The Nefro-Pathology of Scarlet Fever.

To regard Scarlet Fever as an epidemic and contagious disease, caused and propagated by a peculiar and specific poison, the effect of which, when taken into the system of one susceptible to it, is to produce the peculiar type of phenomena known under that name.

Of the causation of the disease, we do not propose to speak further in this paper for the present and shall...
especial attention to the histopathological characteristics of the affection.

And that view of the case we would define the disorder to be a contagious and epidemic disease caused by a peculiar and specific poison, the first effects of which are seen upon the constitution at large. Acting probably as a blood poison, the final and essential feature of which is an altogether peculiar and characteristic effect upon the epithelial structures.
(We beg in the beginning, and if any of the views presented by us should prove weak and out of the beaten track of orderly, God will hour us through ever increasing power because opinion for the line that we may arrive together with unbiased minds, examine the facts carefully in all their bearings and learn from them whether these changes are true.)

In order that we may the better understand each other, and the presentation of whatever we have to say it will be necessary that we consider as
briefly as possible some points in the development of the lesion.

It is necessary in considering a subject like this that we keep the peculiar characteristics of the lesion, their origin and mode of formation closely in view.

It is a well known fact that lesions of like origin and nature, are liable to be similarly affected by like causes.

Although these processes vary widely.

The Octu.

The first thing
of the ovum is what is called the segmentation which continues dividing the mass into smaller and smaller portions until it becomes a mass of globular cells. With the growth of the egg, these globules adhere from the central part to the circumference, leaving a fluid center, where they form a membrane by the conjunction of their margins, then a peculiar thickening occurs at one point called the germinal spot.

Bladder—Now this membrane into membrane splits into two and
are then known as the external and internal endodermic membrane, and at this time constitute the body of the animal. The outer one, the external endodermic membrane, and grows more rapidly than the internal, and a kind of mural membrane is formed, how solid these are the layers of the body are formed except the nervous structures, tend the outer and inner membrane are formed the tissues of muscles, and join the mural membrane, the tissues of support and motion for the formation of the...
nervous tissue for plate may simultaneously along the back of the fetus and arching over come together forming a tube which fills with a substance from which the nervous tissue was developed with cells we have little business except incidentally in this paper.

It is especially with the internal and external substances that we have to deal. We must therefore note the various forms each portion of them. We will call especial attention to their care and to the...
an understanding and the
appreciation of these will depend
on an appreciation of the peculiarities
manifested by the disease under
consideration.

Divisions of the platæ of the (?
the Bladderemic intimal Bladderemic
membrane Membrane rapidly close
together forming a
strict closure Eust., and simultaneously
a partition is thrown across it at
its anterior third.

Epithelium. It is the office
of Alimentation of the lower segment
of this to form the organs
of Alimentation from the Cardine.
orifice of the Pharynx to the
Pharynx, with all the glands
which minister thereto except the
Laws which seems to belong
to the blood vascular system
In this system we have a
peculiar columnar epithelium
which constitutes the epithelium
of alimentation, a distinct type
Epithelium from the upper
portion of degeneration of the original
tube we find the
formation of the tubal respiratory
eystem and the lungs to
proceed which determines its
peculiar type cell tissue
The columnar ciliated or respiratory epithelium, which is the functional tissue of respiration. From this is formed all the glands and tubular stratal mucus to this function.

These cross the upper alimentary tract at the pharynx which constitutes a point of very especial interest as the diseases are to consider as we shall presently see.

Dermal / from the external epithelial / stratodermic membranes / is formed the epidermis / or horny covering of the skin.
and its dermaloid and constitutes an especial variety of epithelium with various and wonderful modifications which enable it to serve the animal in widely different forms.

First it forms the sweat glands by buds or epidermoths into the tissue beneath, which epidermoth consists of the inner Malpighian layer of its cells which form the function cells of the sweat glands shedding the surface of the whole body by secretions. It also forms in this way all the glands.
that extends to the skin in any way. At the same time that epithelium of respiratory forces it away outward to form the posterior and anterior canals.

The dermal epithelium by an ingrowth forms the esophagus at first a wide open hole. And crossing the tract of the tubal respiratory system, forms the esophagus down to its junction with the stomach.

This is the epharyngeal column epithelium and you will please notice that in the pharynx it comes directly in contact with
in interaction with the respiratory epithelium.

In the mouth, this epithelium forms all the salivary and muco-ductal glands, while the respiratory epithelium forms the Eustachian tubes and the broader nas of the tympanic cavity.

As a very important point for us to remember in this disease, there is yet another important tissue in the mouth formed from dermal, or i.e. mucous, derivatives of the respiratory epithelium.

By certain ingrowths of the Rea-Chalubiyi, the Gland of...
the teeth is produced by the differentiation of its cells, a point to which I will call your attention later.

Again on the skin by engrowths it forms the Corneal or Trunk of the eye, the Teares, Ovaries, the Urethra and the Vagina.

The Kidneys: The exact origins of the kidneys and their epithelium is not yet agreed upon by Histologists. They are undoubtedly derived secondarily from the Wolfian.
bodies, but the origins of the
eel's primordial bodies is the question;
as the results of most investigations
has not yet fully settled this
point in the one way or the
other. There are strong histological
and functional reasons, as well
as anatomical for believing the
eel's primordial bodies to be originally
derived from the external blaa-
toidrin's membrane. These reasons
are found in the nature of the
glomeruli themselves; their
functional office, their histo-
logy and their Anatomy

As to their function.
It is more closely allied to that of the sweat glands of the skin, than the function of any other organ of the body.

In their histological elements, they are almost synonymous with the sweat glands in both the form and general character of their cells.

In the anatomy of the kidney, there is a striking resemblance to grouped and interlaced sweat glands; they are both long and tortuous tubal glands, each tubule of which ends in a glomerule, that of the kidney's...
bring much the more perfect.

These with the focus, longinal glands and the tonsils are the only glands in the whole animal economy that possess this character. All others while possessing tubers as the rule to serve as ducts are composed of lobules when or or reach the gland proper.

There are yet other areas or kinds of epithelium.

The parietal and visceral epithelium of the blood vascular system and the epithelium of the sympathetic.
System. The origin of these are we do not attempt to trace, we have no facts which point directly to especial effects upon these last varieties in that disease except the lymphatic and secondary way.

With this brief account of the derivation of these tissues we are well able to understand each other in considering the disease in question. Add any reasons for considering it particularly in epithelial disease. These reasons are to be found in the typical character of the typical
leaving, their order of development and sequence. We shall only speak of the gynecomastia incidentally.

Character: The breast is a mass - the breast unit and typical phenomenon of gynecomastia.

It is very peculiar in the seeming fact that it is an acute inflammation affecting a tissue which is likely but no blood vascular system and cannot therefore, except secondarily exhibit one of the principal features of inflammation namely redness. And yet - redness or emincio color.
is the distinguishing peculiarity of the case.

The back. This color however does not belong to the tissue explained, but to the capillaries underneath immediately beneath consisting very close but not touching this tissue.

It is here that we may find one explanation of the peculiar crimson color of this case.

The tissue explained being the epithelium which has no blood cells, the capillaries themselves are not involved in the inflammation.
Process but bring an esy close proximity to avoid insulating to the support of this tissue through endometrial or lacunar circulation outside their walls they are much expanded so that the column of blood just beneath the surface is largely increased hence the blush. While it is thus largely increased the expanded capillaries not being ingenuously involved in the inflammation do so much the red is not increased as in ordinary inflammations, color of the rash the blood therefore
and more or less to arterial color, hence the peculiar caril-
chyma brilliancy of the vessel as
compared with those inflamed
in which the vessels supporting
the vessels themselves are
involved.

The fusiform appearance of the vessel
ance of the vessels seems
to be due to the first or original
real of the inflammation being in
the esophageal glands, at least.

This theory seems to best
explain existing phenomena
especially when taken in connec-
tion with the light shown.
upon the involvement of these glands by post-mortem examination. Kennick (p. 211) found
the basement membrane of the uvular glands thickened, the lining epithelium entirely gone.
When lost gone it was in many places so increased in size as to entirely fill the canal.
Some of the dorsal glands were irregularly expanded with blood.
This seems to offer an explanation of the bleeding surface sometimes seen in scarlet fever.
Other authors speak also of these glands containing casts.
These changes are in the sweat glands, all in the superficial layers of glandular elements, not extending beyond the basement membrane of the sweat glands; the ducts being normal. From these observations are all the secretions of the sebaceous glands and gland explanation of the well-known benefits derived from their activity with oil. These glands are blocked with epithelial and fibrous, sometimes even as it seems with blood casts, the outer ends of which become dried in the surface; parched skin which
parents their egos.

The vegetables with all their strength directly to distress and
speed them—certainly to prevent
the drying of the caulk and the
choaking of the mounds of the glanols
thus giving exit to their salutary
and contents affording great
relief to the suffrants

From the curval glanss which
prods at the first and points
(the penishform appearance)
the inflammation as a rule quickly
extends to the epithelium between
them, rendering the rash
confluent, or completely involving
the epithelium. But even when this is accomplished the color is often deeper at the original points still resembling the cross grove implication of the epithelium of the glomerular tuber.

Relation of the floor to the rock. He may here speak of the connection existing between the floor and the rock. The floor is known to possess the appearance of the rash from a few hours to a day or more and the manner of its invasion of the rash just described as to the visible phenomenon suggests
the thought that they being in fact begin together and that the force is largely a consequence of the rash although recurring to proceed to

The most serious effects of the epithelial inflammation is now the deeper parts of the corneal lamellae of the tincture. General rules and a little calculation will show that if the epithelial inflammation begins then, which is strongly suggested by all that is known of it—

The time that elapses after the beginning of the fever
until the appearance of the eruption would be occupied in the progress through the length of the cubital glands. Thus we have a strong suspicion that the dependence of the force may largely upon the vessels often are all. We will speak further and of these cases in which no rash appears.

We now examine more closely the condition of the epithelium. Merlin (Semmelweis 217) found that the epithelium was softened and in cadavers it decreased during the stage of
Emphasis it was more easily removed than from those who had a healthy skin.

Lachner (ibid.) ascribes these phenomena to a chemically peculiar solution into the Rete Malpighii, the nature of which he could not ascertain. It seems as if to have thought of its being a true inflammation of the epithelial structure.

Trowbridge (ibid.) found the Rete Nucosi quite shocked (the cells enlarged) and containing numerous round cells containing large nucleoli.
is such a close agreement between the different authors who have examined it that it is useless to quote more. They all agree also that the corium immediately beneath the subcutaneous is found to be healthy except in some very rare cases where necrotic spots show signs of the extension of the inflammation to the tissues beneath.

These spots are marked by dark color during life and mark the extension of the inflammatory process to the true skin.
that these examinations quoted above would sufficiently settle the nature of the lesion.

We are only able to give a few cases for the purpose of showing that the affection also extends to the ophthalmic epithelium.

Thomas (Principles 212) says very distinctly that the process is not concluded when the eruption has passed. "Other disturbances which have arisen during the inflammation of the superficial cutaneous layers must now their course, these result in an excessi..."
formulation of new epithelium which is followed by an abundant evaporation.

Of course this is well known, and if we find this evolution in the epithelium of the alimentary tract we have good reason to believe that the same processes have been going on so that we will do on the skin. Those aging in the beard of the man, do not show as much on the mucous surface of the stomach or intestines neither do they on the skin, for in a very short-
time after death the surface pales and we suppose the same thing to occur on the mucous membrane as may be actually seen in the mouth. Thomas observes that by injecting with a colored fluid a picture of the examination very similar to that in life may be reproduced. Here we have a peculiar proof that the inflammation is especially of the epithelium, and that the blood vessels themselves are not involved... There is an stasis as in ordinary
inflammation, and after death, the expanded vessels near the surface are for the most part emptied of their contents leaving the inflamed parts practically unchanged, with blood. Upon injection however the expanded but now collapsed vessels are again opened and effervesce discharging the rash.

Now by these various means I found that numerous Authors have furnished the facts which show that the exanthem is not confined to the Squamous epithelium, but that-
The columnar epithelium of the alimentary canal sometimes very slightly or perhaps not sufficiently to cause any trouble in a large majority of cases, yet in others it is very seriously involved.

Several authors, 

(Somewhat) frequently we have found the gastric tubules filled and distended with fatty and granular matter, and with cells, also casts of cells in the contents of the stomach. Also casts of the liver, Kupffer's glands of the small...
the gallbladder of the large intestine (appendix) have been found in their cavities

So prominent was Dr. John Harvy of London find the intestinal lesions, that he considered that there was a close connection existing between this disease and Enteric Fever.

So close indeed that he seems to have considered the early stages of the two diseases identical.

It is not possible that we may not find that in chronic cases of cancer death came
Scarlatina or scarlet fever without a rash upon the skin, that are having a very severe epithelial inflammation in hidden parts, and that the difference is only in the location of the inflammation. It hardly seems necessary to stop to argue the point as to whether or not this opinion of the epithelium be a true inflammation. It possesses as many of the characteristics of inflammation as found to nature it is capable of! Namely, Heat & red swelling, there is
plenty a superabundance of heat and,ewing of the individual histological elements is abundantly proved by microscopic investigation. Other markers newly formed in the microscopic study of inflamed parts are all formed here, such as elevation globules, new elements, etc.

This being cannot show pain because it possesses no sense of sense, it cannot show redness in any of its self because it has no blood vascular system. Therefore the absence of these two signs hurt and
be regarded as excluding it.

With these facts in view, the inquiry into the condition of the other varieties of epithelium is very important. In reference to the pavement or dense epithelium and the endothelium of the heart and arteries, we have an report whatever that I have been able to find except that they are found healthy which would undoubtedly be the given appearance.

I have so far read and Anhott who reports having critically examined these structures.
determine whether or not the characteristic epithelial changes could be also found there.

The fact that these changes are widely separated from the synovial and alimentary in their histological origin and function and so of them having been noticed would seem to indicate that they are exempt yet the very remarkable disturbance of the circulation still holds out a suspicion that the endothelium of the blood vascular system may be involved.
Special examinations of each
division are certainly to be
desired.

In case of the Respiration
Epithelium as have been definite
information. Almost every
author who has written upon
the subject has said but
say on this point - not with
the same and in view, that
we now have; i.e., as to the
histological elements involved
but as to whether or not - the
explanation of the choroidal ex-
cremen into the air passages
without the presence of live
Epithema or Camp

without in any way turning up this slight, so our easily, from the abundant soilings, dean the facts as to establish the order of the involvement of these structures. We have the most-evident testifying that the respiratory Epithelium is exempt in this disease except at and extensions from these points where it comes in contact with the squamous epithelium. At these points the explanation crosses the line of demarcation only in
case of long continued and very severe inflammation of the
adjacent synovial epithelium; or, possibly, only after the sub-
epithelial tissues have become involved, it seems that when this epithelium does
become involved in the scarlet-
tenue processes, the nature of the inflammation taking place in it is of a very different
character from that occurring in the synovial variety, in that the tendency is to the
capillar obstruction of the ep-
epithelial covering and inflammation.
and elongation of the sub-epithelial tissue. The points of junction of the two varieties are at the openings of the nostrils, at the root of the nose, at the posterior border of the soft palate and circling the pharynx about at a line with the soft palate when it is raised up. The point of crossing is almost always over the border of the soft palate or in the pharynx with rapid extension from behind forward, usually involving both the posterior and anterior edges.
in a very destructive inflammatory process, which destroys large portions of the columnar ciliated epithelium and gives rise to an acanthous proliferation leaving a surface denuded of epithelium which necessarily heals with difficulty and is prone to leave permanent sequelae.

Eustachian. The very many cases of destruction of the organ of hearing occurring with this disease, make it of importance that we trace its progress within the
Eustachian tubes and the greater part of the tympanic cavity of the ear are lined with the respiratory epithelium and, if it is undoubtlessly by this write that the ear becomes involved, which not only involves loss of hearing, but is one point of danger to the life of the patient. After the once line is crossed and the respiratory epithelium is involved, the invasion of the eustachian tubes very readily occurs and the inflammation by eutnic communication to the tympanic.
Sarply settling up an elaborate process with abundant forehand formalism. The inflamed and blocked a cavitation of the tube has shut the door of exit and the pus is assembled in the ear, setting up violent inflammation of all its parts until the pressure forces an evil charge through the tympanum, or it may be, through the very thin partition of a foramen into the brain with the consequent destruction of life.

The crossing of the line of demarcation at the glottis is of much more rare occurrence.
but when it does occur it is characterized by the same dyspneic inflammatory process as is seen in the canal and
marks a very grave complication. Is whether this involvement of the respiratory epithelium should be considered a diphteric complication or not is a question I will not now discuss for it will find this point discussed at length in many of the text books without recalling
in any unanimity of opinion among medical men.

The involvement of the
Involve and the post convulsion
fulfills is a point of the
utmost importance in this case, as it is the most common
point from which sensory inflammations seem to take their origin.
We must examine for a
moment the compound nature
of these organs. This histo-
tology has not until
very recently been made out.
Around the dome of the
root of the larynx there is
a multitude of small tubal
glands which quite narrow
down which cup down into
the entapithelial ducts become

They are lined each and in

embedding of the outer malpighian of the epanchelium

Each of these latter tuber has

an immediate juxtaposition with

its entapithelial entirely surrounding

and including it. a setting of

minute ganglionic glands, so

that if we remove the entapithelial

with its basement membrane

layer these glands are exposed

The nurse are constituted

in a precisely similar manner

except that here the glands

are longer and bifurcated.

These glands present a

striking similarity to Pyron Patchus
in the small intestine and not very infrequently ulcerate in or as a sequence of epithelial inflammation according to the statements of various authors.

Now it seems that either the epithelial inflammation is more or less localized, or it is in most grave cases of scarlet fever, it is concentrated to these lymphatic setings of the glands both in the roof of the pharynx, and on the buccal aborations and extension to the cellular tissue adjacent and extension through the
Because of the Gomphobatics in the cerebellum, this gives rise to what is known as the
Argine type of scarlet fever which is always to be dreaded on account of the swelling and
ulceration of the tissues about the throat and the adjacent
lymphatic glands.

This type of the disease is as much dreaded, and little
carefully known that we need make no quotations. That this
is the manner of the invasion at this point scarcely admits
of question. A comparison


of the minute anatomy of the parts with symptoms. Keeping the pathological law as to the involvement of tissues of different nature in inflammatory processes until now insufficient to convince any one as to the track and nature of this departure from the epithelium.

Considerable discussion is found in the text-books as to whether or not the salivary glands are involved in the inflammation; to me it seems clear that—
if they were anything like generally involved in any serious degree, the question could not remain in doubt. I therefore take it that the involvement of these glands is an occasional accident of the disease and in no wise an essential feature of the affection.

The comparative freedom of these glands to palpate with the other tubular glands; the clinical history of the disease as well as post-natal examination seem to prove beyond
To question, this is somewhat surprising when we consider their origin and the derivation of their epithelium directly from the epithelium of the mouth. Yet we must remember that the epithelium we have observed to be thymic and all other lobular glands is one for this exception, markedly modified.

So far as we know, we are able to glean, the lobular glands throughout are the more affected any more in this than in other severe fevers. As have now to refer to the kidneys

The prominent and dangerous character of the involvement of these important
organ is too well known and too much favored to require any proof.

Heinrey states that he has in almost all cases found the affection of the kidneys to be as intense as that of the skin and of the same character.

We have abundant evidence however that there is a wide difference in the different epidemics as to the severity of the inflammation in the different localities.

In one epidemic we may find the abrasion variety, in another the renal and in
the third it may be confin'd almost entirely to the skin.

There is however an evident error in the manner of naming as to the nature of the kidney affection. To one kidney it does not differ materially from that of the skin, except through the accident of found and location as to moisture.

In the early part or stage of the eruption when the epidermal inflammation is in progress in the kidneys the fluid may pass readily through and no great difficulty is found...
There are no砖 cell and paranchyma ends of the tubes exposed to the air: all is moist and doubtless in the vast majority, usually a less intense inflammatory action especially when the surface wash is intense.

But when the septal proliferation and exfoliation of the epithelium comes, the long and tortuous tubules can no longer free themselves: they become blocked, and in consequence, then arises an inflammation from this mechanical cause which is not especially epithelial, but an
inflammation of the general
resistance of the organs, which
during its continuance prevents
the epithelial repair. (54)

we will not now however
attempt to follow the resulting
redness horrible family.
The first chord - the epithelial
tissues involved are the Squamation.

Both the horny of the skin
and that of the buccal membranes. The columnae of the
digester tract, and that of the urinary organs, involving
every tubal gland in the body
and excepting three of the uterus.
The secondary inflammations are of the respiratory epithelium giving rise to Caries, Ostitis, Laryngitis, and of the sympathetic giving rise to the Anginoso forms of the disease.

Fever

He will now consider briefly the fever and its blood.

The fever is especially intense forming the characteristic of the disease. This also is dependent upon the severity of the rash upon the skin.
what we have seen, it appears to us to be very closely related to it.
The density of the blow may be received by the alimentary or urinary tract and may be apparent; or it may be combined to the glomerules of the sweat glands and escape prominence. therefore, we cannot say there is no rash, because none is apparent.

The sweat glands must be remembered, having one of their functions, the elimination of superfluous heat from the body, hence their greater activity when we
Became heated in warm weather
or in unusual physical exertion.
This is one basis from which
we may do something toward
accounting for the intensity
of the fever. Another is the
serious nature of the disease
in and of themselves, involving
as they do such large tracts
of tissue.
There is evidence of the in-
volvement of the entire surface
of the body and of the aliment-
ary tract and urinary system
in any inflammation of their
functional tissue or should
not be surprised at the severe constitutional disturbance

What the effect of
the Scarletine poison
may be upon the constitution
at large, through its specific
effect upon the blood itself,
we have no means of knowing
for determining.

The great elevation of
temperature accompanying the
affection is one of its great
sources of danger. There seems
to be little doubt that death
often occurs directly from
Sun Stroke, or as a result-
of our head upon the nerve centres, the essential nature of which is not yet well determined.

In the disease we are now discussing there are no typical lesions of the nervous system. All authors who have made extensive post-mortem examinations, so far as we are aware, agree that the nervous structures are found healthy (except occasional slight congestions), notwithstanding this very severe nervous phenomenon.
The Blood

The condition of the blood is found to be very similar, or incidental, to chol-fynd in other affectional characterized by apoplectic, dizziness, and sensation loss for any peculiarities which would agree with the current effect of a specific blood poison. We therefore conclude that the nervous phenomena are due to the intensity of the heat, coupled with the intense arterial excitement which arises.
The blood with increased force and rapidity flows through the system.

The effects upon the teeth.

The effects of upon the enamel of the teeth by this disease is very peculiar.

Of the disease occur when the formation of the enamel is in progress upon any particular teeth a mark is left encircling the teeth at a point where cells in a certain stage of growth have been destroyed.
are very characteristic and I am often able to tell persons at what age they had the disease from them alone.

Suppose the bone to one around the time made of the central division, it will be found near the cutting edge of the lateral ones just touch the points of the cusps or the other cases it will lose off the cusps off the first molar and touch no others, so the formation is first begun in those, if the disease have occurred later the
hine away to seem covering the Brierbush disappearing under the ground as it approaches the front of its turne. Later still the second shall alone will be unmarked.

This effect upon the teeth is not constant and so no indication as to the severity of the disease gives another indication as to the habit of the affection of spending its force sometimes in one place, again in another.
In some instances the hair drops off in cases the nails of the fingers and toes are exfoliated and rings of imperfect structure in there, which however soon disappear until the growth is not infrequent. Plants are usually exfoliated if they exist.