In the Degree of M.D.

Thesis

Acute Oroupous Pneumonia

in Children.

By

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M.B. & C.M.

1893.
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Stirling District Asylum
Tarbert 24.5 March 1893

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Acute Croupous Pneumonia as it occurs during the early years of life differs in certain important respects from the disease which is met with in the adult.

The subject was brought under my notice in 1890-91 while I was House Surgeon to the Murnal Children's Hospital in Berkendehed, and in the present paper I propose to briefly consider Acute Croupous Pneumonia in Children, indicating the way in which the course and symptoms of the disease are modified in the child.

In the child as in the adult many varieties of Pneumonia occur, but I shall confine myself to the affection usually known as Acute Lobar, Croupous, or Fibrous Pneumonia, and shall include all other lung inflammations, such as Catarrhal or Broncho-Pneumonia, Pneumonia from infective emboles as met with in Pyaemia; Pneumonia from the presence of foreign bodies in the air passages, and that due to the inhalation of irritants, e.g. dust, various gases, *Sommerskodt* produced alkaline.
Pneumonia to be considered here may be briefly defined as an inflammation of the alveolar portion of the lungs, characterized by fibrinous exudation into the air cells. The symptoms and physical signs of the disease were well marked sharply differentiated from the other respiratory affections, but it must be confessed that in children cases are not infrequently met with where it is extremely difficult if not impossible to say definitely which variety of pneumonia is present.

It is during infancy, where Pneumonia is of frequent and frequent recurrence, that this difficulty specially arises:

and let it be noted that a solution of the inflammation which he believed to be true Pneumonia by injecting Formalin into the air passages. See Johnstone in Jenner's "Cyclopaedia," also Wilson Fox's "Atlas of Path. Anat. of Lungs."

2 Traumatic Pneumonia, see Robert Heneine; also Wilson Fox in Reynolds' "System"
question is often by no means easy even when the case has come to an autopsy. For instance, one meets with cases of adult Pneumonia during the first year of life which resemble the groupous variety in that a large extent of lung becomes involved and the illness terminates by crisis. On the other hand they appear to resemble Cattle or Pulmonary Pneumonia in their insidious onset, apparent origin in an ordinary Bronchitis, as well as—broadly speaking—in their physical signs and in their tendency to end fatally.

After death these things do not exhibit the characteristic lesions of Bronchial Pneumonia, but neither do they present the typical appearances of the groupous form as met with in adults. They differ from the latter mainly in being still somewhat spongy, and in the fact that the lobules are affected in a varying degree which renders their outlines more distinct.

These cases are puzzling, and it is difficult to see how they can be explained except by supposing that, although groupous Pneumonia is usually distinct from the Cattle or adult variety, we sometimes
...with mixed forms, even pathologically. This has been denied by many authorities, including Steiner and Zimmerman but it has been abundantly confirmed by Henoch and subsequent writers. Henoch describes the case of a boy with Pleuro-Pneumonia of the whole of the left lung along with Bronchitis, and in the right lung a small patch of Broncho-Pneumonia.

Ashley and Wright have listed several instances in which the post-mortem disclosed typical fibrinous Pneumonia in one lung, and lobular Pneumonia in the other, or even both varieties in the same lung.

The question is difficult to decide in the post-mortem course, there can be little reason for wonder if at the bedside we are sometimes unable to distinguish with certainty between the two forms.

Even in Hospital, where the Temperature pulse etc. are regularly recorded and where there is every facility for complete examination and constant observation, the difficulty is not infrequently great; but it is far greater in ordinary practice.

where the child can seldom be seen
often than once in the twenty-four hours,
and when the physician has only the
too-often confused and imperfect report of the
mother or nurse as to the condition of the
little patient between his one visit and
the next.

Even so experienced an observer as Koch
is sometimes mistaken. He relates how
he had some cases of Pneumonia which
appeared to be Catarhal and were
regarded as such until they terminated
by crisis and recovery within 5 or 8 days.

And, theoretically, it is difficult to see
why mixed forms should not occur.
Bronchitis in the opposite line is by no
means uncommon in Croupous Pneumonia
and there seems to be no reason why this
Bronchitis should not extend, as it is so
appt to do in children, to the Bronchioles
and terminate in a Broncho-Pneumonia.

The course of the two diseases is usually
distinct enough, but this is not always the
case. In some instances, as in the
forms of Croupous Pneumonia known as
"Pneumonia Migrans", the spread of the
disease by small gradual advances
closely resembles the extension of a
Catarhal Pneumonia which creeps over
The chest from one group of lobules to another. Also, in these latter rare cases of Croupous Pneumonia which terminate gradually or by lysis the resemblance of the course of the illness to the interstitial form may be very close indeed.

It is as I have said especially, though not because exclusively, during infancy that Croupous Pneumonia tends to be atypical and therefore difficult to recognize. After the first year and particularly after the third or fourth, the disease resembles more closely the forms which occur in the adult, and at five or twelve years they are practically identical.
Astrology. Frequency as to Age.

Acute Lobar Pneumonia is by no means rare at any period of childhood. Up to the end of the 2nd year it is rarer than Broncho-
Pneumonia; after the third year it is more common. The disease is of
very frequent occurrence between the ages of three and twelve.

Thus in 88 cases out of 124 total

in 19 it occurred between the ages of 1½ and 3 years.

32

37

6

12

3

6

And in 93 cases mentioned by Goodheart,

82 were under 6 years, 57 of these were

under 2 years, while 31 were between

2 and 5.

1. "Lectures on Children's Diseases"

2. "Diseases of Children"
Arthology. (Continued.)

The question of the Pathology of Pneumonia is one of much obscurity as well as of much interest, but cannot be fully discussed here. One or two points may, however, be noticed.

As is well known, two views are held as to the essential nature of Pneumonia. According to one view, Pneumonia is primarily an inflammation of the lung substance, attended as in the case of other local inflammations, by a greater or less degree of dyspnea and constitutional disturbances; while those who held the other and more modern opinion regard Pneumonia as an acute infective disease due to a specific poison, and consider the pulmonary lesions as merely local manifestations of a general disease.

The balance of evidence would appear to be against the first theory, though the matter cannot be regarded as in any way settled. There are, however, certain well-ascertained facts in the production of Pneumonia which may be briefly mentioned.

Exposure to cold seems to be an immediate or exciting cause in a large number of
cases, but different Authors give very varying accounts as to the frequency with which this factor can be traced.

Jüngens (in Jernuus's Cyclopaedia) states that "catching cold" was clearly the exciting cause in:

| 45 cases out of a total of 305 reported by Grisolle. |
| 10 - 186 - Jernuus. |
| 4 - 212 - Griesinger. |

Thus according to these three authorities the frequency with which the disease was due to chill is variously estimated at 1.95%, 5.3% and 1.8%.

As to the time which elapsed between the chill and the appearance of the prodromata out of 33 cases in which the point was ascertained, in 18 the symptoms commenced during the exposure or within a few minutes; in 11 within 2 or 3 hours; and in 4 they were deferred for 1 to 2 days.

The same Author has collected much interesting information as to the occurrence of Pneumonia in various parts of the world, during different seasons of the year, the influence of the patient's occupation etc.

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(1) See also Grisolle, Seiber, and numerous other observers. (2) Jüngens loc. cit.
In the second place the disease would appear to be not infrequently caused by defective hygienic surroundings, such as bad drainage & Pythogenic or sewer-gas Pneumonia.

Instances of this are of frequent occurrence. For example, in a recent paper Dr. Campbell clearly traces an outbreak of Pneumonia in Garlands Asylum to the disturbance of the foundations of some old peggeries which were in process of being razed.

A very striking instance, where sewer-gas seemed due to actually cause the Pneumonia, occurred in a boys' school at East Sheen. Symptoms were developed in one boy within 24 hours, and in two others within 36 hours of their exposure to the incursions from a large sewer.

The recurrence of Pneumonia would also appear to be favoured by any exhausting or depressing conditions, such as starvation, alcoholism, excessive fatigue, mental anxiety and the like. Such conditions known do not appear specially to predispose to Pneumonia more than to other diseases – the acute specific fevers.

Aphthae re.

Pneumonia, as is well known, sometimes occurs in epidemics with a type more or less well marked. In some cases of these, the majority of cases were comparatively mild, but in others the type has been extremely severe and malignant, as in a parish in Iceland during the epidemic of 1863, where out of 24 patients 17 died. Very numerous instances have been recorded, especially in the Continent.

In some of them the evidence would appear to point to the conclusion that pneumonia may — probably under exceptional circumstances — be occasionally communicated by personal contact.

Striking illustrations of limited outbreaks, confined to a single house or family, are related by Dr. Patchett and Daly as occurring in this Country, and many others have been recorded by German, French, and American Authors.

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The attacks certainly predispose to a recurrence. This is a matter of everyday observation both in children and adults, and in this respect Pneumonia differs markedly from most of the specific fevers an attack of which confers a greater or less immunity.

Out of 175 cases quoted by Grisolle, 54 had had one or more attacks already—some as many as eight.

See Zinsser's Encyclopædia, art. Contagious Pneumonia.
The question of the relationship of Pneumococci to Pneumoniae must be regarded as still sub judice, for though at any rate two varieties of microbe have been described as occurring in the sputum, the tissue juice, or in the lung itself, it has yet to be proved that the decision really depends on one specific virus.

In 1882 Friedländer described a microbe which he had found in several consecutive cases and which is now known as the "Pneumococcus". He also described the "Pneumoviruses", or Friedländer's Bacillus. They occurred in the sputum and tissue fluid, and were also found in masses in the pulmonary alveoli and in the lymphatics. According to Dr. Robert Bright they are most numerous in the spreading border of the Consolidated area where the lung is congested but not yet hepatisation, and are not found if the stage of grey hepatisation has been reached. They were also found in normal saliva and nasal mucus and have been detected by Kiverd and others in the sputum of Bronchitis and Broncho-Pneumonia.
A microorganism of a different nature was described by Frasunek in 1887 and was called from its appearance the diploceccus Paramorio. The occurrence of this microbe has since been investigated by numerous other observers among whom may be mentioned Takamori (1883), Michaelbauer (1886), Marki (1888), Jamaleia (1888), and Stemberg (1889). Though it has been shown that this diplococcus is the most frequent of all organisms in the sputum and lung of Acute Paramorio, its detection is no proof that Paramorio is present, as the same organism has been found in ordinary saliva and nasal mucus, in the exudation of pleurisy, even apart from Paramorio, in Emphyema, in Peri- and Endo-carditis, in rheumatic in the sputum of Broncho-Paramorio, and in some other affections. It would certainly seem as if this microorganism were capable, under certain circumstances of exciting Paramorio, but it cannot be regarded as the specific cause of the disease in the same sense as, for example, such organisms as the
Bacillus Anthracis and the Gonococcus are related to Cutibacter and Gonorrhoea.

\[1\]

See Virchow's "Pathological Diagnosis" 1869, and Stokes and Coupland's "Pathology."
Morbid Anatomy.
The three stages of Pneumonia—Congestion, Red Hepatisation, and Grey Hepatisation—appear to occur in the child with much the same frequency as in the adult, and in most cases the appearances presented by the lungs are similar. Godbart, indeed, describes the lungs as differing from those of adults in that they are less solid and lack the characteristic dull granular or rough surface of the adult hepatised lung, but still the difference seems to be chiefly one of degree.

The uninflamed portions of the lung often present areas of collapse and compensatory emphysema, especially at the margins of the lobes, and a certain amount of Bronchitis is common.

Webb believes that all three stages co-exist more frequently in children, and that in them there is a greater tendency for a large extent of lung to become involved. From an analysis of 94 of his own cases and 40 others recorded by Grisolle in his "Traité de la Pneumonie", the same writer states...
That the third stage occurs in children in 56.3% of all cases, as compared with 72.5% in adults.
Portion of Lung Affected.
Perhaps the most usual course is for the disease to commence at the extreme base and extend upwards, but it may attack any lobe and spread thence in any direction. Both lungs may be attacked at once or in succession; the right lung however is more frequently affected than the left. Fig. 8, places the proportion of Right-sided Pneumonia over those of the left side at 6 to 3, and this agrees with the estimate formed by Giressew. He in 77 cases of Pneumonia at all ages occurring in Vienna, found the right lung affected in 52%, the left lung in 37%, and both lungs in 9%. He also quotes Frisolle's figures which were derived from various sources.

English, French & Scots: — In 50 cases: right lung 51%; left lung 29%; both lungs 18%. But this last figure Giressew thinks is certainly too high.

In all regards to statistics among children, Goodhart says that Pneumonia is probably equally common on the two sides. But it is difficult to be certain as to this as the signs of consolidation are readily transmitted from one side to the other. Especially at the root of the lung, and the signs are, besides, often insidious. In worst Cases Double Pneumonia was greatly more common than single, but his experience would appear to be quite exceptional, and other writers do not agree with him.
In Strechers 124 cases the disease was distributed as follows:
3 the whole right lung was affected.
3 both lower lobes.
5 the left upper lobe.
26 " right..."
47 " left lower lobe.
40 " right..."
124

Hilliand and Pepper gave these figures:
Out of 58 cases the disease was unilateral
in 32, double in 26.
Of these 52, the right side was the seat of the Pneumonia
in 29, and the left in 23.

With regard to the part of lung most frequently affected, they found, in 57 cases,
that the upper lobe was attacked in
20, and the base in 31. Of the 20
cases of Pneumonia of the upper lobe
the right side was affected in 13 and the
left in 7; while of the 31 cases of basal
Pneumonia, the right lower lobe was
affected in 15, and the left lower lobe
in 16 instances.

In their 4 cases of double Pneumonia
the disease was distributed thus:
in the 1st case both lower lobes; in the 2nd
the posterior inferior parts of both upper
lobes were the portions especially involved. In the 3rd and 6th cases, the disease attacked first the base of the left lung, and afterwards extended to the summit of the right lung. Billet and Bartlewe, and Rupz and Barrier more or less agree with these figures: as has been already mentioned, what differs.

The lower lobe of the lung is usually far the most frequently affected: according to Jungenau, it escapes altogether in only one case out of four, but pneumonia of the upper lobes seems to be considerably more common in children than in adults.

Billet and Bartlewe consider that in children acute acute pneumonia is very frequent on the right side but rare on the left.

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9. Grig, Copland—Pneumonia—give the figures from the Middletown Hospital P.L. records: of 143 cases, the right lung was alone affected in 80, the left in 47, both in 16.
Terminations.

Death from primary Pneumonia in children is very rare, and the great majority of uncomplicated cases recover.

Secondary Pneumonias also recover is the rule, but the disease sometime terminates fatally if the patient's condition be one of greatly lowered resistance, as after any exhausting disease, e.g., long continued diarrhoea, or in the newly-born.

In exceptional cases the inflammation instead of subsiding in resolution may result in a pulmonary abscess or in gangrene of the lung.

Abscess of the lung as a termination of Pneumonia in the adult is very rare, and some doubt its occurring.

Quain states with it only 5 or 6 times in several hundred cases of Pneumonia which came to an Autopsy, but according to West it is much more common in children, and he found abscess in 4 out of 49 cases.

Eustace Smith states that it may occur in pyaenias, pneumonias and those arising from the presence of a foreign body in one of the

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1. Quoted by West in Diseases of Infancy and Childhood.
2. Quoted.
3. Diseases in Children.
bronchic, and also in Pneumonias occurring in very weakly children.

This termination though of course a most unfavourable one is not of necessity fatal. Graves,\(^1\) indeed, says that abstract is "not infrequently recovered from" and he records six cases in which this result was obtained. Other writers also have recorded instances.\(^2\)

Sanguinosis of the Lung. This is very rarely to follow pure Pneumonias. Trouseau\(^3\) states he never saw it do so. According to Saffran,\(^4\) it is not a natural termination but it occurs in Septic Pneumonias and in those due to Diabetes and Pulmonary Tuberculosis. Saffran Smith\(^5\) quotes Bouillard that a tendency to the formation of acute haemorrhagic clots in the right heart leading to embolism is common in Pneumonia. However this may be, Sanguinosis is certainly rare.

Ashley and Wright\(^6\) have met with Sanguinosis in children already the subjects of Chronic Bronchitis and Empysema, and also in Pneumonias Secondary to

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Scarletical nephritis and whooping cough.

Croupous Pneumonia appears seldom to lead to chronic changes in the lung resulting in Carboeosis or Phthisis. Both Brown and Hilton Fagge say they have occasionally seen a chronic pneumonia develop out of an acute attack. The latter denies that Croupous Pneumonia leads to Phthisis and he quotes Stilks who says he does not believe that Croupous Pneumonia ever terminates in Carboeosis of the lung.

Jürgens (1) however states that both Carboeosis and Phthisis may result from acute Croupous Pneumonia, and according to Fagge the same writer publishes a volume by Dürr in which are related two cases of Chronic Pneumonia which were caused in this way in very young children. (3) Causes of unabsorbed consolidation are certainly of frequent recurrence in the lungs of children, and so are

chronic conditions with partial or less increase of the fibrous tissue, but these appear to be nearly always the result of Catarrhal Pneumonia and only very exceptionally of the Croupous form.
In the practice of medicine.

I assisted to Dr. Barnes

Myself, from September 1891

& December 1892.

1893

March 24th

M. D.

Horace Maclean
Symptoms and Course.

A few remarks on the normal temperature fluctuates and respirations during infancy and childhood may be appended here.

And first of all as to the exact significance of the terms Infancy and Childhood.

Infancy is defined as the period from birth up to the commencement of the first dentition - i.e. up to the 7th month. According to other writers, and there is in some respects more convenient, the term includes the whole of the first year of life.

Childhood commences with the first dentition or at the termination of the first year, and ends with the beginning of the second dentition at the site of 14.¹

Youth includes the time between the 14th to 18th year and puberty which is considered as usually occurring in this country at the age of 14.¹

The temperature in childhood has been carefully studied by Frilayson (Brit. med. journal 1869). His observations were made in hospital on a large number of children whose ages varied from 20 months to

¹ See Ashley, Wright, Diseases of Children.
to 10½ years. He found that there is invariably a fall of temperature in the evening, amounting to 1°.2°.0°.3°. This may take place before sleep commences which it usually does between 7 and 9 P.M. The minimum reading was reached at 6 or before 2 A.M. and the temperature usually began to rise between 2 and 4 A.M.

The Puls.

Heacock states that during the first month the pulse varies from 120-140 per minute; during the second year 100-120; from three to six years it is above 90, and after the second dentition it is at the adult rate.

Meigs and Pepper give a large number of figures mainly derived from Bruch observers. In very young infants, one to ten days old, Bitland found the pulse was 101-102. During the first year, Roger and Valley state it averages 115 per minute. During the second year according to Becquerel (Traite Theor. et

1 Meigs and Pepper, Diseases of Children. 2 Lectures on Children's Diseases. 4 loc. sup. cit.
Pat. Drs. Royal Drs. Enphants) it is 118:
from 2-6 years during sleep, 76; during waking hours 92; from 6-9 years,
asleep 73 or 74, awake 90; from 9-12 years, asleep 72, awake 80. The pulse
was found to be irregular in one-third of all cases during the waking hours,
and in one-third during sleep.

According to Hooker, the respirations in newborn babies number 32-36 per
minute. Later, they are about 30 and gradually decrease in frequency, but
even at the age of 7 or 8 years the rate is higher than in the adult.

Meigs and Pepper state that during
the first week of life the respirations are
39 per minute (Roger). Between the
second month and the second year they
are 35; from two to six years and also
from six to twelve years they are 18.
During sleep 23 during waking,
up to the third year respiration is
mainly abdominal.

5. Lectures on Children's Diseases. 6. Diseases of
Children. 7. See also West, Diseases of Infancy and Childhood.
In auscultating, it must be remembered
that during infancy, the breath sounds
are very faint. The chest moves only
slightly and irregularly; the movements
are not of the same intensity and
duration and the intervals between the
inspiratory acts are irregular.

About the sixth month, the inspiratory
resonance, which up to then has been
weak and faint, begins to become
precise. The sounds are harsh and
have more or less of a blowing character,
the inspiratory resonance being by far
the louder. Sabatier explains this
harshness of the breath sounds by the
fact that in infancy the lumina of the
two bronchi, springing from a bronchus
are together smaller than that of the
primary bronchi, while in adults this
converse is the case.

8 Quoted by Sturmi. loc. sup., cit.
Symptoms.
A child of three or four years of age suffering from Acute Conjunctivitis Pneumonia often presents a characteristic appearance.
He is evidently ill and is markedly dull, groggy and apathetic. The muscular protration is often extreme and may induce a child to lie quietly even when suffering considerable pain from pleurisy.
The face is flushed and often has a somewhat anxious distressed expression. Some lividity about the lips is common.
There is generally no actual dyspnoea and the patient is usually able to lie down, but the breathing is markedly hurried though not as a rule exaggerated. Thearius dilaté with each inspiration and the sigh is of service as indicating that the respiratory tract is fat of disease.
Prone to his pressing need for air a child with Pneumonia comparatively seldom cries and usually submitts passively to examination.
A prodromal stage is rarely observed in previously healthy children and in the majority of cases the onset of the disease is sudden. This definitely marked onset usually enables one to fix with considerable exactness the period of the disease which any particular case has reached when it first comes under observation, and the total duration of the attack. Occasionally however this exact incidence of the disease sometimes terminates a long continued illness of several weeks duration during which the child has exhibited vague symptoms or gastric symptoms which presumably. In such cases of slowly progressive invasion there may be no striking symptoms to mark the exact time of commencement.

In infants and very young children the onset of the disease may be marked by the occurrence of convulsions which may be frequently repeated during a period of several hours. An infant after several such convulsions may develop a drowsy semi-unconscious condition with occasional twitching movements of the face and limbs. It should be remembered that though
These convulsions are usually of slight importance and cease as the attack progresses, in certain rare cases the convulsions or the delirium resulting from them may prove fatal before the attack has developed sufficiently to be recognized.

Convulsions at the onset of Pneumonia are rare after the age of three years.¹

Often there is repeated vomiting. This is a very common recurrence in the initial symptom of Pneumonia. Out of 20 cases whose average age was four to five years, at the Great Ormond Street Hospital for Sick Children, vomiting occurred in 16, and recurred early in the illness in 15.²

Apart from the vomiting which may be induced by constriction and which has been shown to depend on the intestinal association of the respective ebullios, this symptom may, according to Jürgens, be due to:

1. Central irritation, especially in Pneumonia of the acute - this form is violent and may last several days but at least troublesome is not usually important.

¹Adams & Wright. ²Stirrups. ³Jürgens' Cyclopaedia.
3. Vomiting may be caused by mechanical irritation of throat, inflamed faces, by tough masses of mucus.

7. Indigestion. A child is perhaps seized with Paroxysms while the stomach contains a full meal. When the temperature rises gastric secretion is arrested and digestion comes to an end. The masses of undigested food induce vomiting.

The onset of the attack may be attended by a sensation of chilliness or a rigor. Though in adults a rigor is said to occur in one half of all cases sickness at the outset or within 12-24 hours, it is much less frequent in small children. (2 out of 20 cases at Great Ormond Street Hospital)

There may be delirium, especially towards rising. This however ceases after the stage of complete consolidation is reached, and therefore seldom lasts longer than two or three days.

Though these various “nervous” symptoms are of least frequent recurrence at the onset of the attack, it should be borne in mind

That they may be met with, though rarely, at any period of the disease.

They are probably due partly to the quick and generally considerable rise of temperature (though according to Eustace Smith they do not specially occur in cases where the temperature is markedly high), but chiefly to the well-known instability of the nervous system in children. junction states that they are most severe in Pneumonia of the spleen with rapidly developed fever, but Eustace Smith believes that in children cerebral phenomena are often as marked when the base is the seat of disease, and he says further that nervous symptoms are especially nice in robust children, and are, rather than otherwise, of favourable import.

1. Disease in Children. 2. Simpson's Cyclopaedia.
Respirations.
The rate of respiration is notably increased. 40-60 respirations per minute are common in children and are not infrequently observed with higher rates. In addition to this, increased rapidity the rhythm of the respiration is altered. In health the pause occurs at the end of inspiration, but in children with Pneumonia inspiration is immediately followed by an inspiration and there after comes the pause. This is probably due to an involuntary effort to suppress cough which is painful owing to pleurisy which occurs in Pneumonia. According to Finger's pain is also due to reposition of the thoracic muscles.

The ratio which the ratio of the respirations bears to that of the pulse undergoes a change. In health this ratio is as 1 is to 3.5 (respirations to pulse) or 1 to 2.

In Pneumonia the respiration is not only increased proportionally more rapid than the pulse, so that we find a ratio of 1:3, 1:2.5 or 1:2, and even 1:1. For example, "respirations 75; pulse 140" is common. In disease Pneumonia in adults with arteriosclerosis, arteries the frequency of the respirations
may equal or even exceed that of the pulse.

It has been suggested that this extreme rapidity of inspiration is caused by an excess of CO₂ in the blood stimulating the vagus centre, and so causing increased respiration while diminishing the cardiac contractions.²

Actual asphyxia, though rare in children, occurs in some exceptional cases and is due to acute weakening and dilatation of the right ventricle from rapid consolidation of a large area of lung.

The condition of the patient is one of extreme distress. The intercostal muscles of respiration are called into action, but expansion of the thorax is imperfect and the soft parts—supra-ternal region, epigastrium, and lower ribs—recede with each inspiration. The radial pulse is almost imperceptible, though the heart is acting distinctly and the right auricle can often be seen pulsating in the 2nd or 3rd interspaces. The face is livid and the fingers are distended.

In such cases the indication is to let blood from the arm, though unfortunately
The relief afforded is usually only temporary.

The pulse in pneumonia is quickened but proportionately less to those the respirations. In severe attacks of pneumonia up to the age of puberty it is seldom less than 120-130 per minute, and in infants it may reach 200. Intermission and irregularity of the pulse are dangerous signs. At first the pulse is weak and hard, but as the disease progresses it tends to become softer and more compressible. At the commencement it may become reduced to 70 or 80, and in adults has been known to fall to 30-40. During convalescence the pulse is often irregular; this is said to be due to molecular changes in the cardiac muscle which have resulted from the high temperature during the acute stage of the disease.
State of the Skin.

Addison of Guy's Hospital first drew attention to the dry "pungent" heat of the Skin in Pneumonia, which is greater than occurs in almost any other disease with the exception of Scarlet Fever.

In some cases, however, the Skin is moist, and there may even be profuse sweating.

A herpetic eruption occurs in from two-fifths to one-half of all cases. It is generally seen on the lips and appears between the 3rd and the 5th day. In a long time the recurrence of herpes has been regarded as a favourable element in the prognosis, and there would appear to be some grounds for this belief. Grisler lists the following figures:

- Of 182 cases with herpes: 17 died, or 9.3%.
- Of 239 without: 70 died, or 29.3%.

The cause of the herpetic eruption is unknown.

The urine in Pneumonia is a febrile urine, diminished in quantity and of high specific gravity, but is peculiar in containing a greatly diminished amount of chlorides which may even

\(^1\) Färnham. \(^2\) Grisler.
be absent altogether.

Albuminuria is of frequent occurrence and the urine often contains traces of bile pigment. The face is sometimes swollen and the patient may complain of some tenderness over the liver and there distinct attacks of jaundice may be noted with. The disturbance of the hepatic functions is supposed to depend partly on duodenal cathartic and partly on congestion of the organ being to embarrassment of the right side of the heart.

The tongue is thickly furred and in severe cases may be dry and hoarse. The stools are usually constipated, but diarrhea is not infrequent. Appetite is completely lost. Though there is great thirst a child sometimes appears to endure this rather than incur the painful cough which swallowing tends to excite.
The temperature in Pneumonia is of the continuous type of pyrexia with the usual diurnal oscillations.

Observations during the stage of invasion do not appear to be very numerous, but it is certain that the temperatures rose considerably within the first few hours. In children, Freemon once found a temperature of 102.5° in four hours after the initial vomiting, and in two other cases 103.2° and 104.3° respectively within 12 hours after the onset of the attack.

Jürgensen records a temperature of 105.5° within 3-4 hours in a female child of 3 year old, and one of 104.7° within 4 hours in a boy of 9. The temperature in these cases was taken in the rectum, but probably nearly equally high readings would have been obtained in the axilla, as in Pneumonia it has been shown that the temperature of the surface is very nearly as high as that of deeper parts. (Schüller) 3

Dr. John Playfair 4 relates the case of a girl of 9 years who developed Acute

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(croupous Pneumonia) While under treatment for Chorea in the Edinburgh Children's Hospital. On the first day the temperature rose to 102° and next day to 104°; no physical signs were discovered until the third day.

In one of my cases (No. 1. Bennett) the patient, a boy of 5½ years, was apparently quite well until 6 P.M. on the day of admission, when he became drowsy and refused his tea. Shortly afterwards his breathing was noticed to be laboured and vomiting occurred. When admitted to Hospital at 10:30 P.M. - i.e. within four hours after the onset - the disease reached its apex. The temperature was found to be 101.2° and by 3 A.M. the following morning - 8 to 9 hours from the onset - it had reached 103.4°.

Observations at the end of the first and beginning of the second day are more numerous, and a temperature of about 104° is then common. Sometimes the mean temperature increases from day to day until the crisis, but in the majority of cases the maximum
The temperature is reached on the 2nd or 3rd day and thereafter generally declines daily, though only a few reach a degree. This occurs even in fatal cases. In an ease of average severity the maximum is usually 103°-105°, but much higher temperatures are recorded. Windlelich once obtained a temperature of 109.2° in a case which terminated fatally. Thomas had one of 106° and his patient recovered, and Sebert records 107.2° (in the axilla) also in a favourable case. These very high readings however are quite exceptional, and as a general rule we may consider that in mild cases the temperature will be somewhere from 102.5° to 103°, and in severe attacks about 104° or above it.

The temperature during the attack is generally lower in the early part of the day, than in the evening, but the evening recessions are seldom more than 1° or 1.5° C., and are generally less—about 1/4-1/5° (0.5-0.8° F.).

\(^1\) Windlelich. Temperature in Disease.
\(^2\) Jüngstwenz. Jahreshefte Cyclopaedia. \(^3\) Ibid.

Note. It is generally admitted that Windlelich and other Continental observers obtained much higher readings.
The high temperature seldom continues for less than three days but not frequently longer than seven, and in the great majority of cases the temperature falls by crisis.

The stage of delirium usually begins late in the evening and comparatively seldom commences in the morning or at noon (Kundulich Lebert & Others quoted by Jürgensen).

Of the six cases of pneumonia whose charts are here given, in all the crisis commenced after mid-day and the temperature continued to fall during the following night until, in most cases, about 6 A.M. on the next morning.

The normal level is usually reached within 12 hours, often in 6 hours.

In one case of Jürgensen's in which the temperature was noted every five minutes, it took 5 hours 20 minutes to fall from 104° to 100°. Kundulich gives a still longer period for the critical fall and states that it

there have been well over in this Country.

4. Jürgensen, loc. cit. 5. Ibid. 6. loc. sup. cit.
generally occupies from 24-36 hours.
if it takes longer than 36 hours he regards the disappearance as occurring by dysis.
In any six cases into crisis occupied 9, 12, 20, 8 (or perhaps 28), 8 and 20 hours respectively.
Hinchoe states that a crisis occurred in his practice in 72 out of 82 cases and a fall by dysis in only
10.°
At the Crisis the temperature often falls below normal - sometimes consider-
ably below it, and it is to be noted that with these low temperatures the
normal daily variations may occur.
Low temperatures were recorded in Cases I (Campbell) and III (Clark).
Occasionally there is a rise of short
duration during the first few days
after the Crisis as seen in Case V (Thomas).
The cause of this rise is not known
(Hinchoe).
Some variations in the usual
course of the temperature may rarely be just
mentioned. They have been described
in much detail by Hinchoe in his
classical work.
°Lectures on Children's Diseases.
1. Pseudo-crisis. A sudden rapid fall may occur at any time from the second day onwards. The temperature reaches normal or subnormal and then rises almost immediately to somewhere about its previous height. This occurs so rapidly that the whole episode may occupy only about half a day. An instance of a Pseudo-crisis was just written in Case V (Thomas) where there was a sudden fall on the 7th day followed by a rise on the 8th, the real crisis not occurring until the evening of the 8th day.

2. There is often variation in the temperature preceding the crisis. A perturbatio crisis is frequent; just before the fever comes on, the temperature runs up, often reaching its previous maximum but seldom rising above it.

3. Under the name of "Pneumonia Alternata" Wunderlich describes four varieties of temperature curve as sometimes occurring associated with slight local processes. They however do not appear to be of very much practical importance.
Date of the Crisis.
An attack of Pneumonia generally lasts about a week. According to
Jürgens, in 64.20% of all cases the crisis occurred between the fifth
and the eighth day. Of Heynich's 82 cases of Pneumonia in children
the crisis took place in 33 between the sixth and eighth days. Sometimes
it fell on the ninth to the eleventh day; less frequently on the fifth and tenth
of all on the third and fourth.²

Hayfair found that 21 of his 50 cases
terminated by crisis and in 13 of
those the fall of temperature took place
on the fifth or sixth day.³

¹ Artikel Pneumonia. Jürgens's Cyclopaedia.
Physical Examination in Pneumonia.

The physical signs are most commonly recognised over the lower two-thirds of one side of the chest. They are usually confined to one aspect—generally the posterior—except when the apex is affected, but as the disease may attack any part of the lungs it is of the greatest importance that the whole thorax should be repeatedly examined.

It must be remembered that for 2 or 3 days, sometimes considerably longer, there may be no characteristic physical signs. This is the case when the disease begins deeply in the substance of a lobe, and the physical signs are not developed until the consolidation has reached the pleural surface.

Inspection of the thorax of an infant shows that it is relatively deeper and its horizontal section more circular than in the adult. The relation which the antero-posterior diameter bears to the transverse is as 1:2 in the infant, while in childhood it is as 1:2:3, and in the adult as 1:3 or 3:5.

—Ashley and Wright: Diseases of Children.
It is also to be noted that in the
severe state the diaphragm is higher and
the lower part of the thorax is, as it
were, widened out.
In Pneumonia there is usually some
diminution of movement of the affected
side. That half of the chest may appear
slightly fuller than the other, and
by using a measuring tape or better
still a Cylindrometer, the circumference
of the affected side is found to be
increased. The examination
should be made after expectation if
possible (though this is difficult if
the breathing is very hurried) and it
must be borne in mind that the
right side is normally somewhat the
larger. Jürgensen found the average
difference between the two sides of the
chest up to the age of 5 years to be
1-1/2 centimeters and the maximum
2 cm.

Very marked bulging of the side is
subjective of pleuritic effusion.

Palpation.

The condition of the vocal processes which in adults play such an important role in the diagnosis of Pneumonia is not usually of much value in children. It is not always possible to induce a child to speak and more of this can be accomplished the voice does not give rise to muscle vibration of
the chest. The only case increased
vocal processes is only to be appreciated when a considerable area of lung is involved:
if the base portion be of small size and surrounded by lung tissue which contains air, slight degrees of difference cannot be
recognized.

Widmark suggests the vocal processes can be felt best, not in the usual way by laying the palm of the hand on the chest, but by the gentle contact of the smallest possible
surfaces, and for this he recommented that the inner surface of the hand should be used.

This method will be found especially valuable in children, and differences in
the vocal processes which would escape notice if felt in the usual way can be
by this means readily recognized. The
patient should be made to cough first,
lastly, it must be remembered that

F. J. A. Zinner. Zinner's Cyclopaedia.

[Note: The text is written in cursive handwriting, making it difficult to transcribe accurately. The meaning is decipherable, but there may be some errors in the transcription due to handwriting style and legibility.]
Absence of vocal fremitus is of no value in diagnosis.

Percussion.

Too much importance should not be attached to slight differences in the resonance of the percussion note, taken by themselves. In children one sometimes meets with temporarily impaired resonance, which is quite evanescent and appears to be of no serious import. In percussing the flaccid chest of a child, too, a cracked-pot sound is often obtained in conditions of perfect health. In addition to the note elicited by percussion, it is of great importance to estimate the degree of resistance communi- cated to the finger, and the "palpa-
tory percussion" of Wintrich is here of much service. The chest should always be percussed with extreme lightness, at any rate to begin with.

In pneumonia, the note is more or less dull and there is a distinct sense of resistance at all points. When the hepaticated lung lies in contact with the thoracic wall, but in infants this feeling of increased resistance,
if perceived at all is very trifling.

We thus recognize that the dulness has the complete character which is met with in pleurisy with effusion, unless, of course, this condition is present as a complication.

It is often a good plan to percuss in zones around the chest from front to back as suggested by Simpson. To do this satisfactorily the child should be lying on the nurse's lap with the arm removed from the chest, or it may be sitting up, the head being supported if dysphonia be present.

Pneumonia exists if the child scream or struggle, the physical conditions of the chest are altered, and that it is important that the two sides of the chest should be examined during the same act of inspiration.

At the commencement and perhaps most especially at the end of the attack, the note may be more or less tympanitic. This note is obtained from lung tissue which contains air but is less elastic than usual, and as these conditions obtain both before the lung becomes consolidated and again after consolidation.

(C) Cyclopaedia. art. Convulsive Pneumonia.
has occurred, the sympathetic note may be obtained at both these periods. Even at the height of the disease a degree of this sympathetic quality may be heard in the neighbourhood of the hepatic area. In Pneumonia however the note is never perfectly clear and is very different from that which is obtained over the artery but not yet compressed long as to occur via pleuritic effusion. Where this Skodaie presence, often associated with bronchial breathing, is so frequently heard in the infra-clavicular regions.

Auscultation.
The classical auscultatory signs of Pneumonia are three in number, viz.- fine crepitations, bronchial breathing, and broncho-phony, but it must be remembered that in some undoubted cases of Pneumonia none of these may be heard.

A fine crepitation or exsiccated rattle at the end of inspiration is usually considered the earliest physical sign. If however a case is under observation from the very commencement of the illness
before crepitations are developed, one may recognize a degree of weakness of the muscular breathing at the past affected.
The fine crepitation is typically heard over lung which is passing into the stage of consolidation. When complete
even reparation is established it ceases to be audible, but it can then often be heard at the borders of the consolidated area
where the condition is at a stage less advanced.

In Croupous Pneumonia, therefore, bronchial breathing and fine crepitation are not heard together, and this forms an
important distinguishing point between this disease and Broncho-Pneumonia where bronchial breathing and crepitation
(though not, perhaps, the true fine crepitation) are heard over the same area.

In children the true pneumonic crepitation as met with in adults is but seldom heard. In most cases the crepitation
is coarser and is termed a sub-crepitant râle. The typical fine Crackle may, however, sometimes be obtained even in
infants, and is often best brought out on deep inspiration. In situations where
during ordinary inspiration these are sub-crepitant râles.
Though Crepitations is generally supposed to the characteristic of Pneumonia, according to Stimson it may also occur:

1. At the commencement of Edema of the lung.
2. The febrile patients who have long occupied the prone position.
3. Rarely, over contracted but not yet compressed lung in cases of pleuritic effusion.
4. Rarely and briefly, at the onset of Acute Catarh of the Smaller Bronchi.

Bronchial breathing. In children the character of the breathing varies greatly from time to time, even in a few hours. Thus, at one examination, harsh breathing may be heard over the affected portion and within a short time, the breath sounds at the same spot are found to be only weak. Similarly, the edge of the accompanying rales tends to change and may become finer or coarser within a very short period. So that we may meet with simply weak or distant breathing, or distant or thudding bronchial breathing, with all varieties of accompaniments.

(1) Stimson's Cyclopaedia, art. Acute Pneumonia.
1. Weak breathing may occur in several conditions.
   1. The early stage of pneumonia.
   2. Effusion.
   4. Lobbying of a bronchus.
   5. The breathing may be weak or the lung may even appear to be almost silent at one spot owing to temporary plugging of the bronchial tubes with fibrinous coagula.

B. Peculiar or harsh breathing is due to a portion of lung being over-worked. Thus, if much of the lung be involved in the pneumonic process, loud or harsh breath sounds are heard over the other.

C. Bronchial breathing is typically heard in pneumonia and though it may not be developed for some time, when it appears it is usually intense and blowing. It also occurs in tubercular consolidation. In effusion through the breathing is bronchial it is weak and distant.

Bronchophony. The value of this sign is considerably less in children than in adults, but it is of importance in some cases. Though the vocal resonance may be normal in some cases of undoubted consolidation, in older children at last, it is usually loud and high-pitched.
In infants increased resonance of the cry may be the only physical sign.

Jesuquinus points out that sometimes in a pneumonia of one inferior lobe, about the 2nd or 3rd day, one may hear signs which seem to indicate infiltration at the opposite face. The note is slightly dull and high pitched, and blowing, breathing with expirant râles and some rhonchi are discovered. These signs however are not due to commencing consolidation on the opposite side, but to "retraction and commencing hypostasis of the hilus to healthy lung, this beneficial breathing and vibilating rhonchi being conducted from the diseased side."

It relates a case where this was proved at the autopsy and gives the following points as distinguishing this condition from one of double pneumonia: 1. The beneficial breathing becomes stronger the nearer we approach the diseased side. 2. The vesicular respiration (from the healthy side) is heard through the blowing sound, especially on deep inspiration, when, too, the expirations will often be found to disappear.

Constitutional symptoms are not severe enough for double pneumonia, but this last distinction, he says, is not always a reliable one.

When the stage of resolution is reached the dulness diminishes and finally disappears, except in those cases in which the pleura has become much thickened where it may persist for some weeks. The breathing becomes less bubbling and adventitious sounds become audible. Where formerly only bronchial breathing was heard, the "crepitating rales," coarser and more bubbling than the fine early crepitations, is often absent in children and the frequently hears simply mucous rales, though in some cases resolution may occur without the development of any moist sounds. Increased vocal resonance may persist for some time, but eventually disappears with the final absorption of the infiltration.

The rate of resolution varies in different cases. Kouché states that the physical signs usually become normal.
within a week or at latest within 10-14 days after the crisis. Playfair found that in 27 cases the total duration of the disease, from the onset to the total disappearance of all abnormal physical signs, was on an average nearly 15 days, and taking the time from the onset to the crisis as (roughly speaking) a week his statement would fairly agree with that of Treloar.

In 36 of the 61 cases where temperature charts are appended I found that the duration of the illness from the day of admission to hospital to the time when the lungs were noted as being normal, was 13.6, and 16 days respectively. (see p. 34. IV + VI)

In most cases of Pneumonia in children where the crisis occurs it is immediately followed — or one might perhaps say it is accompanied — by an improvement in the patient’s condition, but it is usually a day or two after the crisis before one can discover by physical examination that resorption has commenced in the lung. Thus the febrile symptoms improve before the physical signs.

Though this is the usual course of events, the reverse sometimes occurs. Grisolle (Traité de la Pneumonie) and Sidlo (Deutsches Archiv.f. Klin. Med.) describe cases in which the physical signs showed resolution had commenced before the crisis, and Sidlo found that 37.5% of his cases came to an end so far, at least, as could be discovered by physical examination—41 hours before the onset of the crisis.

His experience, however, would appear to be altogether exceptional. Hancock states that he has seen three instances in which the physical signs were resolving before the crisis, and there seems to be little doubt that in the great majority of cases the change for the better is first noticed in the general symptoms while the physical signs do not improve for some little time after.

In some rare cases there is a relapse which however is shorter and less severe than the original attack. If it occurs it usually commences several days after the temperature has fallen.

(Quoted by Hancock. Lectures on Children Diseases.)
The Varieties of Pneumonia may be shortly reviewed. They have been fully discussed by Baginskiy, and others.

1. Abortive Pneumonia.

After examples of Pneumonia with a course of one day have been published by Lecube and Neill, they recurred in adults.

and Cadet describes such cases as instances of Acute Pulmonary Congestion.

Other cases of Abortive Pneumonia terminates in crisis after 2, 3, or 4 days, and are generally without the Classical signs. The percussion note is slightly dulled or symphatic at some spot and the breath sounds are more weak. Hence it is common.

2. Creeping or Wandering Pneumonia. Compared with scabies, etc., by Neill. The spread of erysipelas. They are apt to pursue a somewhat chronic course with a late crisis (10th to 14th day) or ending in lepra. Sometimes they terminate in Erysipelas, or a hectic condition.

3. Cerebral Pneumonia.

In these the chief symptoms are slight and cough is often absent. The influence of the organs is often affects the apex. The chief importance of this so-called

See Ashley Wright. See Neill.
Vesery is that from the labency of the chest symptoms and the frequently undue prominence of delirium, headache, and other nervous disturbances, a mistaken diagnosis of meningitis is apt to be made.

TV Gastric Pneumonia.
The onset is attended by vomiting and diarrhoea, and the combination of these with abdominal pain and purulent tongue and high fever closely resembles an attack of Gastric Fever.
Complications of Pneumonia.

There are few and not generally of much importance.

I. A certain amount of Bronchitis is of very frequent occurrence in children both on the affected and also on the opposite side, but in most cases it is not severe enough to be a source of danger. If extensive however, and especially if the fine tubes are involved it materially adds to the gravity of the case, and at the same time will raise the question whether the attack of Pneumonia is essentially one of the Convulsive or of the Catasthal variety.

II. Pleurisy practically always occurs when the consolidation reaches the surface of the lung. It is usually slight in amount and seldom forms a marked feature in the case. The pleurisy may be pleuritic or accompanied by effusion. In children there seems to be a special tendency for the effusion to become purulent, and as it is well known the absence of Empyema is frequently very injurious.

III. Pericarditis occasionally occurs.
by extension of the inflammation from
the pleura but also independently.
It is said usually to be of the dry form
though both serous and purulent
effusions are also met with.
Its detection during life is frequently
difficult. (See Sturge-Coupland's
Pneumonia).

IV. Other complications are Endocarditis,
Meningitis, Parotitis, Necrosis,
Sarcoïd, and various renal affections.
Diagnosis of Pneumonia.

In well marked cases the diagnosis is extremely easy, but at times, if the symptoms are indefinite and the physical signs not characteristic or absent a positive diagnosis, particularly at the onset of the illness, may be impossible.

In the majority of instances there is a history of an illness commencing suddenly with fever, cough and quickness of breathing, and if the child is old enough we find that it has complained of headache and pain in the sides.

If we then observe an altered pulse, rapid, lowness of the pulse, increased of the pulse tracings and purpuric spots on the skin, the probability that the disease is pneumonia is very great.

It must be remembered that the physical signs may not appear for three, four, five, or even six days, so that a positive diagnosis cannot be made, though the general course of symptoms of the illness may be strongly suggestive of pneumonia.

Under these circumstances one should carefully examine the whole chest every day until the characteristic signs of consolidation are discovered.

Walter Wright. 1930.
Acute Emphysematous Pneumonia has to be distinguished from Pleurisy, Miliary, Tuberculous, etc., with fever, collapse of the lung, and broncho-pneumonia.

I. Diagnosis from Pleurisy. This is difficult in young children but the following points may be of service although no one of them can be relied on by itself.

(a) The local phenomena - increased respiration and diminished or absent in Pleuritic effusion - does not give one much assistance before the third year, and (b) the occurrence of the characteristics chest symptoms is hardly ever met with in children under 8 or 9 years of age. (c) The temperature may furnish an indication. If from the first days of an attack the temperature rises rapidly reaching 39°C. or a point higher, pleurisy may be excluded, while if the temperature continues relatively low pleurisy is probable, or at least the disease is not simple Pneumonia. (d) The extent of the disease. According to Graves, pleurisy does not tend to spread day by day as Pneumonia does. If, therefore, the pleura influences the extent it is likely to be

(1) From Lennard's Clinical Medicine. (2) Clinical medicine.
involved is determined in 24 hours.

3. It is thought that brain disturbance is
more marked at the outset of pleurisy than
of pneumonia. 5. The breathing in
pleurisy, with effusion, though tubular, has
usually a peculiar "damped" character.

5. If the amount of fluid in the pleural
cavity be large there may be displacement
of viscera.

II. Diagnostic from Meningitis. This
question arises when the nervous
symptoms are specially prominent as in
"Central" Pneumonia of Billier and Bartels.

In Pneumonia the nervous disturbance
usually declines when consolidation of the
lung is established, so that marked
nervous symptoms seldom last longer than
the third day of the attack.

In Meningitis the temperature is not so high
as it usually is in Pneumonia, and
oscillates; the pulse and respiration are
irregular, and the latter is not unusually
hurried; the alæ nasi do not dilate with
respiration; and there is an absence of
the physical signs of Pneumonia.

On the other hand in Pneumonia, the moistting
which is usually so prominent

in hemiplegia seldom continues for long; the pulse is more frequent and not irregular; the tongue is more red as a rule; the beat of the evis is much greater.

iii Diagnosing from Eviscere.

When jaundice intestinal symptoms occur with high temperature as in the "Gastric" variety of Paracemia the disease may closely resemble Eviscere from
This instance was made in Case No. 341 (Vaughan). A little girl of 4 years was admitted to hospital with the history that she had been ailing, tired and listless, for about five days. It was noted that the face was flushed, eyes bright and pupils large.
The eviscere lay close at the lip and edges. Completeness of placid pressure in the right side fossa and elsewhere in the abdomen. The only physical signs in the chest were some venous signs especially on the right side. No apparent enlargement of the spleen and no rash. Temperature 102. Pulse 148. Respiration 40. It was not for 4 days that the percussion note was formed in the right base and scapular region with medium
Sexual metallic aspirations.

The chief points to be attended to are:
the careful repeated examination of the chest for the physical signs of Pneumonia,
and the occurrence of the rose rash
about the 5th day which last however
is not in frequent absent.

Sometimes typhoid fever and Pneumonia occr together.

To Diagnose pnce Scaramata. This may present considerable difficulty at
the commencement of the illness.

In both diseases there is a sudden over-
very frequently attended by vomiting:
the temperature is high, and in both,
also, there is the pungent heat of the
skin which is sticking. To add
to the resemblance, in Pneumonia there
is sometimes considerable congestion of
the pharynx and slight redness of the
skin. This last however is less vivid
and is more diffuse & patchy, and lacks
the punctiform appearance of the
Scaramata rash. In most cases the
development of the typical rash in the me
disease, and if the characteristic physical
signs of in the other will clear up the
Diagnosis.

1 Strongs Inflammation: Pneumonia.
V. Diagnosis from Collapse of the Lung. The mistake of confounding Pneumonia with collapse of the lung should not to be made. Collapse of the lung occurs as a sequel of Bronchitis or Broncho-Pneumonia, and in its lobar form it is characterized by symptoms of fresh production and insufficient irradiation of the blood. The physical signs are the presence of some amount of dulness, with weak or high breathing accompanied by moist rales. The temperature is not usually high.

VI. Diagnosis from Catarrhal Pneumonia. Catarrhal, lobar, or Broncho-Pneumonia differ from the Croupous form in Pathology, in symptoms, and in their respective tendency to end fatally. Thus, Catarrhal Pneumonia is almost invariably a secondary disease and is
due to infiltration of inflammation from the bronchi and bronchioles; the invasion into the alveoli is mainly cellular and is derived from the proliferating epithelium of the alveolar wall. The spread of the disease is influenced by its origin in the bronchi and it spreads from lobule to lobule, or from one group of lobules to another. The severe symptoms are proportional to the extent of lung involved.

The mortality from Acute Pneumonia has been shown to be very small in children, but in Broncho-Pneumonia recovery is always doubtful and during influenza the mortality is very high indeed. It frequently attacks children who are suffering from some debilitating disease such as Whooping-Cough, Measles, Measles-Thera, or who are otherwise un-healthy, whose vitality and power of resistance are low.

The mortality in Broncho-Pneumonia, given by Jirasek from his analysis of his own cases and those of Bartels and Bärnitz, was 187 deaths in 325 cases or 58.3%, and in children's hospitals in large cities the figures are even worse. Stein's of Prague had a death rate of 7.5.

 Cyclopaedia, art. Paratubal Pneumonia
Two-thirds of his cases and in the Foundling Hospital, Paris, out of 128 newly born children affected with Broncho Pneumonia 127 died. A mistake in diagnosis is most likely to be made at the commencement of the illness if the signs of consolidation are delayed. The main differences in the symptoms of the two diseases may perhaps be summed up as follows:

Croupous Pneumonia is comparatively rare in infancy, so that if the patient is an infant, especially if it is feeble or badly nourished, the disease is probably Broncho Pneumonia.

Croupous Pneumonia, though it sometimes arises in the course of an acute or chronic cataract, usually comes on suddenly: history of a previous cough therefore renders it probable that the attack is Catarhal Pneumonia.

In Broncho Pneumonia there is evident distress and difficulty in breathing: there is usually in-drawing of the walls of the chest during inspiration, while in Croupous Pneumonia though the respirations are hurried, there is no true dyspnoea and the child's difficulty
In breathing is not increased by lying down. With regard to physical signs the great distinction is that in Bronchopneumonia expectorations are heard along with bronchial breathing when the lung is consolidated, whereas in pneumatic Pneumonia expectorations disappear when complete consolidation is established and over the area pure bronchial breathing is alone audible.

In pneumonic Pneumonia also through some bronchitic rales are sometimes heard, these are not the numerous bronchial sounds elsewhere in the lung which are usually in the catastrophic form.

Lastly the temperature chart is of much service. The more or less uniform high temperature up to the crisis followed by a continued low temperature contrasts strongly her with that in Bronchopneumonia with its a-typical course and sudden abrupt new oscillations without any critical fall.
Prognosis.
Healthy children attached to uncomplicated cases Acute Croupous Pneumonia nearly always recover. Thus out of 201 cases occurring between the ages of one and fifteen years, the mortality being under five, Zinnesius lost 7 — a mortality of 3.3%. In 10 cases under 10 years, Zinnesius lost 4, all from complications while Bickley had 212 cases between 2 and 15 years with only 2 deaths. Horace had 7 deaths in 64 cases; in one of these the whole right lung was kephatised, in one there was double Pneumopericarditis and percussion Pericarditis, in one diffuse Peritonitis, and in the fourth he found Tuberculosis in many organs.

Two of Mayer's 30 cases terminated fatally; one from Cerebrospinal Juncrisis, and the other aged 18 months, who was very weakly had two or probably three attacks of Pneumonia and then took measles. The chest never cleared up and at the post mortem it was discovered that there was adhesion collapse, congestion and aneurysm Broncho Pneumonia, with Tubercolis.
In various reports.

In the Great Portland Street Children’s Hospital between 1870-5 there were 258 post-mortems of which 43 were instances of lung condensation and were described as pneumonia, (Broncho-Pneumonia being as far as possible excluded). Of these 43, 3 only were cases of acute Pneumonia, and only 1 of these was primary. The primary case was one of simple double Pneumonia in a child of 2½ years; the other two were associated with Pericarditis and the latter with Endocarditis as well.

Thus death would appear to be rarely caused by the Pneumonia per se, and to be nearly always due to some unfavourable complication.

Secondary Pneumonias are much more serious than the primary and within the risk of heart-failure is much greater.

According to Extracts Smith the situation of these lesion has no effect on the prognosis, and Acute Pneumonias in children – whatever may be the case in adults – are not especially dangerous. On the contrary this writer believes that the course of Acute Pneumonias in children is in a large majority of cases
especially short and favourable. In tubercular children Pneumonias of the Apex are more dangerous. Unfavourable signs are hyperpyrexia (105° and upwards), and a very rapid pulse especially if irregular. Thus a pulse of 140 or more indicat.

a severe attack, though children often recover in whom the pulse has risen to 160 or even higher. 3

Treatment.
As the tendency is towards recovery, the
majority of uncomplicated cases of
Pneumonia in children need no active
treatment. The duty of the physician
in such cases is "to maintain life until
nature's cure is effected" (Singeron).

The child should be kept in bed in a warm
well-ventilated room, and given a soft
pillow for the first few days. What is
known in Hospital as a "jacket" pillow
will or without mustard - large
enough to go right round the chest
and left or for some two or three hours
usually relieves the pain in the side.
After it is removed the sheet should be
enveloped in a layer of cotton wooling.

In older children a frequent stripe
for ten or fifteen minutes is more
effective than the practices; it is rather
too severe a remedy for infants.
If medicine be given some acetate of
ammonia is generally sufficient.
Special symptoms, such as undue
sweating, restlessness, diarrhœa etc.
should be treated as necessity arises, upon
general principles.
The departure from the normal in cases of pneumonia is chiefly in two directions: (a) interference with the function of the lungs, and (b) fever, but these are not serious. The chief danger is failure of the heart, more especially of the right ventricle, and with the pulse for our guide our efforts must be directed to ward this off.

Proper feeding is of the greatest importance. A child will often refuse all kinds of food but he should if possible be induced to take nourishing drink frequently, and for this purpose milk, strong beef tea, some of the prepared meat juices, and chickens raw meat juice are perhaps the most suitable forms. In respects at the breast suckling is interfered with, and they may require to be fed by a spoon.

The child should be allowed frequent drinks of water, milk, retails, lemonade etc. as the thirst is usually very great.

Question of Stimulants.

In the use of stimulants and indeed of all other remedies in a disease like pneumonia, in which the natural tendency is towards recovery, it is very difficult to assign the proper value to the means of
treatment employed. Sudden improvement in the patient's condition when the disease is at its worst, and a rapid transference from a state of extreme danger to one of comparative health, occur so frequently when no drugs at all are given, that unusual caution must be exercised in ascribing the favourable change to the influence of the medicines which were administered. Each case must of course be treated on its own merits, and though, on the whole, it is better not to give stimulants as a routine practice, still there are many cases in which their use is imperatively called for. A very rapid pulse, especially if irregular, is an indication for stimulants, and they are also required in conditions of great exhaustion.

Continental authorities speak highly of the red wines, but in these countries brandy or whisky is doses suitable to the patient's age are usually employed. Half to one ounce of spirit may be given to children of 3 or 4 years, distributed over the 24 hours, but if need be this quantity may be largely exceeded.
In cases where the pulse is rapid, weak and irregular, the digitalis group of
muscles seems sometimes to be indicated, and digitalis tincture or strophanthin
may be given.

In cases of actual collapse with asphyxia and asphyxia hypodermic injection
of strychnine (0.025), caffeine (0.01 in solution with
sodium salicylate) or camphorated oil
(1 in 10) are recommended. If the
danger of asphyxia be incipient, it may
sometimes be warded off by one or two
ounce of blood being taken from the arm. 2. Though the relief thus
afforded is usually only temporary, it is
great and immediate.

Some cases which have been published
during the past year it would seem that
in the inhalation of oxygen combined with
the administration of strychnine we
have a means by which in some cases
of impending death from asphyxia
may be arrested. Unfortunately the fatal
issue appears generally to have been only delayed, not prevented, but
more information is required before

1. Sjöman. Treat. of Conspous Pneumonia.
one can assign its proper place to this method of treatment.

It is believed that fever by itself has an injurious effect on the organism, causing restlessness, inanition, and fretful and fretful exhaustion, and therefore the temperature of excessive should be reduced. This can be accomplished in two ways, namely: (a) by the application of cold, and (b) by antipyretic drugs.

(a) Application of Cold. In young children, cold baths are not as a rule advisable. It is better to use tepid baths, tepid sponging, or wet packs.

In children under one year péquerez recommends the application of cold leech compresses around the chest as advocated by niemeyer, but of this method and also of treatment by the ice bag which is highly spoken of by dr. lees and footshard my experience has been too limited to enable me to formulate an opinion.

If a bath is given, the temperature of the water should be about 60°-70° to commence with, and cold water should

1Treatment of Paroxysmal Pneumonia. 2See Lasset 1889. 3Quoted by Strypo and coupland. Pneumonia.
There he should until it falls to about
40°. Even if the temperature is not
inflexible one frequently finds that a
spirit bath at bed-time has a good
effect in soothing a restless child and
inducing sleep. For this purpose the
water should be lukewarm (80°-90°).

When the bath is given for the purpose
of reducing temperature a stimulant
should always be given before the
patient is placed in the bath, and more
should be at hand in case the child
becomes at all faint during the cooling
stage. The amount of stimulant must
be regulated by the character of the pulse
but it requires to be given freely.

The temperature continues to fall for
a quarter to half an hour after the patient
is removed from the water, so that one
should not keep the patient in the bath
until its full antipyretic effect is
produced. It is usually advisable
to remove him when the thermometer
indicates 101°, but in no case should
he be removed in the water for
longer than 10-15 minutes and one
must be prepared to stop the bath at

Treatment of Pneumonia - Jürgensen.
Once should indications of typhus manifest themselves.

If tepid sponging is employed the child should be stripped, and laid in a large folded blanket spread over the bed, or of possible a second bed or couch. The nurse then rapidly sponges the surface of the body with water at about 65-75°F, one part being taken at a time while the blood vessels of the patient's body is wrapped in the folds of the blanket.

Thus, the face and neck may be done first, and sponged over and then dried quickly with a soft bath towel, then the front of the body, next the arms, the back, and lastly the legs. In this way the whole body of a child of 8 or 10 years may be sponged over in 3 or 5 minutes.

In a wet pack either a sheet or a thin blanket may be used. This is wrung out of tepid water and closely wrapped round the patient's body, who is then covered up with numerous blankets. - The duration of the pack so of the bath must be determined by the amount of reduction of the temperature and the effect produced or
The pulse.

3. Antipyretic drugs. In addition to these measures of applying cold we may give various drugs.

Quinine reduces the temperature without interfering with the heart (quinatonic) and the lowered temperature continues for at least 12 hours. Sprenger recommends 6000 grains of the sulphate of quinine for every year of age up to 5 years and 6000 - 7500 after that age.

He says this quantity may be exceeded and where the fever is violent, speaks of giving a dose of 15 grains every second day to a child under one year, repeated if vomiting occurs, but few practitioners in this country would care to employ this remedy in such heroic doses.

Suckle Smith, indeed, does not consider quinine of much service in pneumonia.

Some of the other antipyretics used

1. Treatment of Pneumonia. 2. Liebermeister. (Treatment of fever) advises 2 - 4 grammes of quinine, and 1/4 - 1/2 grammes of digitalis in powder or pill, in cases of severe asthmatic pneumonia in adults.
as Antipyrine or Antifebrin may be given but great caution should be exer-
ced in their use on account of their depressant action. Of the former
I have found that 10 T. & T. under one year and about 90 T. & T. for each additional
year is usually sufficient; and of the latter, 90 T. & T. under twelve months and
about 90 T. & T. for each additional year.
In these small doses the remedy
may be repeated if necessary, the effect
on the pulse being carefully watched.
In Case No. 1. (Brunn) the temperature
rose up to 104° on the fourth night after
the patient's admission, and 3 grains
of Antipyrine were given at 11:45 P.M.
In three quarters of an hour the temper-
ature had fallen 3°, and by 6 A.M. the
thermometer registered only 97.4° — a
fall of 6½ degrees in about six hours.
In this case it was evident that the
drug had been administered at the pre-
critical rise in temperature, and one
cannot say to what extent it influenced
the fall which followed.

With regard to the administration of
other medicines little need be said.
Some writers recommend bromide
in one or two drop doses of the Inclusion every 2-4 hours, or every hour in very acute cases. The effect of the pulse should be the guide to its administration and any irregularity or intemperance should be an indication for its withdrawal.

Pain may be relieved by the application of mustard, or Tincture Stipes in older children. If very severe, heavy cupping or tractions to the chest can be used. Pilocarpine is rarely required but sometimes a dose of Pulv. Sperae. Co. seems to relieve the pain and procure sleep. For a child under twelve months half a grain is sufficient, and for patients of six to eight years the dose may be 2½ or 3 grains.

For sleeplessness, JUNIPERUS PINS. diluted along with hydrochloric acid, largely diluted, but this is not usually a very safe drug in children.

Ablestol or Weight recommended according to size at night.

Expectorant remedies are sometimes of service. If there is much cough Pilocarpine or Compound Tincture of Ipecac may be given, and after 

resolution has been established in the lung, some non-stimulating remedies such as ammonium carbonate and quill. If there is much bronchitis and rales persist into the second or third week the congestive class is useful. Of these, the Syrupus Picis Digestiae is usually well taken by children and has generally appeared to me to be efficacious. M. Perchinth, Perchine and Eucalyptus are also good.
Temperature Charts

I append the temperature charts of six cases of Croupous Pneumonia which were under my observation in the West
Children's Hospital, Bideford. They were cases of average severity and all terminated in recovery.

No VII. is the chart of a fatal case of Croupous Pneumonia in a child, aged three months, admitted to work on Pneumonia.

By way of contrast to these cases of other Pneumonia I give charts of two other affections.

No VIII. Case of Acute Tuberculosis. H. A. E. Smith, a well nourished boy of 3½ years was admitted with a history of slight cough for 7½ months and vague illness for one month. There was no delirium but fine crackling rales were heard all over the chest. Patient was taken home after eight days' stay in Hospital.

No IX. Case of Broncho Pneumonia. Sarah Meyford, aged 1½ years. Admitted 10th Nov. 1870. Died 17th Nov. 1870. There was a history of frequent Bronchitis since the age of 1½ months. Attacks of croup 4 weeks ago. Scattered patches of consolidation were found post mortem in both lungs but chiefly on the right side.

*Note: In many cases the observations were made every 6 hours.
<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Sex &amp; Age</th>
<th>Part of Lung affected</th>
<th>Time in Hospital until Crisis</th>
<th>Maximum Temperature</th>
<th>Amount of fall at Crisis &amp; duration of Crisis</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.</td>
<td>Bennett</td>
<td>M, 5 yrs.</td>
<td>First attacked right lower and middle lobes; then right upper lobe. Then some affection of left base. <em>Creeping Pneumonia.</em></td>
<td>4 days</td>
<td>104°</td>
<td>104° to 97.4° 10PM to 6 AM: 8 hrs.</td>
<td>Potential rise of temperature. Antibiotics therefore given. Marked fall.</td>
</tr>
<tr>
<td>II.</td>
<td>Campbell</td>
<td>F, 4 yrs.</td>
<td>Double Pneumonia both lower lobes.</td>
<td>8 days</td>
<td>103.8°</td>
<td>102° to 96.6° 6 PM to 6 AM: 12 hrs.</td>
<td>Temperature rising irregularly throughout. Compared to tuberculosis.</td>
</tr>
<tr>
<td>III</td>
<td>Clark</td>
<td>M, 5 yrs.</td>
<td>Right upper lobe.</td>
<td>4 days</td>
<td>103°</td>
<td>103° to 97.2° 2 PM to 10 PM: 20 hrs.</td>
<td>Typical temperature curve.</td>
</tr>
<tr>
<td>IV.</td>
<td>Walkley</td>
<td>F, 6 yrs.</td>
<td>Double Pneumonia both lower lobes.</td>
<td>4 days</td>
<td>104.6°</td>
<td>103.6° to 98.6° 6 PM to 2 AM: 8 hrs.</td>
<td>Slight rise after crisis.</td>
</tr>
<tr>
<td>V.</td>
<td>Thomas</td>
<td>F, 3 yrs.</td>
<td>Double Pneumonia both lower lobes.</td>
<td>8 days</td>
<td>103.8°</td>
<td>103.8° to 99.2° 6 PM to 2 AM: 8 hrs.</td>
<td>Pseudo crisis on 7th day. Rise of temperature on 5th Real crisis on night 94.9°. Rise on 9th day after crisis.</td>
</tr>
<tr>
<td>VI.</td>
<td>Vaughan</td>
<td>F, 4 yrs.</td>
<td>Right lower lobe.</td>
<td>8 days</td>
<td>104°</td>
<td>104° to 99° 2 PM to 10 AM: 20 hrs.</td>
<td>At first mistaken for encephalitis. Rise of temperature after crisis.</td>
</tr>
</tbody>
</table>

Table of 6 Cases of Croupous Pneumonia.
<table>
<thead>
<tr>
<th>Date of Admission</th>
<th>Date</th>
<th>Age</th>
<th>Diet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 4th 1927</td>
<td>1/20</td>
<td>3 1/2 years</td>
<td>Case Book No</td>
</tr>
</tbody>
</table>

**Notes of Case**

- Name: Henry J. Smith
- Disease: Acute Tuberculosis
- Temperature (Fahrenheit): 98.6

**Clinical Chart**

- Temperature: Range from 97° to 107°
- Pulse: Range from 80 to 120
- Respiration: Range from 20 to 40
- Bowel Movements: 2 to 12

**Observations**

A chart showing the temperature, pulse, respiration, and bowel movements over time.