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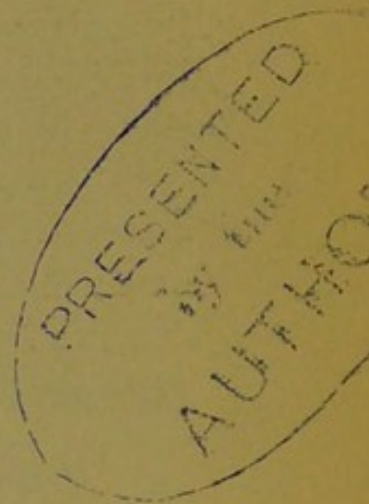
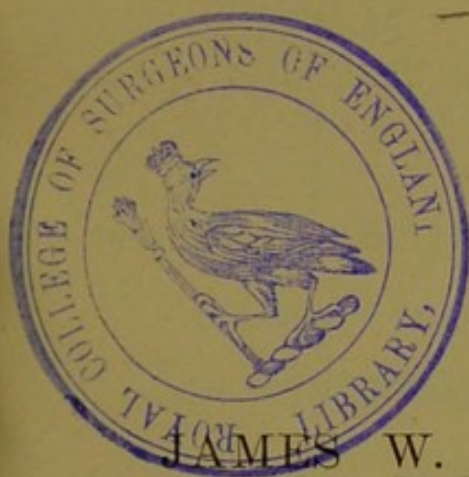
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TYPHOID FEVER

IN VICTORIA



BY

JAMES W. BARRETT, M.B., CH.B.

(Melbourne University)

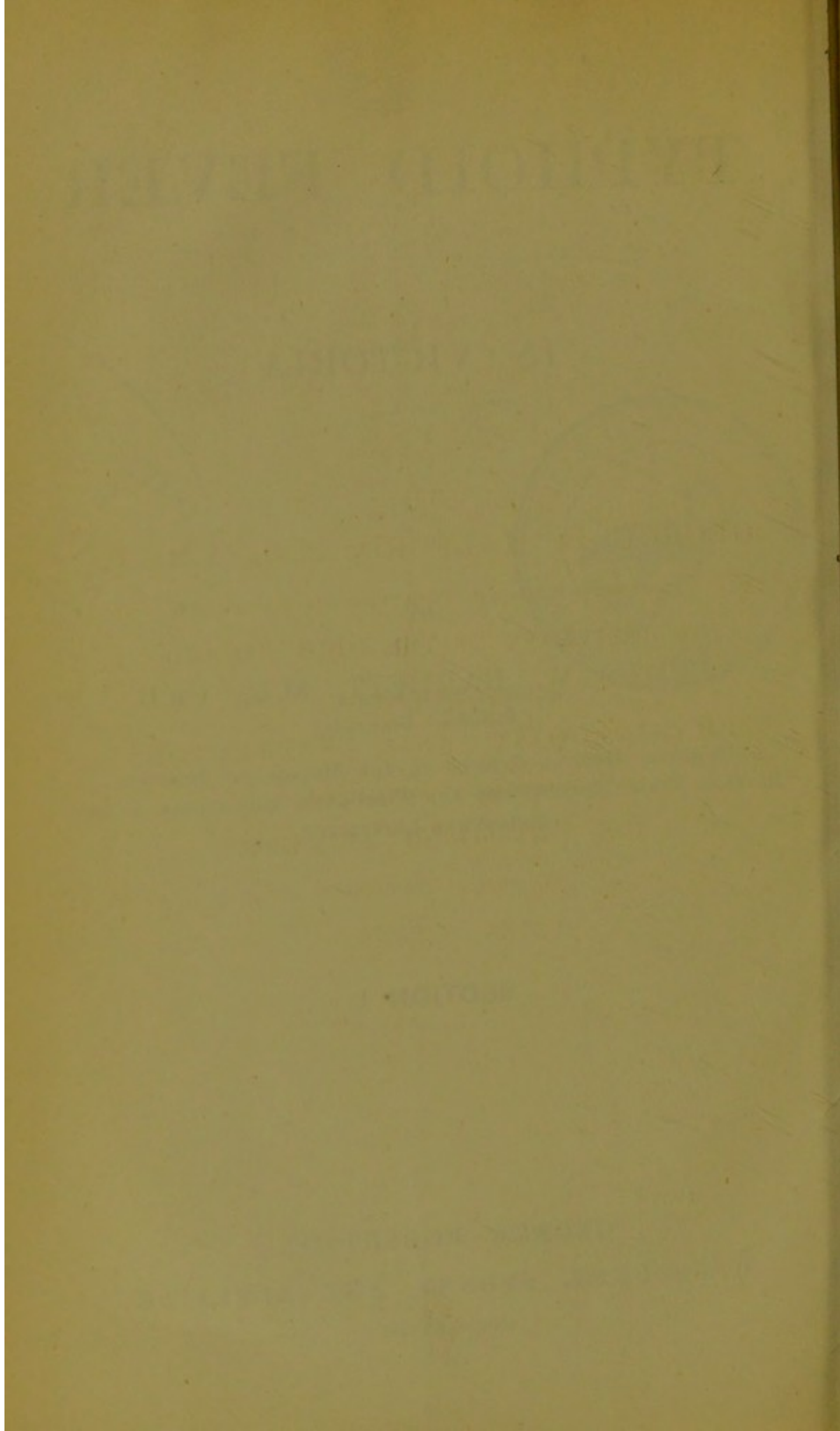
RESIDENT MEDICAL OFFICER TO THE MELBOURNE HOSPITAL
SEVERAL TIMES EXHIBITIONER AND FIRST-CLASS HONOURMAN AT THE
MELBOURNE UNIVERSITY

SECTION I

GEORGE ROBERTSON

MELBOURNE, SYDNEY, AND ADELAIDE

MDCCCLXXXIII



TO
GEORGE B. HALFORD, M.D., F.R.C.P.

(PROFESSOR OF PHYSIOLOGY IN THE UNIVERSITY OF MELBOURNE)

IN TESTIMONY OF THE HIGH REGARD

IN WHICH HE IS HELD AS A

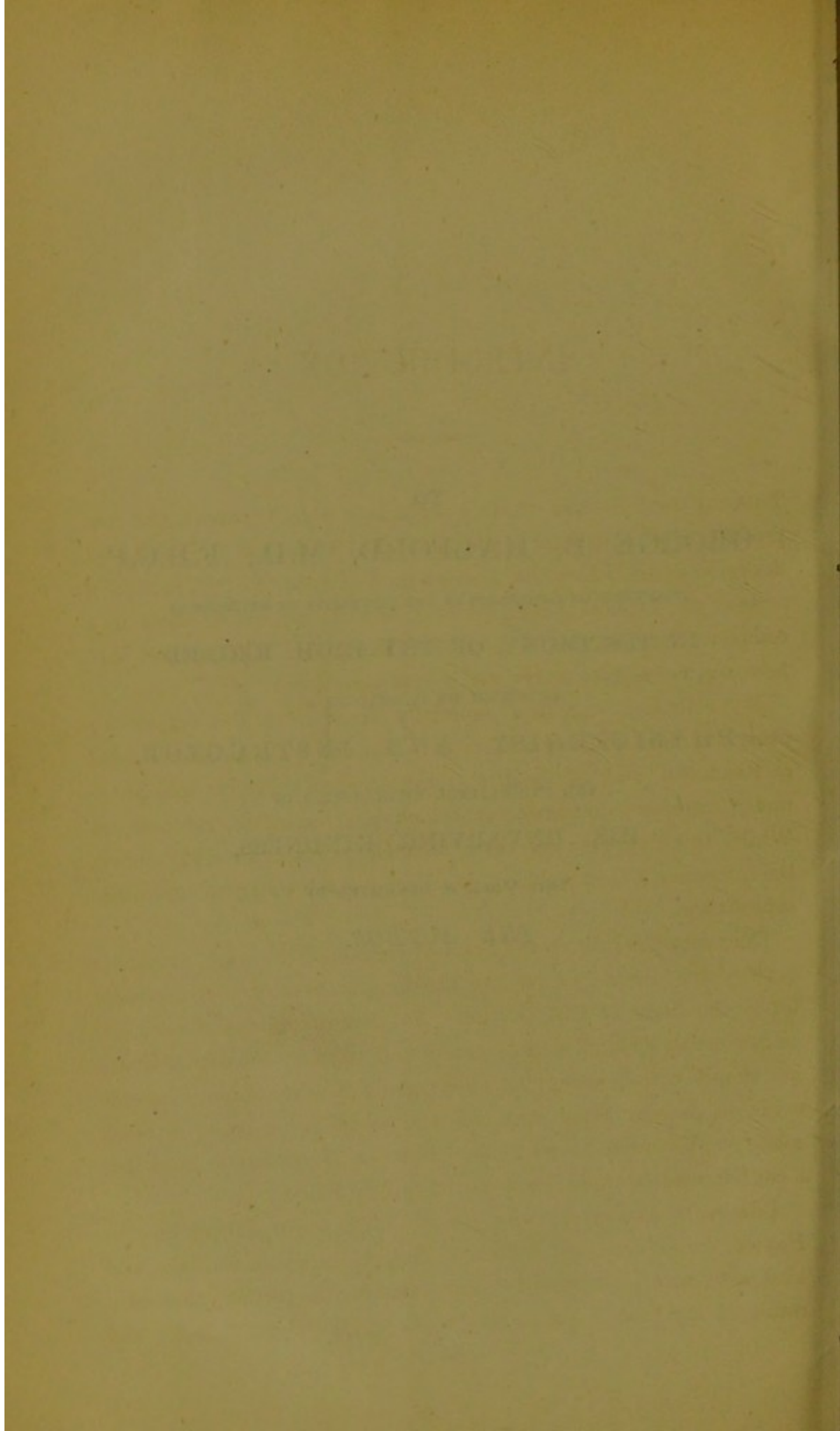
PHYSIOLOGIST AND INSTRUCTOR,

AND IN GRATEFUL RECOLLECTION OF

HIS UNVARYING KINDNESS,

THIS WORK IS DEDICATED BY

THE AUTHOR.



INTRODUCTION.



THIS, my first literary venture—which is also, I believe, the first production of a medical graduate of the Melbourne University—I desire to place before the medical profession as the first section of a work on Typhoid Fever, which I hope to present to them in a completed form as soon as possible. The nature of the subject will, however, necessitate several additional years' work.

My attention was first especially directed to the subject by observing that seven members of a family of eleven, who resided at Richmond (near Melbourne), were attacked with Typhoid Fever under curious circumstances, which are hereafter referred to. Whilst thinking over the cases in order to elaborate and confirm the inferences I then deduced, I collected much statistical and other information.

This, with the private and hospital records of the very numerous cases of the disease I have had the fortune to observe personally, forms the basis of this section. To such extent as I seem to be traversing ground already trodden, it must be considered that I am simply corroborating the observations of others from Victorian evidence, as everything contained in the following pages is based solely on Victorian observations. However, I venture to hope that a considerable amount of new matter will be found.

I desire to express my most hearty thanks to Mr. Henry Heylyn Hayter, the Government Statist of Victoria, to whose constant and kind assistance I attribute in great measure the (to me) successful result of my labour. Also to Mr. C. P. W. Dyring, B.A., and

Mr. Crawford H. Mollison, medical students of the Melbourne University, whose assistance in compiling and checking returns has been invaluable ; to the numerous gentlemen whose names are subsequently mentioned, who forwarded me useful information from all parts of the colony ; and lastly, but not least, to my friend Mr. Joseph Woolf, of Melbourne, solicitor, who, at great loss of time and personal inconvenience, thoroughly revised the whole of the text.

JAMES W. BARRETT.

MELBOURNE HOSPITAL,
October 1st, 1883.

TYPHOID FEVER IN VICTORIA.

CHAPTER I.

ON THE INDENTITY OF ALL THE FORMS OF CONTINUED FEVER EXISTING IN VICTORIA.

WHEN I was first appointed to the charge of the medical wards of the Melbourne Hospital, my attention was directed to the existence of two apparently distinct groups of fever cases.

The cases included in the first group presented all the ordinary characteristics of Typhoid Fever, by which name they were designated in the Hospital books, whilst the other comprised those cases marked in the Hospital records as *Febris*, *Febricula*, or simple continued fever. Cases of the latter class had for their sole characteristic the existence of a mild fever, which lasted from 1 or 2 to 15 or 16 days. They are referred to in the following pages by the general term of *Febricula*, and are separated from those cases of febrile disturbance which are dependent on liver, stomach, or any other organic disease. Fever cases which lasted more than 16 days were almost invariably characterized either by a fever of a violent type, or else by some or all of the characteristic Typhoid symptoms, such as diarrhœa, abdominal tension, or spots, and contrasted strongly with cases of the second class, where the fever was mild, and the Typhoid symptoms were absent.

These two groups of cases include all the varieties of continued fever met with in Victoria, and probably also in New South Wales, South Australia, Tasmania, and New Zealand; and to them the terms *Low Fever*, *Gastric Fever*, *Typhus Fever*, *Colonial Fever*, and *Infantile Fever* have been applied indiscriminately. If, then, it can be shown that this mild continued fever and Typhoid Fever are due to the same cause, it follows that there is but one continued fever in Victoria—which, however, manifests its presence in different individuals by symptoms of very variable intensity.

I have divided the two groups of cases in the preceding lines by

fixing upon the maximum duration of the mild form as 16 days. The distinction, though nearly always a correct one, is nevertheless purely arbitrary, and is only adopted for purposes of convenience.

If, therefore, it can be shown—

(1.) That in those years in which Typhoid Fever was very prevalent, Febricula cases were also, and *vice versa*.

(2.) That in those months of the year during which Typhoid Fever prevailed, Febricula did also, and *vice versa*.

(3.) That exposure to the Typhoid poison may cause Febricula.

(4.) That just as Typhoid Fever in Victoria attacks females far more often than males, so also does Febricula ; and

(5.) If a number of cases be collected showing the gradual way in which the clinical characters of Febricula and Typhoid Fever blend, and the difficulty of drawing an arbitrary line of demarcation between them ; it then follows, as a matter of induction, that this simple continued fever (Febricula) and Typhoid Fever are due to the same cause, and are, therefore, similar in nature ; the one being a mild expression of the effects produced by the introduction of the Typhoid virus into the system, whilst the other is a more severe manifestation of a similar infection.

(1.) THAT TYPHOID FEVER AND FEBRICULA CORRESPOND IN FREQUENCY YEAR BY YEAR.

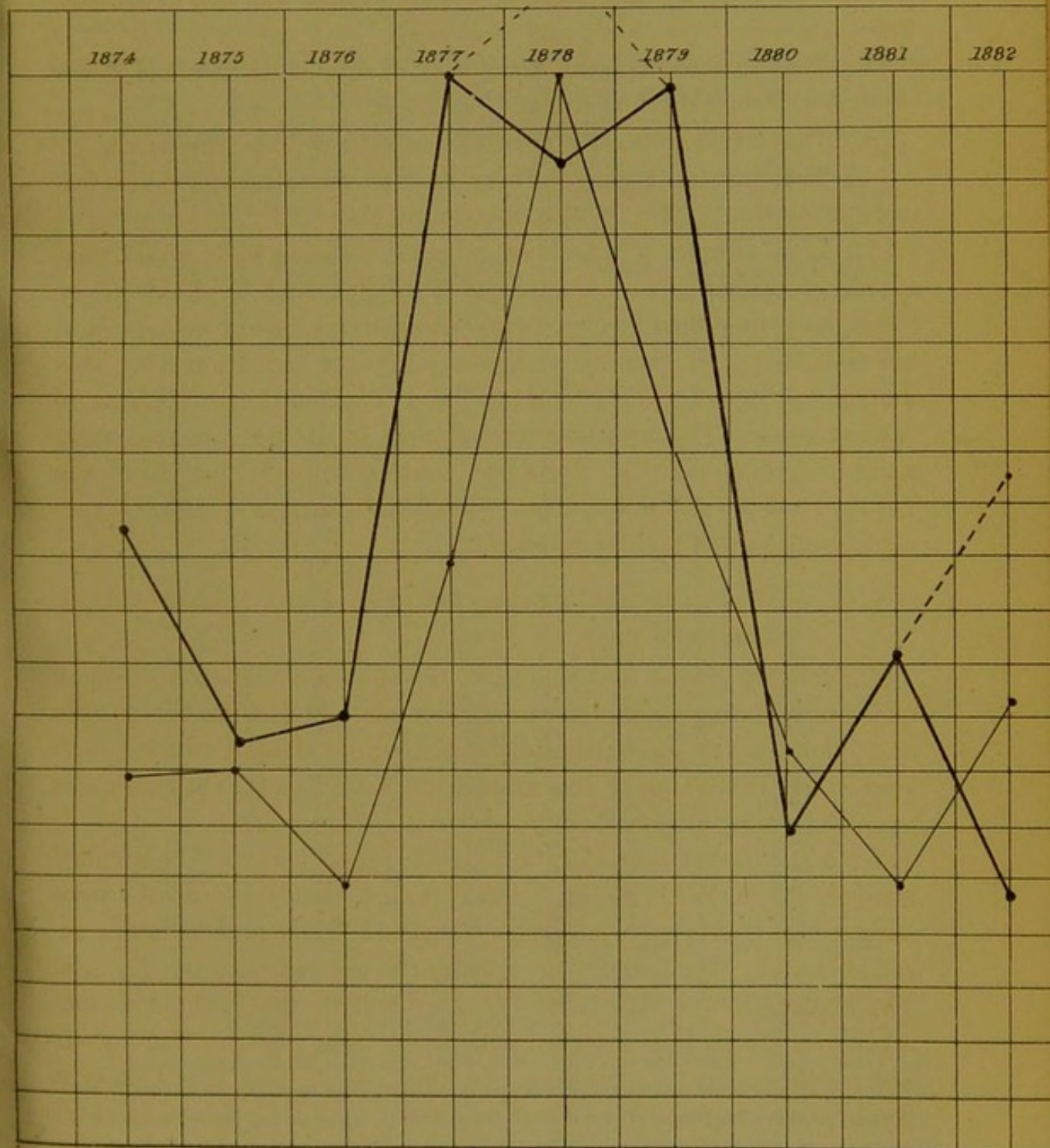
The following table and chart (No. I.) show a numerical statement and corresponding diagrammatic representation of the number of cases of Typhoid Fever admitted into the Melbourne Hospital during each year since 1860, and of the number of Febris and Febricula cases admitted yearly since 1874.

I did not intend originally to separate cases marked “ Febricula ” from those marked “ Febris,” but I found that three deaths were assigned to “ Febris,” which, like Febricula, never proves fatal ; so-called Latent Typhoid Fever apparently not existing in Victoria. The explanation of the mistake is this : During the Typhoid season, when the Hospital is crowded with fever cases, doctors and nurses are in the habit of speaking of “ *the fever*,” and occasionally a Typhoid case is marked as *Fever* or *Febris* ;* and, no doubt, in these

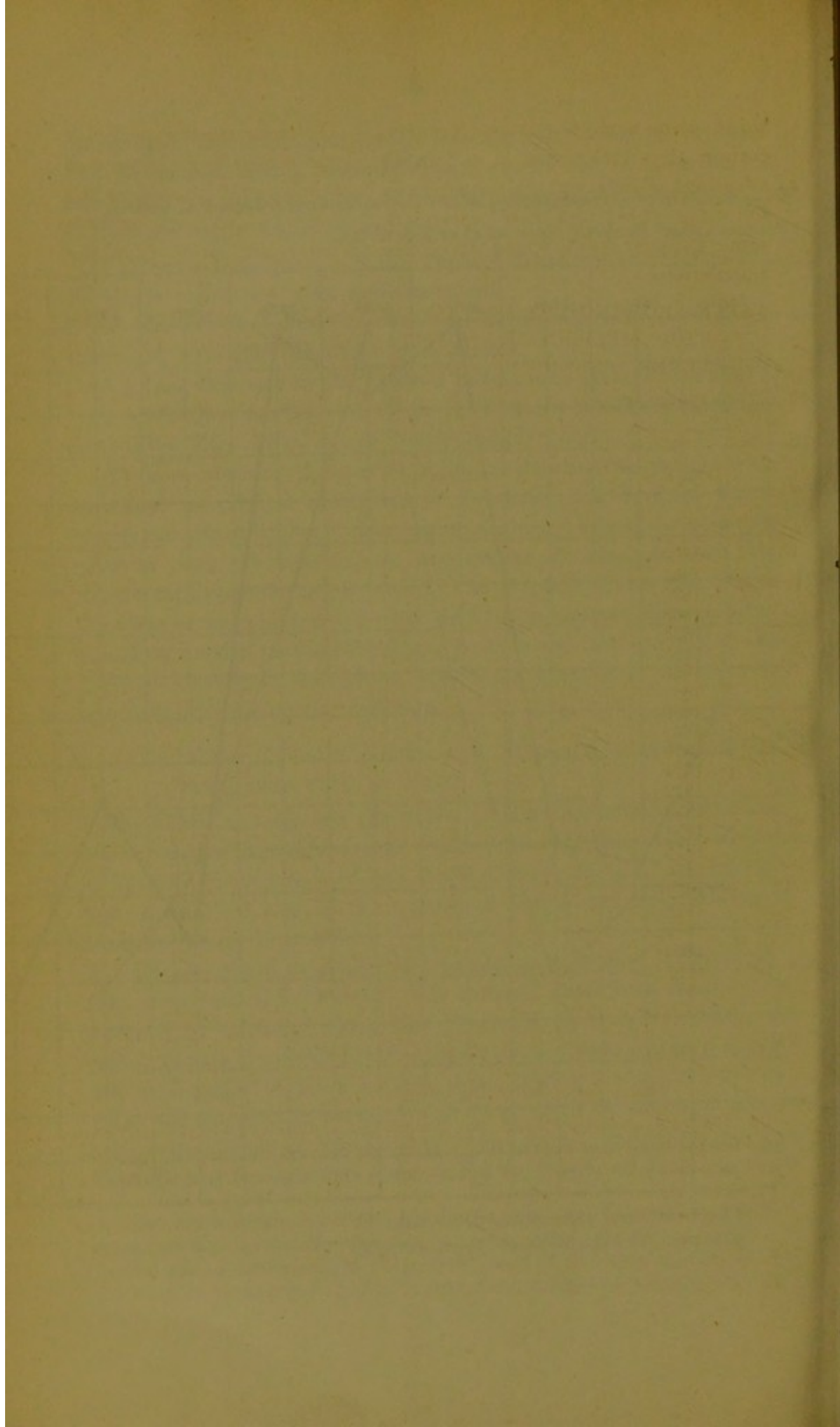
* The terms Febris, Febricula, and Simple Continued Fever are used almost synonymously in the Hospital books. The term Febricula, however, is applied almost exclusively to the mildest forms of continued fever ; whereas the mistake of marking Typhoid Fever cases as Febris has sometimes been made.

Nº I

Diagrammatic representation of the correspondence between yearly frequency of Typhoid fever and of Febricula.



*The thick line represents "Febricula."
The thin line represents "Typhoid fever."*



three cases such a mistake occurred. However, to be perfectly certain that the return is not in the least misleading, these two affections, *Febris* and *Febricula*, have been separately treated in the following table; and those cases marked *Febris*, which might include some Typhoid Fever cases, have been wholly eliminated from the calculations.

TABLE SHOWING THE NUMBER OF YEARLY ADMISSIONS INTO THE MELBOURNE HOSPITAL OF CASES OF TYPHOID FEVER, FEBRICULA, AND FEBRIS.

(Prepared with the assistance of Messrs. Dyring and Mollison.)

YEAR.	TYPHOID FEVER.	FEBRICULA.	FEBRIS.	NUMERICAL PROPORTION OF FEBRICULA TO TYPHOID CASES.
1860	2	—	—	—
1861	3	—	—	—
1862	7	—	—	—
1863	12	—	—	—
1864	26	—	—	—
1865	28	—	—	—
1866	86	—	—	—
1867	53	—	—	—
1868	45	—	—	—
1869	65	—	—	—
1870	116	—	—	—
1871	66	—	—	—
1872	57	—	—	—
1873	56	—	—	—
1874	94	35	25	2·68
1875	95	23	17	4·13
1876	67	24	5	2·79
1877	148	61	18	2·42
1878	271	55	24	4·92*
1879	176	60	30	2·93
1880	97	18	17	5·38
1881	66	28	12	2·35
1882	112	14	11	8*
1883($\frac{1}{2}$)	189	20	1	9·45*
TOTALS	1,937	338	160	

Mean ratio, deducting errors ... 3·24

* The high ratio in 1882 and 1883 is explained as follows :—In the early part of 1882 the number of beds in the Hospital was reduced from about 370 to 300, and as a consequence none but urgent cases were admitted, hence very few Febricula cases obtained admission. In 1878 also, the Hospital was crowded with Typhoid Fever cases, and consequently the Febricula cases were treated as out-patients. When the cases which occurred in those years are eliminated from the calculation, the ratio of Febricula to Typhoid Fever cases is seen to be very constant, averaging about 3·24.

The foregoing chart (No. I.) represents the preceding figures in a diagrammatic manner, and still more forcibly illustrates the correspondence which exists between the two diseases as regards their yearly frequency.

If the errors which occurred in the Febricula returns for 1878 and 1882 were eliminated, and the chart read as represented by the dotted line, the result would be even more striking.

(2.) TYPHOID FEVER AND FEBRICULA PREVAIL AT THE SAME TIME OF THE YEAR.

As to the mildest forms of continued fever, which last only two or three days, I can but assert, from individual experience, that they occur almost exclusively during the Typhoid season (January to May), since, unfortunately, there are no statistics sufficiently extensive with which I can verify that experience. As regards the more severe forms, such as would be admitted into the general hospitals, I have peculiarly accurate information.

The following return shows the number of persons suffering from Typhoid Fever, Febris, and Febricula (it being again, unfortunately, necessary to separate the two latter diseases for the reason formerly mentioned) who were admitted into the Melbourne Hospital during each month of the year from 1874-1882.

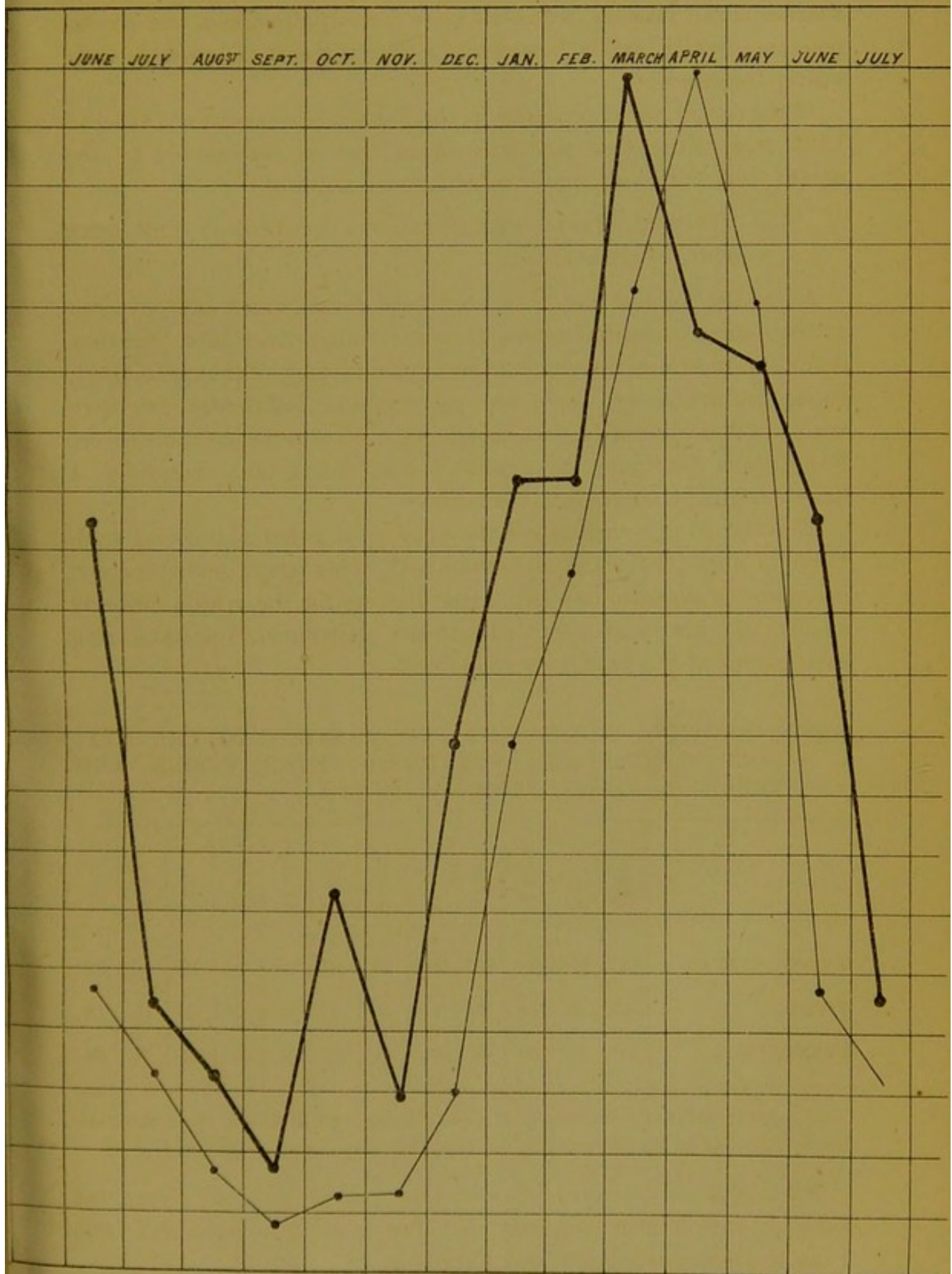
TABLE SHOWING ADMISSIONS PER MONTH INTO THE MELBOURNE HOSPITAL OF TYPHOID FEVER, FEBRIS, AND FEBRICULA CASES, FROM 1874 TO 1882.

	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
TYPHOID FEVER ...	112	146	203	251	202	59	40	23	10	16	16	38
FEBRIS ...	25	16	16	29	14	8	4	11	5	2	16	13
FEBRICULA ...	36	36	54	42	41	34	12	9	5	17	8	24

(Prepared with the assistance of Messrs. Dyring and Mollison, from materials kindly supplied by the Secretary of the Hospital, Mr. James Williams.)

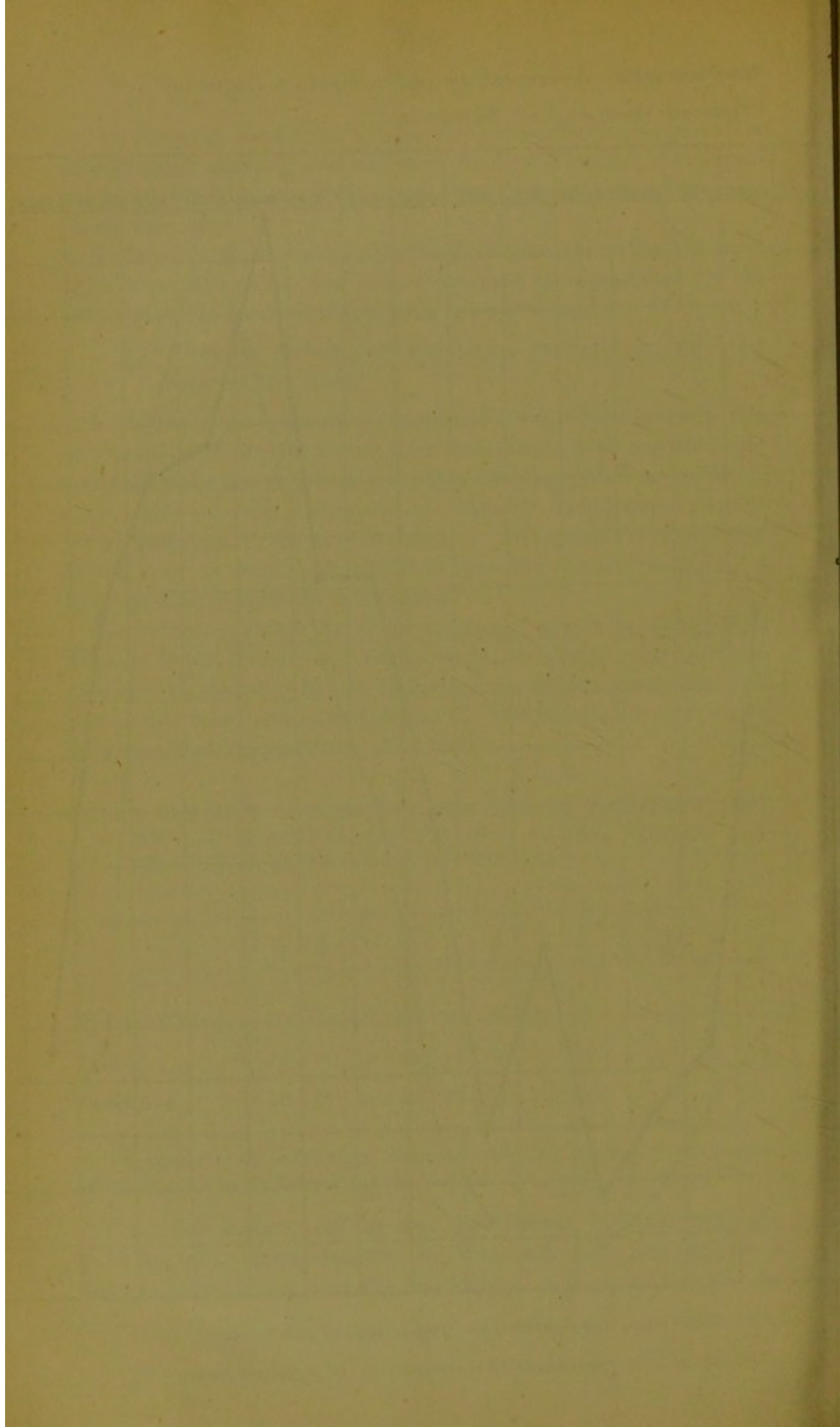
From this table it will be seen that just as Typhoid Fever was more prevalent from January to May, and less prevalent from June to December, so also was Febricula.

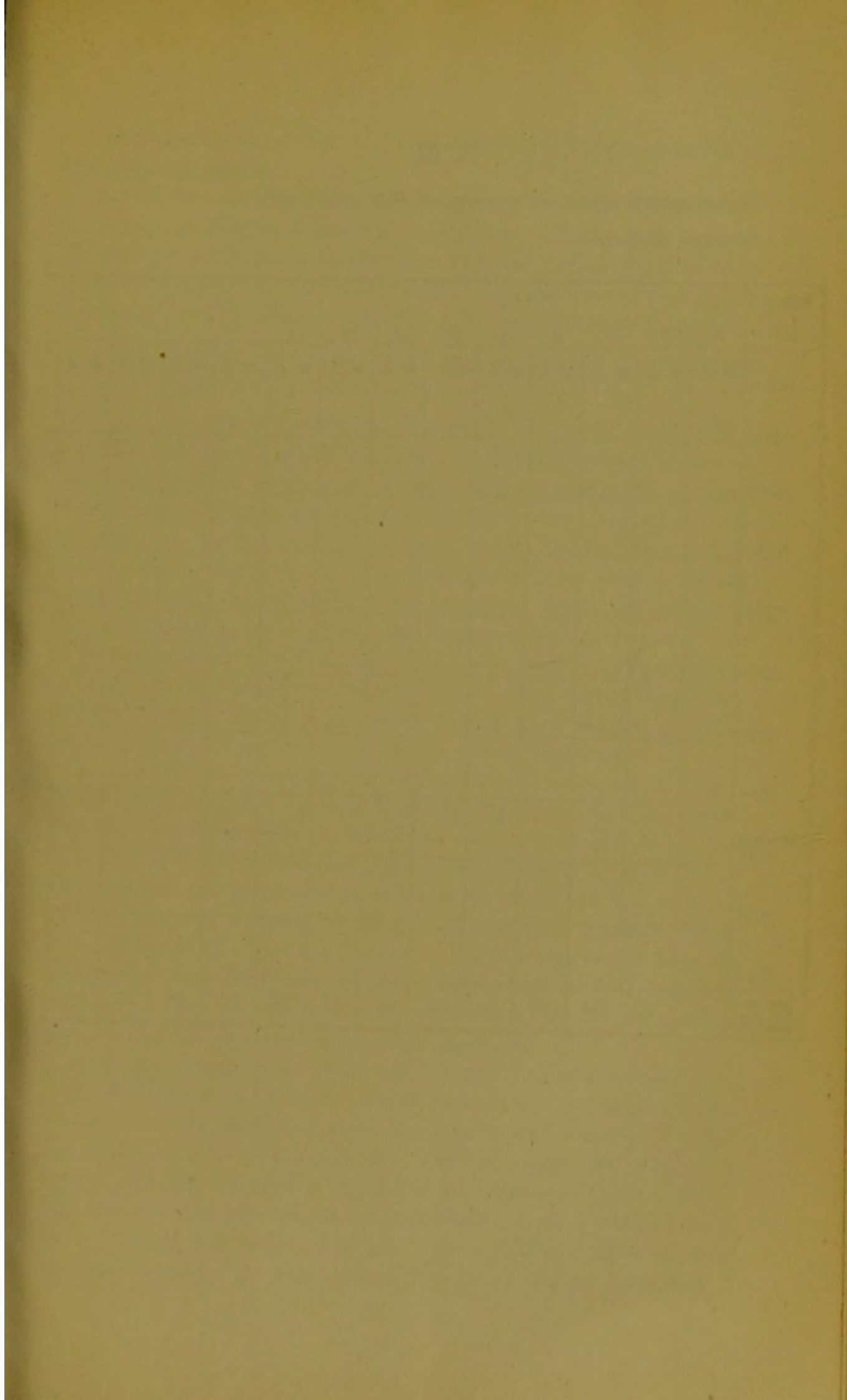
Diagrammatic representation of the monthly frequency of Typhoid fever and of Febricula.



The thick line represents the frequency of febricula.

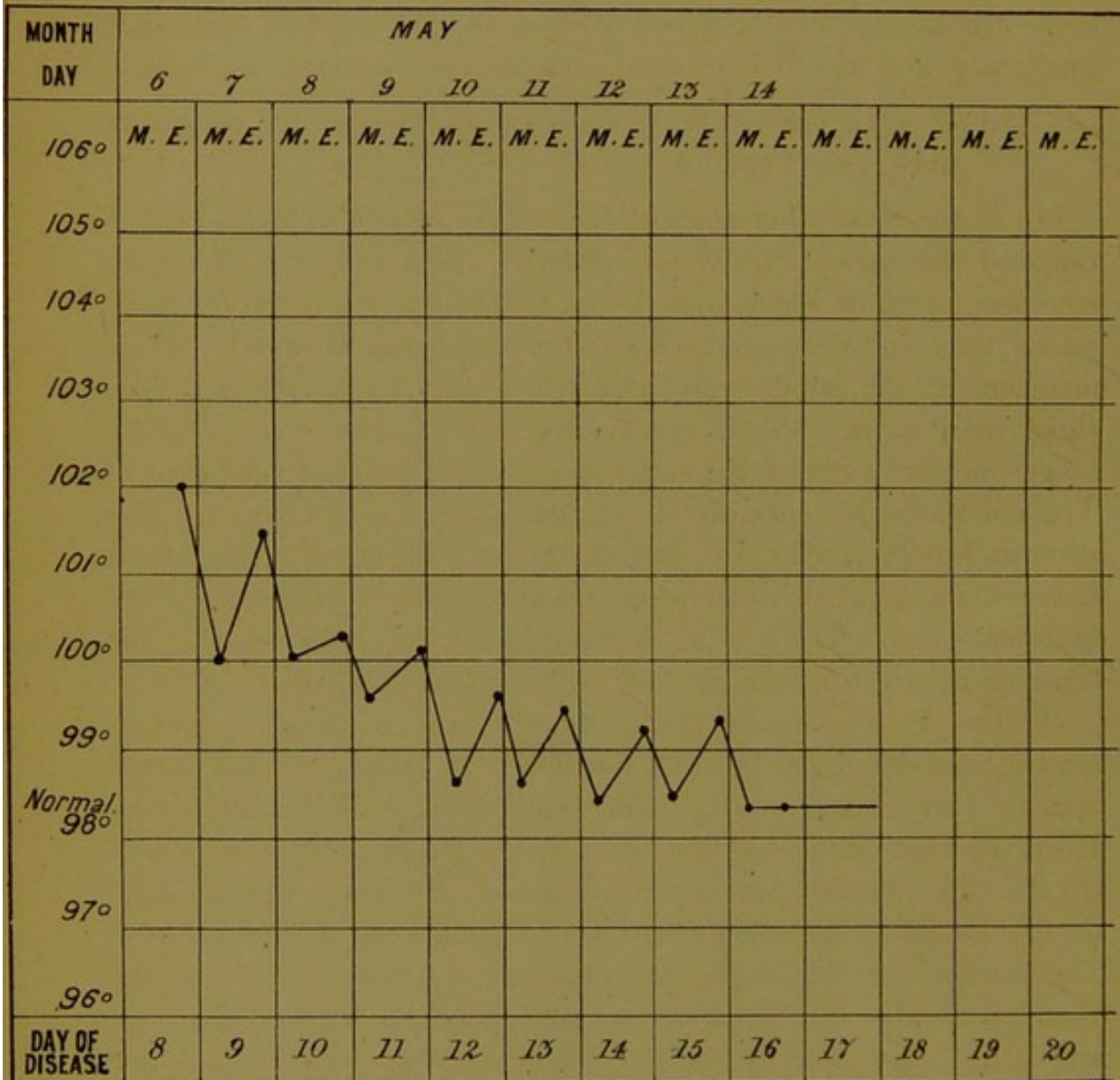
The thin line represents the frequency of typhoid fever.





Nº III

*Temperature Chart of a case of Febricula of
16 days duration.*



The preceding chart (No. II.) is a diagrammatic representation of the foregoing figures.

As will be observed, the correspondence between the monthly frequency of the two diseases is remarkable. If the cases marked Febris were represented in the same way, the result would be even more convincing; but they are omitted for the reasons mentioned previously, and in order to avoid even the semblance of inaccuracy.

(3.) SIMPLE CONTINUED FEVER CAN BE CAUSED BY INFECTION WITH THE TYPHOID VIRUS.

(a) In the *Australian Medical Journal* for December 15th, 1882, I reported the case of the W—— family, which consisted of eleven members, seven of whom were seized with fever within two or three weeks' time, and were admitted into the Melbourne Hospital. Three members of the family were attacked almost simultaneously, then three more at intervals of a few days, and another after a slightly longer interval. Six of the sufferers presented marked symptoms of Typhoid Fever, and one dying, the diagnosis was confirmed. The seventh, however, who was one of the first attacked, suffered from a Febricula, in which defervescence was complete a little beyond the fourteenth day. There is no doubt that all were affected with the same virus, which in one case distinctly caused Febricula.

(b) The P—— family, consisting of three members, a father, mother, and daughter, lived at Carlton. On March 9th the father became very ill, and on the 23rd was conveyed to the Melbourne Hospital, where he passed through a severe attack of Typhoid Fever. On the 23rd the daughter sickened, and on April 4th was removed to the Hospital, suffering from a mild attack of Typhoid Fever. The mother sickened on the 29th of April, and was removed to the Hospital on May 5th, when she was suffering from languor, lassitude, and fever. Her case proved to be a Febricula, which ran a course indicated by the attached temperature chart (No. III.) :—

Here again the facts are clear and the inference undoubted.

(c) My brother and I, many years ago, went on a fishing excursion to the Saltwater River, and there drank some well water into which the sewage of a farm-yard soaked. Whether *propter hoc*, but at all events *post hoc*, my brother developed an attack of Typhoid Fever which nearly cost him his life. On the other hand, I suffered from the mildest of Febriculas, of which, unfortunately, I have no thermometric record. I could record very many similar cases had I

space to do so ; but the three recorded are sufficient to establish the proposition I set out to prove, viz., *that the Typhoid virus can cause Febricula.*

- (4.) THAT JUST AS TYPHOID FEVER IN VICTORIA ATTACKS FEMALES MORE OFTEN THAN MALES, SO ALSO DOES FEBRICULA.

That this is so will be seen by a reference to Chapter IV., where the matter is dealt with at sufficient length.

- (5.) THE FOLLOWING LIST OF FIVE TYPICAL CASES I ALSO COLLECTED, IN ORDER TO SHOW THE MANNER IN WHICH THE CLINICAL CHARACTERS OF TYPHOID FEVER AND FEBRICULA BLEND, AND THE DIFFICULTY OF DRAWING AN ARBITRARY LINE OF DEMARCATION BETWEEN THEM :—

(A.) *Febricula running a 3-6 days course.*—A relative of mine during the last epidemic of Typhoid Fever was suddenly seized with a rigor, followed by a rise of temperature to 101-102° F. She remained feverish for about three days, and then recovered perfectly. This attack was in no way dependent on any organic condition, and represents one of the mildest forms of Febricula. I have seen some dozens of similar cases where persons have suffered from a simple fever lasting from 3-6 days, but they have nearly always occurred during the Typhoid season.

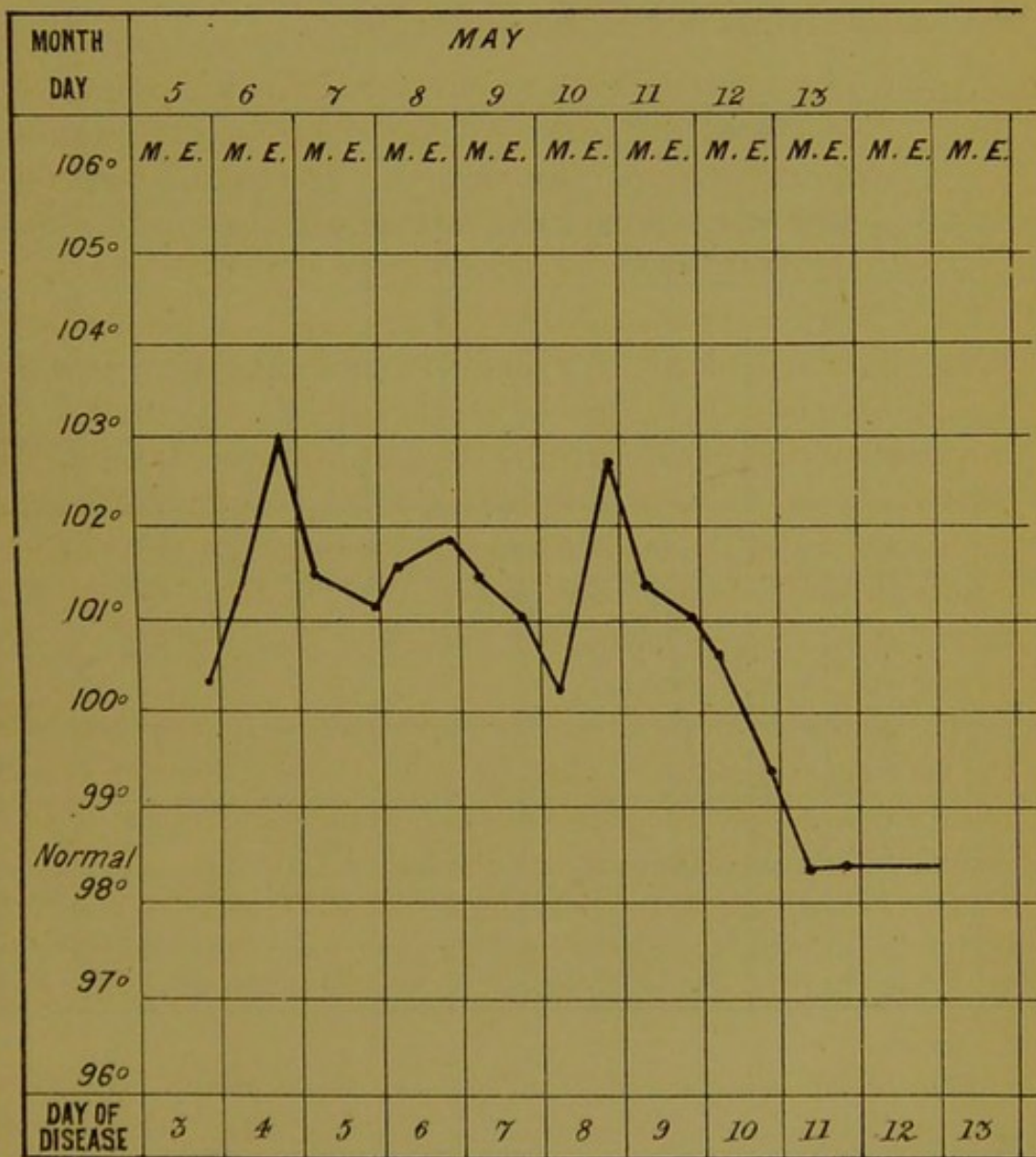
(B.) *Febricula running an 11 days course.*—In this typical case the following temperature chart (No. IV.) shows the only symptom from which the patient suffered—viz., fever, which ran a 10-11 day course. This case is typical of an ordinary Febricula.

(C.) *Febricula running a 16 days course.*—Typical of this variety is the case already cited (Chart No. III.), viz., the mother of the P—— family, who suffered from a Febricula which ran its course in 16 days.

(D.) *Mild Typhoid Fever.*—This case is typical of those which are just beyond the boundary line, that is, where there is some positive symptom, like diarrhœa, spots, or abdominal tension, which determines the diagnosis, whilst the fever is moderate and of limited duration. Of course I am well aware that there are cases of Typhoid Fever in which the so-called characteristic symptoms never appear, and which may simulate Meningitis, &c., but in such cases the fever is generally very intense and very protracted. In this case there was a 24 days' fever, as shown by the attached temperature

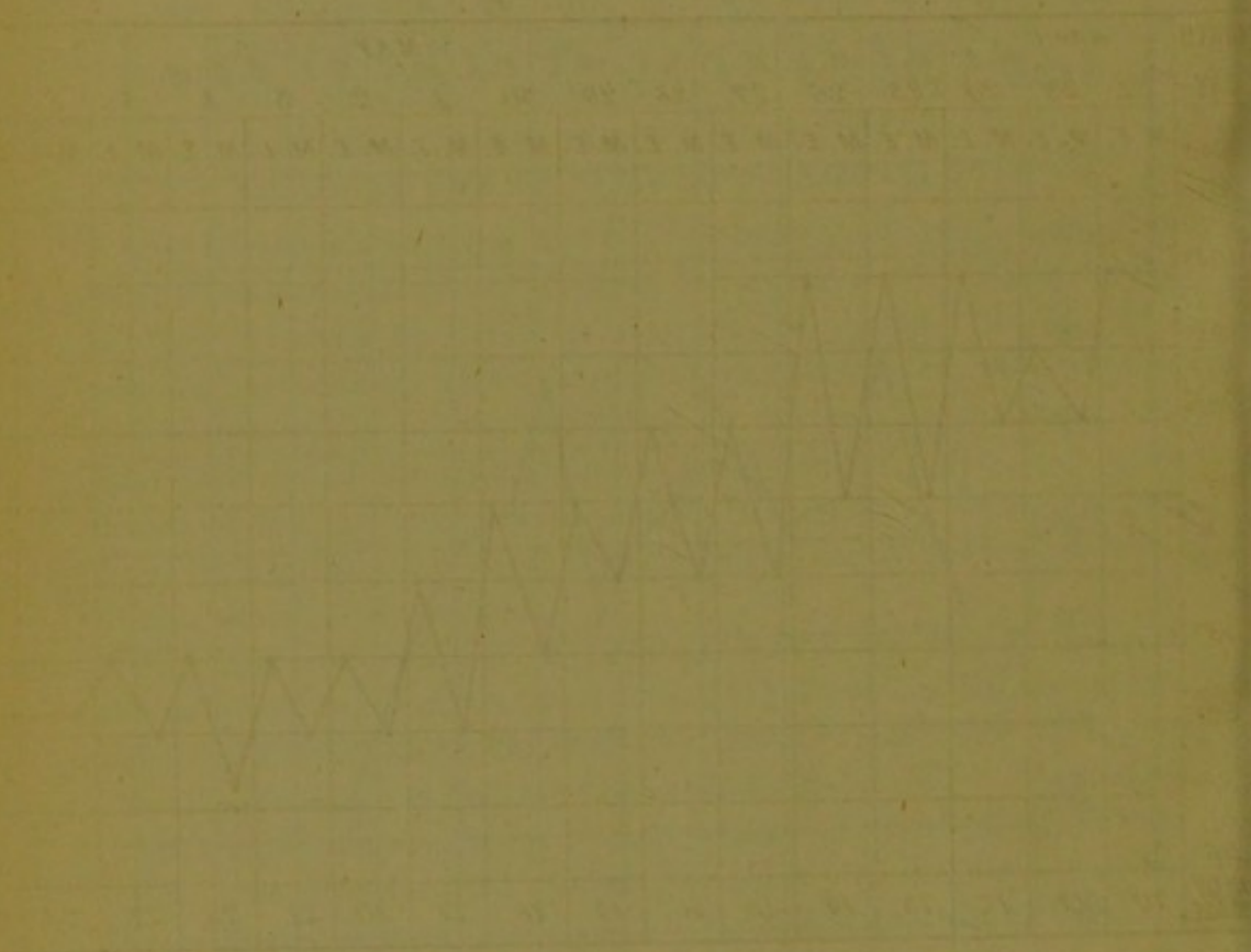
NºIV

*Temperature Chart of a case of Febricula
of 10-11 days duration.*



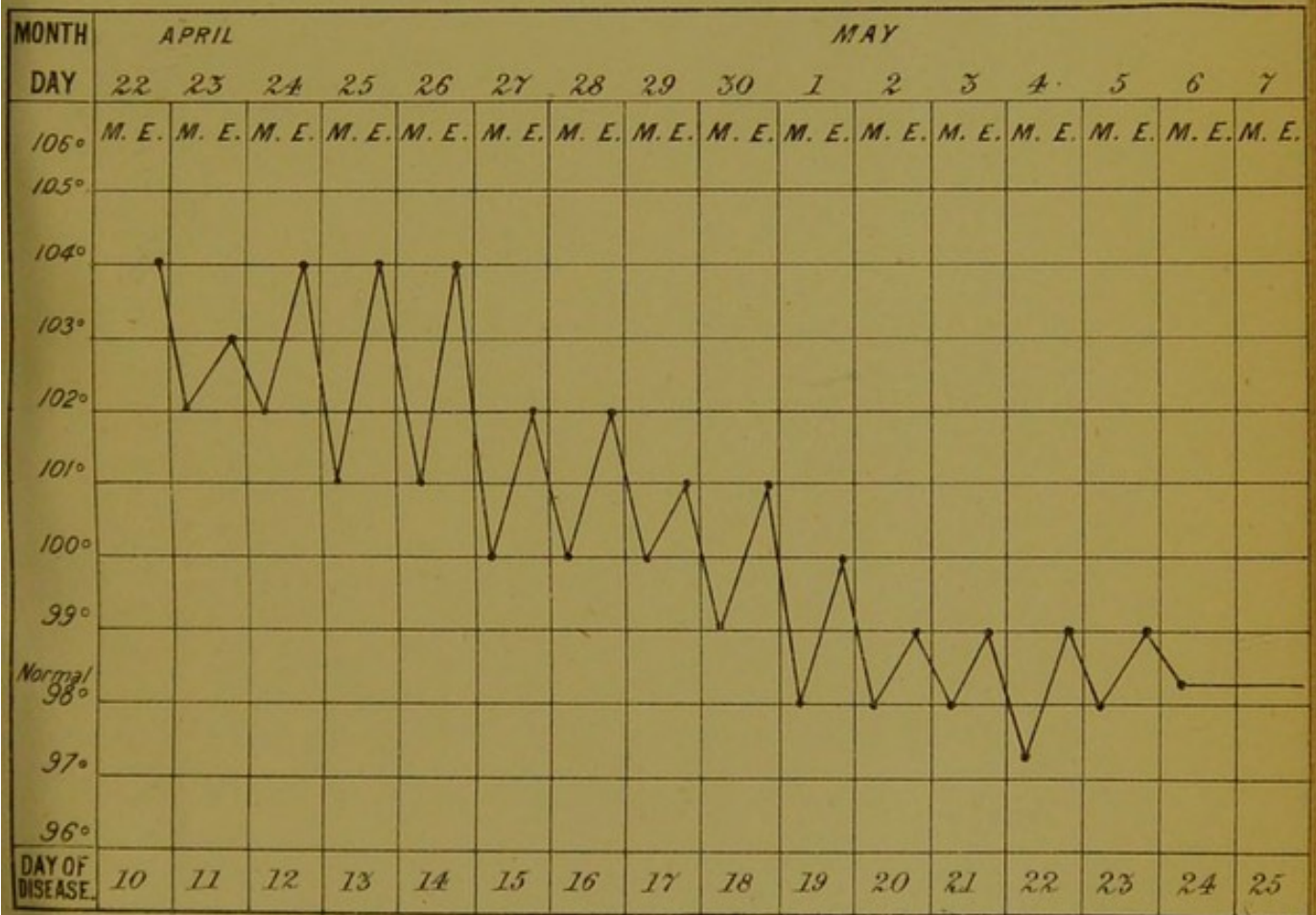
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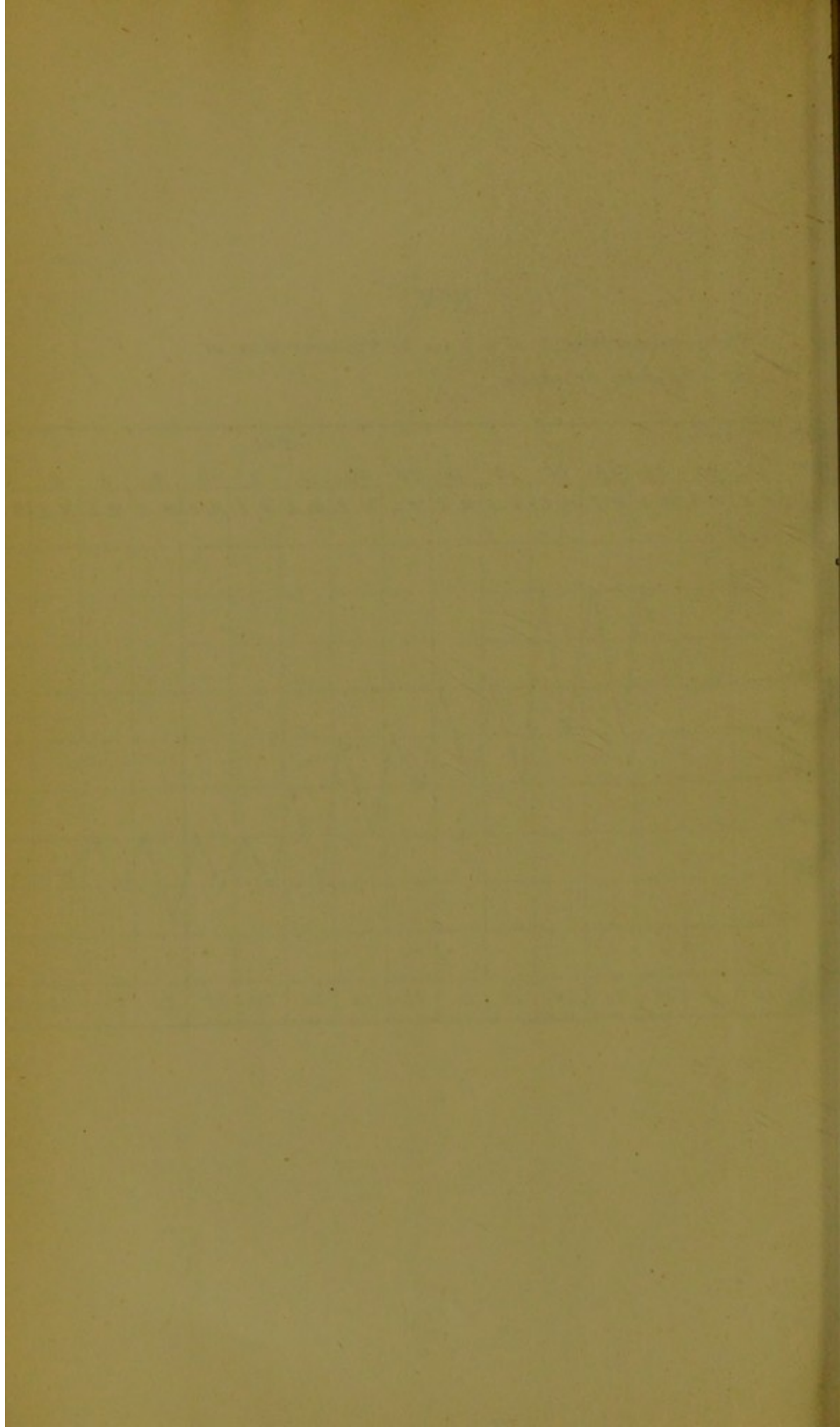
THEORY OF THE EARTH AND ITS HISTORY

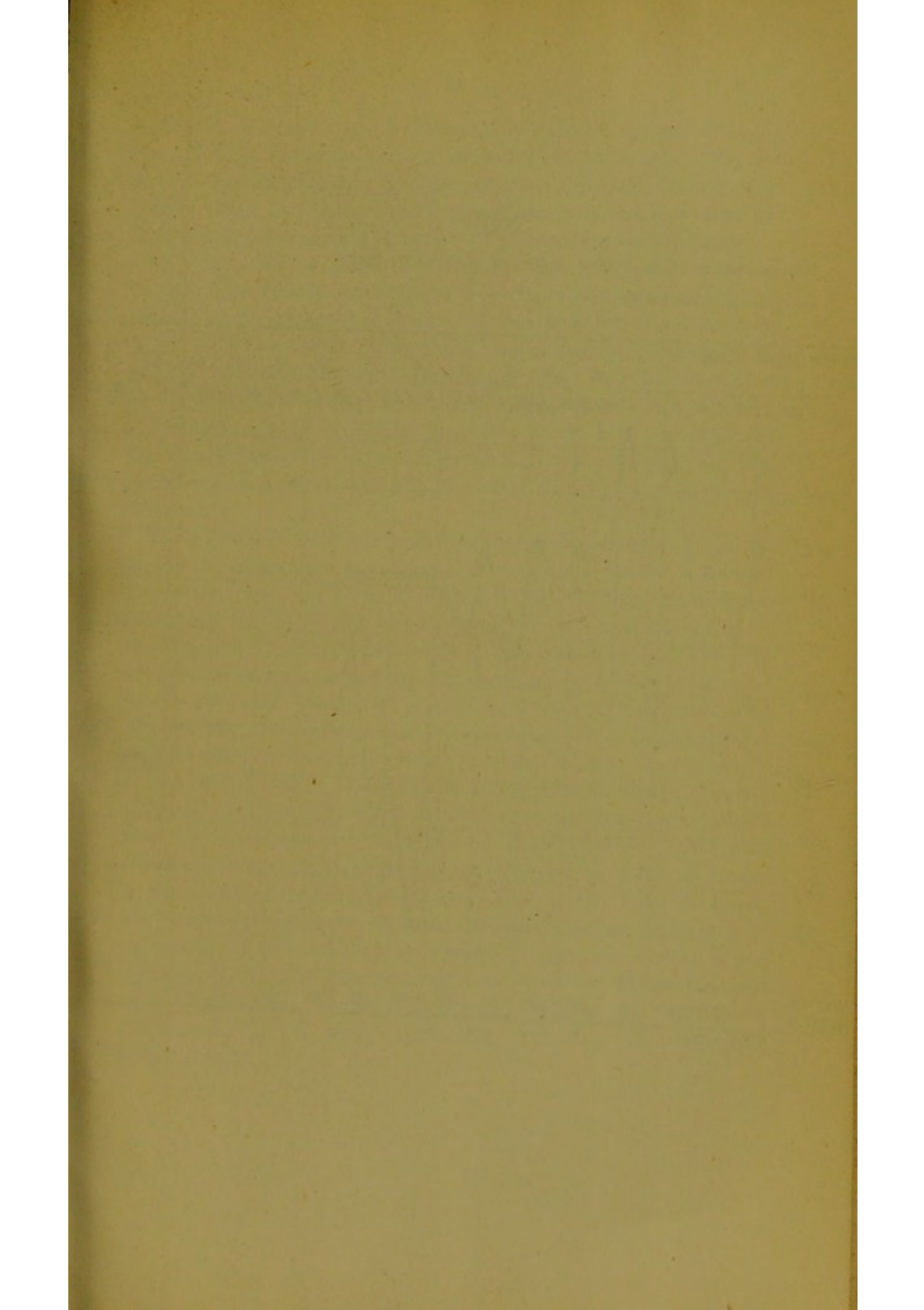


N^oV

*Temperature Chart of a case of Typhoid fever of
20 - 24 days duration.*







Nº VI

*Temperature Chart of a case of Typhoid fever
of severe character.*

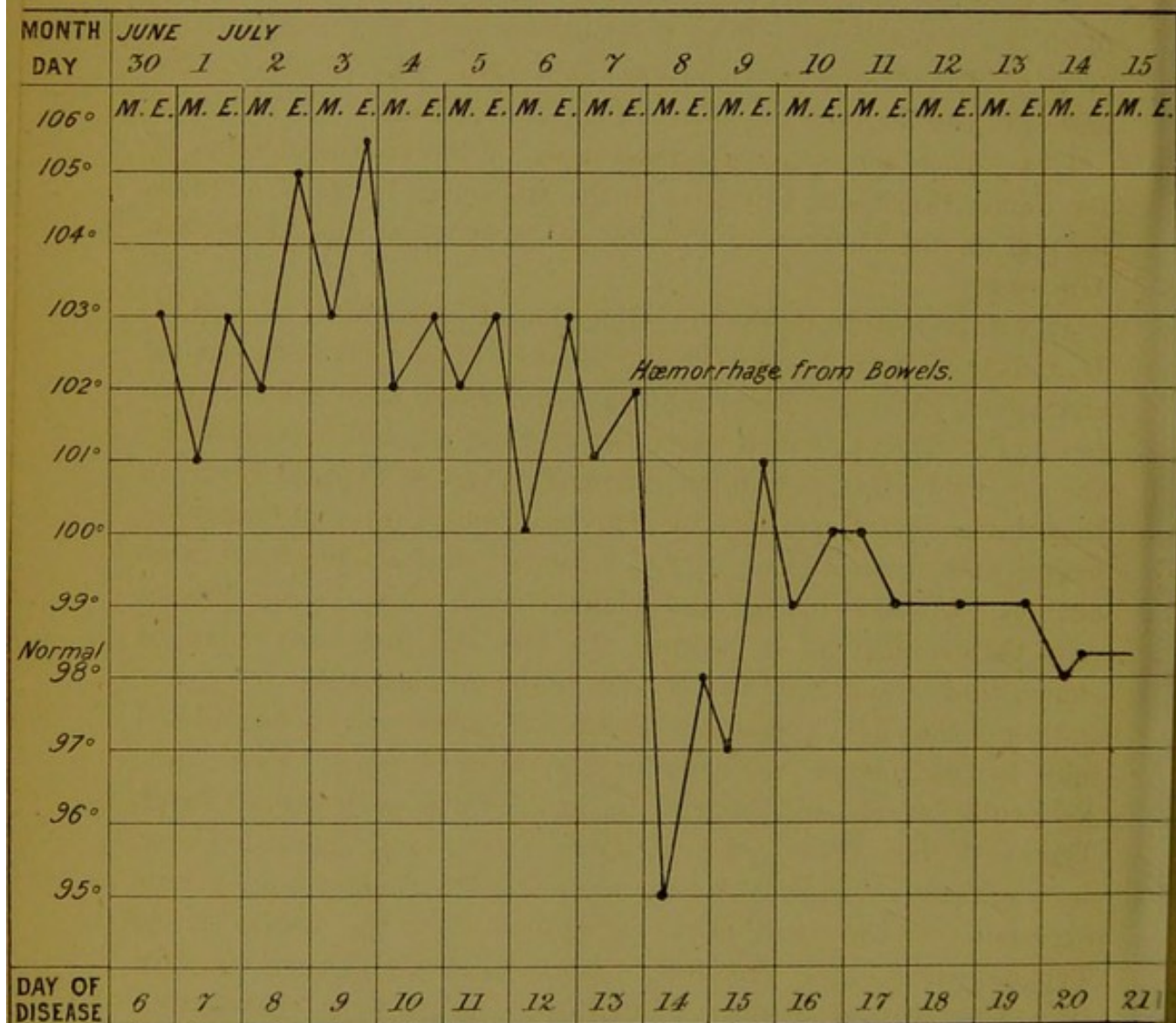


chart (No. V.), and there was also some diarrhœa. Cases of 16-20 days' duration are *sometimes* very difficult to diagnose accurately, the signs of Typhoid Fever being often very feebly marked, or altogether absent. Still, as I pointed out before, if the fever last more than 16 days, a positive diagnosis of Typhoid Fever can *generally* be made.

(E.) *Typical of a severe and irregular case of Typhoid Fever.*—In this case violent hæmorrhage from the bowel occurred on the evening of the 13th day, and was followed by a fall of temperature to 95° F., if not lower. (The thermometer used only registered to 95° F.) The attached temperature chart (No. VI.) illustrates the nature of the case and the effects of the hæmorrhage.

I have been able to publish these cases by the kind permission of Dr. James Robertson, Physician to the Melbourne Hospital, and late lecturer on the Theory and Practice of Medicine at the Melbourne University.

It will be seen from the preceding that of these cases A and B, B and C, C and D, and D and E were much alike in clinical characters, each case being a little more severe than the one preceding it. Then C, which was a case of Febricula, and was caused by the Typhoid virus, only differed from D, a case of Typhoid Fever, in that the latter was marked by diarrhœa and a fever of somewhat longer duration. Again, in E additional clinical characters were obvious, viz., hæmorrhage and violent fever. Yet D and E were nevertheless identical in nature. In just the same way it can be shown that C and D, C and B, and B and A were alike.

From the five preceding groups of facts and arguments I may be considered to have proved that Typhoid Fever and Febricula, which are referred to in Victoria as Colonial Fever, Typhus Fever, Gastric Fever, Low Fever, and Infantile Fever, are identical as regards causation; Febricula being simply a mild expression of the result of the introduction into the system of the Typhoid virus, and therefore that in Victoria there is but one Continued Fever (Typhoid), which is, however, expressed in a very different manner in different individuals.

CHAPTER II.

ON THE RELATION OF DIARRHŒAL AFFECTIONS TO TYPHOID FEVER.

WHEN I first attempted to investigate this subject I chanced to read an article in one of the British journals, in which the writer showed that before epidemics of diphtheria occurred, simple sore throat was very prevalent. He also hinted that simple sore throat was the first indication of infection with the diphtheritic virus, and was transmitted from individual to individual, the transmission being attended with intensification of the type of case until true diphtheria at last resulted.

I then thought that perhaps uncomplicated diarrhœal affections and Typhoid Fever bear much the same kind of relation to one another; the Typhoid poison at first manifesting itself as a diarrhœal affection, then, with propagation, the type of disease intensifies, until at last true Typhoid Fever results.

If this is so, it would be expected that a great number of diarrhœa cases would occur in the early part of the summer, and that as summer advanced they would decrease in frequency, whilst Typhoid Fever would become more prevalent.

The actual state of things is illustrated by the following returns, which show the deaths per month from Typhoid Fever and Diarrhœa in Melbourne (1870-1882), Sandhurst and district (1874-1882), and Ballarat and district (1874-1882):—

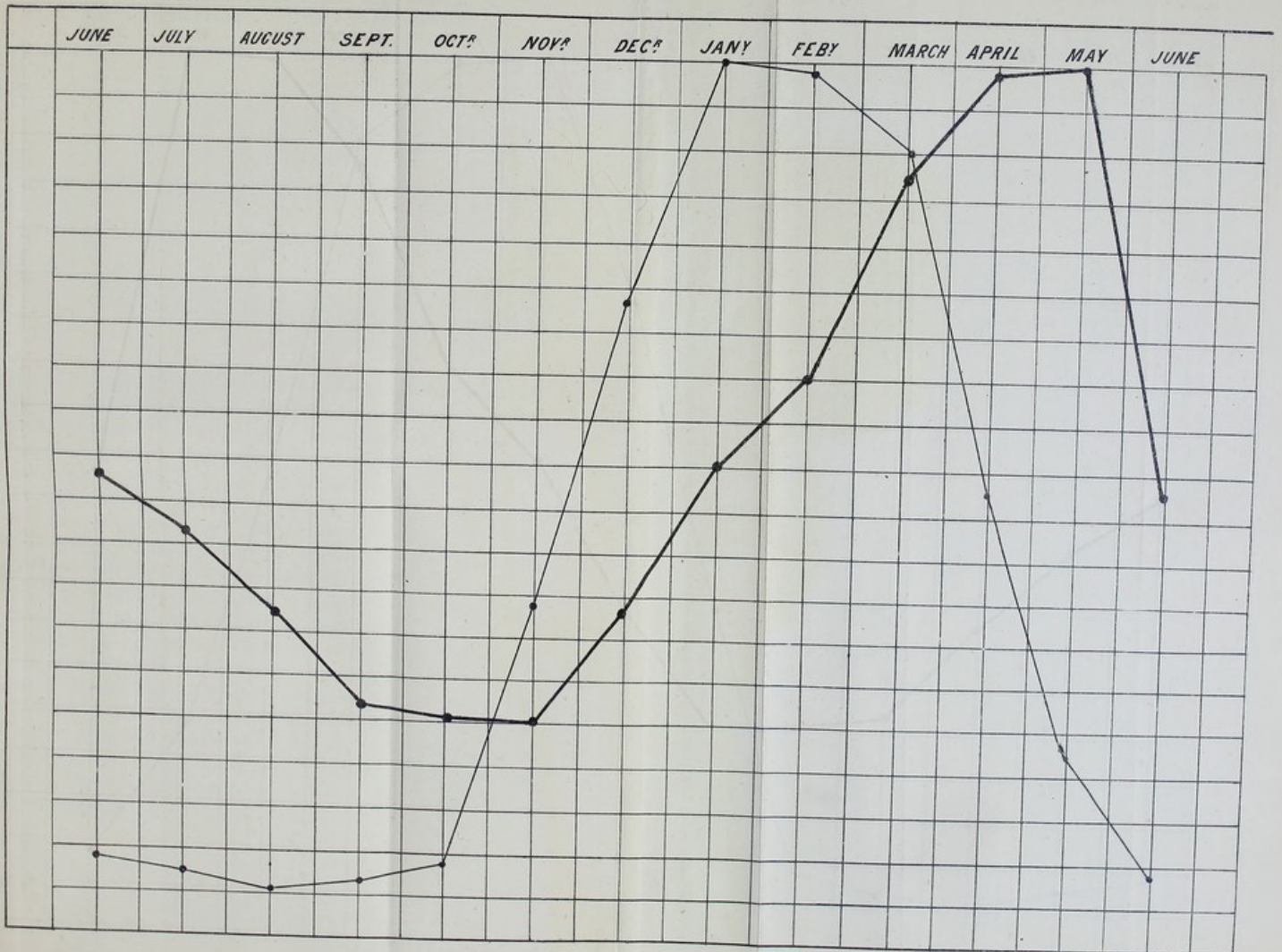
RETURN SHOWING THE DEATHS PER MONTH FROM DIARRHŒA
IN MELBOURNE, SANDHURST AND DISTRICT, AND BAL-
LARAT AND DISTRICT.

(Prepared with the assistance of Mr. H. H. Hayter, Government Statist.)

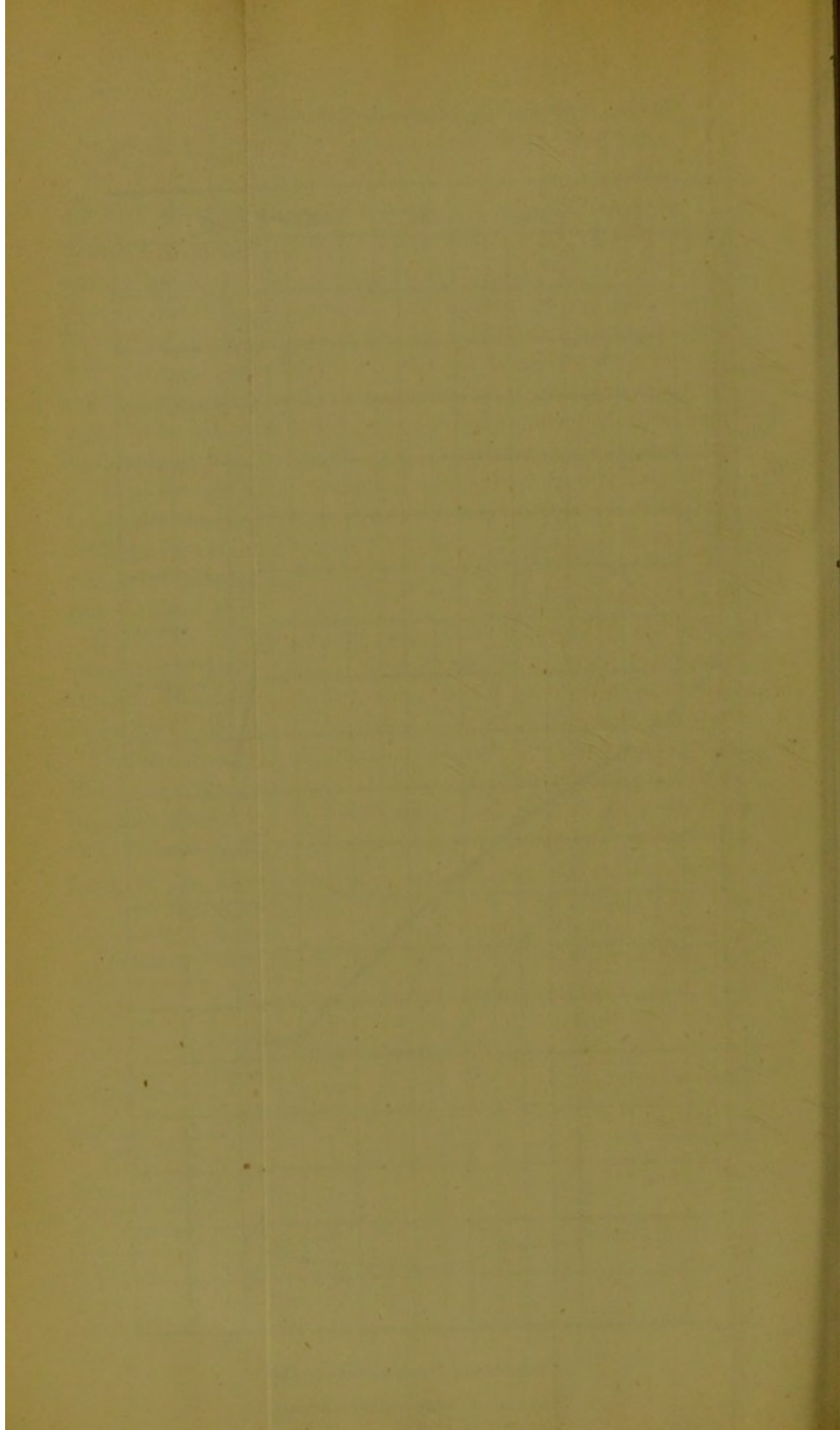
	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
MELBOURNE— 1870-1882	888	870	783	433	193	76	74	55	53	81	363	749
BALLARAT AND DISTRICT— 1874-1882	75	93	65	45	21	7	3	1	5	2	7	12
SANDHURST AND DISTRICT— 1874-1882	128	119	133	94	50	18	11	5	7	8	42	100
TOTALS ...	1,091	1 082	981	572	264	101	88	61	65	91	412	861

Nº VII

Chart representing the relative frequency of Diarrhæal affections and of Typhoid fever as computed from the death-rate.



Thick line represents Typhoid fever.
Thin line represents Diarrhæal affections.



RETURN SHOWING THE DEATHS PER MONTH FROM TYPHOID
FEVER IN MELBOURNE, SANDHURST AND DISTRICT, AND
BALLARAT AND DISTRICT, DURING SAME PERIOD.

(Prepared with the assistance of Mr. H. H. Hayter, Government Statist.)

	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
MELBOURNE— 1870-1882 ...	189	229	325	332	351	193	166	133	96	98	89	137
BALLARAT AND DIS- TRICT— 1874-1882 ...	15	18	25	38	39	15	12	15	4	5	4	9
SANDHURST AND DISTRICT— 1874-1882 ...	34	34	47	59	42	22	20	11	11	5	15	18
TOTALS ...	238	281	397	429	432	230	198	159	111	108	108	164

The results obtained are represented in a diagrammatic manner in the attached chart (No. VII.), which illustrates the prevalence of the diarrhoeal affections in the early part of the summer, and the manner in which their decrease of frequency later on coincides with the increase of frequency of Typhoid Fever at that time.

Now, this would seem to some extent to confirm this view of the matter; but these results are open to the objection that the diarrhoea figures are increased to an enormous extent by deaths from infantile diarrhoea, which may or may not be due to Typhoid Fever. Most probably not, inasmuch as it occurs in all parts of the world apparently as a result of improper feeding.

To eliminate this objection, I obtained a record of all the cases of diarrhoea and Typhoid Fever which were admitted into the Melbourne Hospital from 1860-1882, omitting from the return all cases of diarrhoea depending on tubercle, ulceration of intestine, or other known cause, and to them added the number of similar cases admitted into the Alfred Hospital from 1878-1883. The advantage which this return possesses over the other is that it only takes cognizance of adults.

RETURN SHOWING ADMISSIONS PER MONTH OF TYPHOID FEVER CASES INTO THE MELBOURNE HOSPITAL FROM 1860-1882, AND INTO THE ALFRED HOSPITAL FROM MAY, 1878, TO MAY, 1883.

(Prepared with the kind assistance of Mr. James Williams, Secretary to the Melbourne Hospital, and of Mr. John Anderson, Secretary to the Alfred Hospital.)

—	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
MELBOURNE HOSPITAL												
—1860-1862 ...	161	196	299	352	349	119	76	38	23	33	37	65
ALFRED HOSPITAL—												
1878-1883 ...	35	47	56	79	60	30	7	7	10	8	10	17
TOTALS ...	196	243	355	431	409	149	83	45	33	41	47	82

(Figures checked by Messrs. Mollison and Dyring.)

RETURN SHOWING ADMISSIONS PER MONTH OF DIARRHŒA CASES INTO THE MELBOURNE HOSPITAL FROM 1860-1882, AND INTO THE ALFRED HOSPITAL FROM MAY, 1878, TO MAY, 1883.

(Prepared with the kind assistance of Mr. James Williams, Secretary to the Melbourne Hospital, and Mr. John Anderson, Secretary to the Alfred Hospital.)

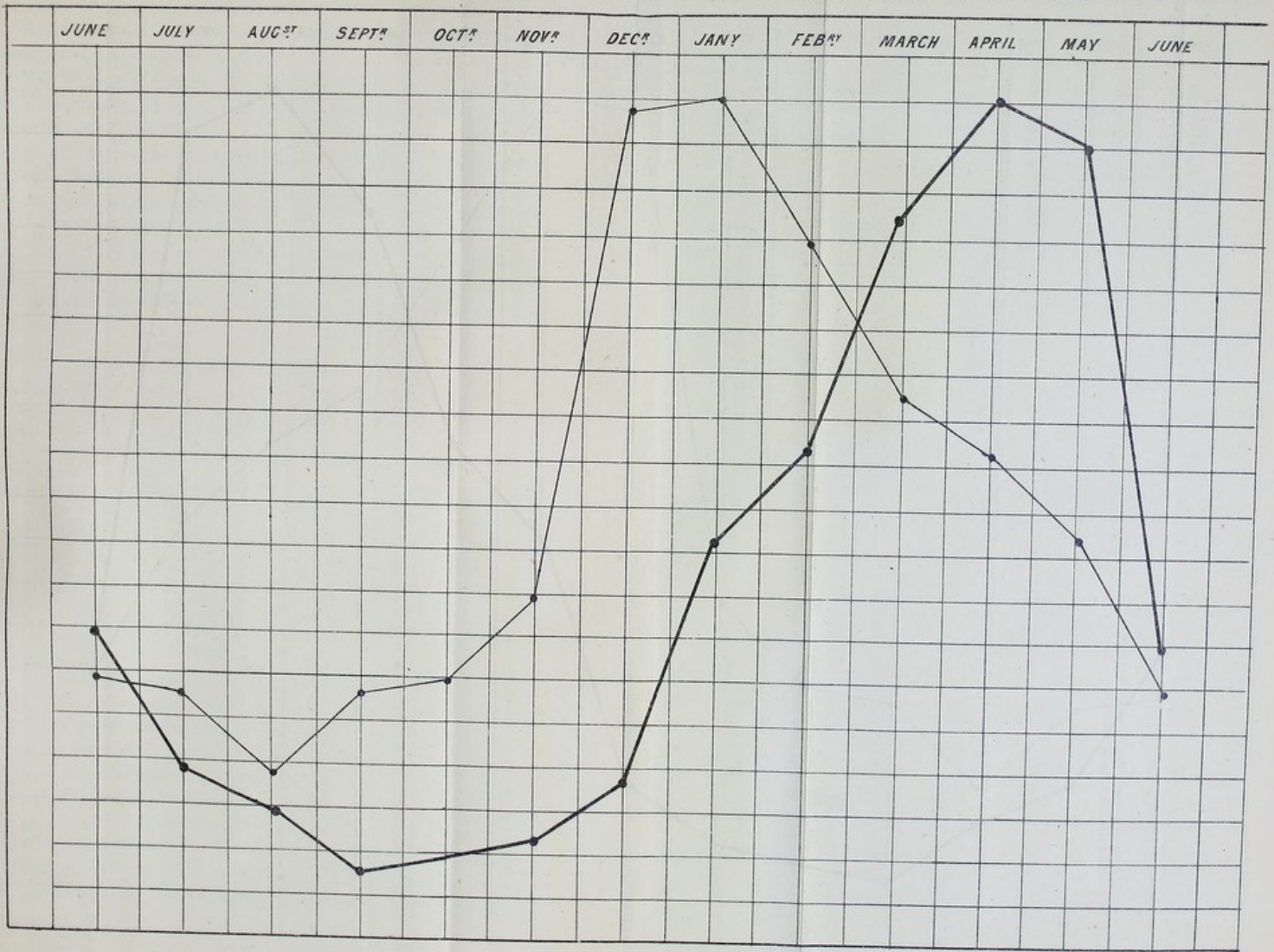
—	JAN.	FEB.	MAR.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
MELBOURNE HOSPITAL												
1860-1882 ...	111	90	69	64	50	32	29	21	28	30	44	116
ALFRED HOSPITAL—												
1878-1883 ...	7	4	4	2	5	3	4	1	5	5	3	1
TOTALS ...	118	94	73	66	55	35	33	22	33	35	47	117

(Figures checked by Messrs. Mollison and Dyring.)

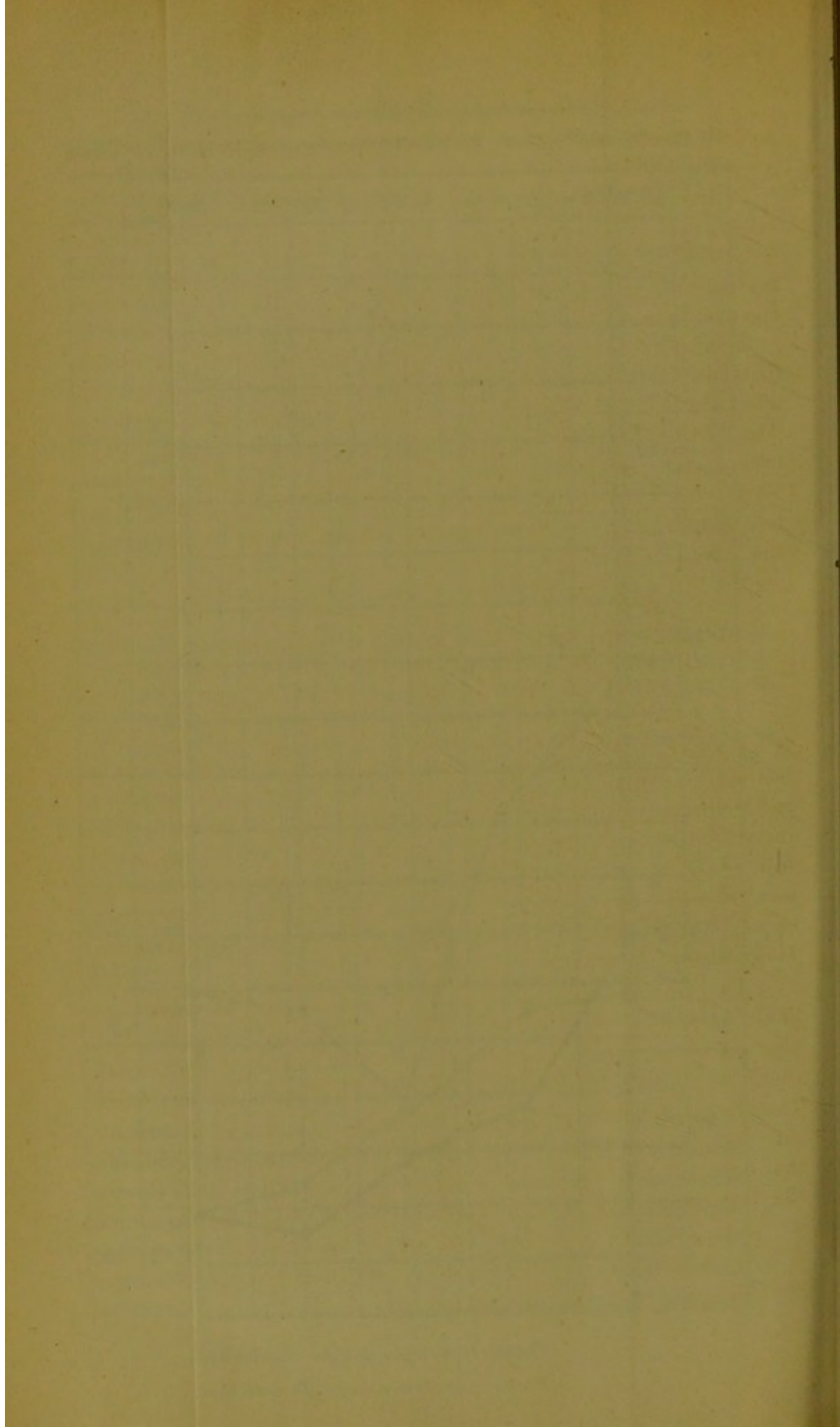
Chart No. VIII. presents the result obtained in a diagrammatic manner, and illustrates very clearly the truth of the original inference as regards their periods of relative frequency. The *post hoc, propter hoc* argument, and its liability to fallacy, is here illustrated. Nothing appears more reasonable than to suppose that diarrhœa is the first expression of the febrile disease, and that they stand in the same relation to one another as sore throat and diphtheria are supposed

Nº VIII

Chart representing the relative frequency of Typhoid fever and of Diarrhoeal affections as computed from the admissions into the Melbourne and Alfred hospitals. AND THEREFORE REPRESENTING THE MONTHLY FREQUENCY OF TYPHOID FEVER IN VICTORIA.



Thick line represents Typhoid fever.
Thin line represents Diarrhoeal affections.



to do. But to this theory, however, there seems to me to be two very serious, if not fatal, objections :—

1. That in Febricula, which is undoubtedly mild Typhoid Fever, constipation is a prominent symptom.

2. That whilst, in Victoria, Typhoid Fever is far more common in females than males, diarrhœa (as shown by the death-rate) is more common in males than females.

Murchison drew attention to this curious relation existing between diarrhœal affections and Typhoid Fever, but he thought the diarrhœal affections were the first effect of the inhalation of sewer gases, on which he believed that Typhoid Fever depended for its origin. However, I must leave the figures as they are without further comment. They are significant, and that is all. I trust that time, thought, and more extended observations will enable me to throw fresh light on the subject.

CHAPTER III.

ON THE SEASONAL PREVALENCE OF TYPHOID FEVER.

A REFERENCE to the tables and charts (Nos. VII. and VIII.) in the last chapter will suffice to show that Typhoid Fever is very prevalent in Melbourne, Ballarat, and Sandhurst from December to June inclusive (seven months), and that it is comparatively infrequent from July to November (five months). This result remains the same whether the number of deaths per month alone be considered, or whether the monthly admissions into the Melbourne and Alfred Hospitals are taken into account.

A comparison of the respective charts representing the frequency of the disease, as estimated from the death-rate and from the Hospital admissions, shows that, whilst they agree in general characters, there is a fixed and constant minor difference between them. The return and corresponding chart (No. VII.) based on the death-rate shows the month in which most deaths occur to be May, and that in which fewest occur to be October; whilst that compiled from the Hospital admissions (No. VIII.) shows that April is the month in which the disease is most prevalent, and September that in which it is least frequent. A similar difference also exists during all other months.

Now, in fatal Typhoid cases, death generally occurs beyond the twentieth day of the illness, which probably represents the twenty-seventh to fortieth day after infection with the virus—the period of incubation varying from seven to twenty-one days or more. It will therefore follow that many of the deaths occurring in May are due to fever contracted in April or March. In the same way, those deaths occurring in every month of the year are referable to fever contracted at some time previously.

Once recognize this fact, and the minor want of correspondence between the two sets of figures and the two charts is understood, and it becomes clear that the chart (No. VIII.) prepared from an estimation of the admissions into the Melbourne and Alfred Hospitals the more nearly represents the seasonal prevalence of the disease. Even here, the known duration of the disease (from three to ten days) prior to admission, not to mention the period of incubation, will refer back some of the Hospital cases to months previous to those in which they have been placed; but this error, being comparatively slight, does not affect the result very materially. What is true of Melbourne is true of Victoria, and *this chart (No. VIII.) may be said to represent the prevalence of the disease in Victoria.*

It will then be seen that in Victoria the disease begins to be prevalent in November and December. Its frequency increases till April, when the maximum is attained. A slight subsidence takes place in May, and a very great one in June. Cases of fever continue very infrequent till September, when the minimum is reached. A slight increase occurs in October and November, and towards the end of December the Typhoid season again sets in.

It will be shown in Chapter V. that when the disease is most frequent it is least fatal, and that at such times Febricula is very prevalent. Hence, a number of deaths in April or May represents a very much greater number of cases of Typhoid Fever than does that in September or October—this statement applying to both relative and absolute results.

The statement made in the preceding lines as to the seasonal prevalence of Typhoid Fever in Victoria is, of course, only based on an average result. The months of greater or less frequency of necessity vary from year to year, as the following table will show:—

RETURN SHOWING THE ADMISSION PER MONTH INTO THE
MELBOURNE HOSPITAL OF TYPHOID FEVER CASES FROM
1873-1882 (10 YEARS).

(Revised by Messrs. Dyring and Mollison.)

	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
1873...	2	3	7	9	8	7	0	1	2	2	6	9
1874...	10	13	17	19	19	2	3	3	0	2	2	4
1875...	5	10	10	19	25	9	9	2	2	2	0	2
1876...	5	9	9	21	11	2	4	1	0	2	0	3
1877...	7	17	25	30	43	7	4	1	1	3	2	8
1878...	36	38	54	73	39	13	9	5	0	0	1	3
1879...	22	21	32	35	30	13	2	6	4	2	5	4
1880...	7	22	29	21	9	3	1	0	1	3	0	1
1881...	6	6	15	4	11	8	1	3	1	1	5	5
1882...	14	10	22	29	15	2	7	2	1	1	1	8

Most cases were admitted in April in { 1873
1876
1878
1879
1882

Most cases were admitted in May in { 1875
1877

Most cases were admitted in March in { 1880
1881

A return showing the number of deaths occurring per month in Melbourne during the same time shows almost exactly the same results, and thereby furnishes corroborative evidence of the value of the Melbourne Hospital statistics.

CHAPTER IV.

IN VICTORIA TYPHOID FEVER IS FAR MORE COMMON IN FEMALES
THAN IN MALES.

LIEBERMEISTER investigated the frequency of the disease in males and females, and showed that males were more often attacked; whilst Murchison considered that about equal numbers suffered. Now, as far as I can see, neither of these observers calculated the

proportion of the number of cases to the number of males and females living in the country in which they occurred. The disease is contagious by means of the stools, and therefore it is to be expected that females should be attacked more often than males, since, by virtue of their domestic occupation, they are necessarily brought more into contact with the virus than males.

Victorian results show that not only does the number of females attacked exceed the number of males similarly affected, relatively, but that there is *an absolute excess in the number of females who suffer from Typhoid Fever over that of males who suffer from the same disease, although there are more males than females living in Victoria.*

RETURN SHOWING THE NUMBER OF MALES AND OF FEMALES WHO DIED DURING EACH YEAR OF THE 11 YEARS, 1871-1881, FROM TYPHOID FEVER, THE MEAN POPULATION FOR EACH YEAR, AND THE PROPORTION OF DEATHS TO THE NUMBER OF EACH SEX LIVING (VICTORIA).

MALES.				FEMALES.		
—	No. of Deaths.	Mean Population.	Proportion per 10,000 Persons living.	No. of Deaths.	Mean Population.	Proportion per 10,000 Persons living.
1871 ...	135	403,319	3·35	134	333,686	4·02
1872 ..	174	409,081	4·25	149	344,117	4·33
1873 ...	135	412,597	3·27	147	352,914	4·16
1874 ...	216	416,725	5·18	254	360,931	7·04
1875 ...	211	419,779	5·02	244	367,558	6·63
1876 ...	166	422,931	3·92	209	373,627	5·59
1877 ...	278	427,727	6·49	254	380,878	6·67
1878 ...	267	433,153	6·16	265	388,313	6·82
1879 ...	215	438,563	4·9	223	395,467	5·64
1880 ...	142	446,445	3·18	155	403,898	3·83
1881 ...	170	456,107	3·7	181	412,835	4·38
—	2,109	4,686,427	—	2,215	4,114,224	—

MALES.—Mean proportion per 10,000 persons living ... 4·50

FEMALES.—Mean proportion per 10,000 persons living 5·38

These results are very striking, but must be modified slightly, since some observers have found that the death-rate from Typhoid Fever in females is slightly higher than that in males (about 1 per cent.). It is only fair to state that other observers have found the mortality equal in both sexes. At all events, to test the result,

I selected the unfavourable years, 1878 and 1879, in which a very much larger number of males than usual had died of the disease, and then obtained a return showing the number of male and female Typhoid Fever patients who were admitted into the Melbourne Hospital during those years.

RETURN SHOWING THE NUMBER OF MALES AND FEMALES
SUFFERING FROM TYPHOID FEVER WHO WERE ADMITTED
INTO THE MELBOURNE HOSPITAL DURING THE YEARS
1878 AND 1879.

MALES.				FEMALES.		
Year.	No. of Typhoid Fever Cases admitted.	Total Ad- missions.	Proportion of Typhoid to Total Admissions.	No. of Typhoid Fever Cases admitted.	Total Ad- missions.	Proportion of Typhoid to Total Admissions.
1878 ...	148	2,572	per cent. 5.75	123	1,619	per cent. 7.59
1879 ...	72	2,492	2.88	104	1,678	6.19
	220	5,064	—	227	3,297	—

MALES.—Mean ... 4.34 | FEMALES.—Mean ... 6.8

Notwithstanding the unfavourable nature of the years selected, the result is conclusive, and places the greater liability of women in Victoria to the disease beyond question.

As Typhoid Fever, then, is more common amongst women, Febricula, which is mild Typhoid Fever, ought to be also; and with a view of ascertaining if this were so, I prepared the following return:—

RETURN SHOWING THE NUMBER OF MALES AND FEMALES
SUFFERING FROM FEBRICULA WHO WERE ADMITTED
INTO THE MELBOURNE HOSPITAL DURING 1878 AND 1879,
AND PROPORTION OF SUCH CASES TO TOTAL ADMISSIONS.

MALES.				FEMALES.		
—	No. of Febricula Cases admitted.	Total Ad- missions.	Pro- portion.	No. of Febricula Cases admitted.	Total Ad- missions.	Pro- portion.
1878 ...	39	2,572	per cent. 1.51	40	1,619	per cent. 2.47
1879 ...	39	2,492	1.56	51	1,678	3.04
—	78	5,064	—	91	3,297	—

MALES.—Mean ... 1.56 | FEMALES.—Mean ... 2.76

This return shows that females are far more liable to be attacked by Febricula than males. It also furnishes corroborative evidence of two facts—

- (1.) That Typhoid Fever and Febricula are identical.
- (2.) That Typhoid Fever in Victoria attacks females more frequently than males.

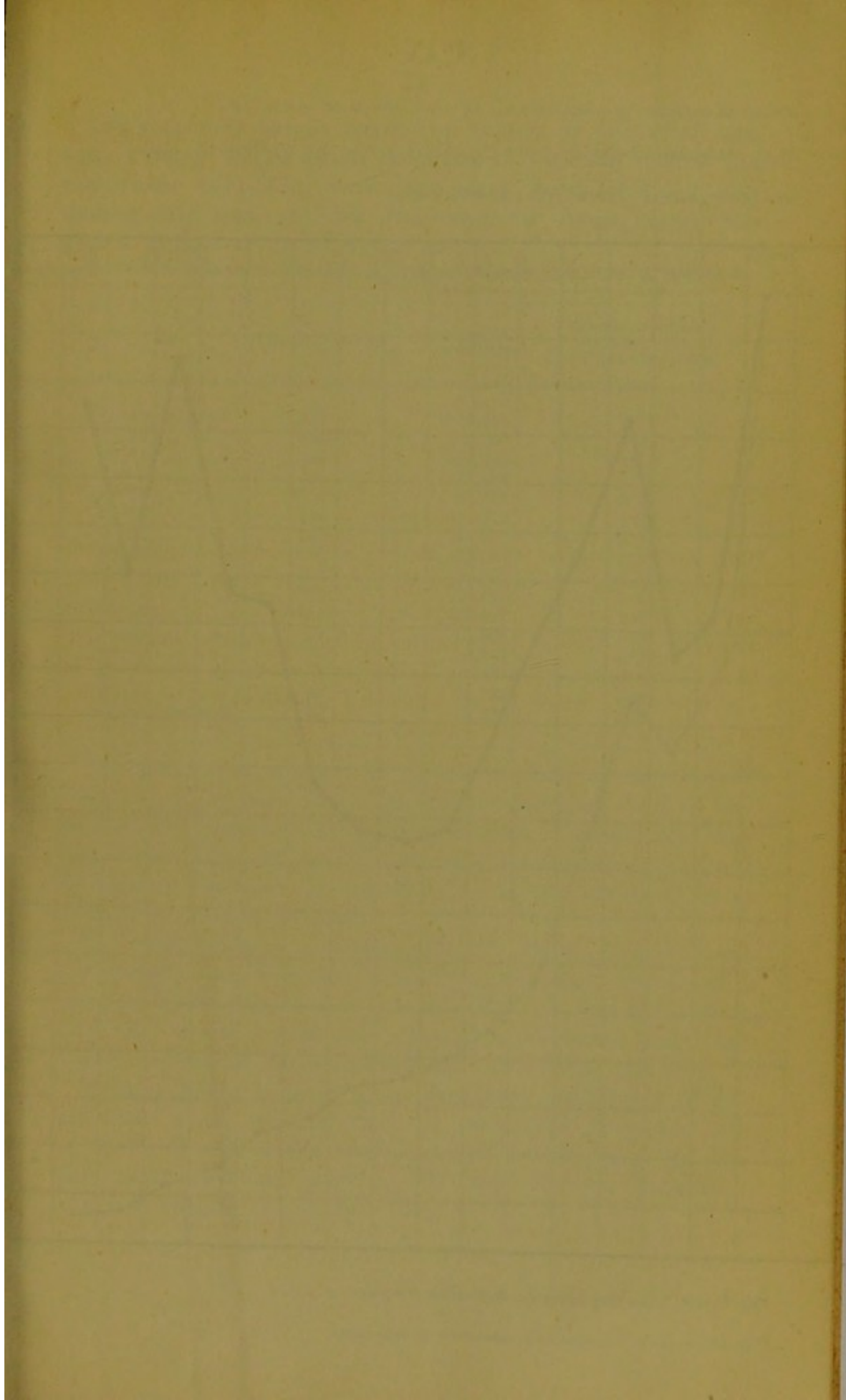
CHAPTER V.

ON THE AGE AT WHICH PERSONS ARE MOST LIABLE TO BE ATTACKED BY TYPHOID FEVER.

THIS is a very difficult matter to determine, because it is impossible to obtain a return showing the ages of Typhoid patients either from the hospitals—as they are divided into hospitals for adults and hospitals for children—or from medical practitioners, because they rarely keep notes. Therefore, as far as Victoria is concerned, the only method by which I could accomplish this object was by obtaining a return showing the ages which Typhoid Fever patients had attained in those cases where the fever destroyed life.

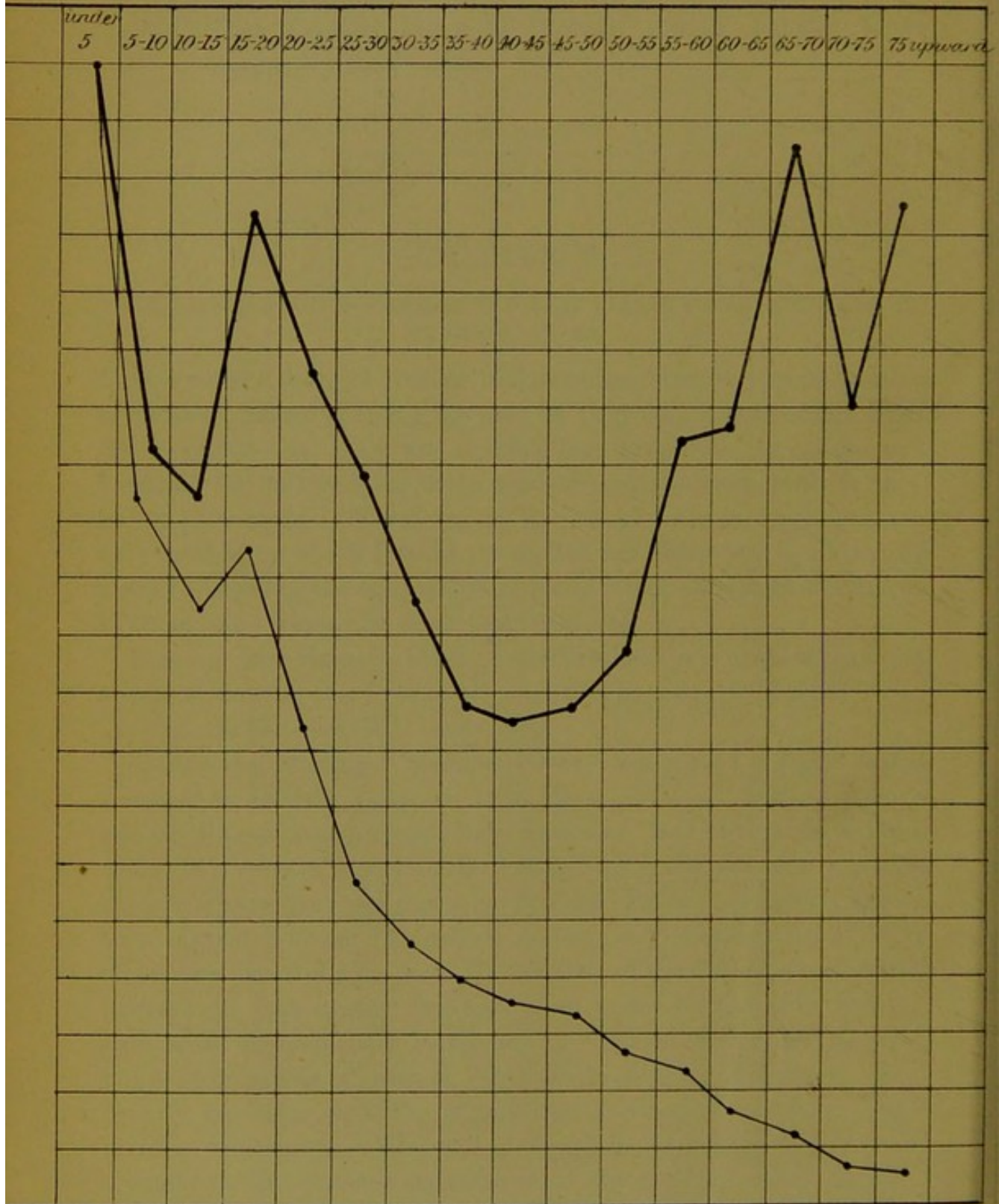
Through Mr. Hayter's kindly consideration I was enabled to obtain a return showing the ages of all persons who died of Typhoid Fever in Victoria between 1871 and 1880.

Under the heading "Typhoid Fever" are placed all the deaths assigned to Gastric, Colonial, Low Fever, &c.; so that, as regards adults, the return is probably very accurate. But as regards children under two years of age, I think that it is probable that many gastric disorders have been put down as Typhoid Fever. It is well known that Typhoid Fever (so called) is not very common in children under two years of age; and Dr. Willis, of the Children's Hospital, informs me that during the last three years he has seen but one case with characteristic symptoms of Typhoid Fever, although he has seen hundreds of cases of Febricula in children of that age. This exactly coincides with the experience of other observers. Under these circumstances, whilst still giving them, I am compelled to throw a doubt on the apparent significance of the numbers indicating cases in extreme infancy, at which period of life, no matter what its frequency, the disease is rarely fatal.



Nº IX

Diagrammatic representation of the absolute and of the relative frequency of Typhoid fever at different ages, as computed from the death-rate.



The thick line represents Relative frequency.

The thin line represents absolute frequency.

THE FOLLOWING RETURN SHOWS THE NUMBER OF DEATHS AT AGES FROM TYPHOID FEVER WHICH OCCURRED IN VICTORIA DURING THE TEN YEARS 1871-1880, WITH THE MEAN POPULATION AT AGES DURING THAT TIME, AND THE PROPORTION OF THOSE DEATHS PER 10,000 PERSONS LIVING AT THOSE AGES.

1871-80.

Ages.	Number of Deaths.	Mean Population at each Age.	Proportion of Deaths to 1,000 Persons living at each Age.
Under 5 years	851	115,446	7·37
5-10	534	107,904	4·9
10-15	446	96,919	4·6
15-20	494	77,596	6·36
20-25	354	66,669	5·39
25-30	254	54,373	4·67
30-35	199	50,972	3·9
35-40	170	53,517	3·17
40-45	153	50,007	3·06
45-50	129	40,626	3·18
50-55	121	33,417	3·6
55-60	97	19,304	5·02
60-65	74	14,584	5·07
65-70	51	7,451	6·86
70-75	30	5,728	5·20
75 and upward	22	3,386	6·49

This table, which is presented diagrammatically in the attached chart (No. IX.), shows that if the absolute death-rate alone be considered, then Typhoid Fever is more frequent in infancy, and from that time its frequency steadily declines as age advances; whilst, if the relative death-rate be considered, it would appear to be as common in old age as in youth.

The result, however, must be toned down a little. Typhoid Fever is admittedly much more fatal in old than in young persons, and it therefore follows that, to read correctly, the thick line of the chart (No. IX.) should be even more elevated in the earlier years, and slightly depressed in the advanced years. In Victoria, therefore,

TYPHOID FEVER IS MUCH MORE PREVALENT RELATIVELY IN THE ADVANCED YEARS OF LIFE THAN IS GENERALLY SUPPOSED, AND IS PROBABLY MOST FREQUENT BETWEEN 15 AND 25 YEARS OF AGE, AND LEAST FREQUENT BETWEEN 35 AND 55; ITS FREQUENCY AGAIN INCREASING IN ADVANCED LIFE.

CHAPTER VI.

ON THE INFLUENCE OF CLIMATIC CONDITIONS ON THE PREVALENCE OF TYPHOID FEVER.

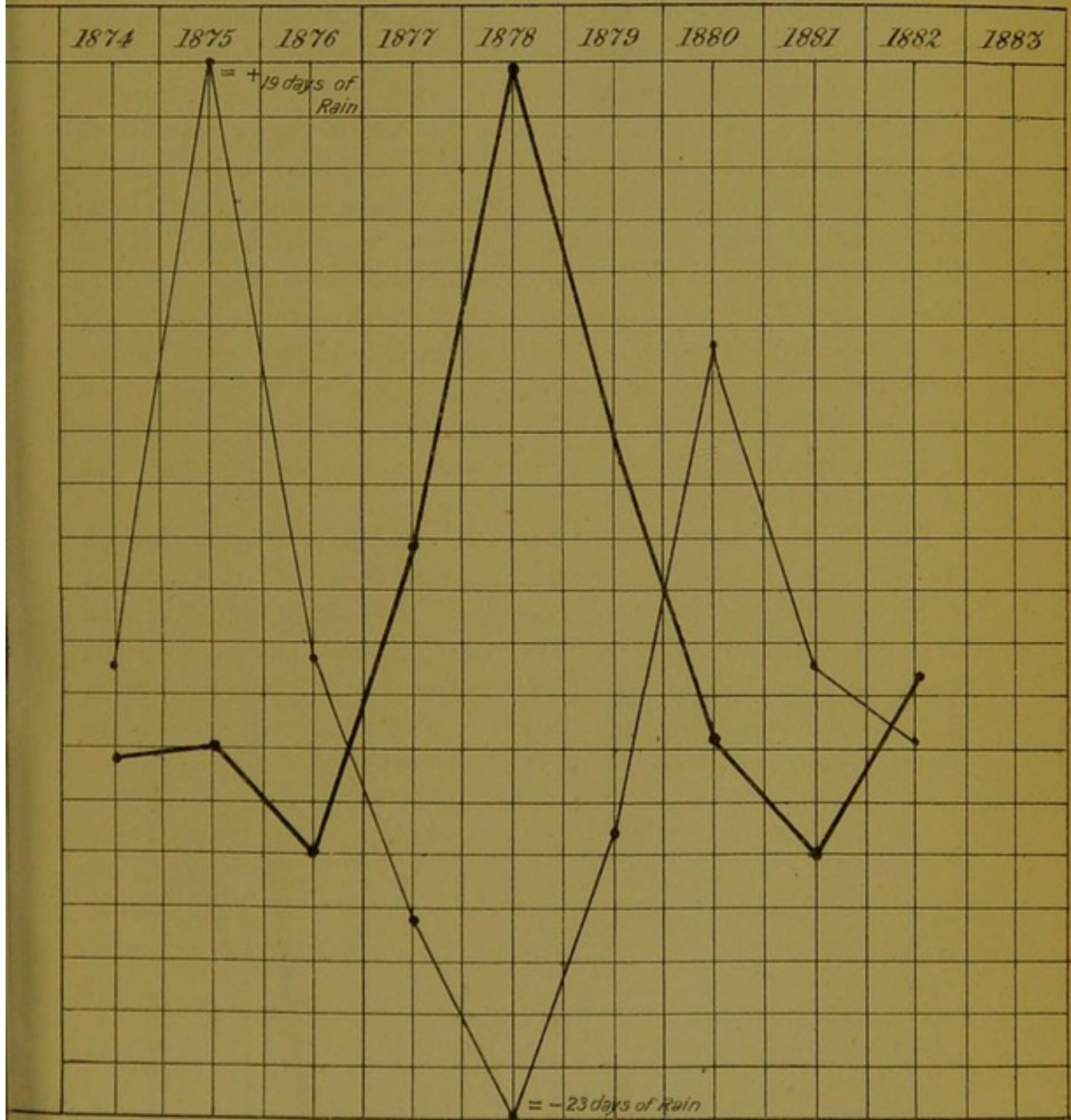
WHEN endeavouring to discover any climatic conditions on which Typhoid Fever could depend, or by which its frequency could be in any way influenced, I obtained from Mr. R. L. J. Ellery, Government Astronomer, a table showing the various meteorological conditions that prevailed yearly and monthly in Melbourne since 1874, and the deviations from the average condition. I then compared this table with another which showed the variations in yearly and seasonal frequency of Typhoid Fever in Melbourne, estimated from the death-rate and from hospital admissions, both of which methods give nearly the same result. From this I find that the only climatic condition in Melbourne (which may be considered as typical of Victoria), which bears any definite relation to the variations in frequency of the fever is the absence of rain in severe fever seasons, and the presence of a heavy rainfall in mild seasons.

The following table, which I have been enabled to prepare through Mr. Ellery's kindness, shows the number of days of rain over or under the average for each year from 1874-1883, and for each Typhoid season (January to May) during the same period; the deaths per year and the deaths per season from Typhoid Fever in Melbourne during that time; together with the yearly admissions into the Melbourne Hospital of Typhoid Fever cases.

Year.	No. of Days of Rain over or under the Average per Year.	No. of Days of Rain over or under the Average per Season (Jan. to May).	No. of Deaths in Melbourne from Typhoid Fever per Year.	No. of Deaths from Typhoid Fever per Season.	No. of Admissions of Typhoid Fever Cases into Melbourne Hospital per Year.
1874	- 5	+ 3	216	134	94
1875	+ 19	- 1	200	118	95
1876	- 5	+ 1	160	98	67
1877	- 15	+ 1	249	142	148
1878	- 23	- 5	307	209	271
1879	- 12	- 4	195	123	176
1880	+ 8	+ 9	138	94	97
1881	- 5	- 2	157	92	66
1882	- 8	- 2	197	122	112
1883	—	- 6	—	196	—

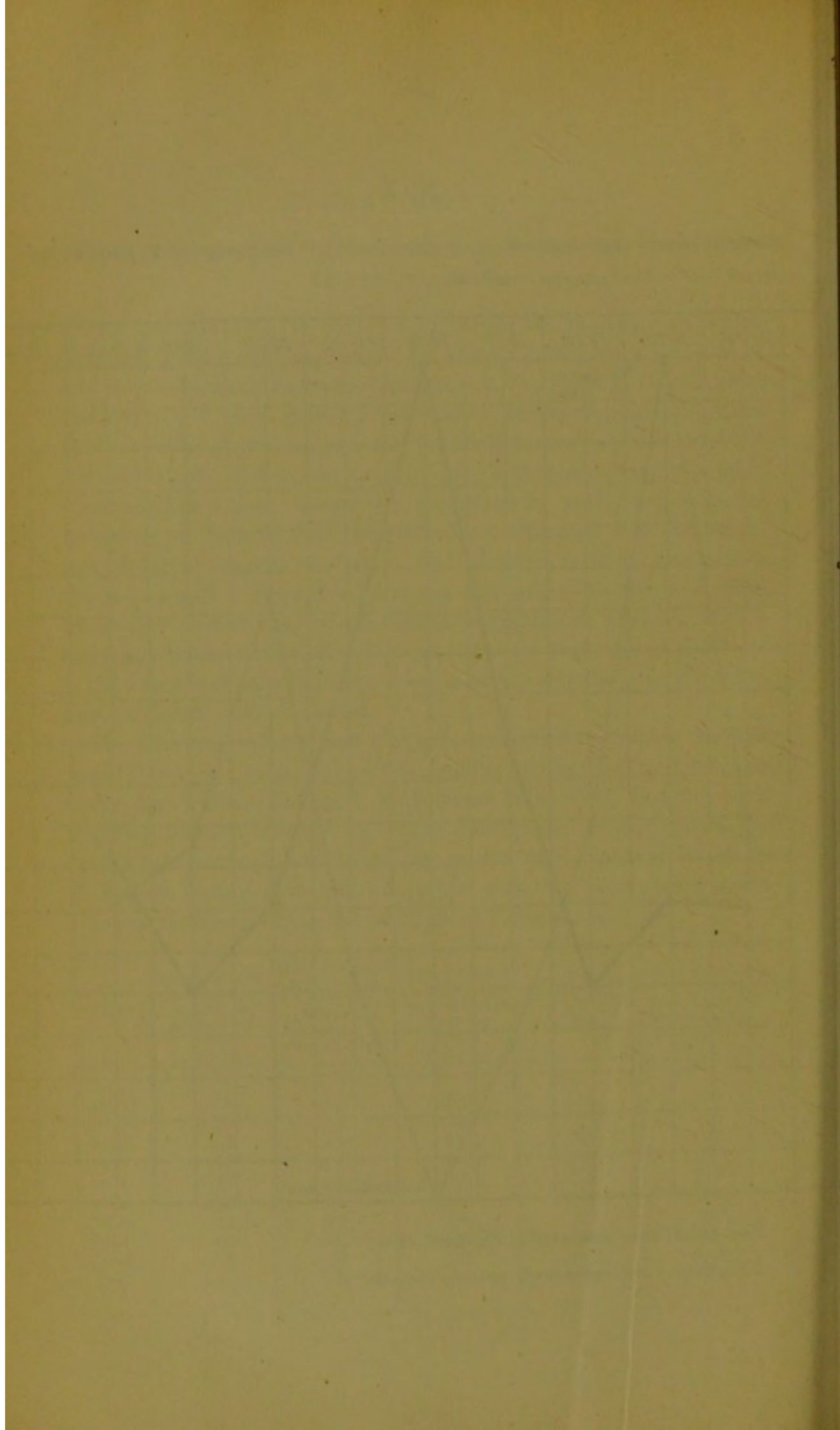
Nº X

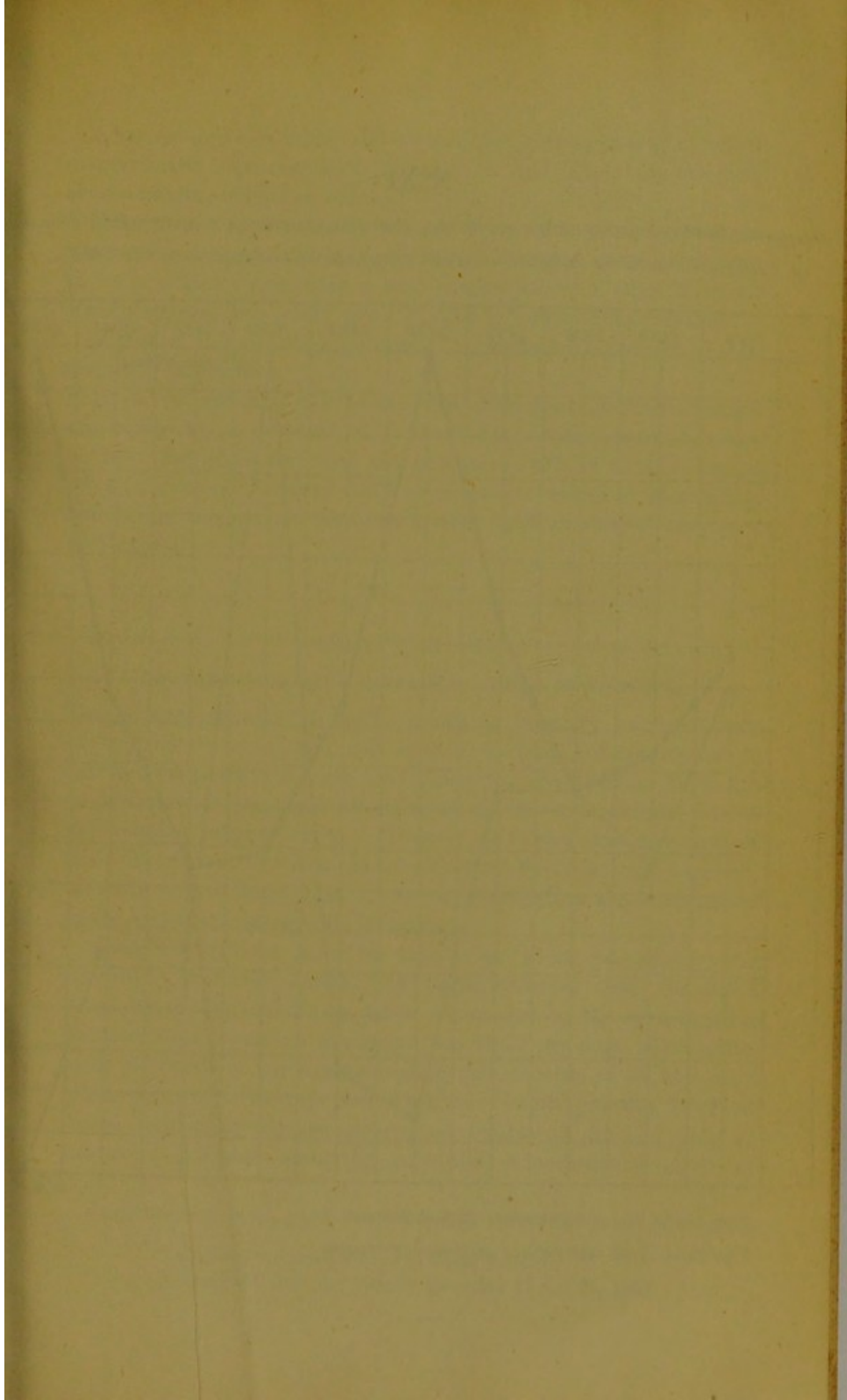
Diagrammatic representation of the yearly frequency of Typhoid fever and of the yearly rainfall.



The thick line represents Typhoid fever.

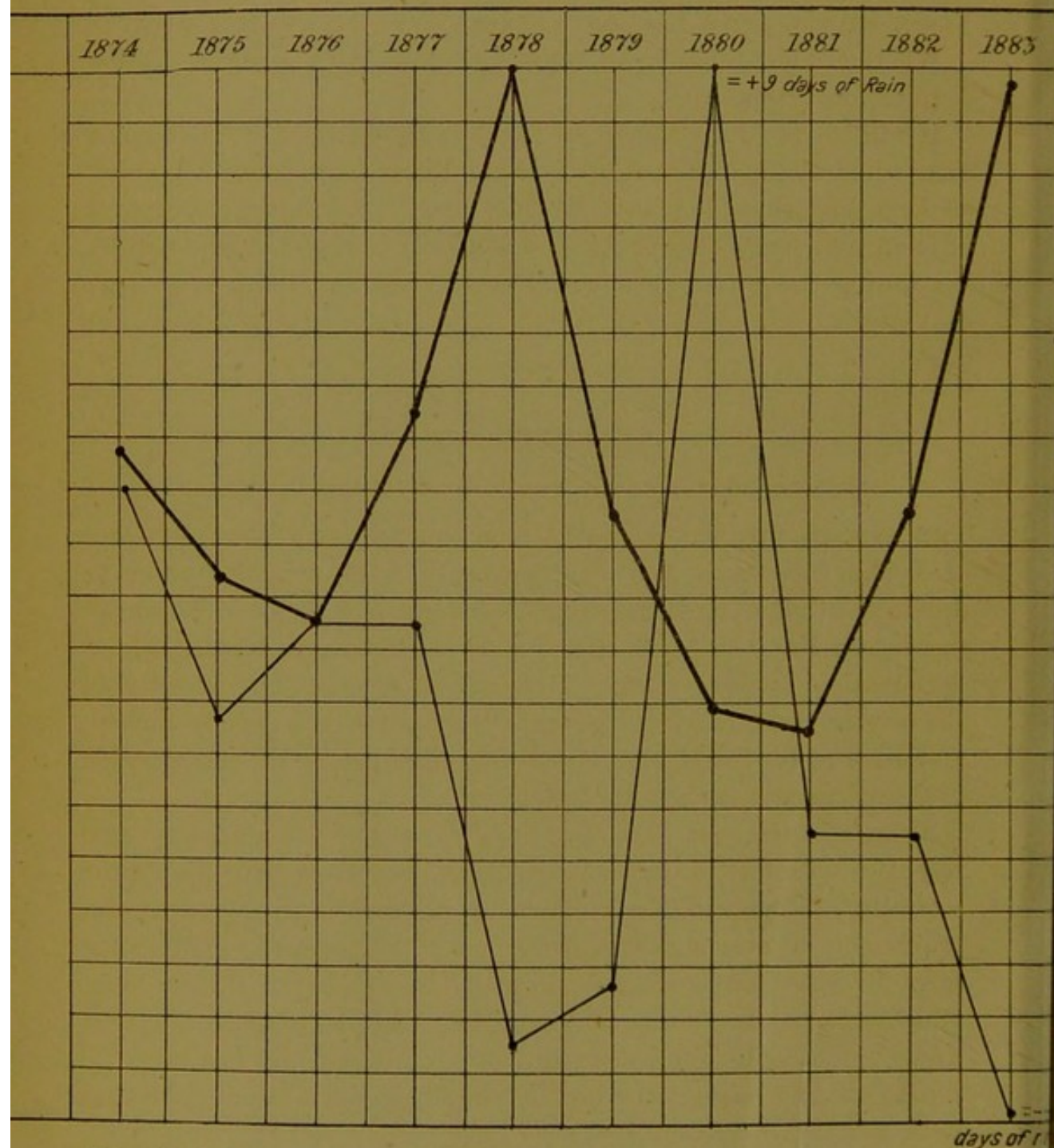
The thin line represents yearly rainfall.





NºXI

Diagrammatic representation of the Relative Seasonal (Jan^y to May) frequency of Typhoid fever as compared with dryness of season (Jan^y to May).



*The thick line represents Typhoid fever
The thin line represents dryness of season.*

After reading this table, and viewing the corresponding attached diagrammatic representations (Charts X. and XI.), only one conclusion can be arrived at, viz.:—

THAT THERE IS A DISTINCT RELATION BETWEEN THE DRYNESS OR WETNESS OF A SEASON AND THE NUMBER OF TYPHOID CASES OCCURRING IN THAT SEASON; AND THAT A WET SEASON MEANS A MILD TYPHOID FEVER SEASON, AND A DRY ONE A SEVERE TYPHOID FEVER SEASON.

Whether this relation is causal or coincident remains to be definitely ascertained.

It will be seen from this return that in the year 1878 Melbourne was visited by an outbreak of Typhoid Fever more severe than any we have had since, but that the last one (1883) is next to that of 1878 in severity. That of 1878 was mostly confined to Melbourne, but during the last one the fever located itself in almost every part of Victoria.

CHAPTER VII.

ON THE MORTALITY OF TYPHOID FEVER IN VICTORIA.

THE average number of deaths occurring in every hundred cases of Typhoid Fever is, and will remain, a most difficult matter to decide until physicians agree that Febricula and Typhoid Fever are to be classed as the same affection, or else fix some definite line of demarcation between them. However, as regards the mortality of the severer cases, to which the term Typhoid Fever is usually applied, all authors have found that it was very high before the introduction of the systematic antipyretic treatment.

Thus,* Murchison gave his results as 15·82 per cent.; and recently† Professor Jacoud, of Paris, asserted that the mean mortality of Typhoid Fever, when abandoned to the symptomatic, indifferent, or evacuant treatment, was 19·23 per cent. This statement he based on an examination of the records of 80,149 cases which occurred in Europe and America. In his practice, however, under judiciously applied antipyretic treatment, he had only 71 deaths in 665 cases occurring in adults—a mortality of 10·83 per cent.

Jurgensen, of Kiel, gave his mortality from 1850 to 1861, when

* On the Continued Fevers of Great Britain.

† *Medical Times and Gazette*, February 17 and 24, 1883.

adopting an indifferent treatment, as 15·4 per cent. ; but from 1863 to 1866, under systematic cold water bath treatment, it fell to 3·1 per cent., and in 1876 was even lower. Liebermeister* found at Basle that the adoption of the antipyretic treatment was followed by a reduction in the mortality from 27·3 to 8·2 per cent.

Noting the enormous reduction in the mortality which took place in the practice of these observers, it becomes very interesting to investigate the mortality of Typhoid Fever in Victoria, where the antipyretic treatment has rarely been followed in a systematic manner. In the Melbourne Hospital the mortality since 1860 has been as follows :—

Year.	Mortality per Cent.	Year.	Mortality per Cent.	Year.	Mortality per Cent.
1860	20	1868	17·7	-1876	35·82
1861		1869	13·8	+1877	16·22
1862		1870	16·3	+1878	12·18
1863		1871	18·2	+1879	12·5
1864		1872	15·8	-1880	16·5
1865	32·14	1873	23·2	-1881	21·2
1866	18·6	1874	29·7	1882	16·9
1867	16·9	1875	14·76	+1883($\frac{1}{2}$)	14·8

- Denotes a year in which the disease was very infrequent.

+ Denotes a year in which the disease was unusually prevalent.

En passant I should like to draw attention to the low mortality which occurred in years in which Typhoid Fever was very prevalent. This fact will be commented on afterwards.

The total number of cases of Typhoid Fever admitted into the Melbourne Hospital between January, 1860, and June, 1883, was 1,937 ; and the number of those cases which terminated fatally was 335. The mortality thus being 17·29 per cent. I expect that if I treated my result as Murchison did his, and eliminated all the cases which terminated fatally shortly after admission, I should then find my result nearly agreeing with his (15·82 per cent.)

The antipyretic treatment has not been *generally* and *systematically*

* Liebermeister on Typhoid Fever.—“ Ziemssen's Encyclopædia.”

followed in the Melbourne Hospital, and the result shows that the mortality attributed by Professor Jacoud to Typhoid Fever abandoned to the *symptomatic, evacuant, or indifferent treatment* (19·23 per cent.) nearly equals that obtained in the Melbourne Hospital under that treatment.

It may be argued that the mortality of Typhoid Fever in the Melbourne Hospital is greatly increased by the admission of severe and desperate cases from outside practice. This is perfectly true; but just the same thing happens at every other metropolitan hospital, such as the London Fever Hospital, so that the force of the conclusion is not lessened.

To obtain an idea as to the mortality of Typhoid Fever in private practice, I wrote to a great many medical gentlemen in Victoria, asking them to forward me their results, and in reply received the information I was so anxious to obtain from fourteen gentlemen, viz.:—Dr. T. A. Garlick, of Murtoa; Dr. C. J. Trood, of Mooroopna; Dr. J. P. Fitzgerald, of Shepparton; Dr. Bennett, of Stawell; Dr. Whitcombe, of Ballarat; Dr. Scott, of Buninyong; Dr. Smeal, of Ararat; Dr. Colquhoun, of Clunes; Dr. Reid, of Sale; Dr. Fox, of Beechworth; Dr. W. H. Embling, of St. Kilda; Dr. Goldie, of Williamstown; Dr. Stewart, of Brunswick; Dr. Barrett, of Albert Park. Dr. F. T. West Ford, of Collins-street, Melbourne, and Dr. A. T. Gunning, of Narracoorte, S.A., were also kind enough to forward me returns. To these gentlemen I owe my heartiest thanks for their kindness in forwarding me the very valuable information which their communications contained. Under the care of the gentlemen mentioned were 889 cases, of which 44, or 4·9 per cent., proved fatal. The value of the result is slightly affected by the fact that nearly all these cases occurred during the last epidemic, when, as during other epidemics, the mortality was low. However, the result was nearly the same when I had collected 500 cases, 650 cases, and 889 cases, respectively. This mortality is about half the Hospital mortality during the last epidemic. Assuming this proportion to hold for all years, the mortality in private practice would average about 8 per cent. This, I think, is too high an estimate, and the prevalent opinion that the mortality in private practice is between 4 and 8 per cent. is probably correct.

At the Melbourne Hospital for Sick Children the mortality of Typhoid Fever from 1877 to 1881 was 4·9 per cent., and the mean

mortality in all the general hospitals of Victoria throughout the same period was 11·227 per cent.

The deaths from Typhoid Fever per 10,000 persons living in Victoria from 1867-1881 are given by the Government Statist, Mr. Hayter, as follows:—

Year.	Deaths from Typhoid Fever.	Number per 10,000 Persons Living.	Year.	Deaths from Typhoid Fever.	Number per 10,000 Persons Living.
1867	455	7·06	1875	455	5·78
1868	295	4·45	1876	375	4·71
1869	360	5·24	1877	532	6·58
1870	416	5·83	1878	532	6·48
1871	269	3·65	1879	438	5·25
1872	323	4·29	1880	297	3·49
1873	282	3·68	1881	351	4·04
1874	470	6·04	—	—	—

Mean—390 ... 5·10

In England the death-rate from Simple Continued Fever (?) and Typhoid Fever was (per 10,000 persons living) as follows:—In 1875, 4·85; 1876, 3·96; 1877, 3·61; 1878, 3·82—so that the death-rate in Victoria is much higher than in England.

Since 1853 about 12,000 persons have died of Typhoid Fever in Victoria.

For every death from Typhoid Fever in the general hospitals there are nearly six in private practice. At the average mortalities, then, these 12,000 deaths represent roughly about 220,000 cases of Typhoid Fever.

From the observations of some of the gentlemen whose names I have enumerated previously, and from the records of my own cases, I have come to the conclusion that Typhoid Fever (so-called) and Febricula are of about equal frequency. This being so, the 12,000 deaths referred to represent about 440,000 cases of fever, in its various forms, which have occurred in thirty years in a colony which now contains only about 870,000 persons.

During the last epidemic—say from December, 1882, to June,

1883—230 persons died of Typhoid Fever in Melbourne alone. Calculating in the same way, those deaths represent about 8,500 cases of *febrile* affections. In other words, over $2\frac{1}{2}$ per cent. of the gross population of Melbourne were infected with the Typhoid virus in six months; and if from the population I could eliminate those who, having suffered before, were not susceptible, the percentage would obviously be much higher.

Although so prevalent in Melbourne, it has been even more so in the country districts—in many of which it appeared during the last epidemic for the first time.

It will be remembered that I pointed out previously that in those years in which the disease was most prevalent the relative mortality was low. Not only is this true, but in those months in which the frequency of the disease is great the mortality is also low.

The following table shows the absolute mortality from Typhoid Fever in Melbourne, Ballarat and district, and Sandhurst and district, and roughly illustrates the frequency of the disease:—

RETURN SHOWING THE NUMBER OF DEATHS FROM TYPHOID FEVER WHICH OCCURRED DURING EACH MONTH OF THE YEAR IN MELBOURNE (1870-1882), BALLARAT AND DISTRICT (1874-1882), AND SANDHURST AND DISTRICT (1874-1882).

(Prepared from Materials kindly supplied by Mr. Hayter, and revised by Messrs. Mollison and Dyring.)

—	JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.	TOTAL.
Melbourne, 1870-1882-	189	229	325	332	351	193	166	133	96	98	89	137	2,338
Ballarat and district, 1874-1882-	15	18	25	38	39	15	12	15	4	5	4	9	199
Sandhurst and dis- trict, 1874- 1882 -	34	34	47	59	42	22	20	11	11	5	15	18	318
	238	281	397	429	432	230	198	159	111	108	108	164	2,855

The following return shows the monthly proportion of deaths from Typhoid Fever to the admissions of cases of that disease into the Melbourne Hospital from 1860 to 1882; and therefore, to a certain extent, gives the relative mortality in Melbourne. Of course, it

does not follow that a death in any month was due to a fever case admitted in that month, but the result is, on the whole, a correct one:—

RETURN SHOWING RELATIVE MONTHLY MORTALITY IN
MELBOURNE HOSPITAL, 1860-1882.

JAN.	FEB.	MARCH.	APRIL.	MAY.	JUNE.	JULY.	AUGUST.	SEPT.	OCT.	NOV.	DEC.
Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.	Per Cent.
22·98	26·02	16·08	12·21	14·61	17·64	17·10	15·78	17·38	27·26	27·3	21·53

An inspection of these tables affords very strong and additional corroborative evidence of the truth of the general law, "*that the prevalence of Typhoid Fever is inversely as its mortality.*"

From the preceding facts it follows:—

- (1.) That before the introduction of the antipyretic treatment the mortality of Typhoid Fever was between 15 and 30 per cent.
- (2.) That since its introduction in the hands of Jurgensen, Liebermeister, and Jacoud it has fallen to 3 to 10 per cent.
- (3.) That the mortality in the Melbourne Hospital is exceedingly high (17·29 per cent.)
- (4.) That in the general hospitals of Victoria the mortality is about 11 per cent.
- (5.) That in private practice in Victoria the mortality is probably between 4 and 8 per cent.
- (6.) And, finally, that if Febricula were included with Typhoid Fever cases in the records, the mortality would be reduced by about one half.

CHAPTER VIII.

ON THE CAUSATION OF TYPHOID FEVER.

IF on this subject I seem to repeat what has been written before by pens so much more able than my own, it is only because, in all parts of Victoria, prophylactic measures for the abolition of this disease are utterly neglected, and that I, therefore, feel it to be a sacred duty to point out to Victorians the means by which they can banish this scourge from their midst.

That Typhoid Fever is due to a specific virus is sufficiently obvious to any one who has studied an outbreak of the disease, observed and noted its clinical characters and analogies to other zymotic diseases. As will be afterwards shown, whenever it is very prevalent in any particular locality, *there is always some attendant defective sanitary condition*, such as faulty sewage arrangements.

Recognizing this, and the equally well-known facts that the fresh Typhoid stools have little or no influence in producing the disease, and that it is rarely contagious in the ordinary sense, it follows that the disease is caused by one of two conditions:—

- (1.) Decomposing sewage.
- (2.) The decomposing Typhoid stool.

If (1) is to be believed, then it is necessary to explain why the inhabitants of a town (say Murtoa or Toolamba) may live and enjoy health for many years surrounded by dreadful sanitary arrangements, when the introduction of a single case of Typhoid Fever causes an outbreak of the disease in that town.

To this it has been replied that there are certain atmospheric and indefinable conditions which render the inhabitants liable to be so attacked at that time.

In cases of outbreaks arising apparently from defective sewage conditions, it becomes necessary to show that no part of any Typhoid stool could have gained admission to such sewage.

It must be admitted, however, that sometimes the stools cause the disease, as there are so many proved cases. In other words, that sometimes it is so transmitted and sometimes it is not.

On the other hand, it is urged that when a disease is proved to be transmitted and caused in any particular way, it is absurd to suppose that it can be caused in another autogenetic and indefinite way.

That in no case can it be proved that there was not exposure to the Typhoid virus, since, amongst other things, it may remain latent for years.

The atmospheric and other indefinite conditions necessary to produce an outbreak are simply those attending an unusually dry summer, which, by exciting decomposition and otherwise mechanically aiding the dispersion of the virus, diffuse it to a far greater extent than usual.

And, lastly, *that the destruction of the stools puts an end to the spread of the disease.**

So numerous are the recorded instances of this indirect contagion that the assertion, that where the contagion could not be traced the disease must have arisen spontaneously, is similar to an assertion that small-pox, scarlet fever, or cholera (or other diseases known to be contagious) are sometimes autogenetic for the same reasons.

Whilst I think it superfluous, it may be as well to record a few Victorian cases which I have collected, and which are very instructive :—

(1.) Dr. Reid, of Sale, kindly gave me particulars of the following case, which he describes as follows :—“In this family four members were attacked with Typhoid Fever. The first to be attacked was a baby, and during its convalescence three others were almost simultaneously taken ill. The house was a brick hovel with a mud floor. There was no cesspit attached, but the inmates deposited their excreta at any convenient place until I was called in attendance.”

(2.) Dr. Smeal, of Ararat, furnished me with notes of a similar case, where one member of a family was attacked with the fever, and during the progress of her illness another member of the family was affected, and shortly afterwards a third.

I know now of some dozens of instances of this kind, viz., the affection of members of a family with fever during the convalescence or protracted illness of some previously attacked member; there generally being some local sanitary defects, such as the existence of a common privy.

(3.) Dr. Trood, of Mooroopna, after a great deal of trouble, obtained for me the following particulars of an outbreak of Typhoid Fever which occurred in Toolamba West :—This town is situate in the Goulburn Valley, and is perfectly flat. To nearly all the houses

* Budd on Typhoid Fever.

cesspits were attached. If the inhabitants did not use cesspits, they deposited their excreta in the open fields. One month before the disease became prevalent in the Goulburn Valley—

(a.) A young man living in Toolamba (*at which town there had never been a case of Typhoid Fever previously*) sickened with the disease. He lived in the same house with other members of his family, who were attacked as follows:—In two days, a brother; in four days, his father; in eleven days, two other brothers.

(b.) A boy living near went to visit the first sick man soon after he was taken ill. He repeated his visits daily, staying in the house for considerable periods. Between seven and fourteen days afterwards he also developed Typhoid Fever.

(c.) A mother and daughter knew (b), visited him, and looked after him during his illness, the girl washing his soiled linen. Shortly afterwards they were both taken ill from the disease.

(d.) (b) went to school till compelled to take to bed. Some time afterwards the schoolmistress also developed the disease.

These cases are very instructive—the disease attacked *no other persons in the town than those enumerated*. In each of these cases there had been ample opportunity for the individuals attacked to expose themselves to the gases arising from decomposing Typhoid stools. Where the first man attacked contracted the disease cannot be definitely ascertained. He had been visiting the surrounding districts prior to his attack, and doubtless imported the disease from one of them.

(4.) At one part of Shepparton a back yard had practically been converted into a vast cesspit by the indiscriminate deposition of faecal matter in it. The odour arising was fearful, and Typhoid Fever abounded on every side. Three sisters, who were in service in different places, returned to their home (a house opposite), and spent one night there. They returned to service next day, and were then in good health. Within a week all three had Typhoid Fever.

(5.) A Typhoid Fever patient in the Mooroopna Hospital left it before he was well, and went home. In a little time six persons at his house were seized with fever, where the disease had not previously occurred.

(6.) The notes of these cases were given to me by Dr. Garlick, who has had a better opportunity of studying Typhoid Fever than most physicians, inasmuch as he has had sole medical charge of Murtoa, in which the disease has been very prevalent. He informs me that in the hotels of Murtoa, where existed very old and foul cesspits,

Typhoid Fever was exceedingly prevalent. Thus, in one such hotel residents were attacked as follows :—

A servant maid	...	...	...	on January 6
Stable boy	...	...	...	February 6
Proprietor	...	...	...	... March 18
Brother of proprietor	...	...	...	... March 21
A lodger	...	...	...	... March 21
Servant maid	...	...	...	... May 12

Such cases only require one comment, that at these localities (Toolamba and Murtoa) these foul conditions had existed for a long while, and had never caused the disease; but that, after the introduction of cases, the disease seemed to obtain a permanent location.

(7.) Dr. Colquhoun furnished me with an account of one of the most extraordinary outbreaks of Typhoid Fever ever recorded. The mining town of Clunes, situate near Ballarat, is supplied by water from a reservoir 20 miles distant. The water is conveyed to Clunes by a race which runs as an open creek through 13 or 14 miles of agricultural country. Seven miles from Clunes is a settling pond, from which the water is conveyed to the town by pipes. The race receives the drainage of two townships—Newlyn and Smeaton—which are situated on its banks, and also receives numerous tributary creeks. Many houses are situated within a few feet of its banks, and, as Dr. Colquhoun expresses himself, “*The Typhoid excreta could not very well escape admixture with its waters if a case occurred in the houses in its vicinity.*” In Clunes itself there were no cesspits, and sanitary conditions were good. In fact, there was nothing to cause any alarm, and previously the disease had been almost unknown in the town.*

The first (1) case to occur was at Coghill's Creek, eight miles from Clunes. A servant girl there was attacked with the disease, and was removed to the Clunes Hospital, where she remained till the middle of February. The second (2) was imported from Sandhurst. A girl returned from Sandhurst to Clunes in December, 1882, and was immediately attacked with Typhoid Fever. The third (3) sufferer returned from a visit to Ballarat, and was soon after taken ill. She was first seen on 17th January, 1883. In March only two cases occurred, one (4) of which was a young man who was sent home from

* Yet fecal matter had been mixed with the water of the creek, presumably, for an indefinite time previously.—*Vide Report attached.*

Melbourne suffering from fever, and the other (5) was first seen on March 23rd, when he had been ill a few days only.

So far, then, very few cases had occurred in Clunes, a town containing 5,000 inhabitants, who should be very liable to the disease, as it had not visited them before. Although Typhoid Fever abounded in Sandhurst, Ballarat, and other surrounding places, still, up to the 19th of April these were the only cases which had occurred in Clunes, and they were all imported except (5). *But during this time a considerable number of cases had occurred in the habitations bordering on the water race before referred to.*

One case of Typhoid Fever occurred near the race in February, and several in the first week of March. The first case at Newlyn appeared in the house of a butcher, whose premises were situated on the banks of the creek. The second case occurred in another house also situated within a few feet of the creek, but *a few hundred yards below the butcher's house.*

Dr. Lyons, of Creswick, had under his care several cases which subsequently occurred along the line of the creek. In addition, several cases occurred at Smeaton.

Cases occurring near the race appeared not only in February and March, but continued to appear until June; so that the water in the race could have been thoroughly mixed with the Typhoid virus.

It will be observed that the first cases occurred at the extreme end of the race, twenty miles from Clunes—that is, at Newlyn—and that the disease subsequently appeared at many other places along the creek, as the virus was probably carried by *en route* for Clunes, which it reached possibly about the second or third week in March, causing case No. 5; or else during April, when the fever became general.

I need hardly add that the people along the creek would use the water which it contained for drinking purposes.

Under these conditions the fever broke out in Clunes, and attacked residents in the following numbers:—

Week ending	April 26th	...	...	...	15
„	„ May 3rd	...	...	...	49
„	„ „ 10th	...	...	...	40
„	„ „ 17th	...	...	...	29
„	„ „ 24th	...	...	...	18
„	„ „ 31st	...	...	...	25
„	„ June 7th	...	...	...	34
„	„ „ 14th	...	...	...	24

Week ending June	21st	...	...	...	31
" "	" 28th	...	...	...	13
" "	July 5th	...	...	...	9
" "	" 12th	...	...	...	7
" "	" 19th	...	...	...	5
" "	" 26th	...	...	...	4
" "	August 2nd	...	...	...	5
					Total—308

I do not wish to weaken such facts by comments. Could any stronger proof of the spread of Typhoid Fever by contagion, and through the medium of water, be possibly demonstrated?

The following is Dr. Colquhoun's report, as furnished to the Local Board of Health, and an extract from the *Argus* of September 12th, 1883 :—

TYPHOID FEVER AT CLUNES.

For the last four months the residents of Clunes have been menaced by the prevalence of typhoid fever in their midst in a somewhat alarming form, but now the malady has almost disappeared. From the time of the outbreak to the end of August there were no fewer than 315 cases, of which 14 were fatal. The local board of health took vigorous measures to lessen the effects of the epidemic, and they succeeded fairly. Their health officer has discovered the cause of its appearance to be the impurity of the water supplied to the residents, and he has suggested that instead of that water being allowed to run along an uncovered channel through a populated district, it be conducted from the reservoir to the town through a main. The council are unable to carry out this work on account of its great cost. With a view to ascertaining, as far as possible, if the health officer's hypothesis be correct, the Central Board of Health have instructed Mr. Le Capelain, their engineer, to inspect the locality and state the measures necessary to prevent a recurrence of the epidemic. The local health officer's last report was as follows :—

“The Hospital, Clunes, August 29th, 1883.

“The Chairman and Members Local Board of Health, Clunes.

“Gentlemen,—Since my last report, on July 19, there have been 16 fresh cases of typhoid fever, making up to date a total of 315 cases. Two deaths have taken place from the disease since last notice—viz., Letitia Barber, Hill-street, aged 15 years, on August 2; and Esther Vickers, Paddock-street, North Clunes, aged 11 years, on August 4.

“I am glad to be able to report that there is every appearance of the epidemic having exhausted itself. Within the last fortnight there has only been one case reported, the remaining 15 having occurred end of July and beginning of this month.

“The deaths which have taken place since the beginning of the outbreak till date have been 14, or a mortality of 4 2-5ths per cent. This is an exceedingly low death-rate, and we have reason to congratulate ourselves accordingly.

“In examining into the causes of the recent epidemic I cannot find that the sanitary arrangements of the town itself are to be blamed. These are on the

whole satisfactory. The drainage of the town is good, cesspits have been abolished, and earth-closets are in general use. At the outset of the attack precautions were taken to limit the spread of the disease by the liberal use of disinfectants, and the inspector of nuisances, Sergeant Nolan, was most attentive in seeing them used in all public places, and in attending to the frequent emptying and disinfection of closets, &c. In defiance of these measures, however, the disease continued unabated through the months of April, May, and June, and, to a less extent, during July and August. There is no doubt that typhoid fever has been very widely distributed this season, and under any circumstances we would probably have had a certain number of cases, perhaps more than usual; but had there not been a local exciting cause the numbers would not have assumed the proportions they did. That cause is, I believe, to be sought for in the impure character of our water supply, and until this is remedied there is an ever present source of danger to the health and lives of the inhabitants of the town. The manner in which the water is brought from the reservoir at Newlyn is most objectionable. Being conveyed in the channel of an ordinary creek as far as Wheeler's Bridge, it necessarily receives all sorts of impurities from the district through which it travels. On the 18th and 22nd of this month I inspected the water-way—on the former date at Smeaton, and on the latter at Newlyn. At both places I found houses, with their conveniences, situated on the banks of the creek. It receives nearly all the drainage from both townships, as also that of the country along its course—a distance of, I understand, nearly 12 miles. At Newlyn things are very bad. At the crossing near Newlyn Bridge I noticed a dunghill, which was laved by the waters of the creek. From the position of these townships, and the different farm dwellings along its line, the creek is bound to become tainted with fœcal and other impure matter, which must tend to make the use of the water one of danger. On inquiry I ascertained that a Mr. M'Kay, whose premises are on the banks of the creek, near Newlyn Bridge, had a case of typhoid fever in his family early in March; that a second case occurred about the same date in the house of Mr. Shea, a few yards further down the creek. Both these cases were brought into the township. Besides these there were several other persons attacked during the months of March and April. Dr. Lyons, of Creswick, who attended these cases, informs me that he had several others during these months along the course of the creek as far as Smeaton. In Clunes the epidemic did not show itself until the beginning of April, and this peculiarity about it deserves notice, as distinguishing it from the ordinary history of typhoid—that there was a large number of persons attacked simultaneously. Within the first three weeks I had to report over 100 cases. The simultaneous character of the attack pointed clearly to a common source of infection, and that, as I have already stated, I believe to have been the water supply. We had, it is true, three cases previous to the fever assuming an epidemic form. But those cases occurred at intervals of time and place, and were each of them imported—viz., from Coghill's Creek, Sandhurst, and Ballarat respectively. In each case the most careful attention was paid to disinfection and the destruction of everything likely to carry contagion. There was likewise an interval of over a month between the last of these cases and the first of the epidemic series. I am quite satisfied, therefore, that the source of the recent outbreak is not to be ascribed to these three isolated cases.

“I would respectfully point out, in addition, that not only is the late typhoid

epidemic to be attributed to the tainted water supply, but that we constantly run the risk of other infectious diseases being conveyed by same means.

"Whenever a case of infectious disease occurs anywhere in the course of the creek, Clunes is liable to suffer from the same. The risk of hydatids, through dogs getting access to the water, should also not be overlooked.

"The only remedy for this state of matters is to convey the water in pipes direct from the reservoir.

"I am, Gentlemen, yours respectfully,

(Signed)

"ROBERT COLQUHOUN,
Health Officer."

(8.) Donald is another town situate in a flat district of Victoria. It exists under the most horrible sanitary conditions as regards cesspits and drainage; and in it, as in dozens of other equally badly constructed Victorian towns, Typhoid Fever was unheard of till this year (1883). Then the importation of a case or two was followed by an epidemic, which, as Dr. Woinarski informed me, ended most disastrously.

However, Dr. Fox, of Beechworth, has also forwarded me notes of cases which he personally attended. If it be required, the notes of these cases form the keystone, and so complete the arch of Victorian evidence.

(9.) In a village twenty miles from Beechworth, in and near which there had been no Typhoid Fever (the Beechworth district, like most other hilly places, being singularly exempt from the disease), a boy returned home from Wodonga convalescing from the fever. To the house in which he lived a cesspit was attached. Soon afterwards five members of this family were attacked with Typhoid Fever.

(10.) At another small town, near Beechworth, at or near to which there had not previously been any Typhoid Fever, a girl suffering from that disease returned home from Melbourne, and shortly afterwards died. A young woman from a neighbouring hotel visited the house in which the girl lay. What communication she had is not definitely ascertainable, but it is certain that after death had taken place she entered the sick room, and touched, if not kissed, the corpse of the dead girl. However, she soon sickened, and went home to her mother, who nursed her; the latter soon after developed the fever herself. In the first house a brother of the deceased girl was also attacked. To none of these places were cesspits attached, but earth closets; and it is very instructive to note the limitation of the number of persons attacked in these instances.

Amongst the numerous cases of which I have records where many members of a family were attacked, *I have not found a single instance where such a condition has not coincided with the existence of a cesspit, or some equally defective sanitary condition.*

Viewing these cases in a connected light, it is impossible to doubt the power of the Typhoid stools to produce the disease when they are allowed to decompose. In cities provided with earth closets and proper drainage the stools have no resting place for any length of time, and the disease, as a consequence, never makes the ravages in them that it does in the country, where they are thrown into a cesspit and allowed to lie permanently. In fact, it is a comparatively rare thing in the cities to find more than solitary individuals attacked.

To use Budd's words: "Those who practice amongst the inhabitants of large towns, who live in houses provided with good drains, and especially with good water-closets, will find it difficult to believe that the disorder which the foregoing narrative shows to be possessed of such virulent powers of propagation by contagion can really be identical with the fever which, in their own sphere of observation, has seldom appeared in more than single cases, or given other than doubtful evidence of being possessed of such powers at all."

All these facts show that where there is a cesspool, or some similar place in which the virus can lodge, that the disease spreads in its vicinity after the introduction of a case of Typhoid Fever. We know equally well that where there are no such conditions, that the disease does not so spread. As it does not arise in a new place without the introduction of the disease from without; as it is not directly communicated from individual to individual; and as the fresh stools do not cause it, it therefore follows that in these cases the fever arose from the decomposition of the Typhoid stools.

Having, then, shown by indisputable facts that the disease is so transmitted, other evidence becomes at once corroborative. Thus the facts that it only prevails in the heat of summer and autumn; that the cold and wet winter and spring are practically free from it; and that the drier the summer the more frequent are the cases of Typhoid Fever, simply show that warmth favours its diffusion—probably by aiding decomposition—and that, conversely, dilution of the receptacles for the poison and the flushing of channels by rain interfere with its diffusion, probably mechanically. Again, women, who

by virtue of their domestic occupations—washing, &c.—are brought into contact with the virus more than men, are attacked far more often than men. It is stated that washerwomen are attacked very frequently.

It follows, too, that if a Typhoid stool is to produce the disease, it must have a suitable resting place in which it can decompose—such as cesspits, stagnant pools of sewage, &c. Hence, a hilly, and therefore well drained, town would be much more free from Typhoid Fever than a flat and badly drained one. In Victoria, contrast Murtoa, which is quite flat—where in every ten persons one suffered from Typhoid Fever during the last epidemic—with Beechworth, which is very hilly, and where Dr. Fox tells me the disease is practically unknown; in other words, it cannot obtain a lodgment. Or contrast the mortality from Typhoid Fever in Ballarat—hilly and well drained, with its greater population—and Sandhurst, flat and badly drained, with its lesser population, by reading the following figures :—

DEATHS FROM TYPHOID FEVER, 1874–1882.

—	Deaths.	POPULATION.	
		1871.	1881.
Sandhurst and district	318	29,871	36,640
Ballarat and district	199	49,971	41,540

The same result obtains in numerous other instances, which space does not permit me to record.

CHAPTER IX.

ON THE PREVENTION OF TYPHOID FEVER.

HAVING established as a fact that it is by means of the stools that the fever is propagated, and that by the existence of cesspools, bad drainage, &c., a suitable resting place is furnished for them in which they may decompose and liberate or produce the virus, it therefore follows that, in adopting preventive measures, one would discard as useless attempts at altering water and milk supply, &c.—which, however, are often means of propagation—and will strike at the root of the disease. Such measures are necessarily of two kinds:—

(A.) Those necessary for the destruction of the virus.

(B.) Those necessary for the destruction of any *nidus* in which the virus might obtain lodgment.

(A.) It is the opinion of most authorities that the addition to the fresh stools of a considerable quantity of some corrosive destroys their power of producing the disease. Others, however, think that this merely averts decomposition for a time. If it does that, it is sufficient, provided the receptacles are emptied and the stools buried at sufficiently frequent intervals. Of course, there is no doubt that burning would be the best method of disposing of them; but it is impracticable. So that the question simply limits itself to the consideration of the cheapest and best corrosive.

To my mind there is nothing equal to chloride of zinc solution, to which there is the one objection of price. A strong solution of carbolic acid (1 in 20) would be very cheap and very effective, and might be used in combination with copperas, the impure sulphate of iron.

In addition, a large quantity of the same material should be added daily to every pan or receptacle attached to a house in which a Typhoid Fever patient lies.

These pans ought to be emptied during the Typhoid season at least twice weekly.

(B.) Measures necessary for the removal of a *nidus* in which the poison might obtain lodgment:—

(1.) The first of these, *par excellence*, is the removal of all cess-pits. Their deadly effect in spreading the disease has already been pointed out at sufficient length.

(2.) The provision of a perfect drainage system. It follows that

an underground system of sewers, well lined and properly constructed and ventilated, is superior to any system of open, half-lined drains, through which sewage soaks, to permanently saturate the soil. I am glad, however, to observe that a new system of underground drainage has been recommended in Melbourne.

(3.) The complete and systematic flushing of all drains and sewers, especially during the Typhoid season. By doing this the natural process is imitated, as I have shown (*vide* Chapter VI., Charts X. and XI.). Typhoid Fever is remarkably infrequent during those summers in which there are many wet days. Produce artificial wet days by deluging the drains and sewers with water, and the beneficial result is soon noticeable.

If these precautions were taken in their entirety, it would make no difference whether the disease was transmitted through the medium of milk, water, air, or anything else ; it would, of necessity, cease to be. But such effectual extinction is like a moral reform, it depends on the combined action of each individual member of the community.

What the effect of these measures has been in countries where they have been adopted may be judged best from the following lines :—

To begin with, Budd writes :—"In no single case that has ever fallen into my hands has this method failed to prevent the extension of this fever when applied from the first, or the further extension of it when it has already been allowed to spread." He here refers to similar measures he adopted.

Precautions of this kind, particularly those of Class B, have been systematically adopted in Great Britain and on the Continent, with the following results :—

DEATHS IN ENGLAND AND WALES, AND IN VICTORIA, FROM
TYPHOID FEVER FROM 1869-1880.

(Deaths from Typhoid Fever per 1,000,000 Persons Living.)

Year.	In England and Wales.	In Victoria.	Year.	In England and Wales.	In Victoria.
1869	398	524	1877	281	658
1870	392	583	1878	309	648
1871	375	365	1879	232	525
1872	382	429	1880	261	349
1873	379	368	1881	—	404
1874	378	604	1882	—	691
1875	374	578	1883 ($\frac{1}{2}$)	—	—
1876	313	471			

In Victoria, where we do not attend to these precautionary measures, our Typhoid Fever mortality is on the increase.

On the Continent a very great reduction in the frequency of Typhoid Fever followed the adoption of these or similar measures, as observed by both Liebermeister and Jurgensen.

Again, contrast the frequency of the disease in Melbourne, Murtoa, and Mooroopna and district during the epidemic of 1883.

Typhoid Season, 1882-1883.	Estimated No. of Cases.	No. of Deaths.	Popula- tion.	Proportion of Cases to Population per 10,000.	Proportion of Deaths to Population.
MELBOURNE ...	About 4200 of true (?) Typhoid Fever	200	300,000	140 per 10,000	1 in 1,500
MURTOA ...	85	4	850	1,000 per 10,000	1 in 212·5
MOOROOPNA AND DISTRICT ...	130	7	2,000	650 per 10,000	1 in 285·7

And then contrast the sanitary condition in the three places.

As to Murtoa, I cannot do better than quote the words of Dr. T. A. Garlick, who very kindly supplied me with the information:—
“The town is badly drained, there being no fall. The drains are not lined, and the soil is sandy, consequently the sewage soaks in, and never leaves the town. Cesspits are not yet abolished, and some of them are very old, especially *at the hotels where the disease has been so prevalent*. A pool of water, covering about 80 or 90 acres, called a lake, is situated on the west side of the town, and many people depend on this for their water supply. It is greatly polluted by the cattle in the summer.”

Could anything more suitable for the lodgment and diffusion of the poison possibly be conceived?

As regards Mooroopna and district, its flatness and want of drainage are well known; and as regards sanitary arrangements, they are thus described by Dr. C. J. Trood:—

“As regards the existence of cesspits, you will find that they existed in nearly every case. At a house, around which Typhoid Fever was very prevalent, I found the back yard converted into a huge cesspit, all the inmates depositing their excreta in it. Typhoid Fever abounded on every side.”

Now, in Melbourne cesspits have been abolished, and the drainage attended to to a slight extent; and even this limited attention has resulted in a very marked difference as regards the frequency of the disease. It is very rarely that several members of a family are attacked at the same time in Melbourne, whilst in the country it is a very common occurrence.

CONCLUSION.

I then find that—

- (1.) Typhoid Fever in Victoria attacks somewhere between 8,000 and 20,000 (average 15,000) persons yearly in its various forms.
- (2.) That it is quite preventable.
- (3.) That, so far, no systematic efforts have been made to stamp it out.
- (4.) That until such efforts are made it will continue to flourish; but that if such remedial measures as I have recommended are adopted, there is no doubt that the disease will be unknown in a few years.