ANALYSIS OF OBSERVATIONS
ON THE
TEMPERATURE, PULSE, AND RESPIRATION,
IN
PHTHISIS AND ACUTE TUBERCULIZATION
OF THE LUNGS.

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THE pyrexia of phthisis has been known from the earliest periods of medical observation to constitute one of the most important features of the disease, and during the greater part of the present century, it has, with more or less frequency, been made the subject of thermometric observation.

The changes in the temperature in this disease are, however, subject to such great irregularities, that it was long before any general description was given of the variations observed, until the publication of Jochmann's thesis,* and of Wunderlich's work on the thermometry of disease.

Jochmann's descriptions so nearly comprehend the chief variations in the types of fever which occur in phthisis, that as his paper appears but little known in this country, it may perhaps be desirable to give a brief abstract of these, since I shall have again to refer to them.

* 'Beobachtungen über die Körper-Wärme in Chronischen Fieberhaften Krankheiten,' 1853. Conducted under the direction of Prof. Traube, of Berlin.

TYPE I.—The temperature scarcely exceeds the normal standard, but that of the evening is slightly higher than that of the morning.

- (a) Occasional evening exacerbations of a higher range.
- (b) Morning temperature occasionally below the normal.

TYPE II.—The morning temperature normal or subnormal. The evening temperature above normal.

Var. A. The evening temperature only slightly above normal.

- (a) On many days the evening temperature normal.
- (b) The morning temperature occasionally above normal; the evening temperature constantly so.

Var. B. Evening temperatures considerably above normal, while the morning temperature remains normal and nearly constantly so, and may be subnormal. This is the "intermitting" type which may be quotidian or tertian.*

TYPE III.—The temperature both of the morning and evening considerably above normal.

- (A) The temperature highest in the evening, but very variable, the morning temperature though above normal, more regular.
- (B) The temperature highest in the mornings.
- (c) The temperature above the normal morning and evening, but reaching its maximum at midday.

Jochmann, however, points out that all these types may alternate with one another in a single case; the most persistently maintained temperatures being, however, the first and second classes as a whole and varieties A and c of

* To these Wunderlich adds a duplicated quotidian in which two exacerbations occur in a single day, an observation formerly made by Laennec, Forbes' 'Transl.,' 346, and by Andral, 'Clin. Med.,' iv, 164. Laennec observed rigors to precede each exacerbation. Professor Lebert has also noticed this form, 'Deutsch. Arch. Klin. Med.,' xi, 91. The tertian type is rare. Jochmann only observed it in one case, in which the course was somewhat interrupted by slight exacerbations. A case of this nature will be subsequently quoted.

Class III. Those which are least persistent are var. B, Class III (morning temperature the highest), and var. B, Class II (high evening and normal morning temperatures). The type of high morning and evening temperatures co-existing is often interrupted by normal morning temperatures.

Nearly all the observations hitherto recorded have, however, been made on limited numbers of cases, each case being taken as the type of a class. Finding that the great irregularity in temperature rendered exact observation for therapeutic purposes uncertain, I wished to ascertain the predominant changes in different groups, and determined, therefore, to analyse a larger number of cases. The observations on which this analysis is founded have been made by a succession of gentlemen holding the office of Physicians' Assistants in University College Hospital, and the high position obtained by many of them gives the best guarantee for the accuracy of these data. To some of them I am indebted for notes furnished at my request of cases not immediately under my own charge, and I have also to thank my colleagues (Sir W. Jenner, Dr. Hare, and Dr. Reynolds), for permission to supplement some of my notes from their case-books. The large majority of cases have been, however, those under my own care, and the observations analysed have in such cases been made by gentlemen acting as my assistants. I have also to thank Dr. Charles H. Carter for some valuable assistance in this analysis.

In one respect the fact that the observations were conducted solely in the mornings and evenings, gives to these results only an approximative value, inasmuch as during the remainder of the twenty-four hours considerable variations in temperature may occur, but they may, I think, be taken as representing fairly the results of a comparison of the temperatures at these periods, in groups of cases, when the observations are conducted in the manner ordinarily pursued in clinical observation, and if they in some respects show the need of a more extended enquiry respecting the course of the temperature during the remainder of the

twenty-four hours they will, though in a subsidiary manner, be, I trust, not without their value.

When this paper was drawn up by me no general statement of this kind had, as far as I am aware, been previously attempted. Since it has been written, an analysis conducted on somewhat similar principles, has been published by Professor Lebert.* As the method of analysis pursued by Professor Lebert differs somewhat from that which I have followed, I have thought it best to leave my own unchanged. I shall, however, frequently have occasion to refer to Professor Lebert's paper in illustration of the results of my own analysis.

I must call attention also to another fact, viz. that the cases here analysed have been instances of more or less distinctly advanced disease, admitted to a general hospital on account of its acuteness, its extent, or for recent aggravation, and that those not ending fatally have been discharged when the more urgent symptoms have been alleviated. The observations thus recorded represent therefore the symptoms of a group of severe cases, and they thus afford no information respecting the earlier stages or the periods of comparative quiescence. They have also with the exception of a few of the cases of acute tuberculosis been nearly all instances of phthisis occurring in the adult.

I have thought it advisable to analyse the records of the pulse and respiration taken simultaneously with the temperature in their relation to it and to one another. The latter phenomena have already been made the subject of a complete and exhaustive paper by Dr. Edward Smith, published in the 'Transactions' of this Society.† As Dr. Smith's observations had the greater advantage of being carried on continuously during the whole of the twenty-four hours, I should have thought it undesirable to publish my own analysis except so far as relates to the comparison of the pulse and respiration with the temperature, were it not also that the number of cases here investigated shows some

* 'Deutsch. Archiv. Klin. Med.,' Nov., 1872.

† 'Med.-Chir. Trans.,' vol. xxxix.

results not yet presented to the profession in this form. The cases thus analysed are eighty in number, and the results are expressed in a tabular form. The numbers of the cases vary somewhat in the different tables, as I found it necessary to exclude some, according to the subject of investigation, where the observations on the points in question were not sufficiently numerous to afford accurate data, and this is especially the case where averages have been taken. As, however, the results are for the most part expressed in percentages, this will not, I trust, prove a source of any difficulty to those who may think them worthy of perusal.

I have divided the cases thus analysed into five classes, corresponding with some exceptions, not to their thermometric but to their clinical features, and I have thought it desirable to maintain this distinction as showing the variations which may occur in the temperature in groups of cases which are otherwise apparently similar.

The classes which I have thus formed are—

A. Fatal cases, viz.—(1) Acute tuberculosis. (2) Acute pneumonic phthisis, including under this category cases of less than eighteen months' total duration as far as could be judged from their history, and the majority of which ran their course in less than a year or nine months. (3) Chronic phthisis, defining these as more than eighteen months in duration, many of them having been ill for several years. (This distinction is of course arbitrary, but, without going into details on this point, I would add that it was confirmed by post-mortem results, showing either pneumonia or recent granulations or freshly formed cavities in the former, and indurations, often of considerable extent, in the latter class.)

B. Non-fatal cases have also been arbitrarily divided by me into two classes, those with a high and those with a low temperature. Those, for the sake of brevity, I shall speak of as "High Temperatures" and "Low Temperatures."

It is possible that the numbers thus represented in the different classes may yet fail to exhibit all the phenomena

which might be observed in larger groups. I think it especially necessary to call attention to this fact in relation to acute tuberculosis, since the cases which I have met with present only the severely pyrexical type, and it must be considered as certain that another group must be constructed in this affection (of which, however, I have only seen one illustration when the data were not sufficiently numerous to be included in this analysis), in which very low ranges of temperature occur, this being either scarcely febrile or below the normal standard; and probably also intermediate gradations may be found when the pyrexia is moderate.*

The facts I have analysed in the different classes relate chiefly to the following subjects:

- I. The maximum temperature observed.
- II. The averages of the morning and evening temperatures.
- III. The frequency of normal or subnormal morning and evening temperatures.
- IV. The comparison of the temperature of the morning and evening.
- V. The remissions and exacerbations occurring from evening to morning and from morning to evening.
- VI. Circumstances influencing the pyrexia.

I have also analysed the maximum, the minimum, and the mean frequency of the pulse in the morning and evening as compared with one another, with the temperature, and also with the respiration, at these periods; the rate of the respiration at the same periods as compared with the temperature; and the pulse-respiration ratio as compared with the temperature. The degrees of temperature are expressed in Fahrenheit's scale.

§ I. *The temperature attained* varies considerably in different cases of phthisis. The general range, at least in one class of acute tuberculization, may be higher than in that

* In illustration of this fact I would especially refer to Dr. Gee's article, "Tubercular Meningitis," 'Reynolds's System,' vol. ii. Dr. Ringer, 'On the Temperature of the Body as a means of Diagnosis in Phthisis and Tuberculosis,' several cases. Dr. Finlayson, 'Glasgow Medical Journal,' 1869, ii. Steffen, 'Klinik der Kinderkrankheiten,' p. 272 *et seq.*

of all the other forms, a fact also observed by Professor Lebert, but another group of this variety of the disease must, as before stated, certainly be formulated, in which no such preponderance exists over even those presenting the lowest scale of temperatures.

The higher ranges of temperature in this form are as a class almost equalled by some cases of acute phthisis, and by some, not ending fatally, presenting high temperatures.* Thus, of the cases here analysed (see Table 2) a maximum temperature of 104° was exceeded by 62·5 per cent. in acute tuberculosis, by 36 per cent. in acute phthisis, by 37·5 per cent. among the high temperatures not ending fatally, by 11 per cent. of the cases of chronic phthisis, and by none of the cases presenting low temperatures not ending fatally.† Temperatures exceeding 105° were, however (with the exception of two single observations, occurring respectively in cases of acute and chronic phthisis), exclusively found among the cases of acute tuberculosis (25 per cent., see Tables 4 and 5). The maximum temperature which I have met with has been $106\cdot7^{\circ}$, but it only occurred on one occasion in a case of acute phthisis.‡ Wunderlich says that hyperpyrexial temperatures may occasionally occur towards death, but of this I have not seen an instance.§

In all the fatal cases, with the exception of eight, the temperatures were higher than in the non-fatal, but a lower

* Lebert found in 22 cases the mean evening temperature of acute tuberculosis was as follows:—In 2 not exceeding $100\cdot4^{\circ}$; in 8, including those last mentioned, not exceeding $100\cdot2^{\circ}$; in 9 more than $103\cdot4^{\circ}$; in 4 from $103\cdot4^{\circ}$ to 104° ; in 1 from 104° to $105\cdot5^{\circ}$. The maximum of these cases was, however, high.

† This distinction is of course arbitrary; the mere existence of such temperatures would in this arrangement have placed these cases in a different class.

‡ I have in another case, not here tabulated, met with a maximum temperature of $106\cdot5^{\circ}$. Lebert does not appear to distinguish this variety as distinct from acute tuberculosis.

§ Lebert records one case when the temperature rose between 107° and 108° F. He remarks that hyperpyrexial temperatures at the close of life are most commonly found in acute tuberculosis.

range of temperature existed in the cases of chronic phthisis than in the others. Thus, of cases where the temperature did not exceed 103° , 25 per cent. were found in acute tuberculosis, 28 per cent. in acute phthisis, none such occurred among the high temperatures not ending fatally, 38·8 per cent. were found in chronic phthisis, and 90·3 per cent. among the low temperatures not ending fatally; while, below 102° , only three cases were found in acute phthisis,* and also in the cases of chronic phthisis, and 89·3 per cent. in those with low temperatures. (See Tables 1 and 2.)

The chronic cases ending fatally present in their temperatures in certain instances an approximation to those observed in the more acute forms; and this will be readily understood from the fact that their progress is frequently by means of a succession of acute or subacute attacks which in their final aggravation are often largely pneumonic in their character, and by which probably the high temperature is determined; such pneumonia being observed, though often in an indurated form, in all those where the temperature exceeded 102° . In one case only of this class did the temperature not exceed 100° . It was in a female, æt. 43, with a history of past phthisis, and in whom death was due to bronchitis, in emphysematous lungs, in which, in addition to old indurations, recent grey granulations had developed. In five only, however, did any large proportion of the observations exceed 102° (40, 48, 56, 60, and 84 per cent. of the observations in each case), and all these were characterised by old indurations and recent extensive pneumonia, combined with recent tuberculization. In two cases of "low temperatures not ending fatally," an evening temperature of $103\cdot6^{\circ}$ and a morning temperature of 103° were each reached on one occasion only, but the average temperatures of these two cases were respectively—mornings, $98\cdot9^{\circ}$ and $99\cdot9^{\circ}$; evenings, $100\cdot2^{\circ}$ and 99° . In two others a temperature of $102\cdot8^{\circ}$ was attained by each on two occasions only, and the average

* In all these there was much pulmonary induration, pointing to a probably longer course than that assigned by the patient.

morning and evening temperatures of these cases did not exceed 99.4° and 100° .

The class of "high temperatures not ending fatally" resembles in this respect a large proportion of cases of "chronic phthisis," that they all presented a pneumonic attack supervening on pre-existing phthisis. Their average temperatures (see Tables 3, 4, and 5), are lower than in the other acute cases; but this is due to several of them undergoing, while under treatment, a marked improvement and a subsidence of the pyrexia. Their maximum temperatures are, however, nearly on a par with those of the acute forms.

§ II. Considerable differences are apparent in the *averages* of both the morning and evening temperatures observed in the individual cases in each class. (See Table 5.) These averages are higher in the larger proportion of cases of acute tuberculosis, acute phthisis, "high temperatures," and chronic phthisis, than in those of "low temperatures." In the latter the larger proportion do not show an average either for the morning or evening exceeding 100° F.; but in the former there are a large number both of morning and evening averages exceeding 101° , none of which are found in the latter class.

This may be shown on analysing Table 5. Thus, in each class the percentage of the cases, when the *average* morning and evening temperature did not exceed 100° , and the cases where these exceeded 101° , may be thus represented.

Class.	Average morning not exceeding 100° .	Average evening not exceeding 100° .	Average morning exceeding 101° .	Average evening exceeding 101° .
Acute tuberculosis	12.5	0	50	87.5
Acute phthisis	28	8	44	60
High temperatures	62.5	12.5	25	37.5
Chronic phthisis	34.3	27.7	22.2	49.9
Low temperature	99.9	85.6	0	0

Averages of evening temperatures exceeding 102° were found in 75 per cent. of the cases of acute tuberculosis, in 24 per cent. of the cases of acute phthisis, in 11.1 per cent. of chronic phthisis, and none occur among the classes of "high" and "low temperatures" not ending fatally. The averages of the evening temperatures are, as a rule, considerably higher than those of the morning.*

The class of "high temperatures" shows an even larger proportion of morning temperatures, which on the whole are comparatively low, than those of chronic phthisis. This may in part be due to the conditions already indicated, as observed in these cases; possibly, also, to the comparatively small number of cases observed. It will be, however, again alluded to.

The average of the whole series of morning temperatures in any given case in all classes may, indeed, be found within normal limits of temperature (not exceeding 99°). The same fact may be observed for the evening averages, but with comparative rarity, except in the class of "low temperatures." (See Table 5.) Morning temperatures with an average within the normal were not, however, observed in any of the cases of acute tuberculosis occurring under my observation, but they have been met with by others.† They are more common in chronic phthisis and in the class of "low temperatures" than in the acute form, but they were met with in the latter variety in three out of twenty-five instances.‡ One of these presented on the whole a low scale of temperature throughout, exceptional among this class.§ In the

* M. Lebert found that in 10 cases only out of 149 was the mean evening temperature between 98.6° and 100.4° (2 of these were acute cases). In 22 per cent. the average evening temperature ranged from 100° to 102° (3 acute cases). In the greater number, or nearly one half, the mean evening temperature varied from 101° to 103° ; and these higher ranges were nearly equally distributed among the acute and the chronic cases.

† Cf. Ringer, l. c., obs. pp. 79, 87, 89; Finlayson, l. c., obs. ii and viii; Steffen, l. c., obs. xxxi.

‡ Cf. Table V. In chronic phthisis they occurred in 5 out of 15 cases, or 27.7 per cent.; in the "low temperatures" in 11 out of 21 cases, or 52.3 per cent.

§ The reason for putting this case among the acute class was the history of the patient that his disorder was only of nine months' standing. There was

other two the low average of the mornings was the result of the marked remissions which ensued after the evening exacerbations, and which may fall to subnormal degrees.* The five cases when this was observed in chronic phthisis were, without exception, those with a comparatively low range of temperature throughout. A maximum of 103° was only exceeded in one, a maximum of 102° in three, while in the fifth this did not exceed 100° . Subnormal morning temperatures, corresponding to more marked remissions, also occurred in all but in one out of the five. Occasional morning temperatures with a maximum exceeding 103° , and in two with a maximum exceeding 101° , were observed in these cases. In the other two the morning temperature never exceeded 99° , and was frequently subnormal. Considerable remissions also occurred in all these cases (in one observation 6° , in one 5° , in one 4° , in two 3° , in one 2°).

In the cases with "low temperatures," when the average morning temperature was normal, this was almost always accompanied by a low evening and a nearly natural, or occa-

an old large anfractuous cavity in the lung, and albuminoid disease of the spleen, leading to the suspicion that the disease was of older standing. The maximum morning temperature was 99.8° , the maximum evening 101° . The average morning was 98.8° , the average evening 99.7° .

* In one of these the maximum remission amounted to 8.8° (the highest I find recorded). The average of the remissions from evening to morning was 3.9° . High morning temperatures, however, occurred occasionally; the maximum morning was 102.8° , the maximum evening 103.2° . The average morning was 98.6° , the average evening 100.7° . Subnormal temperatures occurred in the morning in 7, and normal in 2, out of 25 observations. The morning temperature was, however, higher than that both of the preceding and following evenings on six occasions respectively; and in 2 of the latter the evening temperature was on one occasion normal and on another subnormal, a fact which accounts for the comparatively low average of the evening temperatures. The other case was also an acute one (coming on within a month after confinement of a premature child), with marked remissions from the evening to the morning, the latter being constantly at or below normal, only once rising to 99.8° , while the maximum evening temperature was 103° , and the average 101° ; the maximum remission being from evening to morning 4.6° , and the average of these remissions 2.7° . The lesions present were recent grey pneumonia of one apex with soft granulations in it, grey granulations of the opposite lung, tubercular peritonitis and tubercular ulceration of the intestines.

sionally a subnormal morning temperature. In one only was a morning temperature above 100° observed (102°), and in two only did the evening temperature ever exceed 100° (102° and 103°). These cases, therefore, came for the most part within Jochmann's first type, though this was not always regularly maintained, and the morning temperatures in eight of the eleven were occasionally higher than those of the evening.*

Averages of the evening temperatures not exceeding 99° were met with by me only in cases of chronic phthisis and the class of "low temperatures." They have, however, been met with in cases of acute tuberculosis.† In the two cases of chronic phthisis in which they occurred the low average was due to subnormal temperatures preceding death. In the class of "low temperatures," they appeared to be almost invariably due to a general low range of evening temperature (which in none of these exceeded 100°), together with occasional remissions from the morning to the evening; which, in one of these cases to be hereafter alluded to, completely inverted the regular order (the morning being always higher than the evening), and in three others varied from 30 to 40 per cent. of the observations.

§ III. The total number of cases in which during twenty-four hours a *normal temperature* was observed during some part of the case, is seen in Table 2. The proportional frequency of *normal and subnormal morning and evening temperatures*, both as to the cases and the relative number of observations in which they occurred, is shown in Table 3. Normal and subnormal morning temperatures are there seen to be more common than the

* M. Lebert says that in 33·3 per cent. of all his cases the mean morning temperature only exceeded the normal in exceptional instances. In one third of his cases the mean morning temperature was between $98\cdot6^{\circ}$ and $101\cdot3^{\circ}$. The cases with high mean morning temperature only amounted to 14 per cent. of the whole number. The morning temperature, therefore, tends to be low in all varieties of the disease. High morning temperatures occasionally, however, occurred, in one instance exceeding 105° .

† See Steffen's obs. xxxi, before quoted.

same phenomena in the evening ;* but a fair proportion of the latter is observed in all the classes except that of acute tuberculosis. (It must, however, again be recalled that they do occur in this class also.) It is, however, only in very exceptional instances that they occur in any case in any considerable number of observations. The conditions of such occurrence will be alluded to hereafter.†

§ IV. In *comparing the temperatures of the morning and evening* it will be found that the maximum temperatures, as a rule, are usually attained in the evenings, and therefore the average temperature is in the majority higher for the evening than for the morning. A fair proportion of exceptions exist, however, to this. In 8 cases out of 80 the maximum temperatures observed in the morning and evening were equal,‡ and in two of these the averages of the morning temperatures throughout the case were higher than those of the evening. In 19 more or 23·7 p. c. the maximum morning temperature was higher than the maximum evening observed.§

* M. Lebert found the *minimum* morning temperature below 96·8° in 28 per cent. of his cases; and only in 4 per cent. (6 only of 149 cases) did the morning minimum range from 99·5° to 103·5°. The morning maximum was, however, subnormal in 9 only of 149 cases; in two fifths it ranged from 99·5° to 101·3°, and in one half from 101·3° to 104·9°.

† M. Lebert found a minimum evening temperature not exceeding the normal in one third of his cases.

‡ One of these cases occurred in acute phthisis, 3 in chronic phthisis, 1 among the "high temperatures," 3 among the "low temperatures."

§ Of these 1 case occurred in acute tuberculosis, 6 in acute phthisis, 3 in chronic phthisis, 1 among the "high temperatures," and 8 among the "low temperatures."

Maximum morning temperature exceeded maximum evening by 2° in 1 case.	
"	" 1° in 4 cases.
"	" 1° to 0·5° in 6 cases.
"	" 0·5° to 0° in 8 cases.
	<hr/>
	Total 19 cases.
Average morning temperature exceeded average evening by 2° in 1 case.	
"	" 1° in 2 cases.
"	" 0·5° to 1° in 1 case.
"	" 0·5° to 0° in 6 cases.
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	Total 10 cases.
Average evening temperature exceeded average morning by 1° in 2 cases.	
"	" 0·5° to 0° in 3 cases.
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	Total 5 cases.

In 10 of these the average of the morning temperatures was greater than, in 4 equal to, in 5 less, those observed in the evening. In two cases more, though the maximum morning temperature observed was less than the maximum evening, the average of the morning temperatures was greater than that of the evening,* and in another of the same class the averages were equal.†

High morning temperatures are observed, therefore, in a large number of cases of phthisis, and in nearly all the classes, with the exception of those of "low temperatures"; the proportion of observations in which 103° is exceeded is nearly equal, amounting from 50 to 52 per cent. of the whole number of observations. (See Table 4.) A larger number, however, of cases present a high average of their individual morning temperatures in acute phthisis than in any other class. For, of average morning temperatures exceeding 102° , there only occurred 1 case out of 8 (12.5 per cent.) in acute tuberculosis, while 6 out of 25, or 24 per cent., occurred in acute phthisis, and none in the other classes. The absolute number of cases in which an average of 102° was exceeded was thus in acute phthisis as great in the morning as in the evening, being in each 6 or 24 per cent. of the 25 cases examined, a proportion not found in any of the other classes. (See Table 5.)

Morning temperatures exceeding 104° were only met with in the classes of acute tuberculosis, acute phthisis, and the "high temperatures," in the relative order of 25, 15, and 12 per cent. of all the observations in these classes. None were observed in chronic phthisis and in the class of "low temperatures."‡

* Both occurred in "acute phthisis."

† Occurred among the "low temperatures."

‡ Morning temperatures exceeding 103° were found in 4 out of 8 cases of acute tuberculosis (50 per cent.), in 13 out of 25 cases of acute phthisis (52 per cent.), in 9 out of 18 cases of chronic phthisis (50 per cent.), in 2 out of 8 cases of "high temperatures" (25 per cent.), and in 1 out of 21 cases of "low temperatures" (4.7 per cent.). Morning temperatures exceeding 104° were found in 2 out of 8 cases of acute tuberculosis (25 per cent.), in 4 out of 25 cases of acute phthisis (16 per cent.), and in 1 out of 8 cases of "high temperatures" (12.5 per cent.). The proportions of the number of cases in

The fact that the morning temperatures are frequently higher than those of the preceding or following evening has been noticed by most writers on the thermometry of phthisis, but the extent to which this may prevail has been but little insisted on.* Fournet,† indeed, stated that morning pyrexia was more common in the earlier than in the later stages of the disease, but my observations hardly confirm this opinion.

Out of 75 cases there were only seven which at some part of their course showed no rise of temperature from the evening to the ensuing morning, and only 6 had no remissions from the morning to the ensuing evening. The morning temperature was therefore, occasionally, higher than that of the preceding evening in 90·7 per cent., and higher than that of the succeeding evening in 92 per cent., of the whole number of cases. (See Table 6, Appendix.)

The occasional existence of higher morning than evening temperatures within pyrexial limits was pretty evenly distributed through all the classes of cases with the exception of cases of acute tuberculosis.

	Acute tuberculosis; 8 cases per cent.	Acute phthisis; 24 cases per cent.	High temperature; 8 cases per cent.	Chronic phthisis; 15 cases per cent.	Low temperatures; 20 cases per cent.
Morning occasionally higher than previous evening ...	62·5	87·5	100	100	90
Morning occasionally higher than following evening ...	75	87·5	100	100	85

(See also Tables 7, 8, 9.)

This fact is also not unfrequently observed at temperatures within a normal range, when these occur in any part of the course of the case; but, even within pyrexial limits which these were observed correspond, therefore, pretty closely with that of the observations in each case.

* Traube, 'Symptomen der Krankheiten der Respirations und Circulations Apparats,' p. 77, has noticed the relative frequency of this type of fever in phthisis. It has also been observed by Lebert, and has been termed by these authors the "typus inversus."

† "Rech. Clin. sur l'Auscultation des Organes Respiratoires," 1839.

a very large proportion of the whole number of observations may be found to present this peculiarity. (See Table 6.) In one case, in a series of observations extending over twenty-three days, the morning temperature was constantly higher than the evening, with the exception of three occasions when it was identical with that of the previous evening, and one occasion when it was the same as that of the following evening, these being within a normal range; and on seventeen out of these twenty-three days the temperature was pyrexial, though on a low scale.* The same phenomenon is, however, observed in all classes of phthisis, and may, though comparatively rarely, be present for many days in succession. On one occasion this was noticed during eleven days successively in a severely pyrexial case of acutely tubercular pneumonia, where it occurred in 23 out of 58 observations. In another case of pneumonia supervening on chronic phthisis it was noticed in 21 per cent. of 33 observations. Usually, however, it occurs irregularly throughout the case, but sometimes, as already remarked in a case of acute tuberculosis, on nearly alternate days.

I think it possible, from a limited number of observations, that in some cases, when the morning temperature exceeds that of the succeeding evening, this may be occasionally due to an intervening midday exacerbation,

* This case, a female, æt. 43, presented no peculiarities with the exception of an enlarged heart with a mitral murmur, the result of a previous attack of acute rheumatism. Cough had existed for years. There was emphysema, consolidation of both apices, and dulness of the left base with râles at both bases. There were also present some œdema of the ankles, without albumen in the urine; enlargement of the liver and diarrhœa, to which she had been subject for years, but which had no apparent effect on the temperature. The pyrexia subsided, and the dulness at the left base disappeared, though some râles remained. The morning temperature within pyrexial limits exceeded the previous evening in 70 per cent., the subsequent evening in 74 per cent. of the observations. In 52 per cent. of the whole number the morning was pyrexial, the evening temperature normal. The maximum morning temperature was 101·4°, the maximum evening 99·8°. The average of the morning temperatures was 99·5°, that of the evenings 98·6°.

The maximum exacerbation from evening to morning = 2° average 0·9°.

„ remission from morning to evening = 2° average 0·9°.

but my cases have not permitted me to make any accurate analysis of this point, as they contain very few midday observations.* This explanation is not, however, applicable to those cases where the morning temperature is higher than that of the preceding evening, in which a true inversion of the order of exacerbations appears to take place.†

* M. Lebert, loc. cit., also directs attention to this feature, though his cases are for the most part analysed like mine, solely with regard to the morning and evening temperatures. He, however, points out that the temperature may apparently fall from the morning to the evening, but that the chief fall may occur from morning to noon, and a slight rise occur towards evening. Thus, the fall from morning to noon may be 3.7° , yet the fall in the evening may only be lower than the morning by 1.4° fall. Again, when the temperature in the evening is higher than the morning, the greater part of the rise may be from the morning to noon, and a slight rise only towards evening. The temperature in phthisis, moreover, frequently oscillates considerably within a few hours of the same day. Thus, the difference between the morning and evening may be 2.3° fall, while the difference between the means of the maximum and minimum of repeated observations made in the twenty-four hours may be less than 0.2° fall.

† The course of the temperature in these cases also shows considerable variation. In one case of acute phthisis where out of 42 observations the morning temperature was on 19 occasions higher than on the preceding evening, and on 13 higher than on the succeeding evening, the following variations were observed :

(a) Temperature in morning lower than preceding evening, fell to following evening, but rose next morning.

(b) Morning temperatures then higher than either preceding or following evening for four days, but broken by a rise on the fifth evening.

(c) Temperature in morning higher than previous evening, rose to next evening, and fell to following morning.

(d) Temperature fell from evening to morning, fell to next evening, rose to following morning, and rose to next evening ; fell to next morning, and fell further to next evening ; all these temperatures being febrile.

In another case where out of 58 observations the morning temperature was on 20 occasions higher than on the preceding, and on 23 higher than on the following evening, the following variations were observed in respect of the first class :

Morning temperature higher than preceding evening, fell to following evening in	14	$\left\{ \begin{array}{l} 1 \text{ normal,} \\ 1 \text{ subnormal,} \\ 12 \text{ pyrexial.} \end{array} \right.$
Morning temperature higher than preceding evening, rose to following evening in	4	
Morning temperature higher than preceding evening, remained equal to following evening in	2	
	<hr/> 20	

In a large proportion of all cases of phthisis the temperature of the morning, when febrile, is occasionally found to equal that either of the preceding or following evening, and this equality is also observed within the normal range in cases with low degrees of pyrexia. This, however, only occurs in each case, as a rule, in a limited number of observations, and it is seldom continued, though it is recorded in two cases as lasting during forty-eight hours.

The subjoined Table exhibits the number of cases in which occasional equality between morning and evening febrile temperatures was met with in 75 cases. In addition to these, non-febrile equality was observed from evening to morning in one case of chronic phthisis. Among the "low temperatures" it was also observed from evening to morning in one case, and from morning to evening in two cases. With these exceptions, in which it was frequent in these individual cases, such equality is rare among the whole number of observations. In three cases, however, equality of temperature from evening to morning was met with respectively in 37·5, 33·3, and 33·3, per cent., and in two more in 15 and 16 per cent. of the observations; in all the rest it did not occur in more than 10 per cent., and in a considerable number in both categories it was limited to a single observation. It, however, also occurred from morning to evening in one case in 42·5, in one case in 20, and in eight cases in from 10 to 20 per cent. of the observations. In the remainder it was below 10 per cent.

Class.	No. of cases.	Morning equal to preceding evening.	Morning equal to following evening.
Acute tuberculosis	8	4	3
Acute phthisis.....	24	9	14
High temperatures.....	8	5	5
Chronic phthisis.....	15	9	10
Low temperatures	20	9	11
Total.....	75	36	33

In some cases, where the morning temperature has been identical with that of the preceding evening, there is a fall, but in others a rise is observed to that of the following evening, or, as in one case observed, there may be a gradual fall continuing through thirty-six hours, but followed by a fresh exacerbation. This approximate equality of temperatures in the mornings and evenings is, however, commonly associated with high pyrexia and with a severe form of the disease.

§ V. *Remissions and exacerbations*.—The remissions from evening to morning, and the exacerbations from morning to evening, correspond pretty closely, at least in the higher ranges (see Tables 7 and 8). Marked remissions and exacerbations do not, however, necessarily follow one another, as a continuous or quasi-continuous temperature appears in some cases to be maintained, though generally only during short periods. Extremes of either correspond usually to an alternation of a high and a subnormal temperature. The maxima recorded in these cases are a remission of $8\cdot8^{\circ}$, and an exacerbation of $8\cdot4^{\circ}$, which immediately succeeded one another, and were also followed by a series of considerable though not equally great alternations, occurring during six days preceding death.* Two out of 75 cases had

* The temperature in this case at this period were—

Evening $103\cdot8^{\circ}$.	Morning 95° .
„ $103\cdot4^{\circ}$.	„ $95\cdot2^{\circ}$.
„ $102\cdot2^{\circ}$.	„ 95° .
„ 100° .	„ 98° .
„ 102° .	„ 96° .
„ $99\cdot2^{\circ}$.	„ $97\cdot4^{\circ}$.

Death.

The maximum morning temperature in this case was $102\cdot2^{\circ}$, the maximum evening $103\cdot8^{\circ}$; but the average of the morning temperatures was $98\cdot6^{\circ}$, of the evening $100\cdot7^{\circ}$ (25 days). The average of the remissions from morning to evening was $3\cdot9^{\circ}$, of the exacerbations from morning to evening $3\cdot3^{\circ}$. Remissions from morning to evening also occurred to the extent of $4\cdot2^{\circ}$, and exacerbations from evening to morning of $4\cdot8^{\circ}$. The morning temperature was higher both than the preceding and also than the subsequent evening respectively in 25 per cent. of the observations. The morning temperature was normal or subnormal in 37·8 per cent. of the observations. The evening

remissions of from 6° to 7° from evening to morning, and both these cases also had exacerbations of the same extent from morning to evening.* Five† had remissions of from 5° to 6° , but in none of these, however, did the exacerbations reach the same height, though attaining to 4° . Two, however, had exacerbations of from 6° to 7° and from 5° to 6° respectively, without a corresponding degree of remissions.‡ Eight cases, therefore, out of a total of

was normal after a morning pyrexia in 1 observation.—Acute pneumonic phthisis of nine months' duration; much sweating; much diarrhoea. The patient was a drinker. He had worked at Woolwich, and there was a suspicion whether he might have been subjected to malarial influences; but there was no history of this, nor enlargement of the spleen. Quinine taken regularly had no effect on the temperature. M. Lebert records a case (*loc. cit.*, p. 63) where acute tuberculosis supervened after intermitting fever; and the types of the pyrexia observed in the two diseases were markedly different.

* One case of chronic phthisis with an acute exacerbation and recent miliary tubercles. These remissions were on two occasions from 101.4° to 94.8° . They were followed by three days of subnormal temperature preceding death. In another case of acute phthisis a fall was observed from 104.4° to 97.8° , and another from 103° to 98° . These were both followed by nearly corresponding exacerbations.

† One of these was among the cases of acute tuberculosis, 1 in acute phthisis, 1 in a case of chronic phthisis with acute exacerbations, 1 among the "high temperatures," and 1 among the "low temperatures." In the two last named the fall might be regarded as almost critical. Thus, in the case with high temperature the fall was from evening 103.4° to 98° . After this the morning temperatures never exceeded 98° during twelve days; and the evening temperatures fell nearly a degree for four successive evenings to 99° , and remained at 99° for two evenings, and then fell in five evenings to normal, and the patient was dismissed convalescent. The cough and expectoration and the sweating, all of which had been severe on admission, had then entirely ceased. There were consolidation and other signs of phthisis at both apices. In the case occurring in the class of "low temperatures" the remission occurred on the morning after admission (evening 101.4° morning 96.2°). There was no remission of the same extent after. The temperature gradually fell to normal. This case was marked by much greater disturbance.

‡ Both cases of acute phthisis. One exacerbation from morning 100° to evening 106.6° , the only occasion on which so high a temperature was reached in the case. The greatest remission succeeding this was to 102.4° (4.2°). In the other, though the greatest exacerbation was from 5° to 6° , the greatest remission was from 3° to 4° .

75, or 10 per cent., exhibited in their course remissions exceeding 5°; and five, or 6·6 per cent., had exacerbations of a corresponding extent.

The larger remissions and exacerbations, with the exception of those just alluded to, are, as a rule, nearly equally distributed between the fatal cases of acute tuberculosis, acute and chronic phthisis, and the cases of high temperature. The class of low temperatures not ending fatally shows these, however, to a much smaller extent.

This may be seen from the accompanying table constructed from Table 9. Each column shows the percentage of all remissions and exacerbations exceeding the degree specified.

Class of cases.	REMISSIONS. <i>Evening to morning.</i> Percent. of all remissions observed in every case in each class.				EXACERBATIONS. <i>Morning to evening.</i> Percent. of all exacerbations observ- ed in every case in each class.			
	More than 3°.	More than 2°.	More than 1°.	Less than 1°.	More than 3°.	More than 2°.	More than 1°.	Less than 1°.
Acute tuberculo- sis.....	16·6	44·4	69·5	30·5	20·9	34·6	65·1	34·9
Acute phthisis ...	12·3	29·7	60·2	39·8	9·2	23·2	49·8	50·2
“ High tempera- tures”	11·2	27·4	64·3	35·7	15·4	34·3	60·9	39·1
Chronic phthisis	11·8	33·6	62·4	37·6	4·7	19·	59·2	40·8
“ Low tempera- tures”	2·7	10·4	36·5	63·5	2·	8·	37·2	62·8

It will be observed in comparing the columns of exacerbations with those of remissions, that in the class of acute phthisis there is less approximative correspondence between them than is observed in the other classes. This appears to be due in part to a greater tendency to continuity of temperature, in part to the more frequent occurrence of remissions from morning to evening, in this than in the other classes. It is also in part accidental, owing to

the inclusion in it of two cases where the remissions and exacerbations were throughout small, though they ran an acute course.* A table almost identical with the preceding might be constructed out of the numbers of cases, showing the average of all the remissions and exacerbations occurring in each case. (See Tables 7 and 8.) It is only in the class of "low temperatures" that these averages fall, in any large proportion of the cases, below 1° .

Professor .Niemyer† has asserted that tuberculous phthisis may be distinguished from the pneumonic forms by the larger remissions prevailing in the latter, and that when tuberculosis supervenes these remissions disappear or diminish. This appears, as far as the evidence of the cases here analysed is concerned, to be completely disproved by their results; for a greater proportion of large remissions and exacerbations are observed in acute tuberculosis than in any other class, though the difference is not very considerable. If to these we add the class of cases where acute tuberculosis is attended by a low temperature, we may conclude with Wunderlich that from a thermometric point of view there is no feature which can be relied on as a characteristic to distinguish these two forms.‡ The only point

* In one of these the temperature was low, the maximum morning not exceeding 101.3° . In this case the remissions from morning to evening, and the exacerbations from evening to morning, were both greater than the converse (maximum remission evening to morning 0.6° , average 0.5° ; maximum remission morning to evening 1.4° , average 0.8° . Maximum exacerbation morning to evening 0.4° , average 0.3° ; maximum exacerbation evening to morning 1.6° , average 0.7°). The morning was higher than the preceding evening on six and higher than the following evening on seven out of thirteen days. Almost identical conditions prevailed in the second case, though here the temperature was higher (maximum 103°).

† 'Klinische Vorträge,' pp. 77-8.

‡ 'Die Eigenwärme in Krankheiten,' p. 369. This fact has also been especially insisted on by M. Lebert. He states that every type of fever found in other forms of phthisis may be met with in acute tuberculosis, and *vice versa*; and that cases of the latter class, apparently similar in all other respects, may have very different forms of pyrexia. In one there may be nearly continuous fever, in the next marked remissions amounting to 6.3° F. Subacute tubercle may also have excessive subcontinuous pyrexia, though this latter is, as far as

which, with occasional exceptions, may be affirmed of the different classes is, that the higher the fever, the greater is the liability to marked remissions and exacerbations ; but, on the other hand, a few cases with high fever show an approximative uniformity of temperature.

Although, as before shown, in a large number there are remissions from morning to evening, and exacerbations from evening to morning, yet these in the majority are less in extent than the remissions from evening to morning, and the exacerbations from morning to evening. (See Tables 7 and 8.) Thus, in 75 cases, only 1 case showed a remission from morning to evening exceeding 4° , and only 4 cases an exacerbation from evening to morning of this extent. In a large number also, these latter were limited to one or two observations, and the majority of the remissions and exacerbations in these did not exceed 0.5° , and sometimes ranged as low as 0.4° , 0.2° , or even 0.1° ; so that in such cases there was an approximative though not an absolute attainment of what may be regarded as a nearly equal temperature between the mornings and evenings.*

There are, however, a certain number of cases where high morning temperatures predominate, in which the major remissions occur from morning to evening, and the major exacerbations from evening to morning ; and these may be sufficiently numerous throughout the case to constitute higher averages for these remissions and exacerbations, than for those occurring in the more usual order ; and these

M. Lebert has observed, exceptional. He remarks also that the same variations may be observed in tubercular peritonitis and meningitis (l. c., pp. 58, 61, 78-9).

* The number of the smaller remissions from morning to evening (below 0.5°) is pretty equally distributed among the different classes, with the exception of acute tuberculosis, which shows a less proportion. There is throughout, also, a nearly equal proportion of the minor exacerbations from evening to morning, though these are more numerous in acute tuberculosis than in the rest. In all, with the exception of the class of acute tuberculosis, there is a smaller number of the minor exacerbations than of the minor remissions. The cause of these differences in the class of acute tuberculosis is not apparent (see Table 9).

cases form no inconsiderable proportion of the whole number analysed. This may be seen by the accompanying table, which gives only the number of cases in each class in which remissions from morning to evening, and exacerbations from evening to morning, were observed.

Class of cases.	Remissions.					Exacerbations.				
	No. of cases.	Max. M. to E. greater than E. to M.	Max. M. to E. = E. to M.	Av. M. to E. greater than E. to M.	Av. M. to E. = E. to M.	No. of cases.	Max. E. to M. greater than M. to E.	Max. E. to M. = M. to E.	Av. E. to M. greater than M. to E.	Av. E. to M. = M. to E.
Acute tuberculosis	5	0	0	0	0	6	0	2	0	2
Acute phthisis	22	6	4	4	3	21	5	4	3	3
"High temperatures"...	8	2	0	2	2	8	1	1	1	3
Chronic phthisis	15	2	0	0	3	15	0	5	1	4
"Low temperatures" ...	19	10	0	7	5	18	5	0	6	0
Total	69	20	4	13	13	68	11	12	11	12

Although, however, the maxima of these remissions and exacerbations may be respectively higher than the converse, yet the averages of all such occurring in the case may be equal to or less than those of the remissions from evening to morning, and of the exacerbations from morning to evening.*

Other variations are occasionally found. Thus, in one case, though the remissions occurring from morning to evening were greater than those from evening to morning,

* Thus, in one case the maximum and average morning temperature was higher than the maximum and average evening temperature; yet the remissions from evening to morning were greater than those from morning to

yet the exacerbations from morning to evening when these occurred were also greater than those from evening to morning.

The alternation of these remissions and exacerbations with those following the more regular course produces an irregularity in the latter, which disturbs the order of the temperatures in a large number of cases of phthisis. This has been already alluded to, but the final effect is to produce a want of correspondence between the remissions and exacerbations of either class, which is illustrated in Table 10; where it is seen that in a considerable proportion of cases there is no equality observed between them.

§ VI. *The cause of the variations of temperature* now described is, in the majority of cases, by no means distinct. In more than one case the highest temperature observed was that on the evening of admission, showing that fatigue and excitement may increase the fever. I have more commonly than the reverse failed to find any positive evidence of increase of the physical signs following severe exacerbations. In some instances, however, they preceded distinct and fresh pneumonic consolidations. Rapid and extensive softening also sometimes produces this effect, and in some cases they indicate other intercurrent inflammations.* This has been observed in a suddenly developed high morning temperature, on the supervention of parotitis, by Jochmann;† but in a similar case in my own experience, no marked elevation of temperature was observed.‡ Rigors sometimes attend these exacer-

evening, and the exacerbations from morning to evening were greater than those from evening to morning.

M. Max. 103°, Av. 101°3. E. Max. 103°, Av. 101°2°.

Max. Rem. E. to M. 4°9°, Av. 1°6°. Max. Rem. M. to E. 3°2°, Av. 1°2°.

Max. Exac. M. to E. 4°5°, Av. 1°8°. Max. Exac. E. to M. 3°, Av. 1°4°.

The morning temperature was, however, higher than the previous evening in 50 per cent., and higher than the following evening in 55 per cent. of 18 observations.

* *E.g.* "Pericarditis," Wunderlich, 'Arch. der Heilk,' 1860, Case ii.

† Loc. cit., Case xi, p. 41.

‡ Parotitis supervened two days before death, but only one evening temperature was taken subsequently; it was 99°3°.

bations, but in a distinct form they are in my experience not very frequently observed. In one case, where rigors were of repeated recurrence, with great exacerbations of temperature (106.1°), the invasion of pneumonia was observed successively at both bases.* Rigors were common in Louis' observations with the evening exacerbations of the fever, being wanting only in 16 out of 95 cases; they were rare at other times. My own enquiries have not been very specially directed to this point; but they have not appeared to me to be complained of with this frequency.†

Marked exacerbations are commonly followed by equally great remissions. The latter, as Jochmann has observed, signify in all probability a condition of "inanition," "exhaustion," or "collapse."‡ The temperature in these remissions may sink as low as 95° , but it rarely falls below 96° . M. Lebert has, however, known it fall to 90.5° F. In some cases, however, they form a sort of pseudo-crisis, or (as in two instances) they may constitute a real crisis similar to that observed in acute pneumonia, the temperature scarcely rising subsequently, and within a short period regaining the normal standard. In some instances M. Lebert has observed a subnormal temperature maintained for weeks

* In this case the fever was occasionally quotidian, but was also tertian for six days, but the rigors returned at irregular hours. Thus:—October 17th, rigor at 1.30 a.m.; 18th, rigor at 10.30 p.m.; no fever for twenty-four hours before; 19th and 20th, apyretic until 5 p.m. on the 20th; 21st, apyretic; 22nd, rigor at 1 p.m.; 23rd, slight pyrexia, rigor not noted; 24th, rigor at 10 a.m.; 25th, no notes (probably no rigor); 26th, rigor 6.45 a.m.; 27th, pyrexia, no rigor; 28th, pyrexia in morning; 29th, no notes; 30th, no pyrexia, morning or evening; 31st, rigor; November 2nd, rigor. On those days when the temperature was taken at frequent intervals, the pyrexia lasted in one twenty hours, in one twelve hours, and in one fourteen hours. It was not observed to fall below 98° . On two occasions it reached 106° , on one 105.4° , and on another 104.6° . The patient became discontented and left the hospital.

† Andral, 'Clin. Med.,' vol. iv, p. 174, says that rigors are rare in the evening.

‡ Jochmann quotes Chossat's observations to show that during inanition the oscillations of temperature are increased.

after the subsidence of the pyrexia, ranging from 97.7° to 96.8° or even to 95.9° , with general improvement of the health and gain of weight.

A marked and increasing intensity of remission with high exacerbations may, in some acute cases, for several days precede death. Great remissions, therefore, without a corresponding diminution of the exacerbations, cannot be regarded as a favorable sign. Other conditions of exhaustion may in some cases produce an apyretic or even a subnormal temperature lasting for some days. One such was illustrated* by a female patient who miscarried while in the hospital, another by the supervention of perforation of the pleura,† though this event is not always followed by such a result as was observed in another and similar case, though here also a fall to normal on the next morning followed this event.‡

A subnormal standard may also be attained for some days before death, but this is by no means invariable; and

* A chronic case admitted with a recent fresh attack. Temperature during forty-three days scarcely ever exceeded 100° . A miscarriage was followed the next morning by a temperature of 95.2° , next morning 98.4° , evening 100.2° , next morning 102° . Continued higher in the mornings than evenings for three days, morning 102° , evening 101° . Then for twenty-one days evening higher than morning with great remissions, but never intermittent, remissions being generally 3° , and once 5° , followed by an exacerbation of 5° ; two such exacerbations occurring. The last was attended by the invasion of acute pneumonia, which proved fatal.

† The fall of the temperature did not *immediately* follow the perforation. It had been high before— 103.8° , on the morning on which it occurred; on the evening of the day after the perforation it was 103.4° , and the next evening 104.4° ; then ensued a gradual fall during four days, until on the seventh day after the perforation the temperatures were morning 97° , evening 96.8° . On the eighth day, morning 99.4° , evening 99.6° ; after this a rise took place, but the temperature continued on the whole low, but never again subnormal during forty-four days until death.

‡ M. Lebert, l. c., p. 81, has found in some cases the invasion of pneumothorax associated with a *rise* of temperature, followed by a considerable fall, and finally returning to the ordinary type of the pyrexia. If the opening closes the temperature may gradually fall. If pneumothorax occurs early in the disease it may be followed by an arrest of this and a gradual subsidence of the pyrexia.

in many cases, the temperature continues high up to the fatal termination.

Suffocative bronchitis attending tuberculization may also be attended by a generally low, and by subnormal temperatures; and this may possibly explain some cases where these are observed in acute tuberculosis; but intense dyspnœa, with cyanosis, may be observed when the temperature is 102° or 103° . In some cases also in all forms, as already remarked, normal temperatures may be abruptly interposed in the midst of a general pyrexial course, and this without any evident cause; though Jochmann is disposed to attribute these, and also periods of lower temperature intervening after this had been previously high, to the effects of exhaustion, while in his opinion sustained high temperature may be an indication of maintenance or increase of the vital power.*

Lardaceous disease of the liver, spleen, kidneys, or other viscera, among the chronic cases is not unfrequently associated with an average low temperature; but it does not determine this, for it is also met with among highly pyrexial cases, both in the chronic and acute varieties.†

Diarrhœa may also be attended with a tendency to great remissions; but what part it may play in their production, independently of severe exacerbations, has yet to be more fully studied. It is, however, certainly one of the most important factors conducing to exhaustion, and it also appears in many cases to be the most prominent feature in cases where large remissions are frequent or repeated. In

* Loc. cit., pp. 64, 66.

† Thus, I have observations of the temperature in 12 cases in which lardaceous disease was found; 7 of these were chronic cases, and 5 acute. Of the chronic cases the maximum temperature exceeded 103° in 5, and 102° in 2. The average temperatures (either of the morning or evening) exceeded 102° in 3 cases, 101° in 1 case, 100° in 2 cases, and 99° in 1 case. Of the 5 acute cases the maximum temperature exceeded 101° in 1 case, 103° in 3 cases, and 104° in 1 case. The average temperatures (morning or evening) exceeded 104° in 1 case, 103° in 1 case, 102° in 1 case, 101° in 1 case, and 99° in 1 case. M. Lebert remarks that lardaceous diseases has but little effect on the temperature.

some cases, however, as remarked by M. Lebert, diarrhœa and ulceration of the intestines have but little effect on the fever.

The conclusion can hardly be avoided that the larger oscillations may be in part due to the peculiar type of the fever. In this it resembles the pyæmic fever of blood infection* or of internal suppuration; and as these characteristics chiefly occur in acute cases or in the intensifications of chronic cases, some part of the phenomenon may be due to constitutional conditions, and particularly to secondary invasions of other organs.† In what respect the temperature *per se* is attributable to the tuberculization must yet be a subject for further inquiry. Dr. Ringer was disposed to regard the severity of the fever as a measure of the intensity of this process, but some cases of acute tuberculosis appear to form exceptions to this position. Very high temperatures may indeed be met with when there are few other elements of inflammation present, and acute tuberculosis certainly presents some of the highest ranges of pyrexia found, though this is occasionally equalled or nearly equalled by some of the pneumonic forms of the disease.

In the other varieties of phthisis coming under my observation, the intensity of the pyrexia has generally appeared to be largely proportioned to the extent of the intercurrent inflammation. Lebert, however, has remarked that this is not invariably the case, and that high fever may exist with little local mischief, or without breaking down of the lungs, while moderate fever may be found where the lesions are extensive and the pulmonary destruction is considerable; and I am disposed to believe with him, that these differences depend either on the constitutional‡ pecu-

* A remark for which I am indebted to my friend and colleague Dr. Burdon Sanderson. Andral, 'Clin. Med.,' iv, p. 235, pointed out the resemblance between the sweating in phthisis and that occurring in suppurative fever. He attributed the sweating to the softening of tubercles.

† These latter, however, do not always determine pyrexia.

‡ Lebert remarks that the *age* of the patients affected has little influence on the severity of the pyrexia.

liarity of individual patients, or on varieties in the pyrogenic effects of the changes in the lungs which require further elucidation.

In the main, however, the different types defined by Jochmann correspond very closely with the different varieties of the disease, though his observations do not include cases of acute tuberculosis. The slighter forms of fever (Type I, and Variety A, Type II) correspond either with the early stages of the disease, with mild exacerbations, or with very slowly progressive disorder associated with fibroid thickening or with little suppurative action; though the latter when present, as shown by not inconsiderable expectoration, does not necessarily determine high pyrexia. The other varieties are associated either with recent pneumonic invasion and considerable extension of the tuberculizing process, with or without rapidly progressing ulcerative action. But it must be again remarked, that no special type corresponds with any individual varieties in the anatomical forms of the disease.*

Perspiration cannot *per se* be held to cause remissions of the temperature; it appears in the majority of cases to be a consequence and not a cause of its fall, though judging from analogy, it may possibly mitigate the severity of the pyrexia. It is most marked, as a rule, in the strongly remitting forms, and it bears in this respect a strong analogy to what is observed in other forms of hectic fever, and particularly in purulent infection. It may, moreover, be observed when the temperature is high; and the temperature may even appear to rise while it is present.† In some

* Lebert states that "perialveolitis," "peribronchitis," and "periarteritis," show the same variations of temperature as large cavities proceeding from "broncho-alveolar" inflammation.

† Thus, in a chronic case, where the temperature was on the whole low (average morning 99° , average evening 99°), and where during sixteen days it had not exceeded 99° , and on four occasions was normal, a rigor ensued at 6.30 a.m. on the seventeenth day. Temperature, twenty minutes after the rigor, 101.2° ; fell in one hour to 100.4° , when sensation of heat was felt by patient. Two hours later sweating, during which the temperature rose to 101.4° . In the next hour it had fallen to 99° , and in the ensuing two hours

exceptional cases, also, of which I have seen an instance, the remissions may be unattended by this symptom. In some of the cases when the temperature fell from the morning to the evening, profuse sweating occurred during the day. Jochmann, however, considers that in some cases it may be critical, and may alternate with other discharges.*

Hæmoptysis, as I have more than once observed, even when the amount of this has been considerable, does not appear to exert any influence on reduction of temperature. I have known the temperature rise on its occurrence, and have also known the temperature fall before the hæmoptysis had completely ceased. In some cases, no fever follows a first attack of hæmoptysis, and very high pyrexia may be observed after a second attack.

Pleurisy complicating phthisis may be associated, but not constantly, with a rise of temperature. When it occurs in the earlier stages it may determine a distinct invasion of pyrexia. Lebert remarks that in these cases tapping is usually followed by a fall of temperature, but that if the fluid become fetid, increased pyrexia ensues, which, however, may be again diminished by antiseptic injections. The subsequent course of the fever is determined by the progress of the tuberculosis. I can confirm by my own experience the result of M. Lebert's observations on the effect of paracentesis.

Perforation of the intestines has been observed by Lebert to be followed by a fall of temperature amounting to collapse.

Phthisis occurring in the puerperal state is usually one of the most acute and fatal forms of the disease, and the temperature generally ranges high; but all the variations previously noticed may be observed. Most commonly the

to normal. It continued normal throughout the day, and on the following day had resumed its previous type.

* Loc. cit., p. 80. A case where diarrhoea supervened with the fall of temperature. On the cessation of this, profuse sweating appeared under the same conditions. Jochmann, therefore, thinks it undesirable to check critical sweating. The chief question is, however, in what sense the term "critical" is used.

remissions are great; less frequently a continuous high pyrexia is observed, or it may rise gradually. In a few cases a gradual improvement is noticed with diminution or arrest of the pulmonary disease.*

The sense of heat experienced by the patient, as observed by Jochmann, does not necessarily bear any direct relation to the temperature. Rigors, as is well known in other diseases, are almost invariably at the time of their appearance already attended by an elevation; and in other cases the extremities may be cold when the temperature of the trunk is actually febrile.

In the earlier stages even of comparatively acute attacks a high temperature is not necessarily indicative of a continuously progressive course; for the temperature in such cases often tends to fall, in accordance with what has been already stated to be observed in some of these cases, viz., that they not unfrequently pass into subacute or chronic types.

Even in patients coming under observation with recent exacerbations, time alone can in some cases determine in what the future event of such attacks may eventuate; and in a fair proportion, a speedy cessation of the fever and also of the more threatening symptoms may be reasonably looked for. Thus, out of 21 cases, presenting on the whole low temperatures, there was a nearly absolute loss of pyrexia in 5, a complete disappearance in 3; total 8. In those where the disappearance of pyrexia was not absolute there was only an occasional exacerbation to 99°. In 8 cases with high temperatures there was absolute cessation in 2, a nearly absolute in 2, total 4; or out of 29 cases not ending fatally there was an almost complete or a complete disappearance of fever in 12 or in 41·3 per cent. The reduction of temperature followed in several of the cases at very short periods after admission to hospital. In 3 cases (2 of high temperatures and 1 of low), the patient was admitted after a recent attack commencing with rigors and pains

* See Lebert, loc. cit.

in the limbs; and the temperature in these fell respectively to normal within the twelfth, fifteenth, and nineteenth days after the attack. In all these there was evidence, in addition to consolidation of the apices, of recent affections of the bases. In the whole number, the fall of temperature occurred in the majority, comparatively soon after admission; in two within less than a week, in 4 within less than two weeks, in 3 more within three weeks. In 3 only was the stay in hospital protracted to four weeks, ten weeks, and thirteen weeks respectively, before a reduction in temperature ensued. In 4 only were the patients dismissed in less than a week after the reduction; in the others a normal temperature, or one only broken by slight exacerbations not exceeding 99° , was maintained for periods varying from twelve to fifteen days prior to their discharge.

In all these cases the most noticeable improvement was in the disappearance of the râles. In 3 cases minute notes were not taken on the patient's discharge; but in 9, their complete or almost total disappearance was observed in 7, or 77·7 per cent. In 7 out of these 9, there were more or less distinct signs of cavities at one or both apices; in the others, there was consolidation with râles. In 6 also out of the 9 there was consolidation at the bases. In none was there observed any diminution of the dulness at the apices, but in 2 the dulness had left the bases, coincidentally with the fever. This was especially remarkable in one case admitted, four days after a rigor, with a temperature of $103\cdot6^{\circ}$, when after nineteen days the temperature fell to normal, and the dulness and râles at the bases disappeared.

Complete disappearance of the cough was rare, being only noticed in one case; but in 6 out of the 12 a great diminution of expectoration was observed. Two cases were admitted within a few days after attacks of hæmoptysis. In one of these, however, the pyrexia ceased eleven days after admission, while the hæmoptysis continued for five days longer.

Improvement in the digestive functions was also a marked feature. In 7 cases where there was a furred tongue, nausea or vomiting, and loss of appetite, these symptoms

had improved or disappeared in all. In one only was no improvement noted. In 4 cases where diarrhœa existed, this also ceased.

The weights were, unfortunately, not accurately taken in these cases. In one there was a gain of 4 lbs. in thirty-two days, during sixteen of which the temperature was above the normal; and the greatest gain was during the first period, being 3 out of the 4 lbs. In one case, where œdema of the vocal chords and epiglottis, hoarseness, and loss of voice existed (together with hæmoptysis) on admission, these symptoms disappeared after the application of nitrate of silver to the larynx.

The characters of the pyrexia in these cases presented great variations, and no single feature common to all. Among those with low temperatures, one, a female, already alluded to, had throughout a morning temperature higher than the evening. One other of these had a maximum temperature exceeding 103° , and another exceeding 102° but the average of these did not exceed 100° for evening or morning. The remissions and exacerbations were moderate; in one case only exceeding 3° for the former, and in two only for the latter. In one, however, in addition to that already alluded to, the morning temperatures were always higher than those of the subsequent evening, and in 40 per cent. of the observations they were higher than those of the previous evening. In 3 others the morning temperatures were frequently the highest in 21, 28, and 40 per cent. of the observations respectively, and with nearly the same frequency as compared with those of the subsequent evening.

The cases with high temperatures presented no peculiarities as a class, but the higher morning temperatures were not so frequently observed as in other cases where no reduction occurred. In all of them the maximum temperature exceeded 103° , and in one case 104° ; the average evening temperatures being in three cases above 100° , and in one 101.2° . The remissions from evening to morning were never less than 2° , and in one case 5.4° . The exacer-

bations from morning to evening were 1.4° in one case, above 2° in two cases, and 4.4° in one case.*

In all these cases, both of "low" and "high" temperatures, the treatment was practically indifferent. Small doses of quinine and iron were given in a few, and the rest of the treatment was directed to special symptoms. Gallic acid or ergot for hæmoptysis; bismuth, soda and calumba for stomach complications; opium and astringents for diarrhœa; and morphia, senega and counter-irritation for cough. Cod-liver oil was given in nearly all. The conclusion, therefore, appears to be that in a fair proportion of cases, some of which present symptoms of considerable severity, a reduction or cessation of pyrexia and improvement or arrest of active lung-changes, follows within certain periods, and in some instances within very short periods after confinement to bed and good hygienic management.

Observations on the Pulse.

The circulation is accelerated, and usually in proportion to the intensity of the disease.†

In the severer cases the pulse is rapid, whether the

* Lebert, l. c., p. 71, who has also observed this tendency to natural subsidence of the fever in some cases, records one in which a slow fall of temperature extended over nearly four months. November, morning 100° to 102° , evening 103° to 104° ; December, morning 100° , evening 102° ; January, morning nearly normal, evening 99.5° too 100.8° ; February, occasional exacerbations in the evening; March, morning normal or subnormal, evening occasionally 100° .

† See Tables 11 and 12. These and the following tables are formed from observations on the temperature, pulse, and respiration, taken night and morning. The means are only calculated when the number of observations is sufficient to afford a fair average; hence they represent a smaller number than the preceding tables. Those cases only have been taken which give the data in all these points. It must further be borne in mind that these tables are formed from severe cases of phthisis, of which a large proportion proved fatal. The data are, therefore, scarcely applicable to chronic forms, or to the intermediate periods, when but little progress is observed.

disease be in the acute or chronic form, and acceleration is almost invariably observed whenever the disease is progressing. Thus, pulses above 140, both in the morning and evening, were observed, not only in the acute and chronic forms, but also in some of the non-fatal cases, both with "high" and "low" temperatures. The acceleration is not, however, constant; and in all forms (even including cases of acute tuberculosis without cerebral complication) the pulse may be less than 100, not only occasionally, but with a frequency sufficient to reduce the mean of a series of daily observations below this rate, and it may also in fatal cases occasionally fall to less than 70 both in the morning and evening.

The slower pulses are, however, found in the greatest numbers in the non-fatal cases, and especially in those presenting "low" temperatures, where a large proportion of the mean pulses will be found below 90, 80, or even 70, and a very considerable proportion even of the quickest pulses are below 100. In all the other forms, however, pulses exceeding 100 are almost invariably observed during the progress of the case.

Dr. Edward Smith, in a valuable paper on the rate of respiration and pulsation in phthisis,* found that the rate of the latter fell after 9 p.m. and rose in the morning. Comparing, however, the morning and evening observations (Table 12), it will be seen that, of the quickest pulses, above 100, above 120, and above 140, a large proportion is met with in the evening; while of the slowest pulses, in the means above 100, a similar excess obtains for the evening. The difference, however, varies in each class of cases, and in a certain proportion equality prevails between the maxima and minima, and also between the means of the morning and evening pulses.

* 'Med.-Chir. Trans.,' vol. xxxix. Dr. Smith found the pulse to fall after 9 p.m., and to rise after 5 a.m. The observations here analysed were made from 9 to 11 a.m., and from 8 to 10 p.m. Dr. Smith's cases were observed throughout the twenty-four hours. These only refer to the clinical experience of morning and evening visits.

The relation between the morning and evening pulses is shown in the annexed table, where it is seen that of the quickest pulses observed, the larger number occur in the morning, which so far confirms Dr. E. Smith's observation. In the slowest and mean pulses, however, the reverse obtains.

	Quickest pulses. 54 cases.	Slowest pulses. 54 cases.	Mean pulses. 46 cases.
Evening pulse quicker than morning.....	20 cases	33 cases	28 cases
Evening pulse slower than morning.....	22 cases	14 cases	12 cases
Evening pulse equal to morning	12 cases	7 cases	6 cases

The discrepancy between this table and the columns relating to the quickest pulses in Table 12 is explained by the fact that the percentage of the morning pulses is calculated on 74 cases, and that of the evening on 54.

Observations on Respiration.

The respiration is also accelerated, generally, also, in proportion to the intensity of the disease; but even in the non-fatal cases a considerable number present a mean both of morning and evening respirations above 30 to the minute (see Tables 14 and 15).*

It will be seen (Table 15) that there is an excess of the

* The means thus found are higher than those given by Dr. E. Smith (l. c.). These means are those of all the respirations in each case, for morning and evening. An absolute table of the quickest and slowest respirations observed has not been constructed. The tables given are of respirations corresponding to the quickest and slowest pulses; but, though not always corresponding, they present a close approximative estimate of the characters of the respirations.

means of respirations above 30 in the evening, as compared with the morning, in the proportion of 65·2 to 56·7 per cent.; and also that there is a slight excess in the evening above 20.

	Resp. accompanying quickest pulse.		Resp. accompanying slowest pulse.		Mean respiration.	
	M. Per cent. of cases.	E. Per cent. of cases.	M. Per cent. of cases.	E. Per cent. of cases.	M. Per cent. of cases.	E. Per cent. of cases.
Respiration above 20	98·6	100	93·2	96·2	95·9	97·8

When, however, the respirations in the morning and evening are compared in individual cases, it will be seen that in a fair proportion they are equal in frequency, and that those where the evening is in excess are below half of the whole number.

	Respiration of quickest pulse. 54 cases.	Respiration of slowest pulse. 54 cases.	Mean respiration. 46 cases.
Evening respiration quicker than morning	25 cases	24 cases	20 cases
Evening respiration slower than morning	23 cases	17 cases	20 cases
Evening respiration equal to morning	6 cases	13 cases	6 cases

On the Pulse and Respiration in relation to the Temperature.

When the pulse and respiration are regarded in relation to the temperature of the body and to each other, the

following facts appear to result from a further analysis of these tables :

(a) *Relation of pulse to temperature.*

There is no necessary relation between the pulse and temperature; a very rapid pulse may be attended with a low temperature both in the morning and evening, as—

Morning pulse, 140.	Temperature, 97°	} 2 cases.
" " 120—130.	" 99°—100°	
Evening pulse, 130.	" 95°—96°.	

And, even of the mean pulses, these may exceed 130 during five days before death with a mean temperature of 100°.*

A high temperature may also be associated with a comparatively slow pulse, and even in acute tuberculosis the same disproportion between the pulse and temperature may be occasionally observed, particularly when those of the morning and evening are contrasted.†

Very different temperatures may even in the same case be also associated on different occasions with a pulse of identical frequency. In one case temperatures in the morning of 104° and 100·2° were respectively found on different days with a pulse of 108.‡

Although, therefore, no constant ratio can be established between the pulse and the temperature, yet cases distinguished by rapidity of pulse are most commonly those where the temperature is the highest, and, conversely, uniformly low pulses are generally those where low temperatures prevail. Thus (see Tables 11 and 13), of the

* A chronic case, dying five days after admission to the hospital.

† CASE.	{	Quickest pulse, morning = 128.	Temperature 100·8°.
	{	" evening = 120.	" 102·8°.
	{	Slowest pulse, morning = 82.	" 101·4°.
	{	" evening = 78.	" 105·2°.
	{	Mean pulse, morning = 94.	" 101·5°.
	{	" evening = 100.	" 102·8°.

‡ Jochman, l. c., observed that a pulse of the same frequency might exist with the high temperatures of mid-day and evening as with the lower temperatures of the morning.

cases where the quickest pulse did not exceed 90, all but one are in the class of "low" temperatures. This association, however, is more marked in the morning than in the evening. Thus, of nine cases where the quickest pulse in the morning did not exceed 100, in two only was the morning temperature higher than 100° , but of six similar cases in the evening, in two only was the temperature below 100° .

Even the slowest pulses observed in individual cases have a tendency to be associated with lower temperatures, and in the mean pulses the same relation may be observed. Thus—

Slowest morning pulse below 100=57 cases. Temperature below 100° in 41 cases, or 71·9 per cent.

Slowest evening pulse below 100=34 cases. Temperature below 100° in 19 cases, or 55·8 per cent.

Slowest morning pulse below 80=22 cases. Temperature below 100° in 18 cases, or 81·8 per cent.

Slowest evening pulse below 80=13 cases. Temperature below 100° in 9 cases, or 69·2 per cent.

Mean morning pulse below 100=32 cases. Temperature below 100° in 24 cases, or 75 per cent.

Mean evening pulse below 100=16 cases. Temperature below 100° in 8 cases, or 50 per cent.

Mean morning pulse below 80=8 cases. Temperature below 100° in 8 cases, or 100 per cent.

Mean evening pulse below 80=4 cases. Temperature below 100° in 4 cases, or 100 per cent.

(The absolute numbers of morning and evening pulses, as here stated, bear no relation to one another, since the evening pulses are deduced from a smaller number of cases.)

That the acceleration of the pulse is not, however, in *direct* relation to the increase of temperature is seen also when the evening temperatures and evening pulses are compared with those of the morning. Increase of temperature is observed in the evening in a larger proportion of cases than increase of the pulse.

Thus, in 54 cases of the quickest and slowest pulses, and in 46 cases of the mean pulses, the following relation was observed :—

	Quickest pulse. Per cent. of cases.	Slowest pulse. Per cent. of cases.	Mean pulse compared with mean temp. Per cent. of cases.
Evening temperature, highest ...	74	75.9	76.0
Evening pulse, quickest.....	37	61.1	60.8

When, however, the evening pulse was slower than the morning, the evening temperature was higher in 59 per cent. of such cases among the quickest pulses, in 64 per cent. among the slowest pulses, and in 58 per cent. among the mean pulses (in the latter the comparison is between the means of the morning and evening temperatures). (See also p. 435 and Table 22, Appendix.)

(b) *The relation of the respiration to the temperature* appears, as far as these cases show, in respect of given rates of frequency as compared with degrees of heat, to be almost indifferent, except that in the evenings when a low temperature (*i. e.*, below 100°) is found, there is a rather larger proportion of cases of moderately slow respiration; and the most rapid breathing in the evening is associated with temperatures above 100° . In the morning, however, these relations are exceedingly irregular.* It may, however, nevertheless be occasionally observed in individual cases that there is a very close correspondence between the rises and falls of temperature and increase and diminution in the frequency of the respiration.†

(c) *The relation of the respiration to the pulse* is more definite than it is to the temperature, though here also great variations may be observed. Quick breathing

* This statement is founded on an analysis of Table 16. As the results are almost negative, it appears unnecessary to give the details, especially as they involve complex figures. The highest observed morning temperatures, 104° to 105° (2 cases), were attended by slow respiration (20 and 25). The highest evening temperatures were attended by rapid breathing (3 cases, respiration in all above 30).

† An observation which I owe to one of my pupils, Mr. Thomas D. Parry.

may be associated with a slow pulse, *e. g.* R. 77, P. 72, and, what is more common, slow breathing with a rapid pulse, R. 25, P. 150; R. 20, P. 130 and 110.

The following illustrations of individual cases may exhibit some of the chief of such variations :*

	Quickest pulse.	Respira- tion.	Slowest pulse.	Respira- tion.	Mean pulse.	Mean respira- tion.
I. Case chronic phthisis ...M.	116	72	72	78	87	72†
E.	124	80	76	96	94	67‡
II. Case acute phthisis.....M.	146	60	100	48	120	48
E.	148	96	—	—	—	—
III. Case acute phthisisM.	120	48	84	40	104	42
E.	124	60	100	60	110	50
IV. Case acute phthisisM.	154	76	64	30	106	38
E.	154	48	84	28	106	38
V. Case "low temperatures" M.	92	32	68	44	78	42
E.	—	—	—	—	—	—
VI. Case acute tuberculosis, M.	136	28	88	32	112	33
E.	152	36	96	32	125	34
VII. Case "high tempera- { M.	132	20	80	28	97	26
tures." { E.	104	28	80	20	92	24
VIII. Case chronic phthisis ...M.	136	26	90	16	120	25
E.	—	—	—	—	—	—

In the case of the most rapid pulses the rise of the pulse in the evening is greater in the majority than that of the respiration,§ and this is also to some, but to a less degree, observed in the slowest pulses. It is, however,

* Of these all but No. 5 are females; Nos. 1 and 2 sisters.

† Mean of 27 obs.

‡ Mean of 14 obs.; a girl not hysterical.

§ Quickest pulses (Table 17), respiration from 25 to 40; morning pulse above 100 in 17 out of 33 cases, evening pulse above 100 in 21 out of 26 cases. Respiration from 20 to 25; morning pulse above 100 in 8 out of 12 cases, above 120 in 3 out of 12 cases; evening pulse above 100 in 3 out of 6 cases, and above 120 in 2 out of 6 cases.

scarcely apparent when the means are taken. When in the slowest pulses the pulse remains rapid, the respiration usually does so also,* but the pulse may be slow, both in the morning and evening, while the respiration continues rapid.† The slower pulses are, however, usually associated with some retardation of the respiration, both in the morning and evening, but not usually in the same degree.‡

The pulse-respiration ratio (see Tables 18 and 19) in the majority of cases is found between respiration 1, pulse 3 to 4, both in the quickest pulses and in the means of the pulse to the respiration, but when the pulse is retarded both in the morning and evening the largest proportion is found between resp. 1, pulse 2 to 3. The ratio, when the breathing is rapid, may, however, be absolutely reversed, as pulse 72, resp. 78; pulse 76, resp. 96.§

* Slowest pulses (Table 17).—Morning, pulse above 120 (7 cases), all the respirations are above 35, and all but one above 40, but evening pulse above 120 (19 cases); in five the respirations are above 40, in three 30 to 35, and in one 20 to 25.

† Slowest pulses (Table 17).—Respiration above 40. Morning (19 cases), in 11 only is the pulse above 100 = 57·3 per cent.; evening (14 cases), in 9 = 64·2 per cent. is the pulse above 100.

‡ Thus, slowest pulses (Table 17):

Respiration below 35 morning, 44 cases, pulse above 90 in only 7 = 15·9 p. c.	
„ evening, 35 cases, „ 13 = 37·1 „	
Respiration below 30 morning, 33 cases „ 4 = 12·1 „	
„ evening, 26 cases „ 7 = 26·9 „	
Respiration below 25 morning, 25 cases „ 2 = 8 „	
„ evening, 16 cases „ 2 = 12·5 „	

The means of the pulses and respirations give higher proportions of rapid pulses in relation to the lower rates of respiration. Respirations above 35—morning pulse above 100 in 90 per cent., evening pulse above 100 in 81·8 per cent.; morning pulse above 90 in 93·3 per cent., evening pulse above 90 in 95·4 per cent. Respirations below 35—morning pulse above 90 in 43·1 per cent., evening pulse ditto in 62·5 per cent. Respirations below 30—morning pulse above 90 in 59·3 per cent., evening pulse ditto in 43·7 per cent. Respirations below 25—morning pulse above 90 in 42·8 per cent., evening pulse ditto in 22·2 per cent.

§ Dr. Edward Smith, l. c., p. 189, found that the pulse-respiration ratios were on the average not lower than 1 :: 4, nor so high as 1 :: 2·3. The highest varied from 1 :: 1·4 to 1 :: 2·3. The case presenting the lowest varied from 1 :: 2·8 to 1 :: 5·8. It was raised before a meal, and lowered

A very rapid pulse may also increase the ratio of the pulse to the respirations by more than 6 to 1, but this may also exist to a considerable degree when, without a very rapid pulse, the respiration is disproportionately retarded, and may even be observed in acute tuberculosis.* Such variations of perversion, in either direction, are, however, comparatively speaking, uncommon. (See Table 20.)

The pulse-respiration ratio is, on the whole, very little influenced by the temperature (see Table 21), though a ratio of the pulse to the respiration of less than 2 to 1 is most common in the "low temperatures," inasmuch as the pulse is more influenced by the temperature than the breathing, and a slow pulse and rapid breathing may thus coexist with a low temperature; yet with a high temperature the respiration may rise out of proportion to the pulse.† Ratios of less than 3 to 1 are, among the quickest pulses, most common when the temperature is below 100°, but the same is not observed when the pulse is slow, nor even in the mean pulses, since in the latter a larger percentage both for morning and evening are found above than below a temperature of 100°. When both the pulse and respiration are slow the temperature is usually normal or nearly so, but both a quick pulse and rapid breathing may be simultaneously associated with a low temperature;‡ and, after a meal, and was highest during sleep at night. Dr. Smith, l. c., p. 192, has, however, observed the very low rates of 1 :: 7 and 1 :: 8 in the earlier stages of phthisis, chiefly in persons of unusual stature.

* Acute tuberculosis, 1 case, slowest pulse, morning 82, respiration 14. Chronic phthisis, 1 case, slowest pulse, morning 90, resp. 16. "Low temperatures," 1 case, quickest pulse, morning 96, resp. 20.

† A case of chronic phthisis (see *antè*, Case 1, Table, p. 440), morning temp. 103·4°, pulse 116, resp. 72. Evening temp. 102·4°, pulse 124, resp. 80, quickest pulse. Also in a case of acute phthisis evening temp. 103°, pulse 148, resp. 96. Among the slowest pulses will be observed also three instances in the morning, where, with a temperature between 100° and 101°, the ratio of the pulse to the respiration was less than 2 to 1, and a similar case in the evening with a temperature between 101° and 102°. Of the former, one was in a case of acute tuberculosis, temp. 100·4°, pulse 120, resp. 68; and two in chronic phthisis, one temp. 100·5°, pulse 76, resp. 43; another, temp. 100·8°, pulse 68, resp. 36.

‡ Chronic phthisis, temp. 99°, pulse 132, resp. 44.

on the other hand, pyrexia may exist with but little acceleration of either, or the temperature may be high and the pulse rapid, while the respiration may be but little accelerated.*

In individual cases also great variations may be noticed on different days in the relations of the pulse and respiration to the temperature, whether the exacerbations of the latter occur in the morning or in the evening, and this is true of all forms of phthisis, being observed in both the acute and chronic types, and also in acute tuberculosis. Evening exacerbations may be attended by a positive diminution in the rapidity of the pulse and breathing, or either of these may be accelerated while the other is retarded, or remains at the same standard as in the morning. In some cases also the pulse falls in the morning more than the temperature, but more in proportion to the temperature than is observed in the respiration; but even when this appears to be the rule, there may be a considerable fall in the evening rate of respiration, while the pulse remains nearly the same and the temperature rises. When exacerbations of temperature occur from evening to morning the pulse and respiration may, nevertheless, fall in frequency, but to a less degree than is most usual where remissions occur; or, under these circumstances, the respiration may be accelerated while the pulse is retarded.

When the temperature falls from morning to evening there is less fall of the pulse and respiration; but here also nearly all possible variations may be observed in their relations of acceleration and retardation. In one case the occurrence of pneumothorax produced marked acceleration of the pulse, but had very little effect on the rate of respiration.

The comparatively definite relation of the pulse to the temperature is in accordance with what is observed in most febrile diseases; but the absence of correspondence between

* Chronic phthisis.—Morning, quickest pulse 120, temp. 104.2°, resp. 28. Evening, pulse 120, temp. 103.3°, resp. 32. Slowest pulse, morning, 88, temp. 100°, resp. 20. Mean morning pulse 100, temp. 101°, resp. 26. Mean evening pulse 98, temp. 102°, resp. 26.

the degree of pyrexia and the respiration is remarkable.* The rate of respiration is, indeed, chiefly influenced by the mal-aeration of the blood; and this, especially in chronic cases, may be slowly produced by the gradual progress of the disease, the foci of which in an active state may be too limited to excite intense febrile action. Slower rates of respiration may possibly be induced by gradual impoverishment of the blood and wasting of tissues, but I have not observed that they were specially common in cases marked by extreme anæmia or by great emaciation. A rapid pulse with a low temperature is an unfavorable sign, as indicating exhaustion; and the same is probably true of acceleration of the respiration under similar circumstances, as it is sometimes observed out of proportion to the rate of the pulse on the approach of death. Marked perversions of the pulse-respiration ratios in either direction have also an unfavorable significance; but in comparing the two forms in the fatal and non-fatal cases it will be seen that a rapid pulse with comparatively slow breathing is more common in the former than the latter, while high ratios of the respiration to the pulse are most common in the latter (see Table 19, Means). The greater prevalence of the last named under these circumstances is probably due to the patients so affected being for the most part admitted to hospital with recent acute affections, which tend to increase the rapidity of respiration in proportion to the pulse. Rapid pulses with slow breathing have never been found by Dr. E. Smith in the early stages of phthisis.

* Traube, 'Symptomen,' &c., p. 49, classifies as the causes of rapid breathing:

(a) Maloxygenation; (b) irritation of the fibres of the vagus in the lung; (c) elevation of the temperature of the blood; (d) pain. He adduces the observations of Sklarek to show that narrowing of the air-passages may retard the rate of respiration.

APPENDIX.

TABLE 1.—*Showing the average frequency with which, during 24 hours, the temperatures indicated were reached, but not exceeded, in all the observations in each class of phthisis.*

Class of cases.	No. of cases.	Average No. of observations in each case.	Subnormal temperatures.	98° to 99°.	99° to 100°.	100° to 101°.	101° to 102°.	102° to 103°.	103° to 104°.	104° to 105°.	105° to 106°.	106° to 107°.
Acute tuberculosis.....	VIII	15	...	1.3	1.7	7.4	25.4	22.8	27.5	9.9	2.2	...
Acute phthisis	XXV	24	0.9	2.7	11.4	16.9	25.3	23.6	14.5	3.6	...	0.1*
High temperatures. No deaths	VIII	23.7	1.1	5.1	11.3	25.4	18.4	17.9	16.	3.6	...	...
Chronic phthisis	XVIII	26.7	5.8	7.5	15.9	21.6	22.2	16.6	8.3	0.3	0.2	...
Low temperatures. No deaths	XXI	18.7	...	30.1	43	16.8	7.6	1.4	0.8	...	...	...

* One observation 106.7 in 38 days.

TABLE 2.—Showing the total number of cases in each class of phthisis, in which—(a) Normal and sub-normal temperatures were observed during 24 hours. (b) The cases in which the temperatures indicated were reached,* but not exceeded.

Class of cases.	No. of cases.	Fell to subnormal.	Fell to (98° to 99°) normal.	Not exceeding 100°.	Not exceeding 101°.	Not exceeding 102°.	Not exceeding 103°.	Not exceeding 104°.	Not exceeding 105°.	Not exceeding 106°.	Not exceeding 107°.
Acute tuberculosis.....	8 {	...	1 12.5	...	...	2 25	1 12.5	3 37.5	2 25.1	...	...
Acute phthisis.....	25 {	6 24	8 32	...	...	3 12	4 16	9 36	8 32	...	1 4
High temperatures. No deaths	8 {	1 12.5	2 25	...	...	...	...	5 62.5	3 37.5	...	...
Chronic phthisis.....	18 {	3 16.6	6 33.3	...	1 5.5	2 11.1	4 22.2	9 50	1 5.5	1 5.5	...
Low temperatures. No deaths	21 {	...	20 95.4	3 14.2	5 23.8	9 42.8	2 9.5	2 9.5	...	...	...

* By "reached" is meant that the temperature was higher than the degree lower. *E.g.* "Not exceeding 101°" means that the temperature exceeded 100° but did not exceed 101°. The second lines of figures indicate the percentage of such cases.

TABLE 3.—*Showing the number of cases in which, in 75 cases of different classes of phthisis, normal and subnormal temperatures were attained, and also the percentage of observations in which these were observed in each case.*

	No. of cases.	Less than 5 per cent. of obser- vations.	5 to 10 per cent. of obser- vations.	10 to 20 per cent. of obser- vations.	20 to 30 per cent. of obser- vations.
ACUTE TUBERCULOSIS	VIII	...	...	...	...
E. Pyrexia. M. Normal	2	1	1	...	...
E. Pyrexia. M. Subnormal...	...	...	...	...	...
E. Normal. M. Subnormal...	...	...	...	...	...
M. Pyrexia. E. Normal	...	...	...	...	...
M. Pyrexia. E. Subnormal...	...	...	...	...	...
M. Normal. E. Subnormal...	...	...	...	...	...
M. and E. Subnormal	...	...	...	...	...
ACUTE PHTHISIS	XXIV	...	...	...	...
E. Pyrexia. M. Normal	13	6	6	...	1
E. Pyrexia. M. Subnormal...	6	5	1	...	...
E. Normal. M. Subnormal...	2	1	1	...	...
M. Pyrexia. E. Normal	7	6	...	1	...
M. Pyrexia. E. Subnormal...	3	3	...	...	...
M. Normal. E. Subnormal...	1	1	...	...	...
M. and E. Subnormal	5	5	...	...	...
HIGH TEMPERATURES	VIII	...	...	...	...
E. Pyrexia. M. Normal	7	4	3	...	...
E. Pyrexia. M. Subnormal...	1	1	...	...	...
E. Normal. M. Subnormal...	2	2	...	...	...
M. Pyrexia. E. Normal	3	3	...	...	...
M. Pyrexia. E. Subnormal...	...	...	...	...	...
M. Normal. E. Subnormal...	...	...	...	...	...
M. and E. Subnormal	1	1	...	...	...
CHRONIC PHTHISIS	XV	...	...	...	...
E. Pyrexia. M. Normal	8	5	2	...	1
E. Pyrexia. M. Subnormal...	6	6	...	...	...
E. Normal. M. Subnormal...	1	...	1	...	...
M. Pyrexia. E. Normal	3	3	...	...	...
M. Pyrexia. E. Subnormal...	1	1	...	...	...
M. Normal. E. Subnormal...	1	1	...	...	...
M. and E. Subnormal	2	2	...	...	...
LOW TEMPERATURES	XX	...	...	...	...
E. Pyrexia. M. Normal	8	5	1	2	...
E. Pyrexia. M. Subnormal...	3	3	...	...	...
E. Normal. M. Subnormal...	1	1	...	...	...
M. Pyrexia. E. Normal	6	3	1	2	...
M. Pyrexia. E. Subnormal...	1	1	...	...	...
M. Normal. E. Subnormal...	2	2	...	...	...
M. and E. Subnormal	...	...	...	...	...

TABLE 4.—*Showing the frequency per cent. of the maximum and average morning and evening temperatures in the whole number of observations in each class of cases of phthisis.*

Class of cases.	Maximum morning temperature.						Maximum evening temperature.						Average morning temperature.						Average evening temperature.					
	98° to 99°.	99° to 100°.	100° to 101°.	101° to 102°.	102° to 103°.	103° to 104°.	98° to 99°.	99° to 100°.	100° to 101°.	101° to 102°.	102° to 103°.	103° to 104°.	98° to 99°.	99° to 100°.	100° to 101°.	101° to 102°.	102° to 103°.	103° to 104°.	98° to 99°.	99° to 100°.	100° to 101°.	101° to 102°.	102° to 103°.	103° to 104°.
Acute tuberculosis. Deaths. 8 cases.....	...	...	...	50	...	25	25	25	25	25	25	25	...	...	...	...	...	...	...	...	...	...	...	...
Acute phthisis. Deaths. 25 cases	...	...	16	12	20	36	16	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
High temperatures. No deaths. 8 cases.....	...	...	...	25	50	12·5	12·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Chronic phthisis. Deaths. 18 cases	5·5	...	5·5	16·6	22·2	50	...	...	5·5	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Low temperatures. No deaths. 31 cases	...	33·8	38	23·8	9·5	4·7	4·7	28·5	19	14·2	4·7	...	...	...	...	...	...	...	...	...	...	...	...	...

* One observation.

TABLE 5.—*Showing the number of cases in each class of phthisis in which the average of the whole number of morning and evening observations in each case did not exceed the temperatures indicated.*

Class of cases.	Average morning temperatures.						Average evening temperatures.					
	No. of cases.	Not exceeding 99°.	Not exceeding 100°.	Not exceeding 101°.	Not exceeding 102°.	Not exceeding 108°.	Not exceeding 99°.	Not exceeding 100°.	Not exceeding 101°.	Not exceeding 102°.	Not exceeding 103°.	Not exceeding 104°.
Acute tuberculo- sis	8 {	...	1 12.5	3 37.5	3 37.5	1 12.5	...	...	1 12.5	1 12.5	4 50	2 25
Acute phthisis...	25 {	3 12	4 16	1 28	5 20	6 24	...	2 8	8 32	9 36	4 16	2 8
High tempera- tures not end- ing fatally ...	8 {	...	5 62.5	1 12.5	2 25	...	...	1 12.5	5 62.5	8 37.5	...	...
Chronic phthisis	18 {	5 27.7	3 16.6	6 33.3	4 22.2	...	2 11.1	3 16.6	4 22.2	7 38.8	2 11.1	...
Low tempera- tures not end- ing fatally ...	21 {	11 52.3	10 47.6	...	...	...	6 28.5	12 57.1	3 14.2	...	...	...

TABLE 6.—*Showing the number of cases within pyrexial limits, in which the morning temperature, in each class of phthisis, exceeded that of the preceding or of the subsequent evening, and also the proportion in which this occurred to the whole number of observations in each case.*

Note.—The numbers in this table do not precisely correspond to those of the preceding tables, as in some of the former the excess of the morning over the evening occurred within the normal limits of temperature. One case is also omitted in the class of acute tuberculosis, as the number of observations was too small to allow of a safe estimate of the percentage.

Class of cases.	Total numbers with morning excess.	Proportion of cases in which morning temperature exceeded that of the preceding or of the subsequent evening.							
		1 to 10 per cent. of observations.	10 to 20 per cent. of observations.	20 to 30 per cent. of observations.	30 to 40 per cent. of observations.	40 to 50 per cent. of observations.	50 to 60 per cent. of observations.	60 to 70 per cent. of observations.	70 to 80 per cent. of observations.
ACUTE TUBERCULOSIS. 7 cases.*									
M. higher than previous E.....	V	2	...	1	2	...	...	...	...
M. higher than subsequent E...	V	1	2	...	1	1	...	...	...
ACUTE PHTHISIS. 24 cases.									
M. higher than previous E.....	XXI	2	5	6	4	3	...	...	1
M. higher than subsequent E...	XXI	3	4	5	3	5	1	...	...
HIGH TEMPERATURES. 7 cases.									
M. higher than previous E.....	VII	3	2	...	...	1	...	...	1
M. higher than subsequent E...	VII	2	3	...	...	...	1	...	1
CHRONIC PHTHISIS. 15 cases.									
M. higher than previous E.....	XV	2	2	2	5	2	1	...	...
M. higher than subsequent E...	XV	2	2	4	4	1	1	1	...
LOW TEMPERATURES. 20 cases.									
M. higher than previous E.....	XVIII	4	5	4	3	...	1	1	...
M. higher than subsequent E...	XVII	4	3	5	2	1	1	...	1

Note.—In further explanation of this table it may be stated that remissions from morning to evening and exacerbations from morning to evening were each respectively sometimes limited to a single observation in individual cases. This was observed of the remissions in question in 2 cases of acute tuberculosis, in 5 cases of acute phthisis, in 2 cases of chronic phthisis, in 3 cases of "high temperatures," and in 4 cases of "low temperatures." Exacerbations from evening to morning were similarly confined to a single observation in 2 cases of acute tuberculosis, in 2 cases of acute phthisis, in 2 cases of chronic phthisis, in 3 cases of "high temperatures," and in 4 cases of "low temperatures," and these cases corresponded in all but 4 instances.

* One case omitted, as the number of observations was too small to afford fair percentages in proportion to the remainder.

TABLE 7.—*Showing the number of cases in each class of phthisis in which the maxima and minima, and also the averages for each case of all the remissions and exacerbations respectively indicated, were observed.*

Note.—The averages are formed by adding together, first, all the exacerbations and all the remissions in each case, and dividing the result by the number of observations in each.

Class of cases.	Number of cases.	Averages of remissions and exacerbations. Number of cases of each average.						Maxima of remissions and exacerbations. Number of cases of each.								Minima of remissions and exacerbations. Number of cases of each.												
		4° to 5°.	3° to 4°.	2° to 3°.	1° to 2°.	1° to 0.5°.	0.5° to 0.	8°	7° to 8°.	6° to 7°.	5° to 6°.	4° to 5°.	3° to 4°.	2° to 3°.	1° to 2°.	1° to 0.5°.	0.5° to 0.	3°	2° to 3°.	1° to 2°.	0.8° to 1°.	0.6° to 0.7°.	0.5°	0.4°	0.3°	0.2°	0.1°	
		...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
ACUTE TUBERCULOSIS ...		VIII																										
Remissions E. to M....	8	...	1	6	...	...	...	...	...	...	1	2	3	2	...	...	...	...	...	1	...	2	...	...	2	...	3	...
Remissions M. to E....	5 ¹	...	...	2	3	...	...	...	...	...	...	...	...	1	3	1	...	...	...	...	1	...	2	...	...	2	...	...
Exacerbations M. to E....	8	...	1	5	1	...	...	...	...	...	...	2	4	1	3	1	...	...	...	...	1	...	1	...	1	...	4	1
Exacerbations E. to M....	6 ²	...	...	2	2	2	...	...	...	...	...	...	1	...	3	1	1	...	...	...	1	1	...	...	1	2	1	...
ACUTE PHTHISIS		XXIV																										
Remissions E. to M....	24	...	1	5	13	3	2	1	...	1	1	5	6	4	4	2	...	...	...	...	4	...	3	...	4	...	9	4
Remissions M. to E....	22 ³	...	...	2	6	7	7	...	...	...	...	...	3	4	4	6	5	...	...	...	...	...	...	...	7	...	12	2
Exacerbations M. to E....	24	...	1	2	7	3	2	1	...	2	2	3	4	6	5	...	1	...	...	2	1	2	...	5	...	11	2	
Exacerbations E. to M....	21 ⁴	...	...	2	8	6	5	...	...	...	...	4	2	5	8	1	1	...	...	...	...	...	5	...	3	...	9	4

HIGH TEMPERATURES (no deaths).....		VIII														
Remissions E. to M....	8	...	2	5	1	...	...	...	...	...	...	...	...	...	1	...
Remissions M. to E....	8	...	1	3	3	1	...	...	...	...	...	...	...	...	...	...
Exacerbations M. to E....	8	...	...	3	1	...	...	...	...	...	...	...	...	...	...	...
Exacerbations E. to M....	8	...	...	1	2	3	...	...	...	...	...	...	...	...	...	...
CHRONIC PHTHISIS		XV														
Remissions E. to M....	15	1	...	2	11	1	...	...	...	1	1	4	2	7	...	...
Remissions M. to E....	15	...	...	5	7	3	...	...	...	...	...	1	2	2	...	...
Exacerbations M. to E....	15	...	...	1	11	3	...	...	...	1	...	1	2	8	...	...
Exacerbations E. to M....	15	...	...	...	9	3	3	...	...	...	...	...	1	3	...	...
LOW TEMPERATURES (no deaths)		XX														
Remissions E. to M....	19 ^s	...	...	7	7	5	...	...	...	...	...	1	...	4	5	6
Remissions M. to E....	19 ⁶	...	...	1	4	8	6	...	...	...	...	...	...	1	7	5
Exacerbations M. to E....	19 ⁷	...	...	1	4	9	5	...	...	...	...	...	...	3	9	2
Exacerbations E. to M....	18 ^s	...	...	...	3	10	5	...	...	...	...	...	...	2	5	3

1 3 cases, no remissions M. to E. = 37·5 per cent.

2 2 cases, no exacerbations E. to M = 25 per cent.

3 2 cases, or 8·3 per cent., no remissions M. to E.

4 3 cases, or 12·5 per cent., no exacerbations E. to M.

5 1 case, or 5 per cent., no remissions E. to M.

6 1 case, or 5 per cent., no remissions M. to E.

7 1 case, or 5 per cent., no exacerbations M. to E.

8 2 cases, or 10 per cent., no exacerbations E. to M.

TABLE 8.—Showing the percentage of cases in which each of the minima of the remissions and exacerbations indi-

Class of cases.	No. of cases.	Percentage of cases in which each of the AVERAGES of remissions and exacerbations indicated were observed.						Percentage of cases in sions and exacerbations			
		4° to 5°.	3° to 4°.	2° to 3°.	1° to 2°.	0° to 1°.	0° to 0°.	6° to 7°.	5° to 6°.	4° to 5°.	3° to 4°.
ACUTE TUBERCULOSIS ...	VIII										
Remissions E. to M. ...	8	...	12·5	12·5	75	...	...	...	12·5	25	37·5
Remissions M. to E. ...	5 ¹	...	...	...	40	60	16·6	...	...	...	...
Exacerbations M. to E.	8	...	12·5	12·5	62·5	12·5	...	...	...	25	50
Exacerbations E. to M.	6 ²	...	...	...	33·3	33·3	33·3	...	...	...	16·6
ACUTE PHTHISIS	XXIV										
Remissions E. to M. ...	24	...	4·1	20·8	54·1	12·5	8·3	8·3 ³	4·1	20·8	25
Remissions M. to E. ...	22 ⁴	...	...	9	27·2	31·8	31·8	...	...	13·6	18·1
Exacerbations M. to E.	24	...	4·1	8·3	66·6	12·5	8·3	12·5 ⁵	8·3	12·5	16·6
Exacerbations E. to M.	21 ⁶	...	...	9·5	38	28·5	23·8	...	...	19	9·5
HIGH TEMPERATURES (no deaths)	VIII										
Remissions E. to M. ...	8	...	...	25	62·5	12·5	...	...	12·5	25	37·5
Remissions M. to E. ...	8	...	12·5	...	37·5	37·5	12·5	...	...	...	25
Exacerbations M. to E.	8	...	...	37·5	50	0·5	...	...	...	50	25
Exacerbations E. to M.	8	...	...	12·5	25	37·5	25	...	...	...	25
CHRONIC PHTHISIS	XV										
Remissions E. to M. ...	15	6·6	...	13·3	66·6	13·3	...	6·6	6·6	26·5	13·3
Remissions M. to E. ...	15	...	...	...	33	46·2	20	...	...	6·6	13·3
Exacerbations M. to E.	15	...	6·6	72·6	20	...	...	6·6	...	6·6	13·3
Exacerbations E. to M.	15	...	...	...	39·6	39·6	19·8	...	...	...	6·6
LOW TEMPERATURES (no deaths)	XX										
Remissions E. to M. ...	19 ⁸	...	...	...	36·8	36·8	26·3	...	5·2	...	20·8
Remissions M. to E. ...	16 ⁹	...	...	5·2	20·8	42·1	31·2	...	...	...	5·2
Exacerbations M. to E.	19 ¹⁰	...	...	5·2	21·2	47·8	26·5	...	...	5·2	15·6
Exacerbations E. to M.	18 ¹¹	...	...	...	16·8	55·5	27·5	...	...	...	11

¹ 3 cases = 37·5 per cent., no remissions M to E.² 2 cases = 25 per cent., no exacerbations E. to M.³ 1 case, a single remission of 8·8°.⁴ 2 cases = 8·3 per cent., no remissions M. to E.⁵ 1 case, a single exacerbation of 8·4°.⁶ 3 cases, 12·5 per cent., no exacerbations E. to M.

averages of the remissions and exacerbations and the maxima and cated were observed. (Companion to Table 7.)

which the MAXIMA of remis- indicated were observed.				Percentage of cases in which the MINIMA of remissions and exacerbations were observed.									
2° to 3°.	1° to 2°.	0.5° to 1°.	0° to 0.5°.	3°.	2° to 3°.	1° to 2°.	0.5° to 1°.	0.5° to 0.7°.	0.5°.	0.4°.	0.3°.	0.2°.	0.1°.
25	...	...	...	...	12.5	25	...	...	...	25	...	37.5	...
20	60	20	...	...	...	20	...	40	...	...	...	40	...
12.5	12.5	...	...	...	...	12.5	...	12.5	...	12.5	...	50	12.5
...	50	16.6	16.6	...	...	...	16.6	16.6	...	...	16.6	33.3	16.6
16.6	16.6	8.2	...	...	...	16.6	...	12.5	...	16.6	...	37.5	16.6
18.1	27.2	22.7	...	...	4.5	...	...	...	...	3.1	...	54.5	9
25	20.8	...	4.1	...	...	8.3	4.1	8.3	4.1	20.8	...	45.8	8.3
23.8	38	4.5	4.7	...	...	...	...	23.8	...	14.2	...	42.7	19
25	...	...	...	...	...	...	12.5	12.5	...	12.5	...	62.5	...
25	12.5	12.5	25	12.5 ⁷	...	...	...	...	...	50	...	25	12.5
25	...	...	...	...	...	...	...	...	...	25	...	50	25
12.5	25	12.5	25	...	12.5	...	12.5	...	...	12.5	...	37.5	25
46.2	...	...	...	...	6.6	6.6	6.6	6.6	...	6.6	...	59.4	6.6
13.3	39.6	13.3	13.3	...	...	...	...	6.6	6.6	6.6	6.6	52.8	20
53.3	20	...	...	...	...	6.6	...	13.3	...	6.6	...	66.6	6.6
20	59.4	6.6	6.6	...	...	...	...	6.6	6.6	13.3	...	52.8	20
26	31.2	10.4	5.2	...	...	...	...	10.5	...	10.5	...	52.6	26
36.4	26.3	5.2	26.3	...	...	...	...	20.8	...	15.6	5.2	46.8	10.4
15.6	47.8	10.4	5.2	...	...	...	...	5.2	...	10.4	5.2	57.2	20.8
27.5	16.5	22	22	...	...	5.5	5.5	16.5	...	5.5	...	55	11

⁷ In 1 case the minimum remission from M. to E. was 3.70.

⁸ 1 case = 5 per cent., no remissions E. to M.

⁹ 1 case = 5 per cent., no remissions M. to E.

¹⁰ 1 case = 5 per cent., no exacerbations M. to E.

¹¹ 2 cases = 10 per cent., no exacerbations E. to M.

TABLE 9.—*Showing the average frequency per cent. of every single of cases in each*

Class of cases.	No. of cases.	Remissions.									
			No. of cases.	6° to 8°.	5° to 6°.	4° to 5°.	3° to 4°.	2° to 3°.	1° to 2°.	0·5° to 1°.	0° to 0·5°.
ACUTE TUBERCULOSIS	VIII	Remissions E. to M.	8	...	0·9	1·8	13·9	27·4	25·5	14·6	11·2
		Remissions M. to E.	5 ¹	...	...	...	...	2	46	37·3	14·6
ACUTE PHTHISIS	XXIV	Remissions E. to M.	24	1·9	0·7	5·1	5·5	17·4	30·5	20·6	20·5
		Remissions M. to E.	22 ³	...	...	0·9	2·2	6·9	22·6	20·9	45·6
HIGH TEMPERATURES (no deaths)	VIII	Remissions E. to M.	8	...	1·2	2·8	7·2	16·2	36·9	16·7	18·6
		Remissions M. to E.	8	...	...	...	13·5	12	16·5	2·5	55·3
CHRONIC PHTHISIS	XV	Remissions E. to M.	15	2·6	0·6	4·8	4·4	21·8	28·8	20·3	16
		Remissions M. to E.	15	...	...	0·5	2	8·3	24·4	25·1	40·6
LOW TEMPERATURES (no deaths)	XX	Remissions E. to M.	19 ⁵	...	0·5	...	2·2	7·7	26·1	24·6	38·3
		Remissions M. to E.	19 ⁷	...	...	...	...	7	19·5	30·2	43·6

This table is formed by estimating for each case the percentage of the observations of the frequency with which every single exacerbation and remission occurred. These percentages are then added together for each class, and divided by the number of cases in each class.

remission and exacerbation of temperature occurring in the whole number class of phthisis.

Exacerbations.									
	No. of cases.	6° to 8°.	5° to 6°.	4° to 5°.	3° to 4°.	2° to 3°.	1° to 2°.	0·5° to 1°.	0° to 0·5°.
Exacerbations M. to E.	8	...	...	4·5	16·4	13·7	31·5	11·8	19·3
Exacerbations E. to M.	6 ²	...	...	...	1·7	1·7	9·1	34·1	53·3
Exacerbations M. to E.	24	0·8	0·7	2·2	5·5	14	33·3	21	21·7
Exacerbations E. to M.	21 ⁴	...	...	1·7	1·6	7·4	36·6	29·9	23·1
Exacerbations M. to E.	8	...	...	6·4	9	18·9	26·6	17·6	20·8
Exacerbations E. to M.	8	...	...	...	2	15·4	21·7	22·7	38
Exacerbations M. to E.	15	0·8	...	0·9	3	14·3	40·2	21·4	17·7
Exacerbations E. to M.	15	...	0·2	0·2	1·8	4·2	37·3	18·5	37·4
Exacerbations M. to E.	19 ⁶	...	...	0·6	1·4	6	29·2	20·7	42·7
Exacerbations E. to M.	18 ⁸	...	...	...	3	2·7	21·5	32·2	42

¹ In 3 cases no remissions M. to E.

² In 2 cases no exacerbations E. to M.

³ In 2 cases no remissions M. to E.

⁴ In 3 cases no exacerbations E. to M.

⁵ In 1 case no remissions E. to M.

⁶ In 1 case no exacerbations M. to E.

⁷ In 1 case no remissions M. to E.

⁸ In 2 cases no exacerbations E. to M.

TABLE 10.—*Showing the relative number of cases in which the maxima, and also the averages of the remissions and exacerbations, in any given case, differed or corresponded, comparing the remissions from evening to morning with the exacerbations from morning to evening, and the remissions from morning to evening with the exacerbations from evening to morning.*

Classes of phthisis.	Remissions from evening to morning compared with exacerbations from morning to evening.						Remissions from morning to evening compared with exacerbations from evening to morning.							
	Number of cases.	Maximum of remissions from evening to morning compared with maximum of exacerbations from morning to evening.			Averages of remissions from evening to morning compared with averages of exacerbations from morning to evening.			Number of cases.	Maximum of remissions from morning to evening compared with maximum of exacerbations from evening to morning.			Averages of remissions from morning to evening compared with averages of exacerbations from evening to morning.		
		Max. rem. E. to M. greater than max. exac. M. to E.	Max. rem. E. to M. equal to max. exac. M. to E.	Max. rem. E. to M. less than max. exac. M. to E.	Av. rem. E. to M. greater than av. exac. M. to E.	Av. rem. E. to M. equal to av. exac. M. to E.	Av. rem. E. to M. less than av. exac. M. to E.		Max. rem. M. to E. greater than max. exac. E. to M.	Max. rem. M. to E. equal to max. exac. E. to M.	Max. rem. M. to E. less than max. exac. E. to M.	Av. rem. M. to E. greater than av. exac. E. to M.	Av. rem. M. to E. equal to av. exac. E. to M.	Av. rem. M. to E. less than av. exac. E. to M.
Acute tuberculosis...	VIII	3	5	...	1	7	...	V	1	2	2	1	3	1
Acute phthisis	XXIV	5	13	6	3	18	3	XX	4	9	7	3	9	8
High temperatures...	VIII	2	3	3	2	5	1	VIII	3	3	2	3	3	2
Chronic phthisis.....	XV	7	7	1	5	9	1	XV	4	5	6	3	5	7
Low temperatures...	XVIII	8	4	6	3	12	3	XVIII	4	11	3	7	6	5
Totals	LXXIII	25	32	16	14	51	8	LXVI	16	30	20	17	26	23

From the table it would appear that in the larger number of cases there is no close correspondence between the extent of the remissions as compared with the exacerbations which might be supposed to follow them. The explanation appears to lie in the irregularity of the interspersion of morning exacerbations and evening remissions; but it appears almost impossible to estimate the total effect of these except on analyses of the general temperatures.

Thus—

The maximum remissions from evening to morning were greater than the maximum exacerbations from morning to evening	in 34.2 per cent. of the cases.
Equal	in 43.8 "
Less than	in 21.9 "

The averages of the whole number of remissions in individual cases from evening to morning were greater than the similar averages of the exacerbations from morning to evening

[illegible]

The maximum remissions from morning to evening were greater than the maximum

	exacerbations from evening to morning	.	.	.	.	.	.	. in 24·2	"
	Equal	.	.	.	.	.	.	. in 45·4	"
	Less than	.	.	.	.	.	.	. in 30·8	"

The averages of the remissions from morning to evening were greater than the averages of the exacerbations from evening to morning

[illegible]

TABLE 11.—*Showing the quickest and slowest pulses, and also the*

Class of cases.	No. of cases.	Quickest pulses observed.											
		Pulse 170 to 180.	Pulse 160 to 170.	Pulse 150 to 160.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.
ACUTE TUBERCULOSIS—													
Morning.....	7	...	...	2	2	1	2	...	...	...	...	...	...
Evening.....	6	1	...	2	...	...	3	...	...	...	...	...	...
ACUTE PHTHISIS—													
Morning.....	23	...	1	2	8	2	5	1	4	...	...	...	...
Evening.....	19	...	...	2	8	1	3	2	3	...	...	...	...
CHRONIC PHTHISIS—													
Morning.....	21	...	...	2	4	1	8	2	3	1	...	...	...
Evening.....	16	...	...	...	2	3	6	1	4	...	...	...	...
HIGH TEMPERATURES—													
Morning.....	7	...	...	...	1	1	...	1	4	...	...	...	...
Evening.....	4	...	...	...	1	...	1	...	1	...	1	...	...
LOW TEMPERATURES—													
Morning.....	16	...	...	...	...	1	1	2	4	2	6	...	...
Evening.....	9	...	...	...	1	...	1	...	2	1	2	1	1
TOTALS—													
Morning.....	LXXIV	...	1	6	15	6	16	6	15	3	6	...	...
Evening.....	LIV	1	...	4	12	4	14	3	10	1	3	1	1

means of all the pulses, observed in seventy-four cases of phthisis.

Slowest pulses observed.										No. of cases.	Mean of pulses observed.									
Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Pulse 50 to 60.		Pulse 140 to 160.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Pulse 50 to 60.
...	...	2	...	...	1	4	...	...	...	7	...	2	1	2	1	1	...	...	...	...
...	...	2	1	...	1	1	1	...	...	5	...	1	1	2	1	...	...	...	...	...
...	...	3	...	5	4	8	1	2	...	23	...	1	7	3	8	3	1	...	...	...
1	...	2	3	3	3	6	...	1	...	15	...	1	2	6	4	...	2	...	...	...
...	2	...	1	4	2	7	3	2	...	21	1	1	3	3	5	4	4	...	...	...
...	2	2	3	1	1	3	2	2	...	14	1	1	3	1	2	4	1	1	...	...
...	...	...	...	...	1	3	1	1	1	7	...	...	...	...	1	6	...	...	...	...
...	...	...	...	...	1	3	...	...	...	3	...	...	...	1	1	1	...	...	...	...
...	...	...	...	...	2	3	2	6	3	16	...	...	...	...	3	2	3	5	3	...
...	...	...	...	...	1	1	2	4	1	9	...	...	...	1	1	1	3	...	2	1
...	2	5	1	9	10	25	7	11	4	LXXIV	1	4	11	8	18	16	8	5	3	...
1	2	6	7	4	7	14	5	7	1	XLVI	1	3	6	11	9	6	6	1	2	1

TABLE 12.—*Showing the frequency per cent. of pulses of the frequency the means of the pulses, in*

Class of cases.	Quickest pulses.				Slowest			
	No. of cases.	Above 140.	Above 120.	Above 100.	Above 140.	Above 120.	Above 100.	Below 100.
ACUTE TUBERCULOSIS—								
Morning	7	57·1	100	100	...	28·5	28·5	71·4
Evening	6	50	100	100	...	33·3	50	50
ACUTE PHTHISIS—								
Morning	23	47·8	78·2	100	...	13	34·7	65·2
Evening	19	52·7	73·6	100	5·2	15·7	47·3	52·7
CHRONIC PHTHISIS—								
Morning	21	28·5	71·4	95·2	...	9·5	33·3	66·7
Evening	16	12·5	68·7	100	...	25	50	50
HIGH TEMPERATURES (not fatal)—								
Morning	7	14·2	25·5	100	...	...	...	100
Evening	4	25	50	75	...	...	...	100
LOW TEMPERATURES (not fatal)—								
Morning	16	6·2	12·5	50	...	...	...	100
Evening	9	11·1	22·2	44	...	...	...	100
TOTALS—								
Morning	LXXIV	29·7	59·4	87·8	...	9·4	22·9	77·1
Evening	LIV	31·4	64·8	90·7	1·8	16·6	37	63

indicated, occurring in the quickest and slowest observed, and also of seventy-four cases of phthisis.

pulses.				Means of pulses.									
	Below 90.	Below 80.	Below 70.	Below 60.	No. of cases.	Above 140.	Above 120.	Above 100.	Below 100.	Below 90.	Below 80.	Below 70.	Below 60.
	57·1	...	...	...	7	...	42·8	85·7	14·2	14·2	...	...	...
	33·3	16·6	...	...	5	...	40	100	...	...	...	...	...
	47·8	13	8·6	...	23	...	34·7	82·6	17·4	4·3	...	...	...
	36·8	5·2	5·2	...	15	...	20	86·6	13·3	13·3	...	...	...
	57·1	23·7	9·5	...	21	4·7	9·5	61·9	38	19	...	...	...
	43·7	25	12·5	...	14	7·1	35·7	57·1	42·8	14·2	7·1	...	...
	85·7	42·8	14·2	14·2	7	...	...	14·2	85·7	...	...	...	...
	75	...	...	...	3	...	...	66·6	33·3	...	...	...	...
	87·5	68·7	56·2	18·7	16	...	...	18·7	81·2	68·7	50	18·7	...
	88·8	77·7	66·6	33·3	9	...	...	22·2	77·7	66·6	33·3	33·3	11·1
	63·5	29·7	20·2	5·4	LXXIV	1·3	21·6	56·7	43·2	21·6	10·8	4·	...
	50	24	14·8	1·8	XLVI	2·1	45·6	65·2	34·8	21·7	8·6	6·5	2·1

TABLE 13.—*Showing the number of cases in which given pulses coincided with the temperatures indicated, for the quickest, the slowest, and the means of the pulses observed in seventy-four cases of phthisis.*

Note.—In the column of "means" the temperatures recorded are the means of those observed throughout the case for the morning and evening respectively.

Quickest pulses, morning.													Slowest pulses, morning.													Mean of pulses and mean temperatures, morning.														
Temperatures.	No. of cases.	Pulse 170 to 180.	Pulse 160 to 170.	Pulse 150 to 160.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Temperatures.	No. of cases.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Pulse 50 to 60.	Temperatures.	No. of cases.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Pulse 50 to 60.			
		105° to 106°	104° to 105°	103° to 104°	102° to 103°	101° to 102°	100° to 101°	99° to 100°	98° to 99°	97° to 98°	96° to 97°	95° to 96°	Totals...			105° to 106°	104° to 105°	103° to 104°	102° to 103°	101° to 102°	100° to 101°	99° to 100°	98° to 99°	97° to 98°	96° to 97°			95° to 96°	Totals...	105° to 106°	104° to 105°	103° to 104°	102° to 103°	101° to 102°	100° to 101°	99° to 100°	98° to 99°	97° to 98°	96° to 97°	95° to 96°
105° to 106°	2	...	...	...	...	...	...	...	...	...	...	...	...	105° to 106°	...	...	...	...	...	...	...	...	...	...	...	105° to 106°	...	...	...	...	...	...	...	...	...	...	...	...	...	
104° to 105°	6	...	...	2	1	...	1	...	1	...	...	...	...	104° to 105°	...	...	...	...	...	...	...	...	...	...	...	104° to 105°	...	...	...	...	...	...	...	...	...	...	...	...	...	
103° to 104°	8	...	...	2	1	...	1	2	...	...	...	...	...	103° to 104°	...	...	...	...	...	...	...	...	...	...	...	103° to 104°	...	...	...	...	...	...	...	...	...	...	...	...	...	
102° to 103°	19	1	...	3	3	2	5	...	5	1	...	...	...	102° to 103°	5	...	...	1	2	...	2	...	...	...	...	102° to 103°	6	...	3	2	1	...	...	...	...	...	...	...	...	
101° to 102°	11	...	3	3	2	2	1	...	3	...	...	...	...	101° to 102°	8	...	3	...	2	1	1	...	...	...	...	101° to 102°	16	1	3	3	2	4	3	...	...	...	...	...	...	
100° to 101°	16	...	...	4	1	5	2	1	...	...	...	...	...	100° to 101°	13	...	1	...	3	5	1	2	...	...	...	100° to 101°	15	...	4	1	5	3	2	...	...	...	...	...	...	
99° to 100°	11	...	...	...	1	1	2	...	2	...	5	...	...	99° to 100°	4	2	1	...	3	2	10	3	2	1	...	99° to 100°	23	...	2	5	10	2	4	...	...	...	...	...	...	
98° to 99°	1	...	...	1	1	1	2	...	2	...	...	...	...	98° to 99°	18	...	...	...	1	3	6	1	5	2	...	98° to 99°	14	1	1	1	3	...	4	1	3	...	...	...		
97° to 98°	1	...	...	...	1	...	...	...	...	...	...	...	...	97° to 98°	4	...	...	...	1	1	1	1	1	...	...	97° to 98°	...	...	...	...	...	...	...	...	...	...	...	...	...	
96° to 97°	...	...	...	...	...	...	...	...	...	...	...	...	...	96° to 97°	1	...	...	...	...	...	1	...	...	...	...	96° to 97°	...	...	...	...	...	...	...	...	...	...	...	...	...	...
95° to 96°	...	...	...	...	...	...	...	...	...	...	...	...	...	95° to 96°	1	...	...	...	...	...	...	...	1	...	...	95° to 96°	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals...	74	1	615	616	615	3	6	...	...	...	...	...	...	Totals...	74	2	5	1	9	10	25	7	11	4	...	Totals...	74	1	411	818	16	8	5	3	...	...	...	...	...	...

Mean of pulses and mean temperatures, evening.													
Slowest pulses, evening.													
Quickest pulses, evening.													
Temperatures.	No. of cases.	Pulse 170 to 180.	Pulse 160 to 170.	Pulse 150 to 160.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.
Temperatures.	No. of cases.	Pulse 140 to 150.	Pulse 130 to 140.	Pulse 120 to 130.	Pulse 110 to 120.	Pulse 100 to 110.	Pulse 90 to 100.	Pulse 80 to 90.	Pulse 70 to 80.	Pulse 60 to 70.	Pulse 50 to 60.		
105° to 106°	...	...	...	...	...	...	...	...	...	...	...	...	...
104° to 105°	3	1	...	...	...	...	...	...	...	...	...	...	...
103° to 104°	9	...	2	1	4	...	...	...	...	...	...	...	...
102° to 103°	12	...	1	5	1	...	...	...	...	...	...	...	...
101° to 102°	14	...	1	...	2	9	...	...	...	...	...	...	...
100° to 101°	10	...	...	3	...	...	...	...	...	...	...	...	...
99° to 100°	8	...	1	...	...	...	...	...	...	...	...	...	...
98° to 99°	2	...	...	...	1	...	...	...	...	...	...	...	...
97° to 98°	...	...	...	...	...	...	...	...	...	...	...	...	...
96° to 97°	...	...	...	...	...	...	...	...	...	...	...	...	...
95° to 96°	1	...	...	...	1	...	...	...	...	...	...	...	...
Totals...	54	1	...	412	414	310	1	3	1	1	...	...	...
Totals...	46	1	3	611	9	6	1	2	1	...	...	...	...

TABLE 14.—*Showing the frequency of the respirations corresponding to the quickest and slowest pulses, and also the mean frequency of the respiration, in seventy-four cases of phthisis.*

Respirations corresponding to quickest pulses.				Respirations corresponding to slowest pulses.				Mean of all respirations.			
Class of cases.				Class of cases.				Class of cases.			
ACUTE TUBERCULOSIS— Morning Evening	No. of cases.	Respiration above 70.	Respiration 60 to 70.	ACUTE TUBERCULOSIS— Morning Evening	No. of cases.	Respiration above 70.	Respiration 60 to 70.	ACUTE TUBERCULOSIS— Morning Evening	No. of cases.	Respiration above 70.	Respiration 60 to 70.
23	1	2	5	7	1	2	5	7	1	2	5
19	1	1	7	6	1	1	7	5	1	1	7
CHRONIC PHTHISIS— Morning Evening				CHRONIC PHTHISIS— Morning Evening				CHRONIC PHTHISIS— Morning Evening			
21	1	1	5	21	1	1	5	21	1	1	5
16	1	1	8	16	1	1	8	14	1	1	8
HIGH TEMPERATURES— Morning Evening				HIGH TEMPERATURES— Morning Evening				HIGH TEMPERATURES— Morning Evening			
7	1	1	2	7	1	1	2	7	1	1	2
4	1	1	3	4	1	1	3	3	1	1	3
LOW TEMPERATURES— Morning Evening				LOW TEMPERATURES— Morning Evening				LOW TEMPERATURES— Morning Evening			
16	1	1	2	16	1	1	2	16	1	1	2
9	1	1	4	9	1	1	4	9	1	1	4
TOTALS— Morning Evening				TOTALS— Morning Evening				TOTALS— Morning Evening			
74	2	2	7	74	2	2	7	74	2	2	7
54	2	1	8	54	2	1	8	46	1	3	8

TABLE 15.—*Showing the percentages of cases in which the mean frequency of respiration was observed in different classes of phthisis.*

Class of cases.	No. of cases.	Respiration above 40.	Respiration above 30.	Respiration below 25.
ACUTE TUBERCULOSIS—				
Morning	7	42·8	71·4	1·4
Evening	5	20	80	...
ACUTE PHTHISIS—				
Morning	23	30·4	82·6	13·
Evening	15	26·6	80	13·3
CHRONIC PHTHISIS—				
Morning	21	14·2	52·3	9·5
Evening	14	14·2	71·4	7·1
HIGH TEMPERATURES—				
Morning	7	...	14·2	28·5
Evening	3	...	33·3	66·6
LOW TEMPERATURES—				
Morning	16	6·2	37·5	37·5
Evening	9	...	33·3	44·4
TOTALS—				
Morning	LXXIV	18·9	56·7	18·9
Evening	XLVI	15·2	65·2	19·5

TABLE 16.—*Showing the number of cases in which respirations of the frequency indicated corresponded with the temperatures indicated, and also the correspondence between the means of the respirations and the means of the temperatures, in seventy-four cases of phthisis.*

Respirations corresponding to morning temperatures accompanying quickest pulses.													Respirations corresponding to morning temperatures accompanying slowest pulses.													Mean number of respirations compared with mean temperature—morning.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Temperatures.			No. of cases.			Respiration above 70.	Respiration 60 to 70.	Respiration 50 to 60.	Respiration 45 to 50.	Respiration 40 to 45.	Respiration 35 to 40.	Respiration 30 to 35.	Respiration 25 to 30.	Respiration 20 to 25.	Respiration below 20.	Temperatures.			No. of cases.			Respiration above 70.	Respiration 60 to 70.	Respiration 50 to 60.	Respiration 45 to 50.	Respiration 40 to 45.	Respiration 35 to 40.	Respiration 30 to 35.	Respiration 25 to 30.	Respiration 20 to 25.	Respiration below 20.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																				
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[illegible]

Respirations corresponding to quickest pulse— evening.													Respirations corresponding to slowest pulses— evening.													Mean of respirations compared with means of pulses—evening.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
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Respiration above 70.	1	...	...	...	...	...	...	...	...	...	...	...	Respiration above 70.	1	...	...	...	...	...	...	...	...	...	...	...	Respiration above 70.	1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

TABLE 18.—*Showing the frequency with which the pulse-respiration ratios of the means of all the*

Quickest pulses.										Slowest	
Class of cases.	No. of cases.	Respiration 1. Pulse 0—1.	Respiration 1. Pulse 1—2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse 5—6.	Respiration 1. Pulse 6—7.		Class of cases.	No. of cases.
ACUTE TUBERCULOSIS—										ACUTE TUBERCULOSIS—	
Morning	7	...	...	2	4	...	1	...		Morning	7
Evening	6	...	...	3	2	1	...	...		Evening	6
ACUTE PHTHISIS—										ACUTE PHTHISIS—	
Morning	23	...	...	9	7	4	3	...		Morning	23
Evening	19	...	1	2	10	6	...	...		Evening	19
CHRONIC PHTHISIS—										CHRONIC PHTHISIS—	
Morning	21	...	1	2	9	5	2	2		Morning	21
Evening	16	...	1	1	10	3	1	...		Evening	16
HIGH TEMPERATURES—										HIGH TEMPERATURES—	
Morning	7	...	...	...	3	2	1	1		Morning	7
Evening	4	...	...	1	2	1	...	...		Evening	4
LOW TEMPERATURES—										LOW TEMPERATURES—	
Morning	16	...	...	3	8	4	1	...		Morning	16
Evening	9	...	...	3	4	1	1	...		Evening	9
TOTALS—										TOTALS—	
Morning	74	...	1	16	31	15	8	3		Morning	74
Evening	54	...	2	10	28	12	2	...		Evening	54

ratios indicated occurred in seventy-four cases of phthisis, and also the pulses and respirations observed.

pulses.							Means of pulse to means of respiration.										
Respiration 1. Pulse 0—1.	Respiration 1. Pulse 1—2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse 5—6.	Respiration 1. Pulse 6—7.	Class of cases.	No. of cases.	Respiration 1. Pulse 0—1.	Respiration 1. Pulse 1—2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse 5—6.	Respiration 1. Pulse 6—7.		
							ACUTE TUBERCULOSIS—										
...	2	3	1	...	...	1	Morning	...	...	7	...	...	3	2	2	...	...
...	...	3	2	1	...	...	Evening	...	...	5	...	...	1	3	1	...	...
							ACUTE PHTHISIS—										
...	...	15	7	1	...	...	Morning	...	...	23	...	...	6	14	2	1	...
...	2	7	5	5	...	...	Evening	...	...	15	...	...	2	10	3	...	...
							CHRONIC PHTHISIS—										
1	2	5	8	4	1	...	Morning	...	...	21	...	1	1	14	4	1	...
1	1	4	4	5	1	...	Evening	...	...	14	...	1	3	7	3	...	...
							HIGH TEMPERATURES—										
...	...	5	1	1	...	...	Morning	...	...	7	...	...	1	4	2	...	...
...	...	1	1	2	...	...	Evening	...	...	3	...	...	...	2	1	...	...
							LOW TEMPERATURES—										
...	2	6	7	1	...	...	Morning	...	...	16	...	1	6	7	2	...	...
...	1	3	4	1	...	...	Evening	...	...	9	...	1	3	4	1	...	...
							TOTALS—										
1	6	34	24	7	1	1	Morning	...	...	74	...	2	17	41	12	2	...
1	4	18	16	14	1	...	Evening	...	...	46	...	2	9	26	9	...	...

TABLE 19.—*Showing the percentage frequency of the pulse-respiration and*

Quickest pulses.							Slowest		
Class of cases.	No. of cases.	Respiration 1. Pulse less than 2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse more than 5.	Class of cases.	No. of cases.	
ACUTE TUBERCULOSIS—							ACUTE TUBERCULOSIS—		
Morning	7	...	28·5	55·5	...	14·2	Morning	7	
Evening	6	...	50	33·3	16·6	...	Evening	6	
ACUTE PHTHISIS—							ACUTE PHTHISIS—		
Morning	23	...	39	30·3	17·3	13	Morning	23	
Evening	19	5·2	10·3	52·6	31·5	...	Evening	19	
CHRONIC PHTHISIS—							CHRONIC PHTHISIS—		
Morning	21	4·7	9·5	42·8	23·8	19	Morning	21	
Evening	16	6·2	6·2	62·5	18·7	6·2	Evening	16	
HIGH TEMPERATURES—							HIGH TEMPERATURES—		
Morning	7	...	...	42·8	28·5	28·5	Morning	7	
Evening	4	...	25	50	25	...	Evening	4	
LOW TEMPERATURES—							LOW TEMPERATURES—		
Morning	16	...	18·7	50	25	6·2	Morning	16	
Evening	9	...	33·3	44·4	11·1	11·1	Evening	9	
TOTALS—							TOTALS—		
Morning	74	1·3	21·6	41·8	20·2	14·8	Morning	74	
Evening	54	3·7	18·5	51·8	22·2	3·7	Evening	54	

ratios indicated and also of the ratios of the means of the pulses respirations.

pulses.					Means of pulse to means of respiration.						
Respiration 1. Pulse less than 2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse more than 5.	Class of cases.	No. of cases.	Respiration 1. Pulse less than 2.	Respiration 1. Pulse 2—3.	Respiration 1. Pulse 3—4.	Respiration 1. Pulse 4—5.	Respiration 1. Pulse more than 5.
					ACUTE TUBERCULOSIS—						
28·5	42·8	14·2	...	14·2	Morning	7	...	42·8	28·5	28·5	...
...	50	33·3	16·6	...	Evening	5	...	20	60	20	...
					ACUTE PHTHISIS—						
...	65·1	30·3	4·3	...	Morning	23	...	26	60·7	8·6	4·3
10·5	36·7	26·3	26·3	...	Evening	15	...	13·3	66·6	19·9	...
					CHRONIC PHTHISIS—						
14·2	23·8	38·0	19·0	4·7	Morning	21	4·7	4·7	66·6	19	4·7
12·5	25	25	31·2	6·2	Evening	14	7·1	21·4	50	21·4	...
					HIGH TEMPERATURES—						
...	71·4	14·2	14·2	...	Morning	7	...	14·2	55·5	28·5	...
...	25	25	50	...	Evening	3	...	...	66·6	33·3	...
					LOW TEMPERATURES—						
12·5	37·5	43·7	6·2	...	Morning	16	6·2	37·5	43·7	12·5	...
11·1	33·3	44·4	11·1	...	Evening	9	11·1	33·3	44·4	11·1	...
					TOTALS						
9·4	45·9	32·4	9·4	2·7	Morning	74	2·7	22·9	55·3	15·9	2·7
9·2	33·3	29·6	25·9	1·8	Evening	46	4·3	19·5	56·4	19·5	...

[illegible]

TABLE 21.—*Showing the correspondence between the temperatures and pulse-respiration ratios indicated in seventy-four cases of phthisis.*

Temperatures and pulse-respiration ratios accompanying quickest pulses—morning.										Temperatures and pulse-respiration ratios accompanying slowest pulses—morning.										Means of temperatures compared with the means of the pulse-respiration ratios—morning.																																																												
Temperatures.					No. of cases.	Respiration 1. Pulse 0—1.					Respiration 1. Pulse 1—2.					Respiration 1. Pulse 2—3.					Respiration 1. Pulse 3—4.					Respiration 1. Pulse 4—5.					Respiration 1. Pulse 5—6.					Respiration 1. Pulse 6—7.																																												
105° to 106°					...	...					...					...					...					...					...					...					...																																							
104° to 105°					2	...					...					...					...					...					...					...					...					...																																		
103° to 104°					6	1					3					1					2					...					...					...					...					...																																		
102° to 103°					8	...					2					5					1					3					1					...					...					...																																		
101° to 102°					19	...					4					7					4					3					2					1					...					...																																		
100° to 101°					11	...					1					4					2					3					1					...					...					...																																		
99° to 100°					16	...					5					6					3					1					...					...					...					...					...																													
98° to 99°					11	...					3					6					2					...					...					...					...					...					...																													
97° to 98°					1	...					1					...					...					...					...					...					...					...					...																													
96° to 97°					...	...					...					...					...					...					...					...					...					...					...					...																								
95° to 96°					...	...					...					...					...					...					...					...					...					...					...					...																								
Totals ...					74	1					16					31					15					8					3					...					Totals ...					74					2					17					41					12					2					...				

Temperatures and pulse-respiration ratios accompanying quickest pulses—evening.													
Temperatures.	No. of cases.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.
		Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.	Pulse 5-6.	Pulse 6-7.	Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.
105° to 106°	...	...	...	...	...	...	...	...	...	...	...	...	...
104° to 105°	3	...	...	...	...	...	...	...	...	...	...	...	...
103° to 104°	9	...	1	4	2	1	...	...	...	...	...	...	...
102° to 103°	12	...	1	8	2	...	...	...	...	...	...	...	...
101° to 102°	14	...	...	3	7	4	...	...	...	...	...	...	...
100° to 101°	10	...	...	3	5	2	...	...	...	...	...	...	...
99° to 100°	3	...	...	2	...	1	...	...	...	...	...	...	...
98° to 99°	3	...	...	1	...	1	...	...	...	...	...	...	...
97° to 98°	...	...	...	...	...	...	...	...	...	...	...	...	...
96° to 97°	...	...	...	...	...	...	...	...	...	...	...	...	...
95° to 96°	...	...	...	...	1	...	...	...	...	...	...	...	...
Totals ...	54	...	2	10	28	12	2	...	...	...	...	...	...

Temperatures and pulse-respiration ratios accompanying slowest pulses—evening.													
Temperatures.	No. of cases.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.
		Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.	Pulse 5-6.	Pulse 6-7.	Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.
105° to 106°	1	...	...	...	...	...	...	...	...	...	...	...	...
104° to 105°	1	...	...	...	...	...	...	...	...	...	...	...	...
103° to 104°	5	...	1	1	1	1	...	...	...	...	...	...	...
102° to 103°	5	...	...	2	...	3	...	...	...	...	...	...	...
101° to 102°	11	...	1	5	3	2	...	...	...	...	...	...	...
100° to 101°	9	...	...	2	4	3	...	...	...	...	...	...	...
99° to 100°	10	...	1	2	3	3	...	...	...	...	...	...	...
98° to 99°	9	...	...	4	3	1	...	...	...	...	...	...	...
97° to 98°	1	...	...	...	1	...	...	...	...	...	...	...	...
96° to 97°	2	...	...	1	...	...	...	...	...	...	...	...	...
95° to 96°	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals ...	54	1	4	18	16	14	1	...	...	...	...	...	...

Means of temperatures compared with the means of the pulse-respiration ratios—evening.													
Temperatures.	No. of cases.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.	Respiration 1.
		Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.	Pulse 5-6.	Pulse 6-7.	Pulse 0-1.	Pulse 1-2.	Pulse 2-3.	Pulse 3-4.	Pulse 4-5.
105° to 106°	...	...	...	...	...	...	...	...	...	...	...	...	...
104° to 105°	...	...	...	...	...	...	...	...	...	...	...	...	...
103° to 104°	2	...	...	...	...	...	2	...	...	...	...	...	...
102° to 103°	8	...	...	1	5	2	...	...	...	...	...	...	...
101° to 102°	12	...	...	4	6	2	...	...	...	...	...	...	...
100° to 101°	12	...	...	1	8	3	...	...	...	...	...	...	...
99° to 100°	8	...	2	2	2	2	...	...	...	...	...	...	...
98° to 99°	4	...	...	1	3	...	...	...	...	...	...	...	...
97° to 98°	...	...	...	...	...	...	...	...	...	...	...	...	...
96° to 97°	...	...	...	...	...	...	...	...	...	...	...	...	...
95° to 96°	...	...	...	...	...	...	...	...	...	...	...	...	...
Totals ...	46	...	2	9	26	9	...	...	...	...	...	...	...

[illegible]