Thesis on
the pathology and symptomatology of the Spectrum
by Wm. H. A. Hay

The relation existing between the general symptoms in different diseases, as well as the different stages of the same disease, and the Spectrum did not escape the attention of the Ancients, who gave the appellations of crude, concreted, ripe, to the expectations, according as they conveyed to their minds the indications of the persistence, or resolution, of the disease whose presence they led them to suspect. Hippocrates has this remark with reference to spurious Melanosis even "Perniciosa etiam repellens, spissa, lacteis, et melana nigra subitudo, et obliviscens aetatis, " melasses melanos tietai t’iugma.
Since his time the subject has continued more or less to approximate to small share of medical observation; lately however, since the introduction of auscultation & the use of the stethoscope, a minute structural knowledge of the composition of the spuita according to the extensive experience of Professor Bennet, can in few cases be reenunciated by much practical addition to our clinical acquisitions; nevertheless, it become important to study these general features, as they alone can afford the information in some rare cases, & corroborate in others what we derive from percussion & the stethoscope, in addition to their being one easy of access in our diagnosis of disease.

We shall therefore review the principal changes which the spuita undergo in disease, & endeavour to arrive at a proper estimate of their symptomatic value & their explanations.

For the purpose of somewhat systematizing our subject I shall consider the spuita 1st as the products of congestion, & 2ndly as the products of inflammation,
Without attempting to investigate those cases which present all the post-mortem appearances of preexisting inflammation, without betraying themselves during the life of the patient by any physical evidences as happens in that condition of the lungs described by Leper as the "Pneumonia of the dying," a condition frequently following surgical operations, and described upon both by Andral & Chomel, with no very satisfactory conclusions as to its nature, for the simple reason that microscopical observation & every other mode of research have hitherto failed in determining a subject of such importance as the establishment in post-mortem investigations of a difference between condensation from inflammatory congestion and noninflammatory congestion.

First, then, congestion of a part, whether active, that is to say induced by evidently increased action of the heart or at least of the arteries, or passive, that is induced by a contrary condition of the vascular system, not only lead to great increase of the secretions, but also to great increase of the
Necrosis of the healthy parts, or to a perverted state of nutrition, giving rise to tumors or adventitious growths. It may be dangerous either from the functional disturbance produced independently of any structural lesion of the part, or to defects of the structure and such functional disturbance as may be caused by simple effusion of blood.

As illustrations of these conditions of the lungs where the functional derangement manifests itself without any disorganization of their part whatever, may be adduced many cases of Asthma and Catarh, which are attended with the expectoration of serous or mucous material, which may probably depend on there increased determination of blood to the anorganic membrane of the air passages. Edema of the lungs affords us another example of the above condition, as the spiro here present just such appearances as one would expect from their dilution with the albumen of the blood; they are very watery, frothy, with occasionally a little curdles,
As obstruction of blood in, or (a cause more frequently in) operation in a serious tear in serous membranes) deter-
nomination of blood to the tissues concerned, is the principal sine qua non to pathological effusions in the part, it
will be evident that the nature of effusions dependant on simple congestion, if those depending on inflammation
must closely approximate, and so they do, and the only essential difference
between them consists in the alteration
of the products effected through the
medium of inflammatory action.

The study of the indications of these
congestions of the lungs is important,
as there have been cases which have
proved fatal in consequence of simple
congestions of blood without any fur-
ther change.

We now come to the consideration of the
second class of local effects produced
by congestions, namely, those which
may be produced by hemorrhage in-
dependent of any ulterior consequences. The effusion depends most frequently
on disease of the heart, effecting the left, and not the right side as Chomo-
ck and others supposed, and impede
ading the progress of the circulation, or
to some other disease of the lung,
limiting its circulation there.

The effusions into the substance
of the lung are either upon the Bron-
chi, or into ulcerated cavities, which
effusions of blood have been descri-
de by Salence, under the title of
"Pulmonary Apoplexy," of which con-
ditions he recognised two forms, dis-
tinguished by their pathological ap-
ppearances.

They are characterised during life by
Hemoptysis, the amount of which, how-
ever, bears no relation to the quantity
effused, being sometimes even entirely ab-
dent in fatal cases, & Louis remarks
that "Pulmonary Apoplexy was frequently
found in the bodies of those carried off
by the epidemic yellow fever of Gibral-

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whereas not a single individual had
had Hemoptysis at the time.

When Hemoptysis does supervene as a
symptom of this complaint, it either
does so in sudden gushes proving speed-
ily fatal from the great quantity of blood
lost, or dozes out slowly as occurs in the
uncircumscribed form of the disease, and
is not suggestive of so immediate danger,
altho' when even slight, if it have super-
ceded rapidly & especially if combined
with heart disease, it affords serious ground
for alarm. The spuutra in this second form
of the complaint are dark red with a
certain quantity of sputum are frothy &
contain frothy blood, which is proportion-
ately left at the commencement & towards
the end of an attack.

Blood may ooze into the mouth
from spongy gums, or drop from the
posterior nasal cavities and these cases
though strictly speaking cases of hemo-
ptysis do not constitute what physiolo-
gists understand by that term.
Haemorrhages from the lungs may arise as accidents of the mines, from the bursting of aneurisms from the general plethora of adolescence, or from the detachment of Bronchial Polypi, &c. from other causes; it occurs frequently in Purpura haemorrhagica without any mechanical impediment on the part of the heart, but the cause, by far the most frequent of operation is tubercle, which will come under consideration when speaking of the products of inflammation.

There is a state of the lungs characterized by the expectation of a firm concrete mass like membrane, which is coughed up from time to time sometimes like worms, or the root of a small plant, which show it to have been moulded in the leper ramifications of the bronchial tube. This effect Watson in the second vol. of his Practice of Physic attributes to a species of inflammation, but it appears to me more probable that it depends simply on inhalation of blood.
Induced by congestion in the part, for in the two cases which he records, the uneasy sensations, constriction, and distress with its the chest, appear to be attributable to the presence of Dr. Arnott's stones in their chambers; indeed one of the gentlemen, both of whom were highly intelligent, persisted in referring his symptoms to that cause, and certainly the heat acting on Plethoric constitutions as theirs were, is sufficient, I think, to account for the results, without supposing the existence of a peculiar inflammation which disclosed itself by not marked symptoms for that purpose.

The appearance is a rare one, it was first described by Dr. Warren in the first volume of the Medical Transactions, where he gives the name of Bronchial Polypi to the substances coughed up. In both Dr. Watson's cases, the patients remarkably stout and healthy gentlemen, first experienced hemoptysis which came away in considerable globules for some time before the expectoration of the firm name-
tying up an object which resembled coagula of blood deprived of most of its colouring matter, & these casts of the air tubes of which some were solid & some hollow continued to be expelled without any blood once or twice for a few days. With this the patients were entirely void of fever.

Dr. North in a paper published in the "Medical Gazette," draws a distinction between these so-called Bronchial Polypi and divides them into the hollow Mucilaginous concretions expelled without any blood, & the solid branching masses which accompany or succeed Hemoptysis & are obviously mere coagulated blood moulded in the upper air tubes where they had stagnated. He proceeds to point out the comparatively harmless nature of these cases in which the first occur as compared with the far more dangerous import of the second.

The haemorrhage, according to him, denoting the presence of some organic injury, chief within the thorax, & the mere accidental cause of the Polypous concretions.
Dr. Watson properly doubts the accuracy of this distinction, and urges against it that in both his cases the subjects of the complaint were still continue to be, perfectly healthy, entirely free from cardiac or pulmonary disease; he also argues that in case of organic disease of the heart, and in rheumatic, such corrections are very rarely observed; still I do not think that this limits the explanation to that of a peculiar inflammation, as the products of which on a mucous membrane it is difficult to regard them; if the existence of different dyscrasias in the body, which we know greatly modify the characters of effusions, might account for their not so frequent existence in cases of Tuberculosis.

Heat, and other things are capable of producing congestion, it thereupon probably unusual circulation.

Forming a connecting link between congestions & inflammations stands Pernicous Pneumonia, Notha, a disease which far takes of the nature of both requiring
great variety of treatment from the peculiar difficulties attendant on it.

It generally accompanies disease of the heart, but consists essentially in a diffused inflammation of the pulmonary mucous membrane, attended sometimes with enormous secretion, the free and copious expectoration of which is attended with complete relief.

The secretions of mucous membranes are frequently increased when no kind of organic disease, cause or obstruction can be found to account for the change, and Andral gives the account of 8 cases in his "Clinique Médicale" where the patients expectorated daily one pint or even three or four of a frothy fluid resembling weak gum water in colour and consistence. Had fever, frequency of pulse, or heat of skin, but on the contrary weakness, emaciation and pallor; where the post mortem examining disclosed, but very little appreciable difference in heart or lungs. These cases apparently derive considerable benefit when treated like a gleet with Balsamo Creasote Jr.
We come now to the consideration of the second class of effects consequent on congestion, namely, inflammatory action, adventitious growths, and alterations of structure. If this belongs to the second division of this thesis, the study of the changes effected in the sputa by the instrumentality of inflammatory action. When inflammation attacks any internal part it gives rise among many other things to local symptoms indicative of functional alteration, which, taken in conjunction with the sympathetic phenomena exhibited, enable us to fix its seat with more certainty and precision. The local effects indicative of an attack upon the air passages consist in an increase and alteration of the secretions there, which still continue to retain however more or less of their previous general characters. This rule is almost universal but apparent exceptions do, though rarely, occur, as in those cases wherein, as I have stated above, no functional alteration...
whatever has been observed during
the patient's lifetime, when post mortem examination has afforded a
abundant evidence of preexisting in-
flammation.

As serum is effused upon the mu-
cous membrane of the air passages from
almost the very commencement of
inflammatory action there, we find
the sputa speedily increased in quan-
tity, diminished in consistency, and al-
touched in quality, which changes again
are speedily succeeded by the expectora-
tion assuming a more glairy transpa-
rent, and albuminous character, like
the white of egg, owing to the effusion
of the serum (Liquor sanguinis), and the
reabsorption of the more liquid por-
tions of the exudation. It is this vis-
cid and half solid mucus which some-
times attaches itself to the sides of the
greater Branches giving rise to a coo-
lng sound called Rhotchus by the dimin-
ution which it effects in the caliber of the air tubes, & the vibrating tongues
which it offers to the passing air, & that this is the true cause of the sound in question is rendered evident by its disappearance on the expectoration of the adhering tough mucus.

If expectorated after much coughing the spueta assume a frothy appearance from the admixture of air, a condition which is very marked in Emphysema of the lungs, where, if spueta do exist (not being an essential accompaniment of the disease) they are thinner like gum-water and full of foam. At this stage of the complaint the spueta are often tinged with blood, & these expectorations are those to which the ancients gave the appellations of bruculae.

As the inflammation advances the stringiness and tenacity of the matter expectorated increase to such a degree that you can pour them in a whole glass from one vessel to another, or even clear them out like melted glass; and the degree of this vis-
possibly indicates with tolerable accuracy the intensity of the inflammation.

In acute Bronchitis when the patient has not sufficient strength to cough up this mucus secreted which is found after death blocking up the Bronchi great as well as small, the signs of suffocation begins to manifest themselves and death by apnoea terminates the patient's sufferings.
Should the disease however give way instead of terminating fatally, the expectorations gradually lose their transparency and become mixed with opaque masses of a yellowish white or greenish colour, which increase until, at the complete resolution of the disease they constitute the whole of the sputa. This formed the corrected expectorations of the ancients. The characters of this opaque sputa vary considerably, but should they ever near assume their frotty, transparent, and sticky appearance, it is a sure sign
of the return or extension of the disease.

In very severe cases of Bronchitis, the sputa frequently become of excre
tence, tending to mislead the physician into the belief that gas
grene exists in the lung. In reality, however, the sputa will be found to owe
its production to the detachment of sloughs from the ulcers, which it de
pends severe attacks of Bronchitis are capable of engendering in the air pas
tages.

Besides the aids with which the study of the sputa furnishes us to a knowledge
of the several stages in this disease, it constitutes an important guide in en
abling us to distinguish it from Pneu
monia, as I shall afterwards explain.

and in chronic Bronchitis where the
patient coughs up a certain quantity
of transparence, grey fumes in the win
ter, attended with expectoration in the
lungs, the result of a passive conges
tion of and effusion upon the mu-
cous membrane of the large air passages, caused by slowly advancing heart disease, an examination of the sputum to ascertain the absence of pus globules, taken in conjunction with the presence, or absence of hectic fever, enables us to determine the character of the disease, and to distinguish it from Phthisis which it closely resembles.

This test is now ascertained to be insufficient, as we have seen that acute Bronchitis is capable of producing Pus; a better means of distinction is to be found in the general characteristic appearances of the sputa; it becomes therefore of importance to ascertain accurately the distinguishing features of both.

The green, homogeneous, opaque sputa, existing in chronic Pulmonary Catarrh, and often sometimes in the Acute variety, are not situated as those of Phthisis. They do not contain any of those white particles resembling the described...
by Bayle as existing in Phthisical
Sputa, nor are they usually commu-
icated, a condition so characteristic of the
expectations of Tubercular disease. Be-
sides this the matters expectorated in
Bronchitis are more copious.

Such is a general view of the appear-
ances subject to slight variations, which
the sputa assume, in simple Bronchi-
tis, Influenza, and Croup, in which
last disease however, the inflamma-
tion consumes the effusion of coag-
ulable lymph which becomes depos-
ited on the surface of the Bronchi in
layers forming what are termed false
membranes there, parts of which con-
tribute from time to time to the con-
stituents of the matters expectorated.

In Pneumonia the sputa from the
outlet that is the 2nd or 3rd day of the
disease, previous to which either nothing
is expectorated, or simply some Bronchial
Secrets, the sputa present the most-
characteristic appearances.

These characteristics are a trans-
parent, tawny, jet-colour, and the
epithet forming in the sides, which contains
them a trembling jelly-like mass, the
tenacity of which is such, that it
cannot sometimes be detached all-
the the vessel be inverted and for-
ibly shaken.

When this the case, the prognosis is
unfavorable, as this condition out of
the body indicates a similar condi-
tions one in ultimate ramifications
of the air tubes, whence from this ex-
treme tenacity, it is incapable of be-
ing dislodged, which otherwise, as may
be gained, by inverting the vessel where
it is collected, and observing the de-
gree of readiness with which it flows
along its side. When tilted, there is pro-
portionately deep ground for fear.

When the Pathomonia has reached
its acme, the spura, as I have described
them, remain stationary and
should it terminate in resolution,
their appearances fade in the inverse
order of their ascension; should the
disease on the other hand progress
the rust coloured sputa continue to
the end, commonly however the ex-
cretaions in that case are less, or
even not at all, and this is not owing
to any stoppage of the serous secre-
tion, but its extraction, from its ex-
treme tenacity.
When these rust, or orange coloured
sputa are absent we cannot assume
the absence the absence of Pneumonia,
so that disease may be attended by no
expectoration, or at least by such only
as simply resembles that of Catarrh;
but when they are present, you may be
almost certain of the existence also
of Pneumonia

That the colour of the sputa peculiar
to Pneumonia is dependant upon
the intimate admixture of blood with
the altered tissues, and not as some
have fancied, to the presence of bile.
(also in some rare cases other than, as well as of
Pneumonia) a tawny yellow colouring of
Sputum has been traced to that state)
is rendered perfectly evident when the colour is deep. The sputa are not streaked with blood as sometimes happens in Bronchitis, nor have we the un-mixed blood of hemoptysis but the mucus and blood are thoroughly amalgamated, and in proportion to the quantity of the latter, have we the yellow, rusty or decidedly red colour of the matter expectorated.

All the secretions from mucous membranes are signally exempt from any change of colour in Jaundice, still it does sometimes happen that when Pericardia is combined with that disease, the sputa may be considerably coloured by the admixture of bile, and this independently of any hepatic insufficiency, such as the establishment of a communication by a cleft or otherwise between that organ and the lung. Dr. Watson mentions a case of this kind, where there was expectorated such thin, very tenacious sputa possessing a deep, grayish green colour with here and there
patches of yellow. These sputa, when collected in a basin, presented the appearance of large pyramidal bullae project from among them, of a green colour, and crumpled, irregular surface, looking like bells of inclosed green glass; and when these large bubbles were broken through at their summits, they did not collapse, but still presented firm and blister walls as if they really had been what they so much resembled, bells of glass.

The colour imparted to sputa by bile is then we see, not liable to be confounded with the peculiar appearance of pneumatic sputa, and cannot detract from its symptomatic value.

When the 1st local lesion occurs, namely the rupture of the capillaries accounting for the presence of blood globules in the expectoration, the usual characteristic appreciable, and unmistakable changes take place in the diseased part itself, and in its secretions.
The tendency of the deposit is to pass into degenerations of a particular form, whose characteristics depend first on the nature of the overbroad condition of the blood, and secondly, on the amount of vascularity still retained by the part. The effusion of the blood plasma, and the extravasation of the blood itself, insinuated into every minute space between the tissue, while they render the entire lung specifically heavier. After the coagulation of this fluid effusion, granules form in its substance, and whereas the cells as yet existed other than oval or cylindrical epithelia, and blood globules, the formation of distinct cells now takes place, and these assume a form of organisation first described by Professor Lunge, and constitute the exudation corpuscles of Professor Bennett and other pathologists. These cells are formed in greatest abundance in Laennec’s second stage of Pneumonia, and disappear all—
together as the red papules into the grey softening.

They are imperfectly formed or not at all in the deposits of Syphilis fever. Besides the formation of this cell in the deposits, the epithelia undergo alterations depending upon imperfect development, and assume a more granular aspect.

All these changes may be discovered in the sputa of patients in whom the pulmonary substance is the seat of inoculation.

According to Dr. Remak, this altered form of epithelium constitutes part of microscopic elements of Bronchial coagula.

The products of coagulation may assume a fibrinous form, with nucleated cells and the Pyoid corpuscles of Lebert, and thus fibrinous, as well as the granular form, is found in the second stage of Pneumonia. The immediate effect of the granular form of the coagulated matter is
to impede the respiration, and impair the sanguination by compressing the surrounding parts. The clotted material consequently changes its nature and becomes purulent; cells already formed become disintegrated, extravasated blood corpuscles become spherical, swollen, and at last break up, and the whole mass assuming a more liquid form is speedily converted into pus.

The circumstances which condue to the elementary development of the elementary forms of pus are also those which favour the formation of fat, the amount of which, accordingly, accumulates in the lungs from the time when the compound granular cell commences to disintegrate, or to that when the the Pulmonary tissue itself entirely breaks up, in other words when gangrene supervenes, and this takes place in dependently of any fat furnished.
by the compound granular cell, and to such a degree as to constitute from fifteen to fifty per cent of the whole weight of the lungs, according as that organ is more or less involved.

The formation and deposition of fat stands in a definite proportion relation to the respiratory process, and the proper supply of oxygen for the conversion of the Carbon, destined for respiration into Carbonic Acid. Any cause therefore, such as congelation in any part of the lungs, which diminishes the supply of Oxygen, will produce a disproportion between the Carbon and Hydrogen of the food, and the oxygen, which is absolutely necessary to effect the disipation of their excess as Carbonic Acid and water, and the formation and deposition of fat will be the result.

Regarding the formation of Pus in the occluded Lip Pauquinis, it can only be supposed to exist under two possible conditions.
1st. It must either be a primary or
2nd. Result from disintegration of
the compound granular corpuscle, or blood cells.
Whether the pus corpuscle derives its
nucleus from the compound granular
or not, this is certain, that those circumstances which appear to be favourable
to the development of the one, are also those under which disintegration
of the other takes place.
A knowledge of the various stages in
the development of the exuded mater-
ials, may be obtained from the exam-
ination of the sputa, and nothing is more
common than to meet with sputa
containing masses of molecules, granules,
and fat globules, sometimes separated,
and sometimes more or less aggregated
together, likewise masses containing fi-
brinous debris, or if, as sometimes happens
in acute Pneumonia, any fibrinous
casts of the air tubes be coughed up,
so they will be found to consist of
Molecular fibres infiltrated with pus cells, or deserts Pyloric capsuluses. Similar appearances are presented by the so-called false membranes of croup.

When the pus whose formation we have traced makes its appearance in the expectorations, it demonstrates the superintention of the third stage of Pneumonia; sometimes however, the spueta simply remain rust coloured to the last.

In the advanced stages of Pneumonia the spueta sometimes assume a brownish red colour, and are of the consistence of gum water resembling altogether the appearance of bignonie water juice or plum water, and anderal states that he has been able to predict the existence of Pneumonia's third stage from that appearance alone, and had he ever found the post mortem examinations belie this diagnosis in these cases.

When the Pneumonia proceeds into gangrene, which is rare, the espee
Secretions become of a greenish, reddish, or dirty grey colour, are more liquid, and possesses an intensely fetid odour, which latter property they share in common with the puriform expectorations which occur in cases of circumscribed abscess of the lung, a rare termination of Pneumonia, as well as with the expectorations of Acute Bronchitis so intense as to have gone on to the formation of ulcers in the air passages.

It may find its way into the expectorated fluid from other sources than from the exudations effused into the lung by antecedent inflammation in that organ. It may effect a passage through the diaphragm in abscess of the spleen, or eat its way through the pleura, forming Pneumothorax, and escape from the mouth in a sudden spasm, or yet low emittities composed partly of Bu, and partly of bile may be occasioned upon being spat up from the Bronchii, which after they had penetrated by the teeth.
a communication established between the lungs and liver, by means of an abscess formed by the degeneration of hydatids or some such cause in the latter viscera.

In such cases much information as to the source of the Pudovky may be gained from local examination.

In one case recorded by Dr. Watson, where large quantities of bile, along with hundreds of green hydatids, (specimens of which have been preserved in the museum of the College of Surgeons London) were expectorated for several months, pressure upon the posterior hepatic region produced an immediate paroxysm of cough and expectoration. In this case the patient gradually recovered lost flesh, the sputa becoming only streaked with blood as the pain abated.

The sputa in such affections are sometimes bright yellow, more generally however they present the
appearance of what we should expect from the admixture of bile and phlegm, and the patient discharges from the mouth, during a fit of coughing, a stream of a considerable quantity of grey, mucilaginous fluid of the consistence of gruel, profusely emitting intense fœtus, and having precisely the same qualities as the matters which escape from the biliary sacs, when it is punctured by the knife for the purpose of effecting its evacuation.

The different organisms existing in inflammatory exudations which we have just considered, are liable to modifications, depending upon the existing dyscrasia of the blood, which produce the disease. Both these Cachexias not only tending to regulate within certain limits the local effects of inflammations, causing accentuation in some cases, the formation of false membranes in others,
and so on, but also to exercise an influence upon the cell formations in the matter exuded.

In Typhus and Filthias the product of exudation in the lungs, never attains that degree of organisation that it acquires in other cases, a circumstance in Typhus which has been ascribed by Rosettansky (with reference, chiefly to the intestinal lesion in that disease) to the deposit of what he calls the Typhus material, but in reality it is more probably owing to defective organising power.

Most usually molecules and granules with much fat are all that can be detected, the compound granular cell being entirely absent, the granules simply existing in masses without cell walls. The Pus is dense in perfect, and the morbid condition of the blood is characterised by deficiency in Albunin and Fibrine.
In Akthia is on the advent of its second stage, that is to say, when the yellow tubercle breaks down, leaving cavities in the substance of the lungs. The sputa, which were formerly white, containing bubbles of air become opaque and greenish, cease to contain air, are streaked with yellow, while sometimes makes the sputa themselves acquire a variegated appearance, and sometimes contain opaque white particles which Bayle has appropriately likened to the grains of boiled rice. This last appearance is the sputa however is rare, and is not so frequently met with as the streaked variety. It is also liable to be simulated by formations in the follicles of the tonsils which sometimes find their way into the expectorations.

After some lapse of time, these different shades of colour blend into one. The sputa become homogeneous, assuming a solid form, with ragged edges, and acquire a firmer consistence.
and are heavier, subsequently they change their greenish yellow, for a dirty grey colour. This change occurs towards the end of life, and according to Louis, page 184 generally speaking, only a few days preceding its dissolution. At this stage they lose more or less of their previous consistency, and with it their granularity when spat out. Within the last twenty-four hours of life, they are frequently tinged with blood, a fact not very generally observed, as expectoration is most frequently suppressed at that advanced stage of the complaint.

The existence of tubercular cavities is denoted almost with certainty by these characters, when they are presented in the aggregate. Separately they may resemble the appearances of spits in other diseases, as, for instance, those of chronic or even acute catarrh, whose heavy stage leaflike spitting are common.

* "Researches on Phthisis"
to both affections.

The globular form of Phthisical Sputa is their best diagnostic peculiarity, and these round, flocculent, woolly-like masses have received the appellation of mucicaria from the resemblance which they present to money when they are spat into a dish without water.

As regards quantity, the Sputa of the first period are profuse, but scanty in the second, unless when the peculiar expectoration of the first period coexist, and indeed the peculiarities of the first period generally are restrained by the second.

The complete suspension of expectoration is a rare occurrence in the disease.

Occasionally during the second period, the patients expectorates an enormous quantity of muciform mucus in a very short time, when it is improper to suppose that it is derived from the sudden softening of a
Tubercular mucus which has forced itself into the Bronchi.

Should the patient be submitted to the influence of rest and proper regimen, the sputa, after the persistence for a variable length of time of their greenish opaque aspect, become less opaque, and occasionally acquire something of a vitreous appearance, either retaining or losing their annular appearance as the case may be.

The vitreous sputa containing more or less air which attend the first period of the complaint, are derived from the Bronchi; those of the second period consist of the secretion from the air passages and the tubercular cavities, the proof of which is afforded by the fact that the change in the expectoration takes place synchronously with the supervision of pectorology and gurgling and murruring the breaking up of the tubercles and the co-
Establishment of communications between them and the Bronchi; and secondly, by the resemblance of the matters expectorated to the contents of recently-formed cavities. The evidence of the existence of cavities as afforded by the opaque, greenish, and greyish coloration of the spueta, does not appear however to be conclusive, for Lomis observes, that at this period of the disease, violent inflammation of the mucous membrane must contribute materially to effect changes in the spueta, and that there is little difference, between the matters so furnished and those from the walls of the cavities.

As shreds of tuberculedised bands and calculous concretions are found in these cavities, their occasional appearance in the matters expectorated would, as Annibal has remarked, be nothing more than what we should be led to expect, but in reality, such cases are very rare, and Lomis (1844) has
not met with are in Hospitals, or Private Practice.

When the little flakes of cheesy substance which are found entan-
gled in the purulent Membran are examined microscopically, they
at times of tuberculous, hard and
Calculation calcifications are found in these
cavities. The occasional
present a number of bodies of irregular shape, varying in their diameter
from the 1/10 to the 1/5 of a millimetre
in their longest diameter, called tub-
ercle corpuscles, and these social
along with a multitude of molecules
and granules, which are also increas-
ing in proportion to the softness of the
tubercle:
The gritty little flakes which are oc-
casionally brought up with the spec-
tum consist of particles of phosphates
of lime, chloride of Cholesterol, and
Tubercle corpuscles.

Fragments of acicular tissue are not
unfrequently found in the purulent
where they find their way from the ulcerated surfaces of the pulmonary tissue, and they may be found. According to Schroeder-VanderKolk, in the stomach before the physical signs of ulceration manifest themselves. At all events their presence in doubtful cases where the physical signs are obscure will materially assist our diagnosis. Flies seem to be more attracted by this exudate than by any other. When spit into water it sinks until floated by mucous or air bubbles. This exudate has only been observed twice by Louis, and once by Clonel, unconnected with Plathisis, so that if not entirely it must be regarded as very nearly pathognomonic of the disease. Spitting of blood in Plathisis is a rare occurrence towards the close of life, so that Louis out of 300 cases has only met with 3 which have proved fatal from that cause and it is not inexplicable to conceive it, under
rare circumstances, being the first and last evidence of the existence of Tubercle.

The question of whether hemoptysis preceding cough and expectoration, ought to be considered as a symptom of the existence of tubercle, or not is one which has been much agitated, and one upon which we find very conflicting testimony. Broussais states it as his opinion that a multitude of causes may produce hemoptysis, and Laennec calls it a common symptom of Pulmonary Apoplexy. This assertion however is said by Louis to be not quite consistent with the observation of facts, and it is the opinion of the able hand of the latter gentleman, whose correct investigations entitle him to be considered as a high authority upon the subject, that little a few hemoptysis, when at all rare, exceptions, hemoptysis, when at all severe among tuberculous disease of the lungs, its occurrence therefore with
reference to the probable duration of life is of melancholy omen. This symptom is of more frequent occurrence in women than in men, in the proportion of 3 to 2 and is extremely rare in tuberculous children under the age of fifteen in the proportion according to the work of 2 to 100.

The frequent occurrence of this symptom led Cullen to hold that spitting of blood produced consumption and Morton recognizes a Phtisical disposition.

Of those persons whom Andral had known to spit blood at some time or other of their lives, all of them he also knew to have tubercles, whilst in Louis practice in a large hospital, all those who came before him for the space of fifteen years unaffected with Phtisis, with only a few exceptions where the patient had received violent blows on the chest invariably returned a negative to his inquiry of whether they had ever spat blood at any previous time.
In true Melanotic Phthisis the sputa according to Bayle are white or whitish, which do not always appear to be of a very bad character. These sputa in Bayle further describes as being generally round, and somewhat opaque, and as being almost always expectorated along with a pretty considerable quantity of thin, rich phlegm. If the expectoration does not consist in part of a putridous matter, the sputa alluded to are very consistent, but they swim in water in place of sinking to the bottom of the vessel.

In conclusion, I have to speak of an affection of the spuitum whose cause is found to depend on agencies extraneous to the body, I mean black spittal as it occurs in the spurious Melanosis of coal miners. This symptom of black expectoration is mentioned by Morton, as affording a prognostic of Phthisis, and he not regarded the coloration as being derived from the Bronchial Glands,
to this theory, Haller, subsequently in part subscribed, but thought that it was also derived from the blood.

Wütens, another observer, supposed it to be traceable to the mucus glands of the bronchial as its source, while Dr. Bree maintained that it consisted in a deposition of fat in the carbon of the blood in the pulmo-monary air cells caused by a deficient supply of oxygen.

Dr. Pearson was the 1st advocate for the extraneous origin of the appearances in question; he proved that the bronchial glands were not organs of secretion, and therefore incapable of furnishing any solution to the difficulty. Besides this, he gave it as his opinion, that the black, opaque colour of the expectorations depended upon the respiration of an atmosphere loaded with carbon, particles of which, became entangled with the mucus from the lungs. In this opinion, he seems to have agreed with Chouelle, Sommerring and Heimeizen.
He seems to have agreed with Dr. Duerbrock also in attributing the appearance to the smoking of tobacco. Laennec, as well as Pearson, from the nature of his observations, was led to believe that spurious occurred chiefly in villagers, in the habit of sitting up late at night, and consequently, of using artificial lights. He also observed, that in cases of black Pulmonary deposit, the souseous secretion from the Bronchi was of a greyish tinge, whereas in cases of true Melanosis, although it were present even in considerable quantity, it did not give rise to any black colors in the expectorations, except perhaps at the moment when the melanoic matter, after having been softened, is discharged into the Bronchi.

In all the discussions upon the subject the strange that chemical analysis should have been so much overlooked until Dr. Pearson directed his attention to the subject, and proved,
that the black pulmonary matter of
spurious melanosis differed in its
chemical proportions from any an-
imal secretion, and that it was in
fact Carbon

Dr. Thomson, in a dissertation on
black spittle published in the 21st
col. of the Medico-chirurgical trans-
actions, gives the testimony of many
coal mine managers & to the effect,
that in entire districts spurious Mel-
anosis is scarcely if ever seen. The sub-
ject then is one still envolved in con-
siderable obscurity.

The 1st case of spurious melanosis
upon record, is that of Dr. James Gre-
and Surgical Journal, 1831

In this case after the death of the
patient the washings of the lungs,
which were jet-black, were sub-
jected to chemical analysis by
Dr. Christie, who found they owed
their colorization to the presence
of carbon in considerable proportion.

From the nature of the tests used on that occasion, the existence of carbon is put beyond a doubt, but we still require more proof as to its source.