THESIS

PRESENTED FOR

THE DEGREE OF DOCTOR OF MEDICINE,

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BY

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"*A Contribution to the Meteorology of Sporadic Pneumonia.*"

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The Winter of 1894-95, presumably on account of its unusual meteorological character, provided us with "experiences" in regard to the Public Health which were not without interest. At any rate, some of the problems which arise therefrom are specially attractive to the country practitioner who, by reason of his life and work, is perhaps more given to regarding the connection between the weather and disease than his professional brother in the city.

Hence this record of an experience of my own (with deductions therefrom) in connection with acute Pneumonia which prevailed in a certain part of my practice to an extent which was not only quite strange to me but, in the memory of the oldest inhabitant, was without parallel.

During the five years I have been in this practice the locality in question, which I shall describe in greater detail hereafter,

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has never presented any undue prevalence of Pneumonia till the Winter of 1894-95 for when I state that on an average 10 to 12 cases annually would cover my experience of am, if anything, exceeding the mark.

But last winter – or rather in the 14 weeks between 1st Nov. 1894 and 15th Feby 1895 – no fewer than 30 cases (mostly lobar) came under my notice – that is to say an ordinary 3 years experience was compressed into the short space of 3½ months.

Such a phenomenal prevalence of a distinct well defined disease like Pneumonia naturally caused me much consideration and induced me to make special inquiry into the circumstances which had led to its production.

The cases were all of the so called "Sporadic" variety. Epidemic influences were absent so far as could be made out and

* Influenza did not make its appearance in the district till the middle of march — a month after the outbreak of Pneumonia had ceased — and I did not meet with another case of Pneumonia till near the end of the Influenza Epidemic viz. in april.

Two diseases specially influenced by the weather — be it noted —

** Mainly young children — i.e. those most susceptible to the effects of weather-changes.

the cases were absolutely non-contagious. The Sanitary condition of the locality was good- a new sewage system having been completed and put into operation. Outside of the Pneumonia the general health was excellent and the mortality low. There was no Influenza* and no Zymotic Diseases except 3 isolated cases of Enteric Fever in a different part of the practice. There was practically no Bronchitis and beyond some half dozen cases of Acute Tonsillitis & Acute Rheumatism Pneumonia appeared to have the field entirely to itself.

But there was one coexisting circumstance present which was certainly out of the common viz - the weather; and thus by a process of exclusion - Keeping in mind at the same time the exposed situation of the affected locality and the age-incidence of the cases** - I came ultimately to the conclusion that in the causation of

"The influence of the weather in producing Pneumonia is not to be regarded as paramount; that it must rank as a secondary and not primary nor even an essential cause of the affection." Pneumonia Sturges & Coupland - 2nd Edit. 890. pp 309.

the outbreak in question weather conditions (cold &c were the all important agents at work - the "sine qua non" - in its production

I am aware that this conclusion is not quite in accordance with the most approved teaching of the day* yet to my mind it is justified not only by recent discoveries on the subject but also by a comprehensive survey of the whole aetiology of the disease.

In the succeeding pages I have endeavoured to substantiate this view of the importance of meteorological influences in the causation of this particular outbreak and of "Sporadic Pneumonia" in general.

Before passing to consider the relation of the weather conditions to my own cases it will be interesting to review shortly the opinions which have been and are at present entertained on this subject.

It must be admitted at the outset

* "Frigus unica pneumoniae causa est." quoted from Leichtenstern's "Über asthenische Pneumonie" Volkmann's Klinische Vorträge No 82. pp 659.

that from the earliest times some causal relationship has been believed to exist although opinions as to the precise rôle played by the weather have varied from time to time.

Hippocrates, Galen and other classical writers held decided views as to its importance but it was not till the time of Heidenbrandt and Marcus* that anyone ventured to ascribe to it the sole agency for the production of the disease. About the beginning of the present century, however, the belief in the causative importance of weather changes in pneumonia lost favour and the "Miasmatic Theory" of Cullen, Frank, Laennec and others obtained general acceptance. Later in the century the "Cold" or "Chill Theory" was again revived but in more recent times (especially since the discovery of Friedländers Pneumococcus) it has been in great part abandoned in favour of the "Germ Theory" of the causation of the disease

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Pneumonia. "Natural History & Relations of Acute."
by Sturges & Coupland. pp. 286

Vide "Sturges Coupland" pp 292 shewing Charts
of the Monthly Incidence of Pneumonia in
Vienna, Michigan &c also
Hirsch's Geographical & Historical Pathology"
Syd. Socys Trans. pp. 138.

But in the latest and most important work on Pneumonia* it is admitted that "Exposure to cold (chilling of the surface) is still regarded by many as the sole efficient agency for the production of this disease" and in the face of this statement it may be safely inferred that even at the present time the weather is regarded as having some share in the Aetiology of Pneumonia but whether an indispensable or merely subsidiary one is a matter of dispute.

Mention might here be made of certain facts (for the most part well authenticated) bearing on the incidence of Pneumonia which seem to point to a definite causal relationship between weather Conditions & that disease :-

(1) The Sequency curve of P is always at its highest in the winter or early Spring,*

* Vide - "Hirsch." op cit. pp. 140

** Those tracts of country which are specially favoured in their climate or in the steadiness of their temperature from day to day (Egypt, many parts of India including Bengal and the plain of Burma, California &c are subject to Pneumonia to a very slight extent Hirsch. op cit. pp 140

*** "Where the configuration of the country is favourable to currents of cold air, in such places as Madrid Genoa, Florence, Naples, Gibraltar. different in other respects but alike in this, in the high plateaux of countries whose low-lands are strangers to the disease E.g. Africa & Mexico - Pneumonia finds its Chief victims."
Sturges' Pneumonia pp. 308

never in the summer or autumn. Even Epidemics of Pneumonia are usually met with in the winter or Spring, the recorded instances of exceptions to this rule being few indeed.*

3) Countries or Districts in which a certain type of climatic conditions prevails present a high mortality from Pneumonia while other countries or districts presenting a different or opposite type of climatic conditions enjoy a particular freedom from the disease.**

3) Elevated or exposed localities, towns &c. possess as a rule a markedly higher mortality from Pneumonia than those not so elevated or exposed.***

4) There is a greater prevalence of Pneumonia among individuals who, by reason of their particular occupation, are specially exposed to weather changes E.g. Cab drivers, field labourers. &c

* "Huss & Hirsch believed that a locality exposed to wind was more liable to be the seat of P. than one not so exposed whilst Ziemssen & Jürgensen do not admit this – Hirsch Jurgensen and Ksterlow thought cold played only a subordinate part whilst Huss Hubler and Lebert laid stress on its action in producing the disease. Similar discor: dant opinions are expressed as regards the influence of thermometric, barometric & hygrometric variations" Sturges pp 304.

I have already stated that some causal relationship between the weather and pneumonia is generally admitted although there is still some diversity of opinion as to its importance, and the precise nature of the meteorological conditions concerned.

There can be no doubt that our knowledge of the meteorological Relations of Pneumonia is of a most undigested character and that there is great disparity in the statements of writers on the subject.* It may be the case, as Seibert contends, that the conclusions arrived at by some authorities are based on imperfect observation or insufficient appreciation of the variable meteorological states but in addition to this there are two other circumstances which, to my mind, help to explain the discrepancies referred to. viz:-

1) That the Statistics of Pneumonia are far from accurate being made to include a considerable

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proportion of cases which are not true pneumonia nor even closely allied to it pathologically: consequently opinions based on such statistics can at best be only approximately correct and are sure to differ among themselves.

2) That there are several varieties of Pneumonia each perhaps acknowledging a different cause and influenced by the weather more or less differently; hence statistics including all such varieties indiscriminately are sure to tell a varied tale and deductions drawn from them are bound to disagree

With regard to the first hypothesis - there can be little doubt that the term "Pneumonia" is often very loosely applied by medical men and that diseases are included under that general designation in no way related to true Fibrinous Pneumonia. For example - referring here specially to the Registrar General's Returns - Acute or

Many of these cases might be classed under the "Consecutive" or "Bastard Pneumonias" of older writers.

Passive Hyperaemia - attended with crepitation and a certain degree of hepatisation - so frequently met with in the final stages of Bright's disease, typhoid, chronic Heart Disease, &c. are often returned under Pneumonia; and this is likewise true of many cases of long-standing Bronchial affections especially in the aged and very young. It is impossible to estimate even approximately the number of these misleading certifications but they must be very numerous and I believe I am not in the least exaggerating the point when I state that probably not more than 80% of the deaths returned under "Pneumonia" in this country are really due to the true disease: the residual 20% being cases of Pulmonary Congestion (acute or chronic) Pulmonary Oedema, Capillary Bronchitis or some such complaint - presenting no doubt some clinical resemblances to true Pneumonia

* American journal of medical science - Jany. 1882

** "Iron. Blatter für med. Statistik - Deutsche Klinik 1857.

*** "The causation of Pneumonia" reprint from the "Annual Report" of the Michigan State Board of Health. Lansing 1888.

but pathologically quite removed from it.

I do not wish to impugn the validity of all the published statistics of Pneumonia. Some have been most carefully collected. E.g. those of Seibert* and are as accurate and reliable as statistics can possibly be; but, on the other hand, those employed by Jurgensen** and Baker for example are, in my opinion, not one whit more trustworthy than those culled from our own Registrar Generals' Reports.

It may be presumed that the correctness of the opinions propounded by the different writers will bear some direct relation to the accuracy of the statistics on which they are based. But it is obvious that a certain amount of discrepancy in these opinions is practically unavoidable.

There is considerable evidence in support of the conjecture that we have to deal with

About 15 years ago Hirsch in his Historical & Geographical Pathology (pp 15.) put the question as follows :—

"Is there but one kind of Fibrinous Pneumonia" or is the unity of the anatomical notion (Fibrinous Inflammation of the Lungs) represented always by a single clinical & aetiological thing bearing the name of Pneumonia" ?

* Quoted from Leichtenstern. op cit pp.

several varieties of Pneumonia – due to different causes and differently influenced by weather conditions and that statistics are vitiated by the inclusion of these varieties indiscriminately.*

From the earliest times a number of "Clinical Types" of Pneumonia have been recognised and described. Hippocrates, for example, was evidently acquainted with "asthenic Pneumonia" and pointed out that Venesection was inapplicable to these cases.* In the 17th Century imitating probably the great Botanist Linnaeus this division into types was carried out to an almost ridiculous extent: the undue prominence of any one symptom being regarded as sufficient reason for a special name.

Hence the terms: Pneumonia nervosa; P. delirosa; P. biliosa; P. haemorrhagica; P. asthenica; &c. some of which have not yet disappeared from our nomenclature.

* Hirsch: Op. Cit pp 155.

** Davison's "Geographical Pathology" An Inquiry into the Geographical Distribution of Epidemic & Climatic Diseases". Vol I Chap. on Pneumonia.

***. Some were probably severe Infectious Fevers, Diphtheria, Influenza, Typhoid &c. "Lichtenstein" Op Cit pp 658 (note)

But apart from these "Clinical Types" which are in all probability due to some peculiarity of the individual patient or his environment or indicate merely some "quantitative" difference in the morbific agency at work there is abundant proof of the existence of several distinct Varieties of Pneumonia differing from each other in their clinical characters and in their mode of origin and distribution.

Without following or attempting any special Classification I shall briefly refer here to some of the more distinct varieties under their usual designation.

1) Epidemic Pneumonia has long been known and numerous instances are recorded in the works of Hirsch,* Dawson** & others. It is doubtful, however, if we can regard all the Pneumonia Epidemics mentioned by the older writers (15th to 17th Century) as examples of True Pneumonia.**

* Vide works of Hirsch, Dawson Ll. already mentioned.

** The clinical & anatomical characters are not the same in any two epidemics (1) Long prodromal stage, (2) Signs of the local affection take no shewing themselves, (4 to 6 days from initial rigor) (3) Morbid process is limited frequently to the upper lobe and complicated with fibrinous & Suppurative pleurisy (4) Great weakness (5) Prominent Cerebral or nervous symptoms, (6) Gastric symptoms with frequent diarrhoea and icterus (7) High mortality." Vide Ritter & Wagner. Archiv: für Klin. Medicin xxxv, 1884. Quoted in pp 191 of Hirsch's work.

*** Hirsch: op. cit. pp 154.

From a perusal of the records it is evident that Epidemic Pneumonia may include all varieties of Clinical Types and that the Epidemics may differ among themselves in malignancy, infectivity &c.* According to some writers Epidemic Pneumonia is associated with certain definite pathological characters** but it has been shown that these are by no means invariably present or even peculiar to this variety. "Infectivity" even is not an essential feature although usually the cases in any one Epidemic bear the impress of some infective cause acting on the malady.*** Frequently, however, Epidemic Pneumonia presents special clinical peculiarities being usually "asthenic" in type and with a long prodromal stage: Jaundice, diarrhoea & pleurisy are complications often met with and the mortality is usually high. Epidemic P. has occurred in all manner of localities; e.g. open country

* For an interesting article "On the Relationship of Influenza and Epidemic Pneumonia" by Brodie Cruikshank. M.D vide "B. Med. Journal" July 1895. pp 360.

districts, mountain slopes (alps), cities, towns, on board ships and in prisons and asylums. The causes ascribed to the various outbreaks recorded differ considerably, the following being in order the most important.- Bad sanitation, (sewage exhalations &c.) over crowding, starvation, malaria, cold &c.*

Contagious Pneumonia.- In a few well authenticated instances pneumonia has been communicated from one individual to another by contact. In type contagious P. closely resembles the Epidemic variety and is in general extremely fatal - The cause has not been clearly made out in every instance but exhalations from sewers and overcrowding are perhaps the most potent.

Pythogenic Pneumonia (E. Parkes) due to sewer gas, imperfect drainage and like causes is now a well recognised variety - The cases are of the "asthenic" type as a rule

with a long prodromal stage and no definite course. The mortality is high. It is probable that many examples of Epidemic Contagious Pneumonia belong to this variety

Septic Pneumonia. associated with general septicaemia & some localised septic condition in the respiratory passages &c. In general features it resembles the first three varieties.

Sporadic Pneumonia. includes isolated cases of idiopathic origin altho there seems no reason why epidemic and contagious P. may not occur "sporadically". Its distinguishing characters are (1) sudden onset and definite course - terminating usually by crisis (2) It is neither contagious nor infectious and (3) is most prevalent in winter or spring - in this respect differing from the first mentioned varieties which are perhaps most common in warm weather.

* Re Iceland Epidemic described by Hjaltelin, the Beckerbach Epidemic (Bulry's) & others. vide Sturges. op cit. Chapter on Epidemic pp 260.

Other varieties are mentioned by writers under various appellations E.g. Latent P., Relapsing P., Cardiac P., &c. &c but to my mind these are better regarded as mere "Clinical Types" and not sufficiently differentiated from ordinary Pneumonia to warrant their being classified as distinct varieties.

Of the five varieties of Pneumonia I have referred to the contagious, pythogenic & Septic appear not to be in the least affected by weather conditions, as if the specific agent at work was so potent as to be able to dispense with extrinsic aids in producing the disease. To some extent this also holds good with regard to Epidemic P., although in several Epidemics* the meteorological conditions were regarded as prime agents in their causation. Can it be possible that we have to deal in these instances with Sporadic P. in an Epidemic form?

The relationship, however, of weather changes to Sporadic P. is a matter of common observation and certainly the number of cases in which cold & exposure appears to be the only assignable cause is very large. It would seem as if, in this variety, the meteorological conditions sometimes claimed the dignity of an actual exciting cause and in a very large proportion of cases must be regarded as a contributory or predisposing cause of the first importance.

Touching the question of varieties of P. the testimony of Bacteriology is of the highest value and has led to great modification of the views formerly entertained. It is now generally admitted that P. is "associated with the growth and development of certain micro organisms" several of which within late years have been differentiated and named. By far the most important of

* Quoted from Schenk's "Grundriss der Bakteriologie" Section on "Bacteria of the Sputum"

** Report by Medical Officer of Local Gov. Board 1888-9

*** Weischselbaum: Wiener Med. Jahrbuch. 1886

these is the Diplococcus Pneumoniae (Fränkel) which, according to recent investigations, is present in some 90% of cases. Of lesser import are the Pneumococcus Friedländeri and the Bacillus Pneumosepticus (of Sepsis P.)* Klein also demonstrated the presence of a special micro organism in the Middlesboro' Epidemic of 1888** and a number of cases are recorded in which the Streptococcus pyogenes and the Staphylococcus pyogenes aureus or albus were the only germs found.***

But none of these organisms (Diplococcus Pneumoniae not excepted) can be regarded as the sole specific agent in P. indeed some of them have been found in other inflammations &c. Cerebro Spinal Meningitis, Otitis &c. and even in the healthy secretions of the mouth and respiratory passages. "It is manifest, therefore, that whatever be the precise etiological relationship between the Diplococcus

Sturges. op cit pp 305.

(or any one of the organisms just mentioned) & Pneumonia if cannot be of the same Kind as that believed to subsist in the case of some other so called specific organisms and the diseases with which they are associated. e.g. Tubercle." *

But bacteriologists are not at one as regards the specific micro organism of P. and its precise role in the causation of that disease This much is generally admitted among them that the same pathological conditions to which we apply the name Pneumonia can be produced by a number of perfectly distinct germs.

It is at all improbable that in the future bacteriologists may be able to associate each particular variety of Pneumonia with a special micro-organism characterised not merely by definite morphological & other features but also by the manner in which it is affected by external circumstances and in particular the weather ! In this way at any

rate many obscure points connected with P. and its Varieties would receive a simple and rational explanation.

It might be well to recapitulate here the arguments of the preceding pages:-

The Existence of some relationship between the weather and P. is a matter of almost general acceptance the points at variance among writers being (1) the importance of its rôle and (2) the precise relationship of the individual meteorological elements to the disease. To explain the disparities in the statements of writers on these points it is suggested that the statistics handled by them are vitiated by the inclusion (1) of numerous cases of so called "Bastard Pneumonia" and (2) indiscriminately of Varieties of P. some undoubtedly influenced by the weather others not in no least affected thereby. These assumptions

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having been in great measure substantiated the conclusion arrived at and believed to be warranted by the facts given may be summed up as follows:—

"That in the causation of many cases of Pneumonia, especially of the Sporadic variety, weather conditions are the all important agents at work — the "sine qua non" in their production."

We have now cleared the way for a description of the outbreak with which I had to deal and a consideration of the meteorological conditions associated therewith.

The data were recorded by standard instruments and to facilitate analysis & comparison I have arranged them in the form of charts. But any account of the meteorological accompaniments of the outbreak would be incomplete without a

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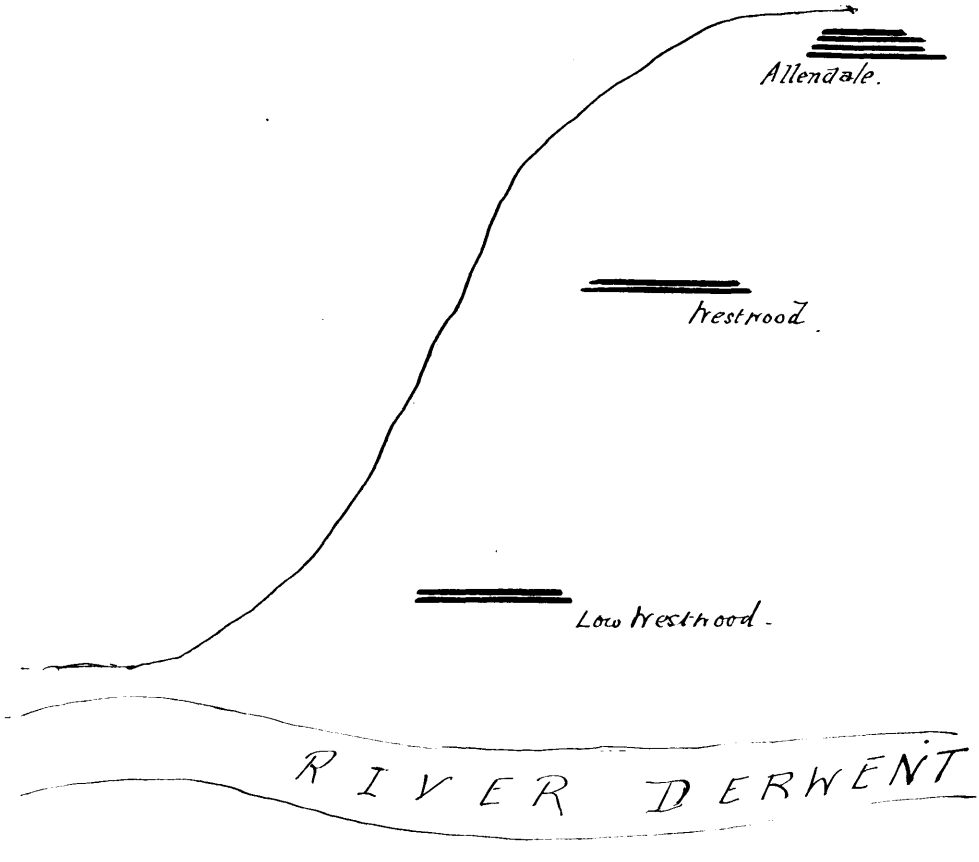
※ In the N.W. of County Durham, 14 miles from Newcastle on Tyne.



Description of the affected locality. This is a small strip of land about a mile in area on the Southern slope of the Derwent Valley* and extending about 1200 yards from the river's bank. At its highest point it is 700 feet above sea-level and slopes down more or less abruptly to the river side.

The inhabitants, mainly coal miners, live in roomy, stone-built houses arranged in 3 groups of rows - one situated at the hill-top (Allendale) another (Westwood) mid way down the hill and about 500 feet above sea-level; and the third (Low Westwood) about 100 yards from the river side. The inhabitants are distributed as follows:- In Allendale 900, in Westwood 150; in Low Westwood 150.

The situation of these houses although excellent from a sanitary point of view is, in some respects, unfortunate - They

are peculiarly exposed to the winds (Especially the N. E & W.) and when snow falls, being away from the sun's rays during the greater part of the day, it is slow to disappear.

During the winter of 1894-95 the Elements seemed focussed in all their intensity on this hill side. Snow fell frequently and for weeks lay to a depth of 18 inches: In consequence of the repeated falls the surface layer was always damp and cold - very disagreeable to the pedestrian - and with the strong winds from the N. & E. - the conditions were such as to try the endurance of the most robust. It is worthy of note that the Pneumonia outbreak was severest in the exposed houses at the hill top and least in those near the river-side where the air was warmer, the snow less deep and the winds less keen.

For an interesting account of the "Frost of Jany & Feby 1895 and its Effects" by Bayard & Marriott. vide Transactions of Royal Meteorological Socy for April 1895.

General Description of the weather during the Winter of 1894-95 as it obtained in the affected locality.

The most prominent feature was the unusual mildness of the weather that prevailed not only locally but generally up till X'mas and the almost arctic severity from that time till the middle of Feby.* The Temperature during Nov & Dec was as a rule considerably above the average for the time of year. On no occasion did it fall to freezing-point in Nov and only nine times in Dec. During Nov the temp.re was pretty uniform altho' gradually on the decline. The "Diurnal Variation" (i.e. the greatest interval between maximum & minimum temp.re was considerable (from 20° to 25°F) but fairly regular. The Temp.re in Dec was high, generally steady and with a rising tendency. The "Diurnal

Wind Chart.

Date.	Nov.	Dec.	Jany.	Feby.
1	SE	NSW	E	SE
2	E	W	NE	NE
3	S. SSW.	W	ENE	E
4	SW	SW	E	E
5	SW	SSE	ENE	E
6	NW	N	NE	SE
7	SSE.	WSW	E	E
8	SW	WNW	ENE	S
9	NW	WNW	ENE	SW
10	ENE	SSE	SW	SW
11	ENE	S	SW	S
12	S	S	SSW	W
13	SE.	SSW	SE	W
14	SSW.	W	SSE	ENE
15	W	W	SSE	E
16	SW	W	SE	E
17	.	W	W	NE
18	W	W	W	NW
19	S	WSW	E	W
20	NW.	SW	E	WNW
21	WSW.	SW	W	SW
22	S	SW	W	SW.
23	S	W	NE	E
24	S	SW	W	W
25	S	WNW	W	
26	E	W	W	
27	W	WNW	E	
28	W.	WNW	WSW	
29	W	NNW	W	
30	.	NW	E	
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Variation was as a rule greater than during Nov. (30° F) and on several occasions a Variation of even 40° F was recorded.

The Wind during Nov. varied considerably - being in the first half of the month more frequently in the N & E. than in the second half when W. & S.W. winds prevailed -

In Dec. the wind was seldom E. and except during the last week rarely in the N or N.W. During the first 3 weeks S & SW were the prevailing winds.

The Rainfall during the whole of Nov & Dec. was only about 2 inches - an unusually low figure indeed. There was no snow whatever during these months.

The Temperature of Jany and Feby (first half) was in general much below the average. and characterised by an abrupt & Enormous fall (and subsequent rise) about the middle of the month. (Jany). Some unusually

Temperature Chart for November 1894.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	56	60	60	58	59	56	54	53	50	50	52	53	49	46	48	48	50	49	51	47	57	49	56	58	54	53	49	48	50	52	
	34	52	53	51	45	46	44	45	43	45	40	38	37	37	40	38	40	39	37	41	40	39	44	45	49	45	43	38	39	39	

70° 65° 60° 55° 50° 45° 40° 35° 30° 25°

Temperature Chart for December 1894.

Dak	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	47	48	46	45	49	49	44	46	47	47	50	51	52	56	53	53	50	49	47	45	46	48	47	52	47	51	51	43	50	48	37
	36	30	28	30	20	25	33	33	30	27	40	45	46	47	47	40	32	30	37	37	34	34	33	36	39	40	37	35	36	32	28

60° 55° 50° 45° 40° 35° 30° 25° 20° 15°

low temperatures were recorded — the lowest in fact for 50 years. The "Diurnal Variatn was not extensive; 40° F was noted on only one occasion in Jany and on 3 ors Feby — the average being about 30° F as in Nov. From the 9th Feby the temp^re gradually and steadily rose and a moderately high register was reached and during the rest of the winter — maintained The Wind during Jany & Feby varied much both in force and direction. In the first week of both months strong E & N.E. winds prevailed; during the remainder of Jany we were strong cold and Easterly on a good many occasions.

The Rainfall (entirely in the form of Snow) was far above the average in Jany - (5 inches). The amount of fall steadily increased till the end of 3rd week when it began to subside.

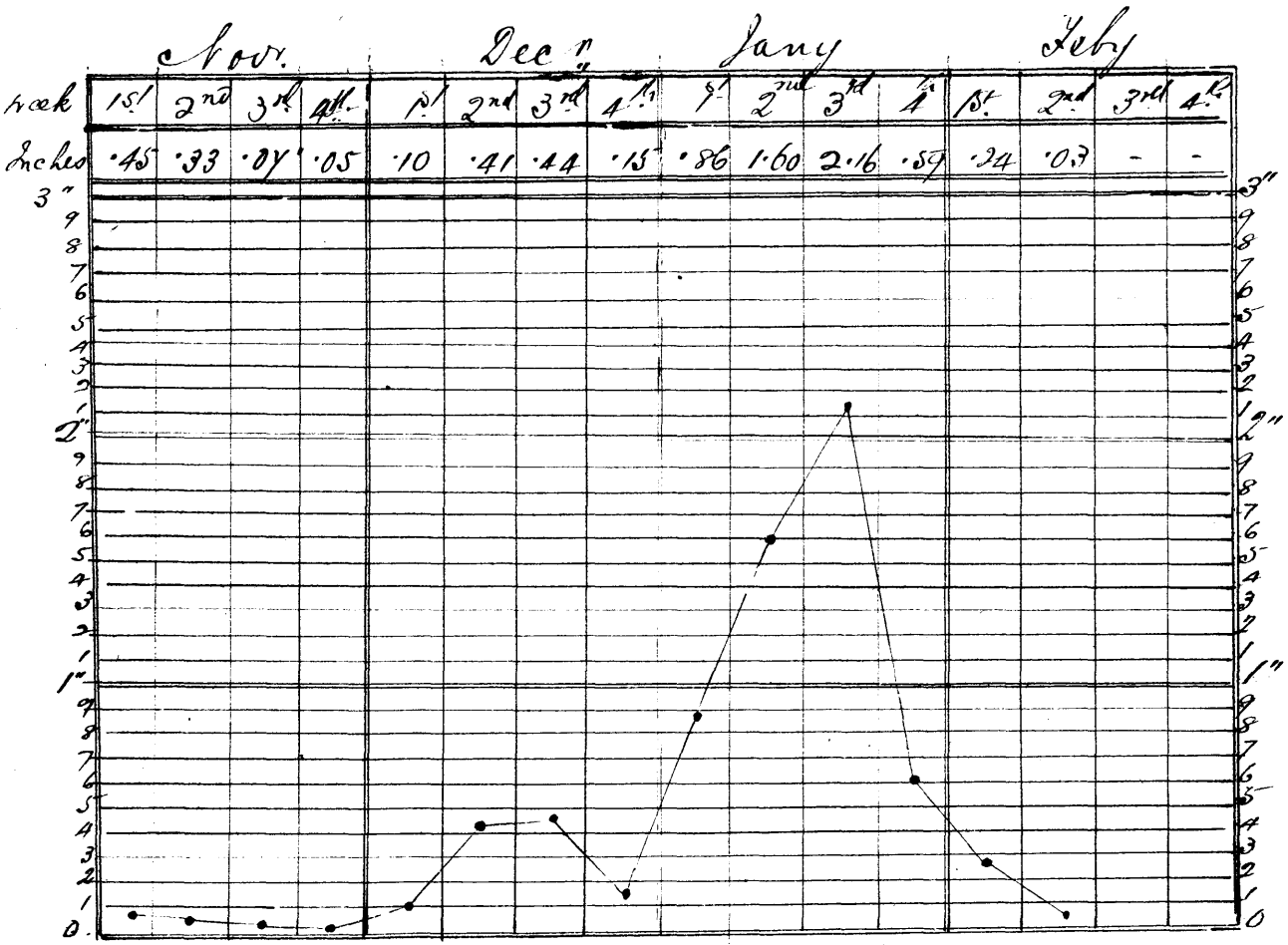
The lobar cases were twice as numerous as the catarrhal or Lobular ones and I have considered them together not because I believe they are diseases pathologically akin but simply from their occurrence at and during the same time.

For the sake of perfect accuracy, however, I have here stated the number of Lobular cases separately although as will be seen their inclusion with the lobar cases would not have affected the conclusions arrived at - Catarrhal & Sporadic Lobar Pneumonia would seem to be similarly influenced by weather conditions -

Relation of the different Meteorological Elements to the Pneumonia Incidence.

Wind. During the 2nd week of Nov. (the wind being on 3 successive days from the N.W.) 5 cases (3 lobular*) took origin. In the remaining fortnight when the wind was generally in the S or W. (only on 2 occasns E & N.) 5 cases were met with (1 lobular) During the first 3 weeks of Decr 2 cases (1 lobular) were noted the wind being as a rule W or SW. In the last 6 days (wind N W on 4 occasions) 2 cases presented themselves. Jany was ushered in by strong cold winds from the E. NE & N. for over a week during which time 7 cases (3 lobular) were met with and during the latter half of the month (the wind on 9 occasions being N or E.) 5 cases (2 lobular) came under observation. In the first part of Feby the wind was invariably from the

Rainfall Chart.



E or S.E. and 4 cases (all lobar) were noted after the 9th the wind was mainly W. or S.W. and accompanied by a rising thermometer and no further case of P. was met with.

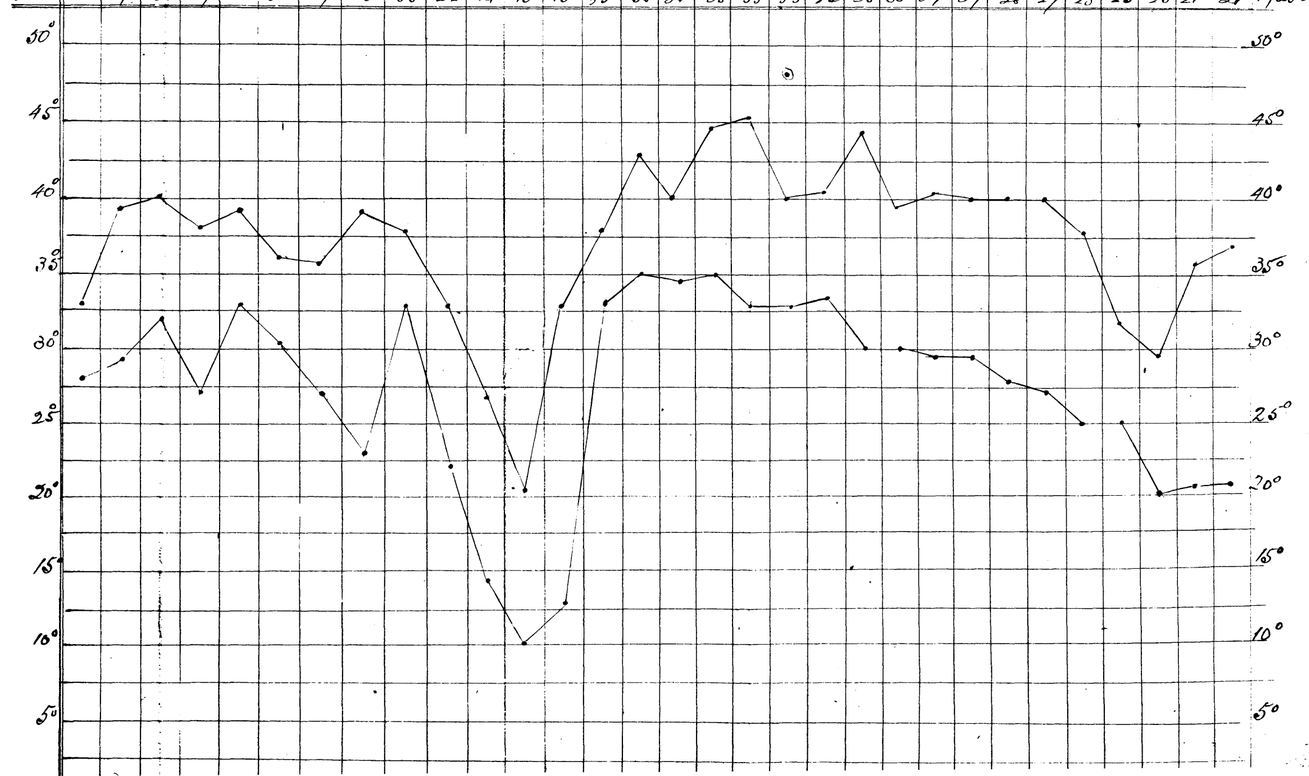
Rainfall Nov. and Dec. had an exceptionally low Rainfall yet in these months (especially the drier-Nov.) Pneumonia was abundant. In Jany with an exceedingly high Rainfall - or rather Snowfall - a still greater prevalence was experienced and no abatement in the number of cases was appreciated as the rain or snow fall declined towards the end of the month and in the first week of Feby.

It is noteworthy, however, that in Jany. the "Frequency curve" of Pneumonia rose - pari passu ~~in~~ almost parallel with the "Snow Fall curve", attaining its height in the 3rd week when the snowfall was greatest.

Temperature. During the first half of Nov. - the temp. being fairly high and steady - with

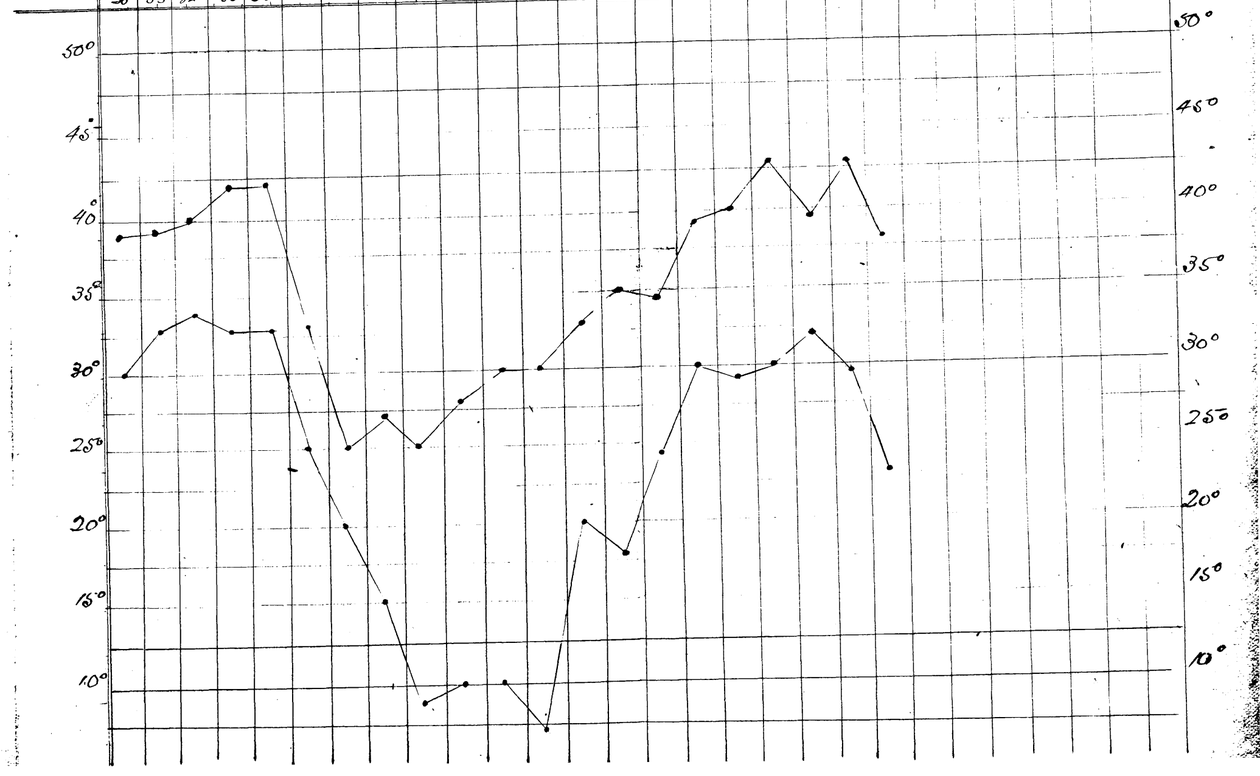
Temperature Chart for January 1895.

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Day	33	39	41	38	39	37	36	39	38	33	27	21	33	38	43	40	44	46	40	41	44	39	41	40	40	40	38	32	29	36	38	Max.
Night	28	29	32	27	33	31	27	23	33	22	14	10	13	23	35	34	35	33	33	34	30	30	29	29	28	27	25	25	20	21	21	Min.



Temperature Chart for February 1895.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	39	39	40	41	42	33	25	27	25	28	30	30	33	35	34	39	40	43	39	43	35
	30	33	34	35	33	25	20	15	8	10	7	14	20	18	24	30	29	30	32	29	23



a moderate Diurnal Variation (20°F to 25°F)
4 cases (3 lobular) came under observation.
During the 7 days (11th to 20th) temp.
at its lowest for the month but fairly steady
4 cases (1 lobular) were recorded; and in
the last week — temp. low and diurnal
variation extensive — 3 cases.

In Decr the temp. was during the first
two weeks generally on the ascendant. and
no case was met with till the end of a
pretty considerable but gradual fall (20°F)
when 3 cases (1 lobular) appeared — followed
during the last 4 days (temp. very fluctuating
and on the decline generally) by other 3 cases

In the first 10 days of Jany — temp. very
low but steadily or gently falling (rapid
after the 9th) 7 cases were met with (3
lobular) No case was recorded during
the exceedingly cold period between 9th
& 14th the Diurnal Variation being at the

"Wind- it would seem is favourable to the production of Pneumonia chiefly if not altogether when the direction is Northerly or Easterly". Sturges op- cit. pp 297

time very slight- one case was met with on the 11th (temperature falling) and four cases (3 bolular) between that date and the end of the month - temp.re during the time being somewhat fluctuating with a falling tendency (especially after 26th) and the diurnal variation considerably increased.

During the first 8 days of Feby - temp. very low and steadily declining. 4 cases were met with - From this date - when the temperature steadily began to rise and the diurnal variation to diminish - no further case was recorded -

Conclusions

Wind. The cases were most frequent in cold weather say of a mean temperature of 35°F - when the wind had an E. N or NE. direction - as during End of Dec.r, Jany and Feby.

But there was a considerable number

"Any Considerable amount of rain has a tendency to heighten the Bronchitis rate but has no such tendency as regards the Pneumonia rate." Stirges. op cit 295.

"As regards the influence of Temperature it would seem that cold does not necessarily affect the Pneumonia rate" Sturges op cit pp 293.

"The favouring conditions (for the production of P.) are low and falling temperature" Dr. Seibert Amer. Journal of Med Science - Jany 1882.

"Diurnal Variations are followed by a rise or fall in the occurrence of P. according to the meteorological state then prevailing." Seibert. op cit Quoted by Sturges. pp. 302

of cases associated with a S. or W. wind (hovy) when the temperature was far from low.

Rainfall. In regard to the rainfall the cases did not appear to observe any fixed relationship. They were frequent alike with a low as with a high rainfall but during the period when the snow lay deepest and with the surface cold and damp from repeated showers the pneumonia outbreak reached its height.

Temperature. The cases were most abundant when the weather was coldest particularly if the thermometer was tending to fall still lower. They were also pretty frequent during the milder weather with a similarly inclined thermometer when the diurnal variations were extensive (above 25°F on an average). On the other hand they were less frequent if not altogether absent when the temperature was fairly

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high and the diurnal variations moderate in extent (under 20° F.)

It will be seen that these conclusions agree more or less closely with the opinions of two of the highest authorities on the subject although in some respects they are at variance with them. It is perhaps too much to expect that every series of meteorological observations will tell exactly the same story although I am confident that as the number of carefully prepared records increases the disparities which now present themselves will gradually disappear. But I am disposed to agree with Seibert that the "question (of the precise connection between the weather and pneumonia) can only be thoroughly and scientifically decided by the collation of a large number of cases

within a comparatively short space of time where the meteorological conditions have been exactly noted from day to day and in relation to one another."

It is hoped that in this regard the foregoing record of even an inconsiderable outbreak may have justified its "raison d'etre".

List of

No	Name	Age	Variety	Lung affected.
1.	Scott.	2 9. years	Lobar.	Left
2.	Stokoe.	4½ years	Lobular.	Both.
3.	Walton	11 mos.	"	"
4.	Robb.	2 years	Lobar	Left.
5	Steele.	5 years	"	"
6.	Clark	3½ years	Lobular	Both.
7.	Stoddart	8 mos.	Lobar	Left.
8.	Turnbull.	12 years	"	"
9.	Simpson	18 mos	"	"
10.	Thomson.	35 years	"	"
11.	Walton.	8 mos	"	"
12.	Smiles	3 mos	Lobular	Both
13	Taylor.	4 years	Lobar	Left.
14.	Green.	3 years	"	"
15.	Hall	3 years	Lobular	Both
16.	Pegg.	12 mos	"	"
17.	Stevenson.	2½ years	Lobar	Left

the Cases.

Situation (if known)	Date of Seizure	Duration of Attack	Results
Base	Nov: 8th	7 days.	Died.
Bases	" 9th	10 days.	Recovered.
"	" 13th	12 days	Died.
Base	" 13th	7 days	Recovered.
"	" 14th	9 days	Recovered.
Bases	" 14th	14 days	Recovered.
Base	" 18th	7 days	Recovered.
"	" 20th	9 days	Recovered.
"	" 27th	7 days	Recovered.
"	" 30th	7 days	Recovered.
Apex.	Dec: 20th	13 days	Died.
Bases	" 31st	5 days	Died.
Base.	" 28th	5 days	Recovered.
"	" 30th	7 days	Recovered.
Bases	Jany 2nd	16 days	Recovered.
"	" 4th	9 days	Recovered.
Base & Middle Lobe	" 5th	7 days	Recovered.

List of

No	Name	Age.	Variety	Lung affected.
18.	Hoslop.	27 years	Lobar	Left.
19.	Pigg.	3 years	Lobular	Both
20.	Wigham.	3 years	Lobar	Left
21.	White	4½ years	"	"
22.	Armstrong	18 years	"	"
23.	Smith	19 years	"	"
24.	Wright	13 mos	Lobular	Both
25.	Phillips	18 mos	"	"
26.	Welburn	3½ years	Lobar	Left.
27	Eggleston.	2 years	"	"
28.	Lee.	1½ years	Lobular	Both
29.	Burke.	1½ years	Lobar	Left.
30.	Wilson	36 years	"	Both.

the Cases cont'd

Situation of Lesion.	Date of Seizure.	Duration of Attack	Result.
Base & Middle Lobe	Jany 6th	13 days	Recovered.
Base.	" 6th	4 days	Recovered.
Base & Middle Lobe.	" 7th	4 days	Recovered.
Base.	" 8th	4 days	Recovered.
" & Middle Lobe	" 16th	9 days	Died.
Base.	" 19th	4-21 days	Recovered.
Base	" 20th	8 days	Recovered.
"	" 23rd	13 days	Died.
Base.	" 29th	5 days	Recovered.
"	Feby 2nd	9 days	Recovered.
Base	" 2nd	8 days	Died.
Base & Middle Lobe	" 7th	5 days	Recovered.
Base	" 9th	9 days	Recovered.

Part II

Description of the Cases.

General Remarks. All the cases were of the "simple" or "ordinary" type and – in origin and distribution – of the "Sporadic Variety". Evidence of a contagion there was none; so far as could be made out no case had any causal connection with any other case. Nor was there any conspicuous likeness in the clinical features of the cases themselves – no indication in short – of a "specifically infective cause imprinting on the malady a peculiar character".

Several of the cases might have been termed "Sthenic," while two in particular (Nos 11 & 18) were decidedly "asthenic" in character. A few were exceptionally mild and recovered almost unaided; others were exceedingly severe

and passed to a fatal issue in spite of every means employed to save them.

Analysis of the Family & Personal Histories of the Thirty Cases.

1) Family History. It is remarkable that in only 8 cases out of the 30 were both parents described as "healthy." The mother was "delicate" or "phthisical" in 9 instances and the father in one. A parent had died of phthisis in 2 cases and a brother, sister, uncle, or aunt in 6 cases. A parent, brother or sister had had Pneumonia in two of the cases and Acute Rheumatism or Quinsy in three.

2) Personal History. In 8 instances only was "good previous health" mentioned. The patients were described as "anaemic" "weakly," "weedy," "puny" &c. in no less than 14 cases and 10 had previously

suffered from Bronchitis (6) Catarrhal Pneumonia (3) and Lobar Pneumonia (1).

Age-Incidence. Of the lobar cases only 5 were adults. One of the others was 12 years old and the remainder (11) all under 5 years - six of them being infants from 3½ years downwards.

Brief Review of the Clinical Histories of the Cases

Case 1. The invasion was sudden in the great majority of the cases and ushered in by a rigor or series of rigors. Among the infantile cases a vomiting fit was perhaps the earliest sign of all in 8 cases. Premonitory Symptoms were conspicuously absent. None of the children had the convulsion fit so common at the onset of pneumonia and other febrile affections. In 3 adults cases a

* "It is sometimes difficult or impossible in particular instances to distinguish, whether from physical or other signs, the one from the other." Sturges. Op. cit pp 230.

certain amount of malaise, weariness and general aching was complained of - "a feeling", to use their own words, "as if something was hanging on them". Among the 10 catarrhal cases (children) the onset was so abrupt and acute in cases as very closely to simulate the croupous form. Especially was this the case in No. 28 when the inflammatory process commenced in the one base and only after the lapse of some days was appreciated in the other lung. In two or three instances so close was this resemblance to the Croupous form that I had to wait till nearly a week had elapsed before being perfectly satisfied as to which form I had to deal with.*

Local Symptoms.

Pain. The usual submammary stabbing

No. 22

DISEASE.

Lobar Pneumonia

Notes of Case.

Name { Thos Armstrong

Age 18 years.

Diet Milk, Bovril &c.

Case ~~Book~~ *No.*

Had pneumonia 10 years ago- After his usual wash on returning from the pit felt shivery & aching all over. Went to bed & had several rigors- Pain in side, crept. tubular breathing over left base presented themselves before 3rd day. Urine had to be drawn off twice daily from 3rd day- Dyspnoea became very alarming on 7th day and dry cupping was tried over affected side with some relief. Stabbing pain in the praecordial region was complained of on 8th day: died suddenly on the 9th. pericarditis suspected-

Day of Dis.	2nd	3rd	4th	5th	6th	7th	8th	9th
Pulse.	120	120	120	132	126	132	132	140
Resp.	30	36	40	40	36	36	50	60
Date.	1							

Date of admission.

Result Fatal-

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pain was complained of in all the adult cases and whenever the children were old enough to make their sensations understood. Among the infants it was the usual experience to have them wince or scream when auscultated over the affected side. In 2 cases (No. 18 & 22) the pain most complained of was referred to the back (lumbar region) and legs and was believed to be rheumatic.

Dyspnoea In both the lobar and catarrhal forms dyspnoea was an early and prominent symptom. In two cases (No 18 & 22 both fatal) it amounted to orthopnoea. In all the catarrhal cases (children) dyspnoea was perhaps the most distressing symptom while in the infantile lobar cases it was never present to any great degree.

No. I

DISEASE.

Lobar Pneumonia.

Notes of Case.

Name { Robert Scott

Age 28

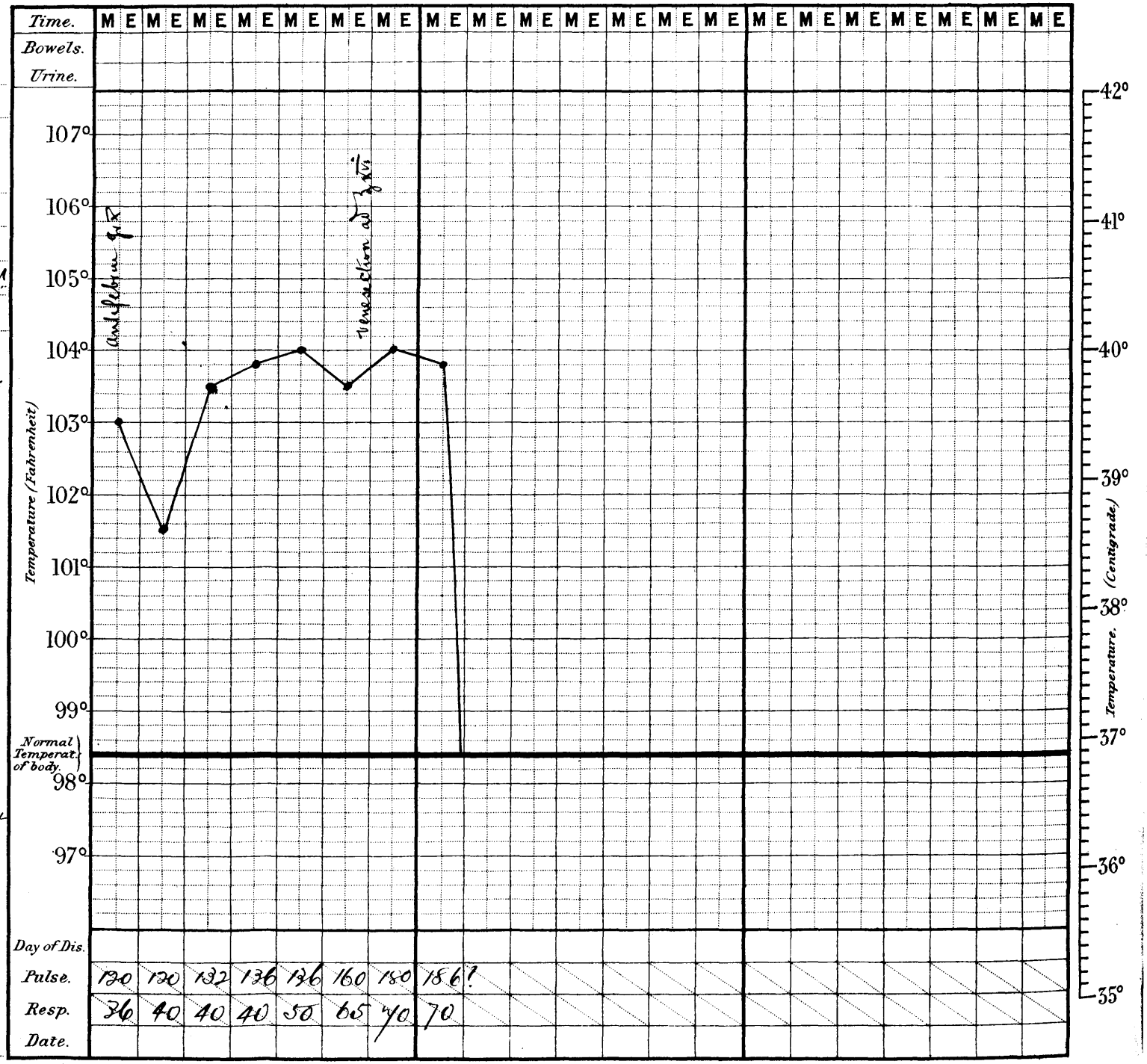
Diet Milk, Beef tea &c.

Case Book No.

A very powerful man but somewhat intemperate. Has had slight cough with haemoptysis for several weeks back. Has been about feeling very unwell but did not take to bed till 2nd day. Serious case from very beginning. Dyspnoea the most trying symptom. Venesection to ℥xvi gave only temporary relief. Succumbed to the apnoea & heart weakness. Sputum during last 2 days past up in rusty masses like black-currant jelly.

Date of admission.

Result fatal.



Entered at Stationers Hall. Printed and Published by Wodderspoon & Co., 7 Serle Street, Lincoln's Inn. Gould's Clinical Chart.

Cough was not specially troublesome except in the catarrhal cases and in two of the fatal lobar cases.

Sputum was always adhesive glairy and tinged with blood. In was characteristically rusty in 9 lobar cases and resembled "black currant jelly" in the fatal case No 1.

Pulse & Respiration-Ratio was always greatly disturbed especially in the catarrhal cases. In case No 18 the pulse never rose above 80 per minute. In the fatal cases it was "thready" and "running" for at least 36 hours before death. Only in one case when a pulse of this character was noted did the patient recover.

Pyrexia. In none of the cases did the fever run at all high. In No 29 (child) it was 105°F six hours after the onset

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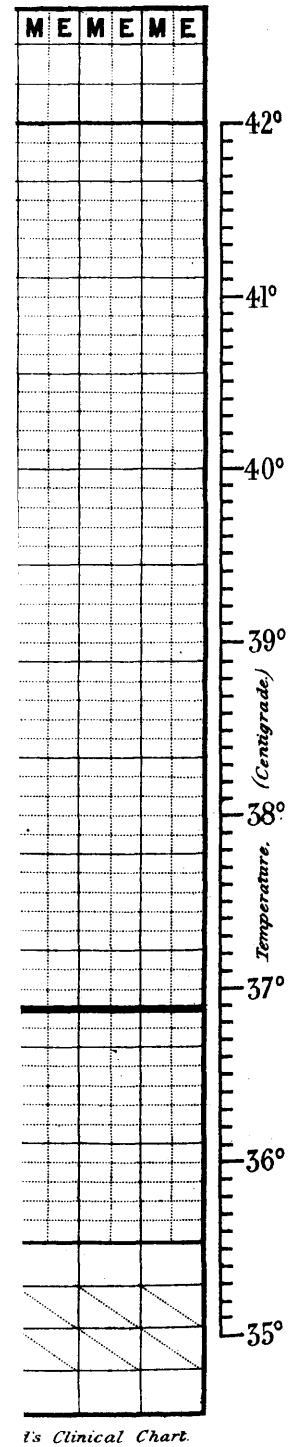
but rapidly fell under treatment. A temperature of 103·4 °F was recorded for several days before the fatal termination in No. 1 but in the other fatal cases it never rose above 102·5.

Crisis & Duration of Pyrexia. In the lobar cases the fever lasted as follows.

3	Cases	5 days.
10	"	7 "
5	"	9 "
1	"	11 "
1	"	13 "

In the lobular cases the pyrexial period varied from 5 to 8 days

The majority of the lobar cases terminated in a critical fashion with an abrupt fall of temperature to the normal. In two instances, however, a gradual fall was observed, associated with one or



t's Clinical Chart.

No 11

DISEASE.

Lobar Pneumonia (apical)

Notes of Case.

Name Jane Walton

Age 8 mos.

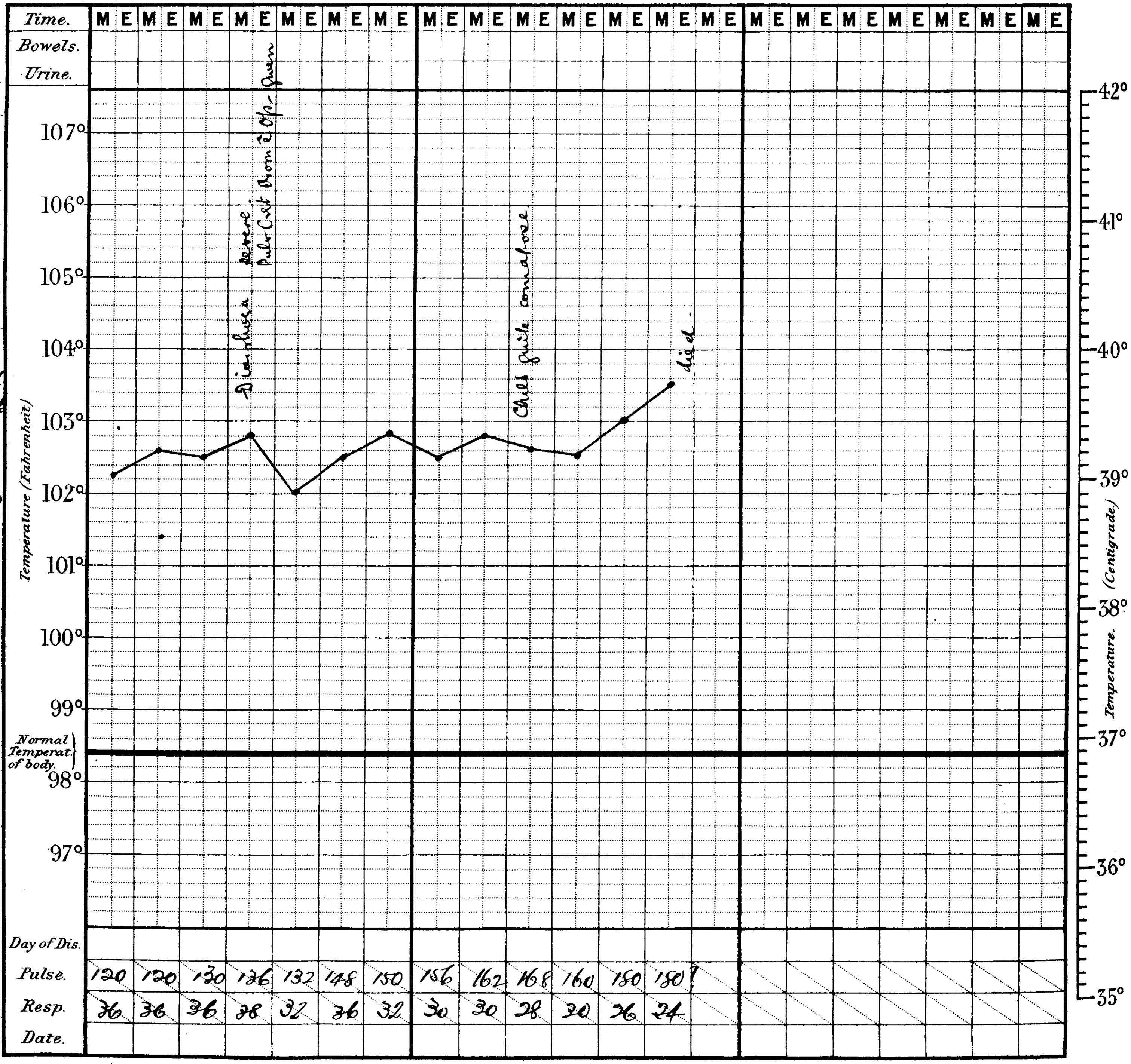
Diet Milk, Beef tea &.

Case ~~Book~~ *No.*

Pale flabby child – previous health good. Slight cough for week before taking really ill. "Woodeny" dulness of affected lobe very pronounced. Diarrhoea a complic.? Was perfectly comatose for 3 days before death.

Date of admission.

Result fatal.



Pulse.	120	120	130	136	132	148	150	156	162	168	160	180	180?
Resp.	36	36	36	38	32	36	32	30	30	28	30	36	24

more pseudo crises. In all the lobular cases that recovered the temperature fell slowly.

Herpes. was absent in all the fatal cases of both varieties. It was observed 6 times in all (4 lobar and 2 catarrhal)

Typhoid symptoms E.g. dry brown tongue, stupor, muttering delirium twitching and tremors only showed themselves in Case No 18 This man's tongue (after the worst was over) simply "dripped" with blood for days.

Lung affected. In the lobular cases both lungs were affected in every instance but in 3 cases the inflammatory process first invaded one lung and subsequently passed over to the other. Of the lobar cases only one was "double" and one "apical." All the others were "single pneumonias" of the left base.

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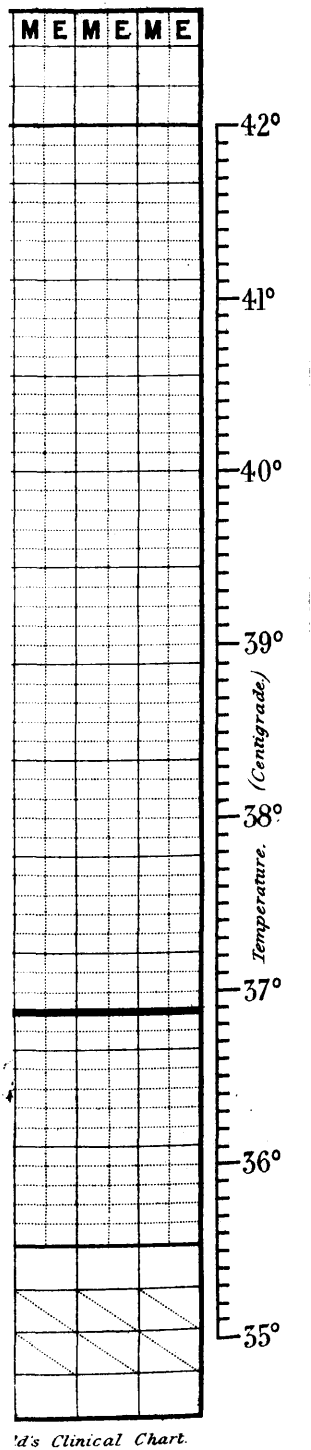

'd's Clinical Chart.

No. 25.

DISEASE.

Lobular Pneumonia.

Notes of Case.

Name { John Phillips

Age 2 years.

Diet Milk, beef tea &c.

Case ~~Book~~ No.

A puny pale faced child has had bronchitis on 2 previous occasions. Been ill from cough for some months till taken & took rather suddenly ill. In 24 hours signs of lobar Pneumonia presented themselves & child was seen as fast as could be. Dyspnoea was the gravest symptom and dry cupping was resorted to several times. Heart weak: viss excessive towards end. Brandy & Strophanthus being unsuccessful in rallying & in collapse. Died of exhaustion & apnoea.

Date of admission.

Result fatal.

Time.	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E	M	E
Bowels.																																				
Urine.																																				
Day of Dis.																																				
Pulse.	130		130		132		130		130		182		216		168		180		216?																	
Resp.	50		60		60		60		50		60		60		60		66		70																	
Date.																																				

Temperature (Fahrenheit)

107° 106° 105° 104° 103° 102° 101° 100° 99°

Normal Temperat. of body. 98° 97°

Died.

42° 41° 40° 39° 38° 37° 36° 35°

Temperature. (Centigrade)

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Physical Signs. (1) Stokes' Stage. The cases being chiefly among colliery club patients who are by no means backward in requisitioning their doctors services I saw them all within a few hours of their onset. Yet although sharply on the "qui vive" I must confess that I was not convinced that I recognised in any of my cases what has been described as Stokes' Stage. In cases 18 & 26 I find it noted that I succeeded in diagnosing correctly the exact location of the disease within 12 hours of its onset and that in the absence of any unilateral pain, tenderness, râles or other physical signs of an unequivocal character likely to assist one. But I can only regard these as "lucky guesses": for although in the cases in question there was some ill defined abnormality in the breath-sounds (to my

* Stokes' Stage is seldom mentioned now in the text-books and only a few special works on Lung Diseases contain any reference to it. It is briefly noticed in Roberts' "Theory & Practice of Medicine" pp 915 & 947.

ear) yet it was so vague and insignificant that had I not been looking for something of the kind I should have missed it altogether. However, the pre-crepitation stage (Stokes') characterised by rough, coarse breathing I cant say I ever clearly recognised.*

Crepitation was detected within 48 hours of the onset in all the adult cases and (with 5 exceptions) in all the infantile ones. In these 5, owing probably to the great rapidity and shallowness of the respiratory movements, it was missed altogether. Indeed, speaking of the infantile cases generally, I did not find the Crepitant Râle such an invariable and helpful sign (from the diagnostic point of view) as the bronchial or tubular breathing which was by far the most prominent auscultatory phenomenon in these cases although occasionally

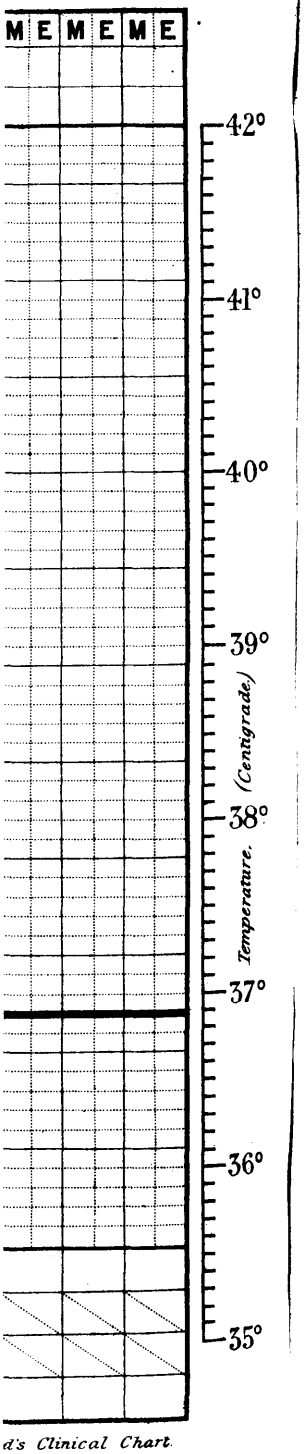
"The latency or delay of the proper physical signs contributes to the obscurity of diagnosis in the pneumonia of children." Sturges op cit. pp 237.

very much delayed in its appearance *

Dulness on percussion in a greater or less degree was made out in almost every case about the 3rd day. In several of the infantile cases the dulness amounted only to a mere heightening of the percussion note - a slightly diminished resonance - but in Case. No. 11 it was of the most "woodeny" character I have ever listened to.

In most of the infantile cases it was late in its appearance and speedily passed off - in 3 cases I was unable to detect it till after the crisis

Bronchial & Tubular Breathing were made out in every case over the affected area. In No 18 it was heard at the angle of the scapula 24 hours after the onset but as a rule it was not made out till the 3rd day. Like the dulness - tubular and bronchial breathing appeared



d's Clinical Chart.

No. 18.

DISEASE.

Pneumonia (Lobar)

Notes of Case.

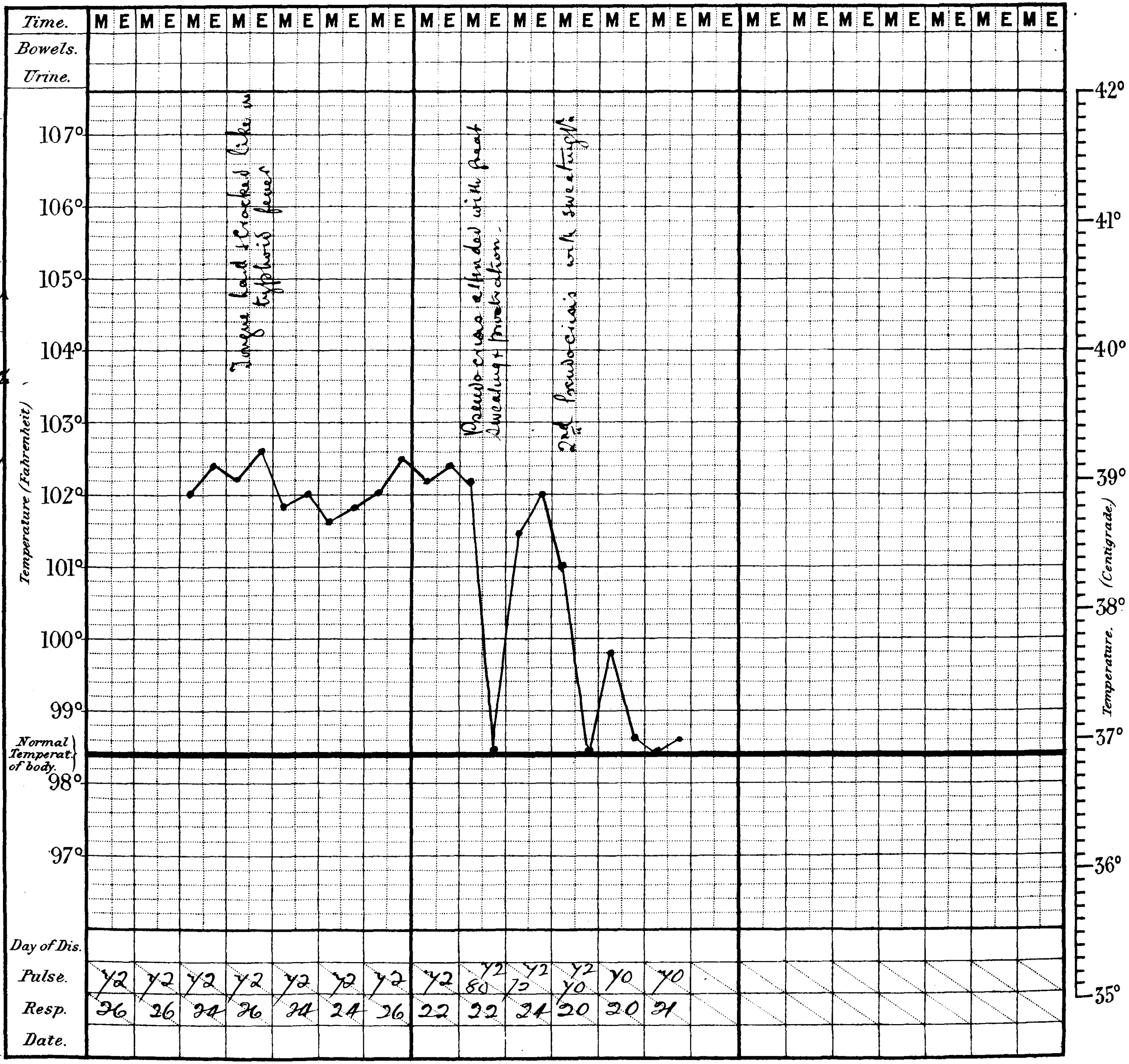
Name John Heslop.

Age 27

Diet Beef tea milk eggs ...

Case ~~Book~~ *No.*

Thin spare man good previous health. Phthisical family history. Onset of disease slow. Pains about back & leg complained of. Lung signs well marked. Bloody sputum. Two pseudo crises with great sweating & prostration. Good recovery.



Date of admission.

Result recovered

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somewhat later among the young cases but were usually made out before the crisis

Increased Vocal Resonance could usually be distinguished in the adult cases and in 3 instances Pectoriloquy and Ægophony were distinctly heard.

Complications were unusually few. (1) Pleurisy (with exudation) presented itself in Case #23 on the fourth day but the patient made a good recovery without aspiration. (2) Pericarditis was suspected in #22 some 24 hours before death but owing to the patient's condition a thorough examination could not be made. (3) Retention of Urine occurred in one fatal case calling for the frequent use of the catheter although just before death the patient was able to micturate naturally. (4) Diarrhœa was present

in 7 of the young cases and in two required special treatment.

Sequelae. In case № 10 resolution went on very slowly and a month after the crisis signs of a pulmonary abscess presented themselves with expectoration of a large quantity of purulent matter. The localised coarse crackle and amphoric breathing passed away after a time and the man regained his usual health.

Petechial Rashes were noted in cases 1 & 2 shortly after the crisis. In the first it was very profuse, the spots being arranged like clusters of black currant berries on the abdomen and thighs.

Fatal Cases. The cause of death was

In 3 cases "Apnoea & Exhaustion"
" 3 " "Collapse & Exhaustion"
" 1 " "Cardiac Failure."

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Notes on the Treatment. There was no "routine" treatment measures being used according to the indications of the individual cases. It was found that the children did well on some simple diaphoretic & expectorant medicine so long as they could sleep well and take plenty of support. Poulticing was usually practised and seemed to benefit by soothing pain &c. In one instance (10) 4 leeches applied over the affected side relieved pain when other means had failed. The temperature was never so high as to need special treatment. In adults antipebrin & antipyrin (when administered) sufficed to keep the fever within bounds. Heart weakness was combated with fair success by Stimulants, Bovril, Strong Coffee, Digitalis, Strophanthus,

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Strychnine and Iron. Dyspnoea was somewhat relieved temporarily by Dry cupping, Nitro Glycerine and (in one instance) by Venesection ad ℥xvi but it must be admitted that in every case in which these measures had to be resorted to the patient ultimately succumbed.