2.49	1806	319	17.66
Deducting 115 who died within 48 hours }	3391	600	17.69	439	9	2.05	1791	304	16.97

<sup>1</sup> Vol. ii, p. 190.

The exclusion of the cases of "febricula" from this table, of course raises the rate of mortality from the other forms of fever. This remark, as is obvious, applies more especially to typhus and typhoid.

Out of 3506 cases of typhus 715 died, making a mortality of 20·39 per cent., or of about 1 in 5. Deducting the cases which proved fatal within twenty-four hours after admission, the mortality falls to 19·3 per cent.; and deducting those fatal within forty-eight hours, it is only 17·7 per cent., or about 1 in  $5\frac{2}{3}$ . In two years, the mortality exceeded 25 per cent., and in one year it was under 9 per cent. The year in which the rate of mortality was smallest, was also that in which there were the fewest cases. The mortality from typhus in the London Fever Hospital does not exceed what has been observed elsewhere. Thus, in the Edinburgh Infirmary, in the year 1848-49, out of 363 cases of typhus 80, or 22·3 per cent., died;<sup>1</sup> and in the Glasgow Infirmary, out of 9485 cases of typhus admitted during eleven years 18 per cent. died.<sup>2</sup>

The mortality from typhoid fever appears, on the whole, to be somewhat under that from typhus. Out of 1820 cases 333 died, or 18·29 per cent., or about 1 in  $5\frac{1}{2}$ . Subtracting the cases fatal within twenty-four hours, it was only  $17\frac{2}{3}$  per cent.; and subtracting those fatal within forty-eight hours, it was under 17 per cent., or about 1 in 6. In one year, however, the mortality was greater than in any year from typhus, being 28 per cent., or about 1 in  $3\frac{1}{2}$ ; and in no year was it so low as what we have found it to have been in some years from typhus, the smallest mortality in any year being scarcely under 13 per cent. Moreover, the year in which the mortality was least, was also that in which there was the greatest number of cases; whereas the mortality from typhus appeared to be lowest when it was least prevalent. In the Glasgow Hospital the mortality from typhoid fever, taken separately, has been greater even

<sup>1</sup> 'Statistical Tables,' ninth ser., p. 14.

<sup>2</sup> Dr. McGhie, 'Glasgow Medical Journal,' vol. ii, p. 161.

than in London. Out of 356 cases admitted into the infirmary during several years, 77 died, making a mortality of 21·6 per cent., or of almost 1 in  $4\frac{1}{2}$ .<sup>1</sup>

The mortality from relapsing fever, when compared with that of the two other forms, is strikingly small. Out of the 441 cases only 11 proved fatal, making  $2\frac{1}{2}$  per cent., or about 1 in 40. This small mortality from relapsing fever has been a matter of general observation. Out of 203 cases in the Edinburgh Infirmary in 1848-49, only eight cases, or less than 4 per cent., died;<sup>2</sup> and out of 7804 cases in the Glasgow Infirmary, between the years 1843 and 1853, only 405, or 5 per cent., died.<sup>3</sup>

It is therefore evident, that the more predominant fever of the relapsing form is at any time, the less will be the mortality from continued fever, taken as a whole. For example, this was the real explanation of the wonderfully small mortality from fever observed in London in 1851, and in Edinburgh, Aberdeen, and Glasgow, in 1843. It must also be obvious, how important it is, in comparing the mortality from fever at different times and places, in order to judge of the merits of different plans of treatment, or for other purposes, that we take into account the form of fever which has prevailed. If this be not done, any such comparison can be of little worth. Thus, while the total mortality from fever in Glasgow was much below that of the London Fever Hospital, that in each of the individual forms was greater, the difference resulting from the much larger proportion of relapsing cases which have occurred at Glasgow. The same remarks obviously apply to "febricula." The greater the proportion of cases coming under this category, the less will be the rate of mortality for all the cases of fever taken together.

If, then, the very small mortality from fever occasionally observed in England and Scotland admits of the explanation just given, it seems not unreasonable to suppose that a

<sup>1</sup> Dr. McGhie, loc. cit.

<sup>2</sup> 'Statist. Tables,' ninth ser., p. 15.

<sup>3</sup> Dr. McGhie, oc. cit.

similar explanation may account for the constant small mortality observed in Ireland. During the great relapsing epidemic of 1843, when the mortality from fever in Scotland was so small, that in Ireland remained at its usual standard. Secondly, the smallest mortality from typhus itself, in the London Fever Hospital, corresponded with the greatest prevalence of relapsing fever. Thirdly, we have already seen that all the great epidemics of fever have originated in Ireland; and it is a fact which has generally been admitted during these epidemics, that the fever has been imported from Ireland into Britain. Fourthly, we have also seen, that at the commencement of some epidemics in Britain, the proportion of relapsing cases to typhus is greater than towards the close; and that this remark applies also to limited localities in London. Lastly, I have shown that a large proportion of the cases of relapsing fever (much larger than that of typhus) admitted into the London Fever Hospital, have been Irish recently arrived in London. Putting all these facts together, there seem grounds for believing that a short mild fever (corresponding, perhaps, to the first paroxysm of relapsing fever) is at all times more common in Ireland; that under certain circumstances this assumes the relapsing form; and that it is this relapsing fever which in many great epidemics the Irish have chiefly imported into this country.

### III. *Influence of Months and Seasons on the Mortality of Fever.*

Months and seasons of the year appear to exercise little or no influence on the rate of mortality of continued fever taken as a whole, nor on that of any of its forms. This is obvious from Table XXI, which gives the mortality for the aggregate seasons of ten years, among the cases admitted into the London Fever Hospital.

TABLE XXI.

Seasons.	TYPHUS.			RELAPSING.			TYPHOID.			TOTAL, including FEBRICULA.		
	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.
Spring .	1069	218	20·39	90	3	3·33	222	44	19·82	1586	265	16·71
Summer.	988	206	20·85	120	1	·83	355	64	18·03	1670	271	16·23
Autumn.	659	131	19·88	123	5	4·06	746	136	18·23	1762	272	15·44
Winter .	790	160	20·25	108	2	1·85	497	89	17·91	1610	251	15·59
Total .	3506	715	20·39	441	11	2·49	1820	333	18·29	6628	1059	15·98

For the whole cases, it will be seen that the rate of mortality was least in autumn, and greatest in spring; but the difference was not great.

The mortality from typhus appears almost uniform for every season. As regards the individual years, the rate of mortality varied very greatly at different times, but without any reference to months or seasons.

The mortality from relapsing fever was greatest in autumn and in spring, but the cases were too few to draw any conclusions.

The mortality from typhoid was least in winter and considerably less in autumn than in spring. In five of the ten years, although the number of cases of typhoid admitted in autumn far exceeded that admitted in spring, the rate of mortality in the latter season was much greater than in the former. In two years only (1853 and 1854) was the mortality greatest in winter, but in these the winter mortality was double that of any other season (40 per cent.) Forget and Chomel have endeavoured to show that the mortality from typhoid fever in France is double in winter what it is in summer, but their conclusions are drawn from a very limited number of cases.<sup>1</sup>

<sup>1</sup> See Bartlett, *op. cit.*, p. 125.



IV. *Influence of Sex on the Mortality of Fever.*

Sex, like season, appears, on the whole, to exercise little or no influence on the mortality of fever, as shown in Table XXII, which gives the results of the London Fever Hospital on this point for ten years.

TABLE XXII.

	TYPHUS.			RELAPSING FEVER.			TYPHOID.			TOTAL, including FEBRICULA.		
	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.
Males	1737	368	21·18	233	4	1·71	905	160	17·68	3324	532	16·
Females	1769	347	19·61	208	7	3·36	915	173	18·89	3304	527	15·95
Males and Females	3506	715	20·39	441	11	2·49	1820	333	18·29	6628	1059	15·98

Taking all the cases together, the rate of mortality for the two sexes was almost identical. In typhus, it was slightly greater among the males, and in typhoid among the females. In five of the ten years, however, the mortality from typhoid was greater among the males; and in three, the mortality from typhus was greater among the females. Of the few relapsing cases which proved fatal, the majority were females.

It will be found, on referring to various statistical reports, that in some places the mortality from fever has been observed to be greater in the male; and in others, in the female sex.<sup>1</sup> In Stockholm, out of 2181 males 252, or 20·7 per cent., died; whereas, out of 1005 females only 87, or 8·65 per cent., perished.<sup>2</sup>

<sup>1</sup> See various extracts in Dr. Bartlett's work, p. 255. 'Statist. Reports Edin. Infirmary.' Cowan's 'Vital Statistics of Glasgow,' &c.

<sup>2</sup> Magnus Huss, *op. cit.*, p. 58.

V. *Influence of Age upon the Mortality of Fever.*

The influence of age upon the mortality of fever may be ascertained by comparing the mean age of the fatal cases with that of those which recovered; or still better, by ascertaining the rate of mortality in each period of life. Both of these plans have been adopted; and the results for the ten years are given in the two following tables, and in Diagram IV. (See page 238.)

TABLE XXIII.

	TYPHUS.		RELAPSING.		TYPHOID.		TOTAL, including FEBRICULA.	
	Number.	Mean Age.	Number.	Mean Age.	Number.	Mean Age.	Number.	Mean Age.
Total admissions in } which age known . }	3456	29.33	437	24.41	1772	21.25	6510	25.96
Cases which <i>recovered</i>	2753	26.15	426	24.14	1444	20.7	5468	24.04
Cases which <i>died</i>	703	41.78	11	35.09	328	23.54	1042	35.97

It will be observed in Table XXIII, that the mean age of the fatal cases far exceeds that of those which recovered; or, in other words, that the mortality increases as life advances. Thus, the mean age, in round numbers, of all the fatal cases being 36, that of those which recovered is only 24. This rule, however, holds good more especially with typhus and relapsing fever; there being a far greater difference between the age of the fatal cases and of the recoveries in these than in typhoid. Thus, in typhus, the age of the cases which recovered being 26, that of the fatal cases is 42; and in relapsing, the age of the former being 24, that of the latter is 35; in typhoid, the age of the former is 27, and of the latter only 23.5. Moreover, as regards typhus, the difference of age between the fatal cases and recoveries given in the table held good for every one of the ten years, whereas in typhoid the difference for several years was much less than that in

TABLE XXIV.

	TYPHUS.			RELAPSING FEVER.			TYPHOID.			TOTAL, including FEBRICULA.		
	No. of Cases.	Deaths.	Mortality per cent.	No. of Cases.	Deaths.	Mortality per cent.	No. of Cases.	Deaths.	Mortality per cent.	No. of Cases.	Deaths.	Mortality per cent.
Under 5 years	17	3	17·65	4	...	...	4	...	...	33	3	9·09
From 5 to 10 years	183	14	7·65	32	...	...	103	15	14·43	401	29	7·23
" 10 to 15 "	363	18	4·95	63	1	1·58	250	32	12·8	809	51	6·3
" 15 to 20 "	546	26	4·76	92	1	1·08	519	84	16·18	1343	111	8·25
" 20 to 25 "	495	47	9·5	76	...	...	404	82	20·3	1138	129	11·33
" 25 to 30 "	343	52	15·15	37	...	...	240	46	19·16	680	98	14·4
" 30 to 35 "	323	55	17·02	37	3	8·1	100	30	30·	527	88	16·69
" 35 to 40 "	270	89	32·96	19	2	10·52	60	14	23·33	394	105	26·65
" 40 to 45 "	292	87	29·79	40	1	2·5	46	8	17·39	422	96	22·75
" 45 to 50 "	212	83	39·15	8	2	25·	20	5	25·	260	90	34·61
" 50 to 55 "	150	78	52·	15	...	...	8	2	25·	185	80	43·24
" 55 to 60 "	100	51	51·	7	1	15·28	9	5	55·55	125	57	45·6
" 60 to 65 "	88	49	55·68	5	...	...	7	4	57·14	106	53	50·
" 65 to 70 "	42	28	66·66	1	...	...	1	1	100·	49	29	59·18
" 70 to 75 "	24	17	70·83	1	...	...	...	...	...	28	17	60·71
" 75 to 80 "	6	5	83·33	...	...	...	1?	...	...	8	5	62·5
Above 80 years	2	2	100·	...	...	...	...	...	...	2	2	100·
Age not known	50	11	22·	4	...	...	48	5	10·41	118	16	13·56
Total	3506	715	20·39	441	11	2·49	1820	333	18·29	6628	1059	15·98

the table, and in one year the mean age of the cases which recovered slightly exceeded that of the fatal cases. This fact, with regard to typhoid, is of course partially explained by the circumstance that this fever is most prevalent in early life; but that it is not so entirely, we find on referring to the mortality in each quinquennial period of life. (Table XXIV.)

Taking all the cases together, it appears that the mortality is greater in the first lustrum of life than in the second; and greater in the second than in the third. Between the ages of ten and fifteen the rate of mortality is less than at any other period of life, and after this it rapidly increases, until of those above fifty years  $48\frac{1}{3}$  per cent. die. Here again, however, these remarks have reference more especially to typhus and relapsing fever.

Thus, in typhus the mortality during the first five years of life is upwards of 17 per cent., in the second lustrum it falls to 7·65, and between ten and twenty it is under 5 per cent. After twenty, it goes on increasing rapidly, until of those—

	Above 30 years of age	36·05	per cent.	die.
„	40	„	43·66	„
„	50	„	55·82	„
„	60	„	62·34	„

As regards relapsing fever, the number of deaths is rather small to draw any very accurate conclusions; but it appears to resemble typhus in the greatly increased mortality in advanced life. Thus of 304 cases under thirty years only 2 died, whereas of 133 cases above thirty 9 died.

In typhoid fever, on the other hand, there is, in the first place, not that remarkably small rate of mortality in early life observed in typhus, the lowest (also between the ages of ten and fifteen) being almost 13 per cent. (See Diagram IV, p. 238.) There is also a greater uniformity in the mortality at different periods of life than in typhus; and, although the mortality does certainly increase as life advances, it does so to a less extent. Thus, of those—

	Above 30 years of age,	27·38	per cent.	died.
„	40	„	27·17	„
„	50	„	46·15	„
„	60	„	55·55	„

A curious circumstance observed both in typhus and typhoid is, that between forty and forty-five the mortality is considerably less than in the period of life immediately preceding. In typhus the diminished rate of mortality at this period of life was, in the female sex, 26·23 per cent.; in typhoid it was, among the males, 14·28 per cent.

The greater mortality of typhus and relapsing fever in advanced life has been a matter of universal observation. Thus, of 363 cases of typhus admitted into the Edinburgh Infirmary in 1849, only 9 per cent. of those under twenty years of age died; but of those above thirty years, 40 per cent. died; and of those above fifty, one-half. Again, out

of 203 cases of relapsing fever occurring during the same year, 3 only, or 2 per cent., died of those under thirty, but five cases, or 10 per cent., of those above thirty.<sup>1</sup>

With regard to typhoid fever, Louis found that none perished out of six of his patients under seventeen years; and he observes that, during ten years' hospital experience, he had only known one case prove fatal under twenty.<sup>2</sup> Probably, however, there are but few cases admitted at a very early age into the Hotel Dieu, for in another Parisian hospital Rilliet and Barthez found that 29 out of 111 children attacked with typhoid fever died;<sup>3</sup> and the experience of the London Fever Hospital shows that childhood by no means proves a barrier to a fatal termination, and certainly to a less extent than it does in the case of typhus.

#### VI. *Station in Life.*

When speaking of the influence of occupation and station of life upon the prevalence of the different forms of fever, I mentioned that the patients admitted into the London Fever Hospital were divisible into several well-marked classes. I shall now endeavour to show the rate of mortality in these classes during the ten years by the following table:

TABLE XXV.

	I. Paying Patients, Servants of Subscribers, and Policemen.			II. Total patients not included in Class I.			III. Inmates of Workhouse only.		
	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.
Typhus . . . . .	94	14	14·89	3412	701	20·54	738	204	27·64
Relapsing . . . . .	2	...	...	439	11	2·5	47	2	4·25
Typhoid . . . . .	281	47	16·72	1539	286	18·58	85	13	15·3
Total, including Febricula }	426	61	14·32	6202	998	16·09	989	219	22·14

<sup>1</sup> 'Statist. Tab., Edin. Infirmary,' ninth ser., pp. 14 and 15.

<sup>2</sup> Louis, op. cit., tom. ii, p. 350.

<sup>3</sup> Bartlett, op. cit., p. 125.

It is evident from the above table that the mortality from all forms of fever taken together was least in the paying cases, and greatest of all among the inmates of workhouses; in the former being  $14\frac{1}{3}$  per cent., in the latter upwards of 22 per cent.

On examining, however, the mortality from each form of fever, it is found that this remark is, in a marked degree, applicable to typhus, and scarcely, if at all, to typhoid fever. Thus, of typhus less than 15 per cent. died among the paying cases; of all the remaining  $20\frac{1}{2}$  per cent., and of the inmates of workhouses alone 27·6 per cent. On the other hand, in typhoid fever, the rate of mortality in all three divisions differed but slightly, and was indeed least of all among those who had been the inmates of workhouses. Several practitioners, also, have informed me that they have found typhoid fever quite as fatal among the upper classes as among the poor. Destitution would thus seem to exercise little or no influence over either the prevalence or the mortality of typhoid fever, whereas typhus appears to be not only most prevalent but most mortal among the very poor.

This conclusion is opposed to the opinions of various Irish writers, that "fever" is most fatal among the rich;<sup>1</sup> but in none of the instances to which allusion is made, has any distinction been noted between typhus and relapsing fever; and the greater mortality among the "rich" (who appear to have been chiefly medical men) may have been owing to typhus having been the most prevalent form among them, whilst the more common form among the poor was relapsing fever.

#### VII. *Influence of Recent Residence on the Mortality of Fever.*

The influence of this circumstance over the mortality of fever is shown in Table XXVI, for the patients admitted into the London Fever Hospital during the two years 1851

<sup>1</sup> See Bartlett, *Op. cit.*, fourth ed., p. 256.

and 1857. It is to be observed that these were the two years in which the total mortality from typhoid fever was smallest; in the former it was only 12·8, and in the latter, 14 per cent.

TABLE XXVI.

Residence in London.	TYPHUS.			RELAPSING FEVER.			TYPHOID.			TOTAL, including FEBRICULA.		
	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.	Admissions.	Deaths.	Mortality per cent.
Not exceeding 6 months .	13	2	15·38	29	1	3·45	43	11	25·58	92	14	15·22
More than 6 months .	294	62	21·09	193	6	3·11	347	40	11·52	931	108	11·6
Total in which it was known }	307	64	20·85	222	7	3·15	390	51	13·07	1023	122	11·92
English .	272	56	20·59	59	3	5·08	384	52	13·54	799	111	13·9
Irish .	40	8	20·	184	4	2·17	18	1	5·55	266	13	5·
Scotch .	2	...	...	1	...	...	3	...	...	6	...	...
Foreigners .	8	2	25·	4	...	...	9	...	...	21	2	9·5
Total in which birthplace known }	322	66	20·5	248	7	2·82	414	53	12·8	1092	126	11·54

Recent residence appears to have a marked influence over the rate of mortality, as well as over the prevalence of typhoid fever. Of 43 patients who had not resided in London more than six months 11 died, or rather more than 1 out of every 4; whereas of 347 patients who had resided in London upwards of six months 40 died, or only 1 out of every 8 $\frac{2}{3}$ .

The same law does not hold good with typhus, in which, indeed, the rate of mortality was less among the newly arrived, although the number of cases is rather small to draw any very decided conclusions on the matter.

Another circumstance to be observed is, that the rate of mortality from typhus is almost equal among the English

and Irish patients; but in typhoid fever much greater among the English.

I shall now briefly recapitulate the principal conclusions which I think may be legitimately deduced from the facts which I have brought forward in this essay.

1. Typhus and relapsing fever occur at irregular intervals, and often simultaneously, as wide-spread epidemics. They then gradually disappear, and both of them, but especially the latter, may be absent for years from those places where, during the epidemics, they are usually most prevalent.

2. Typhoid fever does not occur in such wide-spread epidemics. In certain places it is never absent, and its prevalence varies but little from year to year. When outbreaks of it occur in other situations, these are always of the most local and circumscribed character.

3. Typhus and relapsing fever are quite independent of the season of the year, whereas typhoid fever is almost invariably most prevalent during autumn, at the time that diarrhœa is most common, and it has been observed to be especially prevalent in seasons remarkable for their high temperature.

4. Sex has no influence over the prevalence of continued fever, nor over that of any of its forms.

5. Typhoid fever is pre-eminently a disease of childhood and adolescence, at which periods of life we know that there is a marked proneness to enteric affections. Less than one seventh of the cases of typhoid are above thirty years of age. Typhus and relapsing fever exhibit no such predilection for youth; of typhus one half, and of relapsing fever one third, of the cases, are above thirty.

6. Typhus and relapsing fever appertain exclusively to poverty and destitution, and seldom or never occur among the wealthy, except from direct contagion. Typhoid fever attacks both poor and rich, without distinction.

7. In large cities typhus and relapsing fever are, for the most part, limited to those localities remarkable for the



overcrowding of their inhabitants ; and in country districts they are seldom or never met with, except as the result of direct importation. Typhoid, on the other hand, occurs alike in the centre and suburbs of cities ; in the crowded hovels of the poor, and in the spacious mansions of the great ; and also in isolated houses and hamlets in the country, without any traceable sources of contagion.

8. When fever breaks out in a house or locality, it seldom or never happens that some of the cases are typhus and others typhoid ; but typhus and relapsing fever occur not unfrequently together.

9. Cases of what has been called "febricula" may co-exist along with any of the three other forms, but especially with typhus and relapsing fever. Most of them are either mild varieties of some of these, or dependent upon some derangement of digestion or other non-specific causes.

10. Overcrowding, with deficient ventilation and destitution, appear to be the essential causes of typhus and relapsing fever, and to be capable of generating them *de novo*, while there is no evidence that they have any such influence over the production of typhoid fever.

11. There are many circumstances which tend to the belief that the emanations from decaying organic matter, or organic impurities in drinking-water, or both of these causes combined, are capable of generating typhoid fever ; but there is no authenticated evidence whatever to prove that such causes can give rise to typhus or relapsing fever.

12. There are some grounds for believing that a combination of the causes mentioned in the two last paragraphs may occasionally, although rarely, generate a disease intermediate in its characters between typhus and typhoid, or may (to speak, perhaps, more correctly) cause typhoid fever to assume some of the characters of typhus ; but such cases cannot be used as an argument in favour of the identity of the poisons of the two diseases.

13. Typhus is eminently contagious. Typhoid fever is also contagious, but in a more limited degree, and possibly through a different medium. Again, typhus has in no

instance been proved to communicate typhoid, nor typhoid to communicate typhus. An attack of either confers an immunity from a future attack of itself, but not of the other. X

14. Recent residence increases the liability to typhoid; scarcely, if at all, that to typhus.

15. The great majority of the cases of relapsing fever have been Irish, and of these a large proportion had but recently arrived in London. There seems reason for believing it possible, that fever imported from Ireland as "relapsing" may gradually pass into typhus.

16. Relapsing fever offers a marked contrast to typhus and typhoid, in the small mortality which it occasions.

17. In comparing the mortality from continued fever at different times and places, it is essential to take into consideration the form of fever which has prevailed. If this be not done, the comparison is valueless.

18. The small mortality from continued fever constantly observed in Ireland, along with other circumstances, renders it probable that in that country a fever, more or less allied to the relapsing form, is more common than in Britain.

19. Season of the year has no influence over the mortality of any of the forms of fever.

20. In all of the fevers there is not much difference in the mortality of the two sexes.

21. Typhus is least fatal between the ages of ten and twenty, the mortality at that period of life being under 5 per cent. Above twenty, the mortality increases with the age, until of those above fifty considerably more than one half die. The mortality from relapsing fever appears to be influenced by age in a similar manner. In typhoid fever, on the other hand, in no period of life is the mortality under  $12\frac{1}{2}$  per cent.; and although, as in typhus, the rate of mortality increases with the age, it does so in a less degree.

22. The mortality from typhus is grēter among the very poor than among those in better circumstances. Typhoid fever appears to be equally mortal in all classes.

*1. in 5 in both fevers*

23. Recent residence increases the mortality from, as well as the liability to, typhoid fever ; but does not appear to have any such influence over typhus.

24. Typhus and relapsing fever are strongly assimilated in the causes which give rise to them, if they be not mutually convertible diseases.<sup>1</sup> Typhoid fever, on the contrary, appears to be a perfectly distinct affection, dependent upon totally different causes.

25. The facts which have been adduced in reference to the mode of origin of the different forms of fever, deserve the serious attention of those entrusted with the care of the public health ; for it is manifest that, should they be confirmed by subsequent experience, they must have an important bearing on the question of hygiene.

<sup>1</sup> A further study of the conditions under which epidemics of relapsing fever have appeared, has induced me to believe that it will yet be shown that this fever is the result of famine alone, and that the poison of typhus is generated by destitution, and over-crowding combined.