

AN

INAUGURAL DISSERTATION,

ON

*Pneumonia.*

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BY

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OF

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To

W. H. Bowling M. D.

Professor of the institutes of  
medicine, and the practice of  
medicine, in the university of  
Nashville, &c &c Equally esteemed  
as a philanthropist, profound scholar,  
and dextrous Teacher, of the different  
Branches of medicine, assigned to his  
Chair, the following treatise on  
pneumonia, is respectfully inscribed,  
as an evidence, of the highest regard  
for his untiring, and skillful exertions  
in the teachings of medical science.

By his friend, and pupil  
The Author

you writing upon a subject which has engaged  
the minds of the most wise, of ancients as well  
as modern writers, it will not be expected that  
one who is as limited, as the author of the present  
Treatise, is, both in a theoretical and clinical  
point of view, will be able to elucidate with  
the same force, and elegance, the phenomena of  
pneumonia, or inflammation, of the lungs the  
subject of the present consideration. Notwithstanding  
the humbleness of the author, he presides in knowing  
that it is his privilege, as well as others to give  
his views upon the important subject however  
feeble those views may be. Before entering  
upon a discussion of the pathology of the lungs,  
their Anatomical, and physiological, structure  
should first be briefly considered. The lungs are  
two in number, and are divided or separated from  
each other by the mediastinum, and heart. They  
fill up the remaining portion of the cavity of  
the thorax, not occupied by the heart mediastinum

Oesophagus, Bloodvessels, and Trachea. The lungs are of a soft spongy like texture, each lung is divided into lobes, the right into three the third being intermediate in size and situation, the left is divided into but two lobes. The lungs are united by means of the bronchial tubes, pulmonary vessels, and trachea, to each other and as it were suspended by those organs, they have also an attachment to the diaphragm, by means of a fold of the pleura, by these attachments the lungs are kept in their proper positions. When the lungs are in their natural situation, they present somewhat a conical appearance the apex above, and the base which is cut off from before backwards and from above downwards and resting on the diaphragm. The lungs are always in apposition with the cavity of the thorax, consequently they are more conical or less conical in proportion to the

form of the cavity of the thorax. The volume of the lungs is likewise various, being always in accordance with that of <sup>the</sup> thorax, and heart.

The office of the lungs is that of arterializing the blood, by bringing in contact with the venous blood of the capillaries of the lungs, air by means of which the venous blood is rendered fit for the sustenance of life, as the lungs vary in size, so will the quantity of air received into them in a given time vary in the same proportion, it follows therefore that different individuals will inhale different quantities of air, those having wellformed lungs will inhale more in a given time, than those whose lungs are comparatively smaller in volume. — The lungs are different in size and form — the left is narrower and longer than the right lung; the cause of this difference is owing to the liver (which is situated in the right hypochondriac region).

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prevent the descent of the diaphragm,  
as low in this as in the left - Hypochondriac  
region. The external surface of the lung is  
convex especially the posterior part, and  
is covered with a serous membrane (The pleura)  
which lines the inner cavity of the thorax  
The proper function of which is to secrete  
serum by means of which, the parietes of  
the thorax and surface of the lungs are  
lubricated, thus the organs are enabled  
to move upon the surrounding parts with  
ease. The inner surface of the lungs is  
slightly concave particularly that of the  
left lung this is caused in part by the  
pericardium and mediastinum, against  
which the inner surface of the organs  
rest. The anterior and inferior portions  
of the lungs are thin and sharp; the  
inferior part of the left organ is excavated  
for the reception of the heart which is always

Exposed at this part even at the fullest distension of the air-cells. The base of the lungs rests upon the diaphragm and is somewhat concave; the concavity corresponds with the convexity of the diaphragm. The apex ascends between the scaleni muscles, trachea, and last cervical vertebra; this portion of the organ is narrower and somewhat rounded. If the patient be in the recumbent position at the time of the examination, it will be found on drawing a line vertical to the clavicle, there will be a portion of the apex of the lungs varying from a half inch to two inches in length exterior to the clavicle. This is rather a deviation from the natural extent of the organ, but is of sufficient occurrence to render its knowledge of importance, to the practitioner of medicine—.

The portion of the lungs, called by Anatomists,  
The root is composed of the bronchiae,  
pulmonary artery, and veins. Their vessels  
are enclosed in a membrane which is  
continued over them from the mediastinum,  
and extended from them, to the lungs.  
There are four veins and one artery  
and these are so arranged that the artery  
is above, the veins below, and the bronchiae  
between and behind them. This should be  
born in mind, as a knowledge of this fact  
is of great utility in forming a diagnosis,  
as will be seen when we come to this part  
of our subject. The division of the trachea  
into the two branches called the bronchiae  
takes place behind the aorta opposite the  
third dorsal vertebra the branches are  
separated from each other at nearly  
right angles, their inclination is towards  
the inner surface of the lungs.



The right tube is larger but shorter than the left, its direction is nearly horizontally outwards, and enters the corresponding organ on a line with the fourth dorsal vertebra. The left branch is about an inch longer than the right and extends more obliquely outwards consequently extends somewhat lower than the former before it reaches the lung of the same side. When these tubes have arrived at their place of destination they divide into other smaller branches the right into three the left into two. These again divide into other branches the division is thus continued until the tubes are so small as not to be perceptible to the naked eye. The blood vessels are terminated in the capillaries of the lungs & it is of this minute ramification of the bronchial tubes and pulmonary vessels that the parenchymatous substance of the lungs

is composed. The color of the lungs is various, different in the same individual at different periods of life, also in disease. The lungs of the foetus are of a uniform brownish red, after the organs have performed the function of respiration they acquire, a light florid complexion which continues through the period of childhood, at the age of puberty they are of a greyish red, and so on in prospect of time they appear streaked with red and in some instances quite black, in their aspect, this last appearance should not be lost sight of as a want of such intelligence might lead to error in— a postmortem examination clasping a healthy lung of such an appearance with one which had been in a state of inflammation. The consistence of the lungs like the color is various in different individuals—

and at different periods of life and according to the death the individual had died, for the foetus the lungs are firm dense and hard resembling somewhat liver but after they have performed the function of respiration they become soft flexible and elastic air bubbles may be pressed out of them. When cut will crepitate distinctly or being thrown into water they will float on its surface. The texture of the lungs is such that it is not easy to tear them asunder. There is a difference in the natural sound in respiration between the two lungs which difference is in consequence of the inequality in the size of the caliber of the bronchial tubes the right being nearly double that of the left side and where there is no such sound to be heard. The lungs are supplied with lymphatics nerves and blood vessels. But as our intention is only to give an outline of the Anatomy of

The lungs as a guide in forming a correct diagnosis by means of auscultation and percussion. Two of the best modes of detecting the extent and situation of the disease we shall not give a minute description of the organs under consideration - let what has been said suffice, as a general description of the lungs and their offices in a healthy state. But before we leave this part of our subject it will be well enough to give the sounds of the lungs in respiration in health. The air as it enters into the pulmonary passages produces a peculiar sound which is called the respiratory or vesicular murmur when heard in the minute vesicles of the organs this sound is somewhat soft and crepitating not unlike salt when thrown upon hot coals of fire or the other situations the sound is more dry and unattended with crepitation which occurs in the expansion of the air vesicles -

This is the bronchial respiration This sound is very different in different individuals and at various periods of life, it is remarkably strong in children so much so that it has received the name of puerile respiration this gradually diminishes towards puberty and is comparatively feeble in old age. All of the sounds are influenced by the chest consequently due allowance should be made for this while engaged in examining a patient laboring under pneumonia. With this imperfect description of the structure and functions of the lungs in a healthy condition we come next to speak of their pathological appearance in acute inflammation. pneumonia or inflammation of the lungs is a disease of no recent date as it is spoken of by the oldest authors of nosology neither is it a disease of any particular country or vicinity its range being as extensive as the globe itself or at least as far

as the population of man extends nor is it  
confined to a particular <sup>Season</sup> of the year as it  
may occur at any period, but the time it  
makes its greatest inroads is during  
the months of January, February, March,  
and April, in the two latter of which there  
is generally the greatest mortality. Though  
not confined to any particular section  
of country pneumonia more frequently  
occurs in low damp situations or where  
the temperature of the atmosphere is frequently  
changing from one grade to another than  
in parts which are dry and the atmosphere  
temperate and regular. Pneumonia may  
be regarded as a dangerous disease rarely  
failing to cut short the lives of many of those  
who are so unfortunate as to be attacked by  
it yet many recover or are said to recover  
from pneumonia inflammation but the fact  
is perhaps well authenticated that no one

- is so fully exempt from a subsequent attack as before - persons who have once been affected with pneumonia may therefore be considered as being more liable to its attacks than if they had never suffered from such disease. Questions have been raised with regard to the precise part of the lungs that is first affected by inflammation but there can be no doubt that all the textures composing the substance of the lungs in the part affected are involved in inflammation. It is therefore important that we should find the precise part of the organ which is affected by inflammation and its extent. The inflammation may be very slight extending over a small surface or it may involve only one lobe when the inflammation is thus limited it is called lobular inflammation. The whole lung and even both lungs may be involved in the progress of -

The disease but this is seldom the case for the life of the patient would be destroyed before the inflammation could have advanced thus far. There are three conditions of the lungs corresponding to different periods and degrees which are very constant and well marked attendances. The first condition is that of engorgement. The portion of lung inflamed is engorged with blood and bloody serum. It is of a dark red color externally and the crepitation is less than that of the sound lung. When pressed there is a presence of more fluid than air in the capillaries. It is inelastic and heavier than usual indentations made upon its substance remain in some degree. It is less tenacious than the healthy lung and when divided by an incision the edges of the ~~engorged~~ part are red in appearance and a large quantity of bloody serum will



— Generally 4 rds from the edges of the divided portion This is a brief description of the first stage of pneumonia which appearance has by some authors been called splenization from the analogy of the lung at this period of inflammation to the spleen. When the disease has advanced a step farther the organ becomes more altered in structure. The red appearance as in the first form is still present but the crepitation upon pressing the substance of the lung is no longer to be heard This doubtless is owing to the exclusion of air from the capillaries which is evident from the readiness with which a segment of the organ will sink— if dropped in water. This would not be the case if the segment contained air The divided surface is sometimes variegated in appearance being red mottled or variegated owing to the interlobular tissue and the black matter of the lungs being intermixed—

The organ has lost its spongy texture has become more solid and weighty. If the organ be cut the cut surface will be of a liver like appearance and from this circumstance this form of the disease has been by most authors termed hepatization, if the substance of the lung be now divided and subjected to pressure there will flow out a fluid containing streaks of purulent matter shewing the approach of supuration. The hepatized lung is more solid its texture more friable than before and is more easily crushed upon pressure. This results from the softening of the tissue which holds the substance of the lungs together. As no air is contained in the part of the lung which is hepatized it follows therefore that if the whole organ were thus affected that it would not collapse if the thorax were opened but would appear to be—

enlarged in bulk in consequence of the engorged state of the vessels with blood serum and lymph which is in the interstices as well as the vessels of the lungs and being retained in them and enlarged or swollen appearance of the lungs is thereby produced as in case of inflammation of other parts of the body sometimes the lungs become so enlarged as to press with such force against the parietes of the thorax as to leave in them the indentations of the ribs. When the lungs are enlarged as just stated they are frequently very soft and pulsy having changed from the liver like consistence to this fulfury mass. On the farther advancement of the disease the dull and engorged state of the lungs still remain as in the second stage but the color has changed to a redish gray or straw color there are small granulations which-

are white or greyish. The organ is still more brittle and rotten than before. At this period of the disease the lungs are full of purulent matter which if the substance of the lung be cut will ooze out plentifully. The more the lungs are engorged with this fluid the more soft they become and if crushed between the thumb and fingers they become a soft pulp resembling very nearly the fluid just described being a little more consistent if a cavity be formed by gently passing the finger into the parenchymatous structure it will soon fill up with pus thus giving the appearance of a recently formed abscess for which it might be mistaken. (Though perhaps abscesses are not of as frequent occurrence in pneumonia as was formerly supposed) The occurrence of gangrene is perhaps equally infrequent—

high authority among modern pathologists  
to the contrary, notwithstanding who speak  
of gangrene of being of frequent occurrence  
in the termination of pneumonia. When  
gangrene does result from pneumonia the  
part affected is of a dark blue or greenish  
brown color the part is moist and wet—  
its consistence is generally soft and  
attended with a very offensive odor  
So far we have been considering more  
particularly pneumoniae in a general  
sense. But both organs are perhaps  
seldom affected at the same time and  
the entire organs never the inflammation  
as already mentioned may be in a particular  
part, lobe or one lung and pass through  
all the degrees above mentioned without  
spreading but this is not generally the case  
for the inflammation continues to extend  
over a greater surface if not arrested—

— until the whole lung is involved in inflammation  
if the life of the patient is not destroyed  
before the inflammation shall have advanced  
so far from Andral's account pneumonia  
is rarely in both sides at once and the  
lung most obnoxious to the disease is the  
right other authors say the left lung.  
Whether one lung is more disposed to  
suffer from such inflammation than the  
other and which if either we are not able  
to say but are disposed to believe that  
both lungs are equally prone to such  
inflammation but are seldom affected  
at the same time According to Laennec's  
Statement there is considerable difference  
in the portions of the lungs as regards  
their liability to inflammation the lower  
lobes being more liable than the upper lobes  
the inflammation beginning in the lower  
lobes and extending upwards a knowledge—

of this fact is of great importance in making a diagnosis as well as in the treatment of the case. Pneumonia is invariably accompanied with Bronchitis the mucous membrane of the bronchial tubes is inflamed throughout all its branches that are in the inflamed lobe of the lung. This is sympathetic bronchitis dependant upon inflammation of the parenchymatous structure of the lungs. Bronchitis may exist without pneumonia but the latter never does exist without more or less affection of the bronchial tubes. The same is true in regard to the pleura the investing membrane of the lungs. There may be inflammation of the pleura without the substance of the lungs being involved in it, but if the substance of the lung be the seat of inflammation there will also be inflammation of the pleura attending it. This is the fact in a majority of cases but

- There may be some cases of pneumonia, without  
apparent inflammation of the pleura but  
it is highly probable that such cases are of  
rare occurrences, We come in the next place  
to speak of some of the means by which we  
are able to learn the degree and extent of the  
inflammation. Of all the means afforded  
us percussion and auscultation are the  
best together with the appearance of the sputa  
if the ear be applied to the chest over the  
inflamed part of the lungs and the disease  
in the incipient stage there will be a peculiar  
crackling sound heard which has been compared  
(by Watson) to the crackling of salt when  
thrown on hot coals of fire (by Andral) to  
the rumpling of parchment this sound is  
known by different names as crepitant  
rhoncus minute crepitation the crackling  
of pneumonia &c This crackling sound  
may be heard in a very limited spot in the



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beginning of inflammation. This is a sign  
of vast importance as by it we are able to  
know that pneumonia is set up and ~~are~~  
therefore able in the outset to use the proper  
precautions to prevent the advancement  
of the inflammation but if inflammation  
continues to advance the healthy murmur  
is destroyed or the sound is not heard.

But if the progress of the disease is arrested  
the healthy murmur again resumes its  
normal sound when this is the case it denotes  
the resolution of the inflammation. But the  
crackling may cease and no sound be heard  
at all. This indicates to us that the disease  
is still advancing or already arrived at  
the period of hepatisation. When the lung  
is hepatised it prevents the air from passing  
into the smaller tubes but permits it to pass  
into the bronchioles and larger tubes of the  
bronchioles in consequence of which there is a

— different sound produced which may be detected by the application of the ear over the part affected. This is called the bronchial respiration and is compared to the sound produced by blowing through a quill. If the patient be made speak at this time and the ear of the auscultator is applied at the same time to the chest there will be quite a difference in the sound of the voice compared with the healthy sound. This sound is compared to the voice of one speaking through a tube. The sound is more apparent when the inflammation is in a portion of the lung in which the bronchial tubes are large or entirely suppressed, when the lung is so hepatized as to obstruct the caliber of the bronchial tubes and thereby destroy the sound. When bronchial respiration is present there is also dullness on percussing the part over the seat of disease—

This dullness will of course vary in proportion to the part and extent of the hepaticized lung. If the inferior part of the organ be the seat of disease there will be but little if any dullness of sound, but if the seat be in the superior part of the organ or where the bronchial tubes are large the dullness will be considerable. The sound will also vary in accordance with the surface of the lung that is affected. If the surface in apposition with the parietes of the thorax be the seat of disease the dull sound will be audible but if the part be more remote the dullness of sound will be less audible. The period when no sound is heard but the bronchial respiration, is termed the critical one that is whether the organ will gradually return to the healthy state or whether it is passing into the third stage or that of purulent infiltration. If the termination be a favorable one there—

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- Stage is doubtful. The general symptoms of pneumonia are febrile excitement puls frequent and vibrating, respiration hurried, skin hot and dry excretions all diminished Tongue dry and generally furred sometimes dark, great thirst, The local symptoms are pain in the chest more especially in the seat of inflammation General shivering followed by increase of heat and frequent puls difficult respiration Cough which is augmented on a deep inspiration The expectoration tinged with blood of tough phlegm like consistence adhering to the sides and bottom of the vessel in which it is expectorated These may be regarded as signs indicating pneumonia but they are not without exceptions for many be absent or there may be more present and yet the inflammation may be greater in every case one of the most-

important practical signs is the presence of dyspnoea. If this be considerable the patient appears to take no notice of what is going on about him but occupies his whole time in respiring his articulations are difficult, countenance pale, or livid, <sup>and</sup> nostrils dilated, delirium is also frequently present. When all these symptoms are present, that we have mentioned, the patient seldom recovers. The symptoms vary and some are frequently wanting entirely. The cough in pneumonia affords but little information. The sputa attendant on the cough constitutes one of the most certain indications of the presence of pneumonia. When this sputa is well marked it is of a rust color of the appearance of liquorice spouts of a viscid consistence so much so as not to be separated with ease from the vessel in which it was spate. When the sputa is of the nature just described it

- Shows that the inflammation has reached its second stage and therefore at its acme. If the inflammation subsides at this period the sputa will gradually become less tenacious, the dark appearance will also disappear and the sputa expectorated will be like that of common cold. But if the disease continues to go on the consistence of the sputa will continue to the end of the disease which terminates with the life of the patient. The patient may from debility desist spitting up this viscid matter but it will continue to be secreted by the mucous membranes of the bronchial tubes while the sufferer lasts. Though we have laid down these three stages of pneumonia they are not to be considered as all nor as always uniformly occurring, as has been stated as regards the first second or third stage nor all the symptoms which -

— are said to occur in the third stage may be present in the first, so various indeed are the symptoms that hardly any two cases are precisely alike, and as the terminations are many and the symptoms dependant on them, we are prepared to account for the variety of the latter. Pneumonia may pass rapidly through its course or it may be tedious not coming to an issue for several weeks but its usual termination is from five to ten days. The causes of pneumonia are many, 1<sup>st</sup> a plethoric habit vigorous constitution and 2<sup>nd</sup> a previous attack renders the individual more liable to its attacks. 3<sup>d</sup> The season of the year 4<sup>th</sup> A wet cool atmosphere, low damp situations 5<sup>th</sup> Those of a scrofulous habit of body or predisposed to phthisis are predisposing causes of pneumonia. The exciting causes are those applications which are calculated to check

— or diminish the excretions, as cold, exposure  
to cool air when coming out of a heated  
room <sup>2nd</sup> Not changing the dress to suit  
the vicissitudes of the weather <sup>3rd</sup> Aerial  
substances coming in contact with the lungs,  
act as a cause, of pneumonia, Besides these  
many other causes might be enumerated,  
But as we have already been too tedious  
we will omit them, in the next and last  
we come to speak of the treatment of  
pneumonia if the symptoms are mild  
and the inflammation is in the inferior part  
of the organ and has not extended over  
much extent of surface the disease will  
generally yield readily by evacuations.

from the blood vessels and by such means  
at the same time as will relax the system  
and at the same time restore the excretions  
in general. But if the symptoms are  
severe and the inflammation more



extensive our treatment must be more prompt. The lancet (as justly remarked by a physician of great skill) is the right arm of the physician in the subdual of inflammation. But it might as correctly be said, That while the lancet has been the right arm of the experienced physician restoring the suffering to health and vigor by cutting short the inflammation, That it has been the weapon in the hand of the inexperienced with which they have cut asunder the remaining cords of life by its free and untimely use. When perhaps that Stimuli and Tonics were indicated to support the already exhausted patient. The symptoms which requires bloodletting are dyspnoea hot and dry skin with a full quick and wiry puls. The patient should be bled from the arm from a large

- orifice in a full stream until syncope  
or there is a decided impression made upon  
the system the object being to relieve  
congestion of the lungs by reducing the  
quantity of blood in the system which  
serves as a general stimulus to keep up  
the inflammation the patient should  
have some mild purgative such as the  
sulphate of Magnesia to stimulate the  
mucus membranes of the bowels and carry  
off the fœces which may be indurated  
and serve to keep up the excitement  
of the system, though much purging is  
objectionable. The mercurials are the best  
supporters of the secretions and excretions  
Calomel or Blue Mass in ʒ or ʒss doses or  
smaller if the strength of the patient  
will not admit so much Nauseants are  
better than full vomiting of ipecac or Tartar  
Emetic or both combined and given in -

Small and repeated doses. If given  
separately from  $\frac{1}{2}$  gr. to two grs of opiac  
or if tartar from a  $\frac{1}{4}$  to  $\frac{1}{2}$  gr will be about  
a medium dose The syrup of squills  
is also a good promotor of expectoration  
Some of the preparations of potassa  
should be given to promote the secretion  
of the kidneys and skin such as nitre  
and dovers powders &c &c Mucilaginous  
drinks such as slippery elm flax seed tea  
&c If the inflammation continue and  
the patients system will not allow farther  
depletion by the general abstraction of  
blood and there is local pain cups may  
used with advantage over the seat of  
pain or the application of a blister at this  
time to the part would perhaps be attended  
with good The tonics that are the most  
suitable are the peruvian barks in the  
low forms of the disease Quinine and

— Brandy should be used to sustain  
the system. The extremities should be  
bathed in hot mustard water and  
cloths saturated with the same should  
be applied to the chest. The diet should  
be mild and generous such as beef tea,  
chicken broths, rice soft boiled eggs &c  
if the bowels are likely to become costive  
gentle laxatives or emera should  
be given