The Pathology of Thilis and its Relation to Fatty Liver.

1858.
"Hypotheses non fingo."

The Pathology of Phthisis and its relation to Fatty Liver.

It has always appeared to us a mistake on the part of those situated in circumstances similar to our own, to choose a practical subject for an "Inaugural Thesis." The limited experience of a student almost necessarily entails that anything of a practical nature written by him, will be but a mere recapitulation of the treatments recommended by those who have preceded him; the result in medicine is not advanced.

Therapeutics unquestionably is the ultimate object of Medicine, but it must always remain, an uncertain and unsatisfactory science, and the practice purely empirical, until we become more consistent with the conditions and processes of health and disease.

We must know the temper, the viles and the resources of the enemy; before we can hope successfully to cope with him.

Physiology, Pathology and Organic Chemistry have been making gigantic strides towards perfection, while our faith in Therapeutics in the same proportion has been eroded and undermined. This is no less than what might have been anticipated; it would have been strange indeed, if with the
hundred eyes which we can now employ in investigation we should
attain, no doubt, or find no inconsistencies in the practice
of those who without our advantages went before us.

It has too long been the custom to look upon certain
forms of disease as incurable. Such a doctrine could never have
gained circulation had Therapeutics not ignored the fact that
her place was in the rear, not the rear of the Physiologist
and Pathologist. The list of incurables must now be reduced,
the incessant activity of the Laboratories of Europe is
big and pregnant with nothing less. The disjointed, but
elaborate analyses which have of late been accumulating, wait
but the efforts of some giant generalizer, to grasp and interpret
them.

In the whole circle of the art of medicine, there
is perhaps not a disease which by the mass of the profession,
has been more sedulously avoided, or approached with more
reluctance than Phthisis pulmonary; but here too the Therapeutist
has his place, teased and tormented Nature by
every engine of imperial experiment. Still, Nature, sparing
such unscientific inquiry, has refused to reveal her invisible
secret. On the other hand Therapists have not been wanting,
but Speculation after Speculation has been swept away
like the scaffolding of a building, or the building itself,
has not progressed. Theory after theory has been reaped,
but hitherto they have only proved to be,

"Rich windows that exclude the light.

And passage where he lead to nothing."

After so many and such signal failures in explaining this most obscure affection, it may seem, not to say preposterous, but the promptings of a forlorn hope, in us to attempt a solution of it. But it is high time that the ruler of our homes were called to a more strict account, and though I should not succeed in clearing up the obscurity that surrounds it, I shall be justly well rewarded, if my attempt stimulate others to ride over my failure to the relief of suffering humanity.

It is not my intention, in the following essay to enumerate and for less to discuss the various causes upon which phthisis has been supposed to depend. It may however be necessary, from the fact which, it now enjoys, and the connection it has with the views herein to be advanced, to make a few remarks on the theory that attributes phthisis to an incapacity for the digestion of fats. Among the most distinguished and strongest advocates of this theory is Professor Bennett of this University, who extols phthisis as essentially the result of malnutrition, consequent upon an inability to digest the oleaginous constituents of the food, which he affirms are indispensable for a proper elaboration of the chyle, and
Therefore, all the blood and tissues. The third of these views supported by the undoubted fact, that fat is an essential requisite of cell-formation, and that this is proved by the morbid conditions which ensue upon the absence of fats, and the marked improvement which often occurs upon the administration of Cod Liver oil in phthisis. But supposing that there may be an absence of fats and an inability to digest them, the cause of the disease is just removed, the step further back, as there still remains to be shown the reason of this inability.

There is evidently a constitutional habit or diathesis which predisposes certain persons to tubercular disease, for in other constitutions, however much digestion prevails, and of fats in particular may be deranged, still they will not manifest such effects in the production of tuberculosis. But while I admit the necessity of fats to a proper nutrition, I think I shall be able to show, that so far from these being a deficiency of fats, there is in the circulation an excess of it, that the system is often glutted, clogged, and filled with fat and at the same time highly tubercular, and in such cases Cod Liver oil, however readily it might be digested and absorbed, will only aggravate the disease. While I admit that fat is indispensable, a fine gone from to a healthy nutrition, there is another condition in, the absence of which, fat is not of the slightest service, either as a colorificatior.
histo-pathetic agent, and it is from the absence of this condition
that the inefficacy of cold linseed oil is to be explained in
these cases, where a phthisical patient may take it with
which, drink it like water, while the disease stills on to
a fatal termination with, if not quickened, at least not
impeded much.

If the repugnance of the phthisical subject to fat
were the only bar to the successful treatment of the
disease, this could easily be surmounted, for the experiments
of Liebig, so long contested by Lamarck, are now admitted
to prove that the system possesses a power of transforming
amylaceous principles into fat - the rapid increase of adipose
tissue in fowls fed entirely upon Indian corn, the fattening
of herbivorous and omnivorous birds are instances of the
power of the system to convert amylaceous into oleaginous matters.

If there were then a deficiency of fat in phthisics, and
an inability to digest it, the rational treatment, considering
this fat forming power, would consist in administering
an abundant supply of starch, sugar, and other carbohydrates
from which it might be elaborated. But while this would
be sufficient in a healthy person, even as in the omnivorous
bride and Porcine, it would assuredly fail, not to private
fet, but to be of the slightest service to the phthisical subject
for the condition is wanting upon which the efficacy of fat depends.
While Dr. Bemitt and his school held that the system is deficient in minerer material, we, on the contrary, maintain there is no deficiency, but the system may be shifted, closed with it, and at the same time like Tantalus parching for that which, on every side surrounds it.

In the Blood, that grand elaborator of the tissues, we find certain matters which, although not present in the tissues, yet from their constancy in health and varying only in disease, it is certain that they are not accidental, but play some high part in the transformation of tissues, and cannot be withdrawn from the circulation without inducing derangement of the most serious nature, and this not in consequence of their entering into the composition of the tissues themselves, but of the influence they exert on their elaboration and metamorphosis. Iron, for instance, is an essential constituent of the Blood corpuscles, while soda and perhaps other alkalies act merely as oxidizing agents, catalytically in the formation and metamorphosis of tissues. However much one substance may resemble another in its chemical reactions and substitutions as conducted in the laboratory in the living organism, the balance of affinities is so nicely proportioned that one substance cannot be substituted for another. One other metal can supply the place of iron in the formation of the blood, potash, and another soda is contained in the blood globule, soda and not potash.
potash in the Blood Stream. The same universal law holds good in the vegetable as well as in the animal kingdom. The
grasses however plentifully that may be supplied with other earths,
cannot form their starchy without silicon without phosphorus. These
seeds cannot come to perfection. But this is not all. Analyses
of plants of the same species, and at the same stage of growth
show that their acids and alkalies entering into their constitution must
always stand to each other in certain definite proportions. In
the presence of an overabundance of alkalies in the soil, we do
not find the juices of the plant increased in alkalinity. Neither
when the supply of alkalies has been diminished does the plant
go on elaborating acids in excessive quantity. The same fact
is observed in the healthy condition of the animal organism; it
is only in disease or tendencies to it, that this alkaline-acid
balance is disturbed; and it is interesting to see how the
system under adverse circumstances will struggle to maintain
the relative proportions of these substances to each other. If,
for instance, when the alkalies and acids are in their normal
proportions, we then throw in more alkalies, the Blood does not
become more alkaline, the toxins being immediately excreted
from the system, but if the system has been below "par"
in regards to alkalies, it will retain just so much, as will supply
the deficiency. On the contrary, the food contain no alkalies, a
beautiful Conservative provision is manifested, Nature stops further
elimination.
elimination, think himself to use the same particles of matter and one against in the same organic processes. The bile of the bile after having served the end for which it was destined is released from the biliary acid with which it was combined, and again absorbed to enter into the formation of fresh bile; in this way it circulates on completing and ever renewing the cycle of the same organic processes, but this will not go on forever; after a time the albumen in the course of its resolution is attacked by other products of decomposition and forced into useless combinations. Having ceased to be serviceable it is excreted from the system. But this is but one way in which the balance may be destroyed. There is another and more common one, in passing into it, we will merely remark that hyperplasticity cannot occur except transiently, when albumen is injected quicker than they can possibly be eliminated; even then the system endeavors to make up what is deficient in elimination power by increased formation of acid, as seen sometimes in practice after the too prolonged alkaline treatment of certain diseases. Hyperplasticity then is transient, and can only be induced from without, but it is quite different with the opposite condition, hypoplasia, which is induced by causes operating from within: the system not being dependent upon external supplies, but having an inherent power of producing the acids required for the organic processes. In health this power is always
Always...with certain limits, but in disease it sometimes becomes excessive. Nature stands perplexed, the cause of generating activity, and these which still remain, are being rapidly freed from their combinations, and fused into new ones quickly to be extended from the system; the organic processes depending upon the alkaline supply are arrested and the system is plunged deeper and deeper into disease.

We have alluded to the theory which attributes phthisis to an absence of fat and an incapacity to digest them, in a greater manner, the absence of fat. And it can only excite surprise that it should ever have been maintained that pathological anaphyes become so common. From the condition of wild animals and men in a state of nature, the deposition of fat in the cellular tissue seems rather an abnormal circumstance. The result of life under unnatural conditions, however, that may be, it has still a function to perform. The fat is there as it were stored up in a magazine for future consumption. If these phthises were dependent upon a want of fat, we should expect never to find tubercular dispositions until every globule of the subcutaneous fat had been consumed. But how different is the case, tubercle is found if not always, to some extent, deposited long before the subcutaneous fat has begun to disappear. And Linnemann distinctly asserts in advanced tuberculosis, that fat may be abundant and inflammation insignificant.
Boudey found the unaluminized fibr of the blood in cores, while Bequaert, Medier, and others showed that even tubercle itself contains a considerable amount of fat, as however this occurs only in recent tubercle. Gradually disappears as it becomes older and more solid; it is probable that those who found none, had examined tubercle not in the early but in the later stages.iphone also found fat abundant in the bile of persons dying of the angioptic stage of tuberculosis; thus instead of being deficient, fat may be in normal amount in the cellular tissue, in excess in the blood, present even in the pleural deposit of the disease. In fluids not usually containing it in the healthy state. But there is another form of the disease in which a deposition of fat occurs in a still more marked degree: We allude to a remarkable condition of the liver to which Louis first directed attention in 1825. It usually causes fatty liver. He found it in 3/4 of the pathological cases examined, precisely a concurrent of tuberculosis, 1/3 of 230 persons dying of other chronic diseases, he found fatty liver without tubercle only twice, it is doubtful whether seen in these two cases. Tubercle did not exist in some part of the body. The affection was more common in women than in men, in the proportion of 3 to 1; in women more frequent about the age of 18 than later in life. Now the liver always contains a small proportion of fat; usually, according to Tan Biche Beache
not more than 3 to 4%, but in the affection described by
Laud it is extremely increased. The fat in an analysis of
Vaucoulen showing 45% & in another of Beal's 65% of the
weight of the whole organ. The fat is unaccompanied & deposited
in the hepatic cells, & in interface with the formation of
Bile, this according to Thirard, when the Liver is affected
to any material extent, the secretion loses the characteristic properties
of bile, & when 5% of the organ is involved in a mere admixture
of albuminous fluid and non-separated fat. Since the time
of Louis' fatty Liver has been found in connection with cancer &
thoumous attended with profound subperitoneum, and in a limited form
associated with inflammations of the liver.lythart We have been speaking
of fatty Liver, when the deposition of fat is limited, either entirely
or in a marked degree, to that organ. For examine deposition
of fat in the liver occurs in conjunction with deposition of fat
throughout the rest of the body, usually as a consequence of gross feeding
and starchy habits. This is sometimes seen in the human
subject, and Magendie produced it in dogs by feeding them
on a diet of fat, their liver became quite greasy & their
skin exhaled a strong smell of fatty acid.

Laud thought the cause of this degeneration obscure, while Rudd
Pitman & the latest authors on the subject, still agree
that no satisfactory explanation of it has been given. By
some it has been considered a consequence of phthisis but we
we shall be able to prove the two diseases do not stand to
each other in the relation of cause and effect, but are dependent
upon one and the same cause.

The facts which we have insisted are sufficient to show
that the development of tuberculosis is quite consistent with the
presence of an abundance of fat, but this proof is not so easy
in all cases, for it does not occur in every case of phthisis,
and we are not ignorant of the fact that sometimes chemists
of the highest order, Keen and Johnson, have failed in finding
any excess of fat in the blood. But this does in no degree
invalidate and argument or strengthen that of those who consider
phthisis due to a want of fat, for the solitary instance
of tuberculosis occurring with an abundance of fat would
completely negative, and disprove their theory, and force us
to seek in some other quarter for the cause of the disease.

We will now for the better illustration of what follows,
turn upon the consideration of the diapnoea of fats, and the share
which they with all other take in the organic processes.

The fats of the Blood may have a threefold origin;
1st. They may be derived directly from the intestinal canal,
2nd. They may be present in the Blood as
3rd. They may be derived directly from the subcutaneous tissue,
and the Blood fats are the same whether they arise from one or
other of these different sources. Recent experiments in physiology
Then in regard to the albuminous and amylaceous matters, some change is wrought upon them in the course of digestion. Albumen being converted into albumose starch into sugar, it is quite different with the fat. Digestion accomplishes no chemical change on it, but merely converts it into a form which, physically, presents less obstruction to its absorption into the lacteal; digestion when used in regard to fats expelling oil being more than reduction, and effected as Berzelius has lately shown mainly through the inactivity of the pancreatic and biliary secretions.

Different opinions have been held with respect to the state in which the fat is at the time of absorption, some holding that it was first expolished by the alkalies of the bile, but unfortunately for this view, the fats of the chyle are not expolished; Malchott to get over this difficulty asserted they were first expolished and afterwards on being absorbed again released from the expolishing agents, but the fat even of the bile are unexpolished, and the intestinal canal, if the opinion of Malchott were correct, fatty acids in abundance, whereas we know the contrary to be true.

It now appears from the experiments of Biber & Schmidt, that the bile plays a very important part in the absorption of the olieumino's principles of the food; owing that the capacity of an organic membrane to absorb fat was increased by being mixed over with bile. They established
picture openings in dogs by which they drew off the bile as quickly as forced, and with this result, the fat absorbed was nearly three times less than when the bile had access to the absorbing bowel; we do not yet fully understand how the bile influences the intestine in this process, but it is extremely probable that it is due to the taurocholate of coda, which we know to be a very ready absorber of oily viscous matters and we think the limit which Bunsen and others have found in the absorption of fat, will be found to correspond, dependent upon the available taurocholate of coda in the bile.

Under the second head I come now to consider the subject of fats present in the excretion, and as I have already in a great manner stated the basis upon which this conclusion is founded, it will be unnecessary for me here to enter upon it so fully here. Liebig was the first to demonstrate that the excretion possessed a power of time forming the saccharine principles of the food into fat, analogous to that which Hunter and Maber showed the bee possessed of forming wax out of the honey extracted from the flower. The fat of starfish can have no other origin, as that found in their bodies is altogether not of proportion to that contained in their food, but to put the question beyond doubt,
These were first tied up so as to prevent in them all motion, then fed upon maize in which the proportion of fat, which is contained had been previously ascertained. The result was, the animals increased extraordinarily in weight & on opening them after death the increase was found due to the excessive formation of fat. We know not as yet in what part of the body this transformation is accomplished. Some have thought in the liver, but were this so we should find the mesentery and portal veins bearing to these, again large quantities of sugar, whereas, we know the portal vein at least is irrationally deficient in it. We are forced then to adopt one of the following conclusions, either that the transformation is effected in the lacteals, or that the sugar there undergoes some intermediate change preliminarily to the formation of fat, which is completed in some other part of the system; however that may be, the fact is undeniable that fat is formed in the animal body from the simple laws of the food.

In the Gall Bladder & Mesenteric Cannels we observe a provision for preserving secretions, which, while they are constantly being formed, are only at certain periods consumed; in the fat deposited in the subcutaneous cellular tissue, we have another instance of the same nature.
The jet having been formed quicker than the demands of the system required, is there laid up, again to be resorbed and employed in the organic processes, either when the exigencies of the system require an increase, or when the supply from without may be diminished or altogether cut off; an instance of this kind is exemplified in the case of those hibernating animals, which, wearing jet toward the end of Autumn, retire to their burrows for the Winter, again emerge from them in spring, hibernating, destitute of jet, and reduced to the last state of emaciation. Of them those animals consume the subcutaneous jet, the question presents itself, why do not the phthisical? it does not accumulate in their blood, does not burden their liver, why does it then so injuriously affect that of the phthisical? if the consumptive patient be dying for fat, why is not this appropriated? if jet be the excrescence, why does tubercle ever appear before every particle of the subcutaneous jet be consumed? Dr. Bennett argues that to be serviceable in the organic processes, it must be worked up and elaborated in the intestinal glands along with the other constituents of the chyle, but he forgets that the lymphatic glands through which the subcutaneous jet must pass before reaching the blood, are also capable of elaborating blood plasma: the lacteals, cannot.
form a proper style from the absence of fat. Why cannot the lymphatics elaborate a proper lymph when it is in abundance? The fact is, it matters not whether it be present in the lacteals or not, for in physiology, they can no more employ it than the lymphatics. The greater frequency of fatty liver since cod liver oil has been so much employed, shows that even when fat is absorbed it is not elaborated into the capillaries described by Dr. Bennett, but passed into the blood and deposited in the liver, just as that is which is derived from the subcutaneous cellular tissue through the lymphatics. Disregarding the office which we have assigned to the subcutaneous fat, it would be difficult to see the function which it plays in the animal economy, the fat fills up and gives repose to the figure, but Nature is double purposed, combining strength with beauty, having an eye to the useful as well as to the beautiful in all her works. The hair, for instance, is not only an ornament, but a non-conducting coating destined for the protection of the sensitive brain beneath.

The fat from each of those sources although at first unappreciated are no longer so after entering the circulation. For with the exception of cholesterine and the ketone of Bloodet, which are not depository, all the fats of the Blood, as the analyses of Becquerel and Morier show, are combined with
with soda in the form of magarite. The soda is the base. It is only in disease when fat has been received into the circulation, in excessive quantity, that free fat is ever found.

As the body in the presence of respiration, histogenesis, and heat, and much afterwards, be considered in connection with soda, we will now advert to their alkali.

Soda is one of these substances to which we have already alluded. We enter into the formation of no organic tissue, whilst it is a most important constituent of the blood, and most of this only lasts in the bile, peritoneum, salivary secretions, of the humour of the eye, every fluid throughout the body. The blood is an alkaline fluid, the wellbeing of the system, and the very existence of life itself depends upon the maintenance of this property; it is probable that acidity, the contrary condition, could not exist even for a short time without being speedily fatal, and when we consider how inconceivably near, by mere thin, a membrane, the acid juice of flesh is separated from the alkaline blood, can we fail to admire the hand which places the conditions of life and death, in such startling proximity, yet still retains them to their proper sphere?

To estimate them, the importance of soda we have only to remember that to it the alkaline reaction of the blood is due; that, it exists not free, but in various forms of combination...
Combination, the chloride, carbonate, bicarbonate, phosphate, neutral in basic albumen, the albumen never being found in the healthy serum, but is always combined with soda. These albumen are very easily decomposed and readily give up their soda, especially in the presence of acids. The tissues we here see contain soda as they when the albumen of the blood becomes organized, it must part with its base, which immediately enters into other combinations. This is a constant current passing between the albumic blood and the acid juice of flesh. The neutral phosphate of soda passing from the blood is immediately converted into an acid phosphate on the other hand the lactie, uric and phosphoric acids resulting from the transformation of tissue, consequent upon muscular action, enter the circulation & combine with the soda liberated from the albumen as it is transformed into new tissue. The soda with thus formed are next, in part burnt off, the lactate into albumic carbonate, the uric acid becoming oxidised into urea, partly from, and restates the soda to the blood, while the phosphates are excreted from the kidney. In this manner the blood is able to contend with the influx of acids pressure, its aceticity, but to dispose the acids are sometimes joined in such large quantity as to a great measure to drain the blood of its albumin. The consequences of an under albumic condition hereafter to be treated of experiments.
We are now in a position to consider the subject of fat and will now revert to it.

It is very generally considered that fat performs a most important part in the function of respiration. I do doubt it does, but how, it seems scarcely to have been noticed by any one to consider.

Liebig indeed shows that it partly enters into the formation of bile, we, from other considerations, and independent of Liebig's discovery, are led a step further. We think fat never is, nor ever can be employed as a respiratory agent, until it has undergone the intermediate process of 'Bilirubinization.' fat, we feel, being an exceedingly unoxidizable substance, and experiments show that all acids have much less power over its combination than they have over that of the albuminous tissues. After a meal of fatty albuminous principles, the excretion of fat is increased long before there is any increased elimination of carbonic acid from the lungs. The reason of this is obvious. Nitrogen compounds are powerfully prone to oxidation and decomposition; on this account, as their action can at once be burnt off, it is different as we have seen with the vegetable matters, which can only be disposed of after having been passed into bile, and secreted from the intestine, as Liebig first showed and now fully admitted by Physiologists. There are certain facts which have been supposed to militate against the idea of the fatty origin of bile. Bidder & Schmidt found
that when animals were fed upon pure fat, no more bile was precipitated than would have occurred if the animals had been starved during the same space of time. From this it is argued that fat is not converted into bile.

We dissent both from the manner in which the experiment was performed and the conclusion, sought to be deducible from it. It is obviously most unphilosophic to place an animal in abnormal circumstances, and then argue from the manner in which its functions are disarranged, that so it must occur under normal conditions. A diet of pure fat is certainly sufficient to dispose and interrupt the integrity of the whole organism; but proving this, it does not follow that the bile secreted should correspond to the fat injected. For we do not maintain that the whole bile is formed from the fat, but on the contrary, only the greater part of its carbon and hydrogen, we know fat of itself, cannot form bile. Nitrogen, carbon and sulphur in addition being required. It is therefore obvious that, however abundantly fat may be absorbed, increase of bile will not take place, unless those other substances be also furnished in proportionate amount. We are thus led in this by Nasse who found that when the ordinary food was added to this excess of fat, the secretion of bile was remarkably increased, proving that, to some extent at least, the bile is in proportion to the amount of fat.
When the other constituents also are finished, Bider & Schmidt found, as we have seen, no more bile than would have occurred had the animals been kept fasting, clearly because the formation of bile could not go beyond the amount of nitrogen, carbon, and sulphur afforded by the same formation of tissue, and as this was the same whether the animal was starved, or fed exclusively on fat, or the amount of bile was the same also. From the proportion of nitrogen combined with the carbon and hydrogen found in the bile of Herbivora Liebig stated much of the latter must be derived from the non-saturated principles. The amount he estimates occurs in the twenty-four hours about 37.50 or 39.00 of the bile, the amount of nitrogen combined in this would be 2.75, but an albuminous compound capable of yielding this amount of nitrogen, would give not more than 75% of carbon, a quantity far short of that which is extracted. The remainder must therefore be derived from the non-saturated matter. But this is not all, we have with accuracy the proportion which carbon have to nitrogen in a protamine compound, and a consideration of this, together with the amount of carbon found in the bile, proves that the albuminous principles injected during the 24 hours, could not possibly furnish all the carbon found in the bile secreted during the same time, even if they were all...
all appropriated to this purpose instead of the renovation &
building up of the tissues - Pathological chemistry furnishes
us with equally certain evidence of the fatty origin of a large
proportion of the Bilious secretion - Bequest Modier found
the quantity of Bile in jaundice beers & increased in the
to that of the Blood jet, in jaundice with depression of bile
their analyses indicated a diminution of fat, and in the
same disease, when the secretion of Bile was suppressed, the
cholestatic, desicced & dephosphatidal jet were almost never found markedly
increased, & in two cases which they examined with great care
it was doubled in the one & even more than doubled in the other.

Now when, as in the cases here produced, we find a decrease
of jet with an excess of Bile & an increase of jet with a
diminution of Bile, we think the inference of the fatty origin
of the Bile is quite legitimate. Where the transformation
process is still a question we leave it to the place
in the Liver, others, in the ultimate results of the System.
Finally, the latter appearing to adopt this view must be
much from any evidence of the transformation of Bile, as to
support some theory of disease which involves it. Dr. Allison,
for instance thought the Bile existed ready formed in the
Blood, but in a different form and having properties from
that found in the Biliary duct, or gall bladder, before being
eliminated by the Liver, he accounted the Bile a very poisonous
prisoners matter, of its non-absorption, the cause of that form of jaundice which, in so rapid a form, but having once passed into the hepatic cells it become decomposed and might then be absorbed without producing any further alteration than occurs in simple jaundice - this is a very ingenious theory, but with nothing to support it. While there is much which militates against it - there is no evidence that bile is a poisonous fluid. The opinion of Dr. Henderson is more probable, that such in this form of jaundice is not because of the poisonous action of Bile, but of a true circulating in the Blood. Liebig, without giving any reason for such an improvable statement, says the Bile of Gärtner is for the most part formed in the ultimate vessels while the rest is elaborated in the Liver. In the lobe of the Liver on the contrary, he thinks the major portion is formed in an organ, the Liver, especially designed for secreting Bile, and the remainder in the tissues. We do not stop to contrast our opinion as purely arbitrary as this: it seems to us a most extraordinary hypothesis, for any one to put forth, that while there is a specific organ for elaborating a specific secretion, the secretion may sometimes be formed in that organ, sometimes not. It is quite anomalous, contrary to all analogy, that a fluid should originate anywhere but in the organ destined
desired for its elaboration. The spermatogonia are not found in
the blood but in the testicles. The gastric juice is formed only in the
stomach. Lécheux's opinion is plainly founded upon the false analogy
existing between the Liver and the Minced Brawn. This analogy
for it is so. We have evidence of the production of the products
extracted by the Kidney, none of those secreted by the Liver, were
ripe and have been detected in the Blood. The bile was not, but
there is positive evidence against the view of the production of
Bile. Blondlot found when the biliary ducts of dogs were
obstructed by calcareous or otherwise jaundice resulted in three days.
But Müller found after tying the ducts and attachment of
the Liver of large frogs, cut it out and although the animals
lived longer than three days, no jaundice nor accumulation of
the hepatic secretion occurred, analogous to the accumulation of
urea after catarrh of the Kidneys. Blondlot's dogs were affected
with jaundice in three days after ligation of their hepatic ducts,
and if it should have occurred to the frogs, above mentioned,
if the bile existed ready formed in the Blood. If Allison's
theory were true, the complete conclusion of the bile would
have been immediately fatal.

These are strong proofs of the hepatic origin of the
bile. Still it may be argued that the density of these experiments
is such, as materially to interfere with the transformation
of bile into formation of bile, if these experiments were
the only evidence on which it depended the allegation would have some weight, but the evidence against the prostration of bile is so strong, and supported by such varied considerations, as completely to exclude it from ever being entertained with any show of reason. Pathological observations are not less conclusive than the physiological experiments which I have added. Jaundice never occurs as a result of inflammation of the pericholedochal layer of the hepatic organ, nor of tubercular or fatty deposit in its serous structure, while it is inseparable from obstruction of the biliary ducts. Here in the one class of affections we observe that the whole substance of the liver may be seriously involved and function destroyed, without producing any accumulation of bile in the circulating fluid. While in the other, it inevitably follows upon the stopping up of a duct of even inconsiderable size. Of all the diseases of the liver, fatty degeneration, as it is termed, is the one in which jaundice should occur; if the bile existed readily formed in the blood, but experience testifies that it never occurs, even when the liver is obstructed to such a degree that the excretion instead of preserving the character of bile is so altered that merely an albuminous solution. The analysis of the blood of the subjects and efficient means of the liver led Lehmann to the same conclusion, which we have endeavored to establish, both in regard to the fatty deposits of the bile and the seat of its elaboration. His analyses
showed that the portal blood is very rich in plasma while that of the hepatic vein is comparatively poor in it. The red blood corpuscles are irregularly formed and aggregate in a ramified manner, while those of the hepatic vein, are regularly formed and arrange themselves in irregular groups. The cells are also differently affected by water, from those of the portal or any other vein. The white blood corpuscles, he also found, were five times more numerous in the hepatic than in the portal vein. From these facts Lehmann thinks that a rejuvenescence of the corpuscles of the blood is accomplished in the passage through the liver, and that the albumen of bile is transformed into blood corpuscles, which contain no bile, must necessarily be decomposed. The dyes which are liberated certainly perhaps, or in some unknown manner, predispose the fatty matters, which we have seen are arrested in the liver, to the products of the metabolism of proteine tissue to combine with the acids of the bile, with which the dyes itself, and into combination, to form the glycocidate and tannocidate of soda, the chelate chelate of soda, (the chelate chelate of S节目s)

The flavor of these acids contains all the four principal elements of organic compounds, Carbon, Hydrogen, Oxygen and Nitrogen, while the latter in addition contains Sulphur. The researches of S节目s show the universal presence of these acids in all the animals whose bile was
Examine it. Their relative proportions indeed varied in different species, but in the same species it was always the same, a fact which considering the endless variety of conditions under which like-breeding animals exist, surely indicates the title of this fluid to a higher place in the economy than some physiologists are inclined to allow it. Of the two acids, the taurine acid seems to be the most universally abundant. In some animals these may exist in nearly equal proportions, but when any discrepancy occurs, it is always due to the reduction of the glycocholate. In the Rana esculenta and pleuronektides maximus among fishes, in the dog among the mammalia, and reptiles among the Reptilia the bile is almost exclusively composed of alkaline taurine acid with merely a trace of glycocholate.

In a preceding page we have shown the immense prevalence of soda in the blood. In the bile also it is the principal base. The other acids as we have seen are combined with it, and the analyses of ox bile by Wiedemann and Teacher show that there is also a considerable amount of the chloride of sodium in the tribasic phosphate of soda. Now when it is considered how much the food of herbivorous animals with potash, we cannot but wonder that their bile contains so little of it and so much of soda. Lehmann has endeavored to explain it by the greater solubility of potash,
allowing it to drain away. Presuming it from being retained like soda, there are certain considerations which make this opinion untenable. Under its probable, we might say, attain that the function of soda in the bile as in the blood is peculiar, and cannot be discharged by potash or any other alkali.

The analysis of the bile of salt water fishes by Streeter and Blenck, show, contrary to what might have been expected, that the bile of fish in the composition not of soda but of potash. Now a priori, if soda or potash might be used indiscriminately, in salt water fishes, above all other animals, living as they do in a concentrated solution of chloride of sodium, we should least have anticipated that the alkali of their bile should be potash. If the theory of Lehmann be correct, why do we find potash in circumstances so favorable for its solution, abstraction? Why do we not find soda when it is so easily accessible to the animal? We believe those questions are unanswerable on the hypothesis of Lehmann. It may be replied that the case of fish is peculiar, that they are cold blooded animals and therefore may be done now be differently organized. The objection at first sight is plausible, but close to be seen when we look to the composition of the bile of such water fishes, cold blooded animals in every way constituted like those of the sea, some of them actually visiting the sea at certain seasons.
Seasons of the year. The objection we may, seems to be plausible when we find the ability of their bile is lost & not present.

Whether the liver in those cases, of themselves from the bile acids from the materials brought to the liver, or merely enable the hepatic cells to accomplish it, we know not, but it is certain that bile cannot be, and never is formed in the absence of those abilities. It is also evident from the facts which we have advanced, that each of those abilities is peculiarly suited for the cases in which it occurs, that the function of the one cannot be discharged by the other.

The bile formed in the liver and in the manner which we have indicated is next discharged into the duodenum to aid in the absorption of fats. As the experiments of Biedler & Schmidt, before referred to, show, it does. It is not then immediately excreted, but decomposed and again absorbed by the lining of the intestinal canal, borne into the current of the circulation; it encounters the oxygenated corpuscles of the blood, is leached by the prim, unite to form carbonic acid and water, thus completing the process by which the unoxidizable fats are reduced and fitted for the production of animal heat. We will now draw attention to the manner in which the doctrines which we have attempted to establish are based upon the pathology of Physiological and Pathological.

It has long been observed that the pathological present to our
Notice a peculiar exceedingly well marked "diathesis," "constitution" or "habitus of body." Their muscles are soft and flabby. They are incapable of prolonged endurance, they easily succumb to fatigue, thus proving points to an imperfect nutrition. Their whole bearing and constitution as indicative of a low degree of vital action. This condition may have been original or acquired, hereditary or produced at an early age. Dr. Bennett shows digestion is easily disarranged; that the intestinal canal is prone to acidity, but this acidity is constitutional, general and not confined to the intestinal canal, but equally prevalent wherever there is muscular tissue from which indeed it has its origin. From an early age this general acidity is shown by the various stomach diseases characteristic of the Thumus. Generally acknowledged to have their origin, maintenance in an overacid condition of the secretions - Bile, juice and Alum - show this acidity is the inevitable consequence of muscular waste in the normal state of the system, but it is still more so in phthisis. Where, in consequence of the imperfect nutrition and irregular vital action, the muscles are peculiarly predisposed to waste, and then for to acidity. Bad food, poor air, insufficient clothing and whatever interferes with the integrity of nutrition, aggravates the tendency to hyperacidity. These are some of the causes which have long been recognized as most powerfully predisposing to phthisis, but how they operated it had never been.
been examined. Dr. Bennett indeed pointed out an abnormal acidity, but contenting himself with the fact, he never sought for the reason or the relation in which the acidity stood to the acknowledged predisposing causes of Pitheicis.

Dr. Bennett considering that the acidity was limited to the intestinal canal, founded his theory of Pitheicis upon the influence which it exerted on the primary digestion, an influence which we shall see is quite incapable of explaining the phenomena of Pitheicis. The hydrosed state of the intestinal canal arrests (he asserts) the digestion and absorption of fats and other hydrosed bodies, while it facilitates the digestion of the albuminous principles. The flesh then for are not absorbed, the albumen on the contrary is taken up in excess rather than the Blood in increased amount. Dr. Bennett is nevertheless correct in stating that the absorption of the fatty principles is interfered with, but we demur to what he alleges concerning the digestion of albuminous or amylaceous principles. The presence of an excess of albumen in the Blood. With respect to the amylaceous principles, there is nothing so far as we have been able to discover which would lead to the conclusion that their digestion is interfered with by the presence of the acid state of the canal. The assumption is manifestly founded not upon the result of experiment, but on what might be supposed would occur on the neutralization of the albuminous saline.
The physical fact that "all chemical analysts" have found it.
These ignorant of the chemists are alluded to, but certainly
all chemists have not succeeded in discovering an increase
of albumen. And yet Garnier, chemist, adding, if no
mean standing have failed in finding it, while Bercouel
and Pridie so far from finding an excess found the albumen
markedly diminished, and this early in the disease when the
appetite was yet unimpaired.

Seeing then the influence of a local acidity on
the digestive function, is less than some have supposed, let
us go on to enquire how the acidity, having become general
would influence the processes of respiration and cell-development.

Under another head it has been already shown that the
acids present in the muscles enter the circulation and seeping
upon the albumen force it into effete combinations. When
the acidity as in phthisis becomes excessive, the albumen-acid
balance, wherever extended for, is destroyed the consequences of
a deficiency of albumen. The albuminate of soda is decomposed
the acid combining with the latter, setting the albumen free.
The condition is, which it is found in, phthisis, moreso much as the albumen in health always exists, not free
but in a state of combination: in the same manner
the soda is abstracted from the blood, just which an now
our long-disparaged. The Blood is a decidedly mixed state,
and the effects begin to manifest themselves. The pathological principles are being constantly metabolized into jet. The lymphatics as in health are passing jet into the circulation from the subcutaneous cellular tissue. But now there is no consumption of it, its oxidizable nature prevents it, as yet, from undergoing direct combustion. The portal vein still carries it to the liver; but the soda which should have transformed it into bile is absent or in diminished quantity; it is therefore only partially bilirified. The remainder is deposited in the hepatic cells. The venous portae continues to transport more jet to the liver. The same partial melanosis indeed, increasing the deposit; each circulation of the blood now only magnifies the bile, eventually the liver is completely blocked up and instead of bile, an albuminous fluid mixed with fat globules flows forth and is passed into the intestines.

But fatty liver does not occur in every case of phthisis. Its occurrence or not depends upon the rate at which the jet is abstracted from the blood. The amount of subcutaneous fat capable of being thrown upon the liver. If the soda be slowly withdrawn, there will still be a considerable amount of bile formed, the excretory action of which will wash away the excess of jet from being deposited & accumulated in the liver. The analysis of bile taken from patients in the colliquative stage of phthisis actually proves this, the jet having been
been actually found in each case remaining even in the bile. Groops also detected it in the form of globules with the microscopy and travelling along the intestinal canal, together with fats found in the primary digestion. Roux van: Bredt and Schmidt found it in large quantities in the feces. Lehmann also found it in the urine, and there cannot be the slightest doubt that fatty liver would occur in every case of phthisis, if the abstraction of alkalies were more rapid and the elimination by the liver and urinary present.

The fat found in the liver in this disease may be derived from all the sources which supply the blood in health with it, not even excepting the intestinal canal. For the greater frequency of fatty liver since the oil treatment has become fashionable shows that its absorption is not diminished, not altogether prevented.

But certainly the greater part is furnished by the subcutaneous cellular tissue. The greater frequency of hepatic complication among females as compared with males is no doubt due to the greater development of adipose tissue as characteristic of women.

We have seen how a diminution of alkalies leads to fatty liver, but an increase of fat thrown upon the liver is productive of the same results, even though the alkalies lie in normal quantity. The hope in Magendie's experiments that fatty liver because the fat rapidly thrown upon the liver...
organ was disproportionate to the dose available for biliary transformation. Another instance of the same nature, but where the fat is derived immediately from the subcutaneous cellular tissue, instead of the intestinal canal, is seen in the case of fat grese, which, if confined in a warm place prevented from moving, speedily lose their subcutaneous fat. Which on opening the animal after death, is seen to be translated to the liver, floating it up as in phlebitis in a small quantity draining away from it through the hepatic ducts.

Accumulation of blood fat then is the inevitable result of a disproportion between the transforming alkali and the substance to be transformed. This may arise either from an absolute diminution of the alkali while the fat are in normal quantity, or from an absolute increase of fat while the alkali is undiminished.

A consideration of the other conditions in which the blood fat are increased shows that it is dependent upon the same cause.

In the Phlegmatics and Fever, Becquerel found the cases in diminished quantity, and the fat in the same disease increased. The increase of fat is also proved by the analyses of various other chemists, Christison, found in nephritis the magarine, stearine & oleine of the blood so abundant as to communicate to it a lactic acid appearance. The
Some were stopped by Smith in Nephritis by Zanocchi in Pneumonia. Christian and Leman showed the jet in those cases as in phthisis more free, for the lactescence was immediately dissipated when eau was added in sufficient quantity to saturify it. We have seen how the deficiency of albumen in phthisis is produced without endeavoring to explain how it is accomplished in inflammation. We have merely pointed out that it is productive of the same result, a defective combustion & consequent accumulation of fat in the Blood.

It matters not in what manner the albumen has been extracted, whether in the course of disease, the result of accident, or the effect of some physiological process; the consequence in all cases is essentially the same. Hemorrhages, frequent bloodlettings, profuse suppurations by draining away the albumen are immediately followed by an accumulation of the Blood yet.

Birds during ovulation are often found to lay soft eggs when by any accident a bone has been broken. The cartilaginous instead of going to form the shell of the egg is withdrawn and appropriated for calcifying the relation of continuity in the fractured bone. In the human female in a state of pregnancy a retention of the mineral matters takes place in an opposite direction. The nutrition of the fetus advances with such amazing rapidity that the ingesta of the mother are insufficient to keep pace with it; her blood is
...imperished by the constant amount of mineral matters and her bone frequently, to such an extent deprive of their musle as to render them quite feeble and flexible. The metamorphosis of jet is consequently interrupted. It accumulates in the bowels and is not ejected. It would be pleasant to add more, the instances which we have already produced are sufficient to show that an accumulation of jet is always the result of a disproportion between the amount of jet taken into the circulation, and the ability available for its transformation.

Dr. Budd asks why the subcutaneous jet in phthisis is taken up into the circulation in such excessive quantity. There is no evidence to think that it is so, the excess of jet in the blood and its accumulation in the liver is due, as has been proved, not to increased absorption, but diminished combustion.

Such then are beliefs to be the true relations of this fatty deposit, but other opinions have been advanced both with regard to the source of the jet, and the cause of its deposition. Lacy thinks there is nothing inconsistent in the idea of the being the result not of deposition, but of actual transformation of the hepatic substance into jet. This is evidently incorrect. The liver substance is no more changed than might have been expected would occur from the constant distension of the organ, with such an amount of foreign matter, and its microscopic examination by Mr. Brown shows that the jet is deposited...
in the hepatic cells, and not manufactured out of them. Besides a mere metamorphosis could not account for the enormous increase in weight and volume which the organ in such cases undergoes. Others, while admitting it to be a defect, attributed it to the imperfect combustion of fat in the lungs consequent upon their diseased condition. But Robertet shows that fatty liver occurs in connection with tubercular affection in other organs, the function of the lungs being unimpaired. Besides it does not seem to bear any relation at all to the manner in which the pulmonary circulation is performed. The function of the liver in Empyema and some forms of heart disease, for instance, is often impaired to the last degree, and still the deposition of fat in the liver takes place. The theory altogether is based upon an error. The liver cannot meaningfully become the function of the lungs. Their two functions are entirely distinct. The liver is not an executor of carbon, but a preparer of it. The lungs as we have seen are incapable of reducing fats, and have no influence whatever over their oxidation. They must first be converted into bile and secreted into the circulation before their carbon and hydrogen are resupplied. It is from an incapacity, on the part of the liver, to perform its function, not from an over-action in the discharge of it, that the liver becomes obstructed in the manner alluded to. A knowledge of the correct pathology...
The pathology of fatty liver in the treatment of phthisis is of the greatest importance, and there cannot be the slightest doubt that an ignorance of it has often led to the worst practice.

Cold liver oil has been administered only to clog the liver and thereby complicate the disease. Statistics show that since the oil treatment of phthisis became so fashionable, the frequency of fatty liver has greatly increased! And let us not think it to be an insignificant complication, for we have seen how completely it affects the formation of bile, whose ultimate function as shown by Liebig is respiration and protection against the oxidation of living tissue. All the substances of the body, he remarks, which in themselves do not possess in the form of vital force the power of resisting the action of oxygen, must be far better adapted for combining with, and neutralizing it, than those tissues under the influence of the vital force. In this point of view we cannot fail to perceive the importance of the bile in regard to the intestine and the substance of the pulmonary cells. When the membranes are compelled from their own substance to furnish resistance to the action of oxygen, this is when there is a deficiency of the substance destined by Nature for their protection. They must, since their renewal is confined within certain limits, yield to the chemical action; the lungs and intestine will always simultaneous be suffused abnormal changes. Being then the
extreme importance of the bile, we ought to husband every grain of it, and avoid all causes tending to diminish its secretion. The blood is never an efficient in all bile as completely to arrest all function of bile, the quantity may be very small, till the smallest amount is of importance to prevent excitation in a system naturally prone to waste & possessing but little power of reparation. It is true we have but little power of controlling the deposition of fat in the liver, when there is an abundance of it in the cellular tissue, still we may always avoid doing harm through the injudicious administration of oil, which can be of no service, for the condition is amounting upon which the efficiency of oil depends; it will only work, if it does not find an exit by the bile ducts & river, to obstruct the liver. Under the function of bile, already much reduced to a minimum, altogether impossible, and suppose for the acidity, ordinary to bile obstruction arrested, observe how recovery is complicated, the liver is saturated with an amount of oil, of which washing but time can relieve it, and until this be accomplished the organ is being constantly wasted by the presence of so much gaseous continually upon it, and the digestive process is subject to the direstions consequent upon a diminution of bile. We do not decay the efficiency of the liver oil, but its indiscriminate application. The more intelligent members of the profession are now beginning to find that
that it is not a panacea for everything, but applicable only in certain cases, where doubtless it will long maintain its high reputation. Like many other excellent remedies it has been extolled as a sovereign remedy, but now that the flush of novelty has passed, like them also, it is in even less danger of falling into an unwarranted disrepute, not as much among intelligent practitioners as amongst those who cannot discriminate between the case to which it is suitable and those to which it is not.

A diminution of alkali, then, whether it lead to fatty liver or not, is equivalent to a diminished biliary secretion and in proportion as this approaches to complete suspension, so must the oxidation and waste of tissue be increased. The salutary effect of the oxidizable bile being removed, these tissues under the influence of the vital force must now yield to the corroding action of oxygen. The fist as we have shown withstands it, leaving the albuminous tissue to furnish the whole of the animal heat. The muscles are inconsequence wasted, the tissue of the lungs and intestinal canal are pressed upon, producing and amounting the patient to the last degree. The integrity of the vessels generally, but more particularly of those of the lungs and intestinal canal, is impaired. They become less firm, more spongy, and prone on slight irritation.
to effuse their contents. The mixed albumen, now freed from
the ether, together with the unconstipated jets, partly from
the vessels constituting the peculiar deposit of the disease,
named Tuberculosis. The analysis of this deposit shews
it to be composed of albumen and not the free state,
a very small proportion of soda, with more or less calcaeous salts, according to the age of the deposit.
The proportion which soda bears to the lime is remarkable,
and apart from the physiologists now offered, quite inexplicable.
Soda, before shown to be the most abundant and most
minimally diffused alkali in the body, is reduced to
a minimum, while lime which exists in every small
quantity in the healthy blood, is in this mixed condition
in larger and increasing amount. Some consider the
phosphate of lime in this situation, the result of more
irritation produced by the tubercle on the neighbouring mucous
membranes. Long continued irritation of a mucous membrane
doubtless produce a deposition of this salt, but
such is not the subject in the case under consideration.
In this disease, contains it in greater quantity than is ever
been either in health or in any other (mixed) effuion. The
amount increases as the disease advances. In proportion to
the
the cote decreases, the phosphoric acid generated in the tissue cifies and leaves among the cachexic matter of the system. This accounting for its presence in such excessive quantities in the blood with excretions. The urine also becomes highly impregnated with phosphates. So far we have observed that early in the disease the disease has become more marked in the latter stage.

We have before drawn attention to the consumption of the albumen by oxide here, to its elimination from the liver and here in the form of tubercle we find its arriving from the vessels; is it strange then, that the chemists which are here instanced in a second page should have found it diminished in the Blood? In all these ways the blood is deprived of its nutritive plasma. The nutrition of the system, therefore, impaired, but the chief source of the imperfect nutrition is unquestionably due to the marked condition of the albumen consequent upon its being robbed of its affinity.

A mere suspension of the function of bile does not amount to nutrition, but increases waste. The stop which Mr. Blondlet obtained upon the bile through its at the time openings, lived and continued to be nourished for months and years, but they fell into a cachexia, wasted him, and ultimately died of consumption, but not of tuberculosis, for the sick of their blood were in normal quantity. There were no decomposition.
decomposition of its albumenates of soda as in physiologic and
nutrition consequently went on as before. The animals dying not
because nutrition was arrested, but, because, being deprived of
the protective power of the bile, the irritation of the tissues
went on quicker than nutrition could repair them; without
pouring off the bile one can produce the same result by
preserving the formation. Elias, experimenting upon guineas
and Schmidle on cats, found that an excess of fat, or
yet forming materials, in their diet, caused a diminution
of the albumenous matter, rapid in proportion as the
deposition of fat in their tissues was rapid. So that, as
the animals increased in fat, they lost in albumin, for the
latter had become so glutinized by the rapid influx of
fats as to be unable to furnish the necessary protection
against oxidation, the albumenous matter then for compell
the withdrawing and neutralizing the oxygen, in so doing were
consumed.

Dr. Bennett unable to deny the presence of fat in
tablet, he sought to explain it in a manner which only
shows how much he was enamoured with his theory.

The course of fat in tablet, he remarks, is evident.
The albumenous compound, which like muscle, fibrino
exudation and Blood may be transformed into oily granules
by a chemical process not yet accurately determined. Flesh
"Flesh by exposure to a running stream of water is, as is well known, converted into adipose.

It is possible this fat may actually be formed by the putrefactive fermentation of albumen, and it is probable that that obtained by Dr. Michael Rosin & Wickard from the maceration of flesh was actually the result of albuminous transformation and not diastase fat. We do not dispute the possibility of this in the general, but call for the evidence of it in this special case. It is not enough to say "it is evident," pass it over. We maintain there is not a shadow of proof in favor of the fat found in tubercle having an albuminous origin, while there is positive evidence of the opposite. In what tubercle do we find fat? Only in the recent deposit and never in the old. In the latter, if Dr. Bennett's explanation were correct it should be not only present, but also always more abundant, for the older the tubercle the greater would be the putrefactive fatty transformation.

The low vitality of tubercle and its abortive attempts at organization have been noticed by all, although the explanation of it, as far as we are aware, has been attempted by none. It differs in this respect remarkably from other excrescences, but to these it also in composition. Cancer and prox are characterized by a rapidity of cell growth.
growth, and chemists have found them to contain soda in great abundance, in fact, for instance, there is three times as much chloride of soda as there is in the serum of the blood. Oxydox is also very rich in it and abound in cells, and masses which is composed almost entirely of cells is richer in chloride of soda than any other animal fluid. The experiments of Bousquet and also indicate the histologic function of chloride of soda, for the hair of cattle from which it was withheld in a very short time became dry and then fell off, while that of another set of the same animal remained smooth and glossy, although they were maintained on the same food and under the same conditions with the single exception, that chloride of soda was afforded to them in addition. This proves very clearly that the growth of hair, as much of cellular formation upon the presence of chloride of soda, and cannot proceed in its absence; in this we have a key to the rapid development of cells in concave or concavo-convex fluids, and the absence of it in tubers.

Without speaking of them in their fulness, or in the detail in which they occur, we would merely recapitulate a few of the principal facts elicited in the previous investigation. To the theory that attributes phthisis to an absence of soda and an incapacity to absorb them, we have
Opposed prove that so far from a deficiency there may be an excess of them, but they may be diminished in the cellular tissue, in excess in the Blood, accumulated in the Liver and draining away from the Kidneys. Now this fat must be derived from one, or all of the three sources from which the Blood is supplied with fat. From the increased frequency of Fatty Liver since the employment of Cold Linseed Oil. It is proved that even in phthisis the capacity of absorption of fat is never entirely destroyed, for had it not been absorbed it could never have been met with in the Liver. Why is it not consumed? Does this not show that with the diminished power of absorption, there is an impaired combustion of fats?

We have seen that men in a state of health can assimilate the fats obtained from the transformation of animal carcass principles, and that certain animals have no other source of fat, how then can Phthisis arise from a want of fat, since this very fruitful source of it is unparched?

It has been shown that the Symptomatics are constantly leading fat into the circulation, accumulating it up in the Liver. Why is this not appropriated? It has been answered that it is excretory, therefore inapplicable for employment in the organic processes, but we have proved the contrary, inasmuch as it is actually employed by certain by-replicating Animals. Dr. Bennett states that it can be of no

service.
service, unless it be elaborated into corpuscles along with the other constituents of the chyle, but do not the lymphatic glands elaborate corpuscles in the same manner, by the same conformation and action for the same purpose as those of the chyle? Why then can the chylous subject not elaborate the fat into these corpuscles? and this applies not only to that of the lymphatics but also to that of the lacteals. For even the little fat which they are capable of absorbing is passed on through the glands unchanged into the circulation, again and again, and this not fails to indicate that phthisis is due to a diminished power of combustion, than to any diminished power of absorption.

We add other objections against the theory of Dr. Bennett; but will not again mention them, as the validity of his theory depends upon the points just alluded to, already sufficiently answered.

The discussion of Dr. Bennett's theory of tuberculosis has occupied a prominent part in these pages, nothing but the overwhelming objections to it could ever have compelled us to differ so widely from him. While we yield to none in the admiration with which we regard him, while we believe that the tendency of his teaching, more than that of any other man of the present day, is to establish the art of medicine upon a less empirical foundation.
foundation, we must still condemn the theory of tuberculosis, which, if false theory lead to false practice, is a very dangerous one.

1st. That the most generally accepted theory of tuberculosis; let us now in a single view present the successive steps of that which we have advanced.

By a long and varied array of proofs we hold them to be the following positions, now established.

14. That tuberculosis must be preceded by a predisposition original or acquired, and essentially consisting in an irregular vital action, evinced by a preternatural proclivity in the tissues to waste.

2nd. That the inevitable consequence of muscular waste is a generation of acids, which latter is in direct ratio to the former, and consequently in tuberculosis where the waste is excessive, so also must be the acidity. The existence of such acidity is exemplified in the liability of the organism to certain skin diseases depending upon a hyperacid state of the secretions.

3rd. That the acids thus generated in the tissues enter the circulation, combine with the alkalies, and force them into effete compounds.

4th. That the albumins, natrium of the blood, thus freed from the alkalies (soda) are there by rendered method unsuited for nutrition.
5th. That Chemical Analysis actually prove, that the albumen, and fats exist in the raw state.

6th. That much of the Bile is derived from yet, which can never be oxidized until it has undergone this metamorphosis, and consequently whatever hinders the formation of Bile prevents the consumption of yet.

7th. That soda is indispensable to the formation of Bile, and thereby to the combustion of yet.

8th. That as the Blood in phthisis is defective in, soda in the metamorphosis of yet into Bile must be arrested, and as yet is always being added to the Blood notwithstanding that it is not consumed, so it must accumulate & being constantly brought to the Liver, there, not meeting with the transforming alkali (soda) it becomes a deposited constituting the affection, named yet, liver.

9th. That Bile, as truly shows after coming in the intestinal canal is received only as a protective against the oxidation of the albuminous tissue. When its formation, as in phthisis, is prevented, the tissues being no longer protected against the affects of oxygen, must yield to it.

10th. The vessels of the lungs and intestinal canal, being specially exposed to oxygen, suffer from its affects in an especial manner, and become peculiarly prone to suffer their...
Contents an slight irritation, constituting the peculiar deposit of which is named "rubele".

Although strictly speaking this is a Pathological essay, it may not be out of place shortly to indicate the practical bearings of the doctrines here advanced. From a comprehensive view of the whole subject, that no specific treatment can avail. It may be thought that as the blood is deficient in all bile, no treatment should mainly consist in its exhibition, but this could at least be but palliative, remiss, as it is directed to the effect and not the cause of the disease. For so long as there is an excessive production of acid, the excessive elimination of said must continue. To attack the disease with success we must strike at the root, and the only possible method of doing this is through a general tonic regimen. Hygiene. But as the effects of this must necessarily be long in manifesting themselves, can we do nothing in the mean time to diminish or prevent the oxidation of tissue? As Nature is now incapable of offering it the protective influence of the bile, it suggests itself to us, that this inactivation might be supplied by the form of the bile of other animals. Remembering that the bile of nearly all animals is essentially the same, how can be no doubt but it would serve for inspiration with equal efficiency. Of course, we do not suppose that this exhibited it could ever
Contribute to assist in digestion or some may but its ultimate or respiratory function.

And now as every theory must be tested by its applicability, we willingly resign sure to this ordeal. While we are deeply sensible of the imperfect manner in which it has been stated, we cannot but think that the varied trains of proofs which we have led entitle it to be called something more than a hypothesis.

The experiments and analyses on which it is based were executed by men of no particular school, for any different purposes than that to which we have applied them. Whatever they may be its defects, it can scarcely be objected that the facts were made to suit the theory nor the theory to the facts.

There is nothing so absurd as not to have been entertained by some one, by ascending a little it would be easy to find facts to suit any theory. But we have added in the support of ours only men of distinguished and acknowledged fame, for one object has been put to write "Thesis" but to discover "Math."