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Cause & Effect
in relation to the
Symptoms & Signs
of Scarlet Fever.
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1. Epithelium from alimentary tract.
   " 2. Healthy tonsil.
   " 3. Enlarged tonsil.
   " 4. Lymphatic tissue.
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   " 6. Villi of Plate 5 more highly magnified.
   " 9. Healthy epithelium.
  10. Epithelium of Scarlet Fever.
The condition of the organs is characteristic of fever taken in a general sense may be said to fall under one of two headings viz:

1. Those conditions which upon examination may be looked upon as a cause of certain symptoms and signs.

2. Those conditions which may be looked upon as the effect of certain other pathological conditions.

With such a diversity of conditions, symptoms, signs, and phenomena as are observed in Scarlet Fever, it is evident that it must be invaluable to the medical man to recognize the fact that although the symptoms and signs present are primarily the result of the fever, they are dependent on a certain
extract (secondarily) or other accompanying pathological conditions; in this way — by discriminating between cause and effect, it may be possible to obtain further knowledge of which symptoms or signs to suppress, which to alleviate, or which to favour.

Very much has been written on this subject in many of the numerous and excellent textbooks now in use, but it is not my intention in any way to make a full discussion of the many varied symptoms of the specific fevers, but merely to offer a digest of the remarks of others and some observations made by myself in Scarlet Fever.

I consider them in the first place, regarding fever as an abstract condition, what symptoms or signs do we find, which may be said to be common to all? With all of them we find without exception

I. A period of languish & unrest
III. Rise of temperature.
IV. Rise of pulse.
V. Certain signs & symptoms
which may be referred to one or other
of the systems of the body, either
nervous, digestive, circulatory,
urinary or respiratory.

VI. Period of cassitude and rest.

Let us then consider what is at
present recognized as the cause of
this period of cassitude.

Many at present hold that this
period of cassitude is due to the
action on the organism of the
special microbe, bacillus or bacterium
as the case may be. But this will not
in any way explain those cases
in which no bacillus has been
discovered. True, it may be said,
that future research may clear up
what special germ is pathogenic
of these fevers, but until then it
may not be out of the way to look
at some other possible causes of this
symptom.
Wherever the seat of this feeling of lassitude exists, it is probable that it is perceived in the hippocampus major, for this is supposed to be the centre of feeling. Moreover, we cannot understand this feeling in any way to be referred to either of the other senses—sight, taste, smell or hearing.

Granted that the hippocampus major is the centre for feeling, it follows that whatever sensations reach it, must do so by the medium of the nerves which, through the posterior roots of the spinal cord, communicate with it.

Is it not possible or even probable that this feeling of lassitude should be due to an altered condition of the terminations of the nerves themselves? Just, I would say, from being supplied with impure blood, the result of the presence of a microbe circulating in that medium, or from the want of oxygen in the blood, but from an
Alteration in the Calibre of the small blood vessels & arteries.

Whenever there are small blood vessels, there also will be found small filaments of nerves in connection with them.

The sensation referred to is felt all over the body, but in most cases it is most felt in the back, it is also referred to by the patient as being General Heated in the head, legs, or arms or in fact in all.

Upon consideration of all these localities we find a long foundation constant, in the back, specially the large cancellous lumbar vertebrae, in the head, the calvarium with its cancellous structure; in the legs & arms the long bones of the limbs.

All this bony cancellous tissue is made up of numerous canals, of these are found to transmit blood vessels & nerves. Various other structures, the blood vessels &
nerves accompanying one another in the same canals. These are in fact dilatable structures within non-dilatable canals.

Any alteration in the force of the flow of blood through the arterioles in these canals or any continued alteration in the calibre of the vessels would cause pressure—greater or lesser, upon the filaments of the nerves accompanying them— which pressure the nerves would not be able to escape, from being confined by the unyielding walls of the cony canals.

Such a condition as this is found at the onset of fever when both the force and frequency of the pulse are found to be increased. The small blood vessels to be in a state of congestion.

I am not aware that such a cause for this feeling has been noticed in any text book, but I think that it is at least deserving
of some consideration. I believe this likely as much the reason for this feeling of cascara found at the commencement of fever, as the fact that a patient having a congested foot from unsupported varicose veins will complain of the same aching and numb feeling, the only difference being that in the first case it is an active congestion while in the second the congestion is passive.

As to the cause of the alteration in the force of the circulation & the change of the calibre of the vessels, it is a question which will be discussed later on.

II Rigors.

Now as to the cause of the rigors & the frequency of the pulse, it is said by Priestoue 6th Edition p. 108 that "rigors appear to be explicable by the fact that owing to the excessive contraction of the arteries, the skin receives less than its due share of blood, & less than its due proportion
"of the heat generated within the body."

On examining the matter we find that very often the rigor is the first definite symptom noticed by the patient, moreover in noticing the order of the symptoms which precede almost any febrile attack in young children, we find that very often convulsions take the place of the rigor.

This last fact would seem to confirm the theory that the rigor is due to an alteration in the circulation being caused by the reflex flow of blood to the brain, the nervous system in children being more than normally excitable.

But to come to the root of the matter, is there anything that can be said to be the cause of this alteration in the circulation?

Whenever we find the human organism subjected to abnormal influences tending to the destruction of the whole or part of it, then also
Shall we find that there are special efforts on the part of nature either to destroy these influences, or to at least neutralize them.

Is it possible that the rigor occurring at the onset of a fever, or feverish state is just one of these expressions on the part of the organism of an attempt to throw off the irritant—whatever it may be?

For arguments sake let us suppose the irritant (heat, cold, foreign body &c.) existing in the air, obtaining access to the body by one or other of its numerous routes, viz., throat, digestive tract, respiratory tract, mucous membrane &c. in some cases even the skin.

Suppose I say the irritant gains access to the body in one or more of these ways, then the first structure it comes into contact with is the epithelium lining the part.

It is easy to suppose that the
instant which when once in the
blood has such a harmful effect
cannot come into contact with the
delicacy epithelium without very
detrimental results.
Let us allow that the epithelial
cells are not strong enough to
withstand the effect of the irritant.
If they break down then the process
of an attempt of casting off will
commence in order that the dead
cells which are now foreign to
the organism may be got rid of.
This does not in any way correspond
to the process of desquamation of
Scarlet Fever, it being a local condition.
Healing at the time of the entry of
the irritant into the system while
the desquamation of Scarlet Fever
is a general condition occurring
after the system has been disturbed.
This primary attempt to cast
off the dead cells is effected by a
adulteration of the blood vessels in the
immediate vicinity of the part.
if the part affected is limited all well & good - the effort may be successful, but on the other hand if the poison multiplies I find the dead matter a fitting medium for its development then other changes take place which we will notice directly.

During the time there has been this attempt on the part of nature to throw off the mischief, the energy of the organism has been directed to the point of casting off, & this is found to be accompanied by a dilatation of the blood vessels in & around the vicinity.

In this way more blood is drawn from the neighbouring parts, & also from the skin, & the terminations of the nerve filaments are placed in that condition which (breathing the brain by the medium of the nerves) gives rise to the sensation of Coldness & shivering.
It has been said that in all cases the poison is absorbed into the blood; but is it not probable that this attempt at elimination would not first be tried on the part of nature, or how can we account for the presence of sickness which is so often found at the commencement of an attack of the specific fever, and also the increased respiration, when it may be supposed to have entered by the respiratory tract, and also for the presence of diarrhoea, which is so commonly found, not only at the commencement of an attack of a specific fever but also at the commencement of any febrile disturbance.

All these may be explained by the theory that it is a purely eliminatory process on the part of the organism.

The stomach, when performing its natural functions as essentially a secreting organ, it is probable
The stomach then has been unsuccessful in this attempt to get rid of the irritant, or the poison may have gained access to some part of the digestive tract below the stomach, where the membrane is peculiarly adapted for absorption of the poison has entered into the blood; nature still attempts by all means in her power to get rid of the mischief by means of an eliminatory diaphoresis — the blood vessels dilate and try to throw off the foreign body — dilating not only in the part which has been suffered to be primarily affected, but also in those parts which are in any way connected with the delicate epithelial surface of the digestive tract — all these being reflex acts brought about primarily through the presence of a something foreign to the part.

The skin becomes red, the respirations increase in force.
(partly from the increase of heat).
The sickness continues. The kidneys and
the whole of the digestive tract
become congested, and we shall see
further on how partly in this way
(by the dilatation of the small
blood vessels), the concomitant
albuminuria of Scarlet Fever may
be accounted for.

Is it not probable that this
primary rush of blood to the place
of entry of the irritant withdraws
blood from the skin. Is it causes a
feeling of cold? I believe this is
partly the theory which is generally
accepted, but I am not aware that
the rigor occurring in fever has
been considered as an indirect
attempt of nature to throw off the
matter which is foreign to the
organism.

III. Rise of Temperature.

Two of the leading features
common to the fevers have been
discussed, but there is the rise
of temperature about which nothing has been said.

There has been more written or said on the subject of this rise of temperature in fever than almost any other symptom or sign which is present.

If the views held as to the cause of it—there are two—may be briefly considered.

a. That it is due to increased production of heat.

b. That it is due to a diminution in the loss of heat.

As regards these two theories the first is the one which is generally accepted, by which the increase of the heat in fever may be mostly accounted for.

Robert, 1983, last edition says that "the main source of the animal heat is derived from a chemical change, which takes place in the food substances." This is supplying the body
The in a state of perfect health, but granting that such is the source of the increase of temperature, should we not expect that the heat which is found in the organism in a state of disease, must come from some other source.

The point I wish to discuss arises from an observation made by Beale mentioned in Roberts' text book 1983, to the effect that "the conversion of non-living into living materials" is the cause of the production of animal heat.

But upon looking at the condition in which there is fever, is it not possible for the opposite in some cases to be the cause of this rise in temperature?

During the process of fever the functions of the different organs are much altered and in some cases exaggerated.
if we cannot believe the theory of Reade, then with so much destruction of tissue, there should be a great fall in the temperature of the body, but there is not, there is a rise, is it not rational to suppose that this is due to conversion of living into dead material rather than to the reverse of the process.

I am not aware that the production of heat in fever has ever been looked at from the view of the individual cell being regarded as similar in every way to the organ or developed organism of which it forms a part.

It has been mentioned before that increased heat production is attended with excessive tissue metamorphosis & destruction, but how is it then that we find very often there is a great destruction of tissues & yet no rise in the temperature?
It must be explained by the fact that in the one case the products are absorbed into the blood, where the blood corpuscles are destroyed in their attempts to give up their oxygen. As if it were oxygenize the irritant to cause its destruction; while in the other case though there is a great destruction of cells, they are altogether outside the organism, to in no way influence it.

In short it may be said that the dilatation of the blood vessels causes fever. But when there is a casting off surface, the oxidization by the blood is carried on upon products outside the organism.

Looking also to the likeness of the individual cell to the organism, in very many cases the whole body is subject to a great rise in temperature at death. May not this be taken as a great
exaggeration of what takes place at the time of the death of a single cell.

Rise in Pulse.

As regards the increase in the frequency of the pulse, before considering the changes met with in the beat & rhythm of the heart in fever, it may be as well to glance at the same phenomena in a state of health and perhaps also to discuss at short length the accepted physiology.

For convenience the heart may be looked upon as forming a single tube, subjected to variations in its activity by circumstances over which (by itself) it has no control.

It is well known that upon examination of a frog's heart certain sets of ganglia are found to occupy certain constant positions in the heart.
They are found to be immediately beneath the pericardium & are known respectively as the ganglion of Remak & Bider's ganglia.

These ganglia are found to be in connection with certain nerves, which in turn are found to alter the heart from its usual end.

The former of the two ganglia mentioned is found between the aevus pulmonis & the auricle of the latter ganglion is found between the auricle & the ventricle, both of which positions are as it may be starting & stopping places of the contractions which take place in the different divisions of the organ.

If the heart be removed from the body, the nerves & main blood vessels being severed, the heart will continue to beat of its own accord; this
We will not continue for an indefinite time, but the time will be lengthened if the heart is supplied with blood by means of a perfusion column. The nerves being severed or the fact that the heart goes on beating up to a certain limit without a supply of blood, shows that no rhythmical continuous action must be due either to the ganglia found in its substance, or to some inherent power of rhythmical contraction in the heart muscle itself.

How as to any quickening or slowing (more particularly the former), which may take place in the beat of the heart, the cause can only enter by means of the nerves mentioned before,—the vagus and spinal accessory or by means of the blood,—this cause whatever it may be is stimulating.
The vagus is known as the cardio-inhibitory nerve or the special accessory as the augmentor, but here the question arises, how is it (if the two nerves can only enter by means of these two nerves) that the effect caused by the stimulation of the vagus nerve is not neutralized by the same stimulation applied to the other? In fact, how are we to account for the increase in the rate of the pulse in fever? Is it due to a partial paralysis of the vagus? Is it due to the stimulation of the special accessory? Or due to either of these causes, how is it brought about?

The increase in the rate of the heat in fever cannot be set down solely to the increase of the temperature although the heat does to some extent affect it by means of stimulating the sympathetic muscle of the heart through
The medium of the blood at this time heated; but it will not explain those cases where we often find that the beat of the heart is increased in frequency without there being any corresponding rise in temperature, as for instance in ophthalmic goitre, when the beats of the heart are increased in number and diminished in force, or in mental excitement, when the beats are increased in force as well as in number.

This last is more similar to the condition of the heart in fever, the heart beats first increasing in frequency this being followed by a dilatation of the smaller arterioles and capillaries.

Again we find that the beat of the heart may be normal or even below normal as regards their frequency, though the temperature at the time may be found to be raised.
These facts all tend to show that any quickening or slowing in the rate of the pulse is not governed exclusively by the degree of heat in the body at the time.

The heart we have seen will beat of its own accord when deprived of blood, but this is not all, it will beat also when deprived of all contact with the nerves and ganglia.

This Foster says in his text book (p.258) "is due to the fact of the muscle of the heart being to a great extent non differentiated."—In other words the lower the tissue is in the scale of organisation the more independent will it be found to be, both in maintaining its own continuity by its inherent power & also by a concentration & reservation of energy requisite for the purpose it serves.

This being the case, the action of the heart, pure & simple,
undiminished & unaccelerated, without blood vessels, or ganglia, may be looked upon as a constant all other conditions affecting it being accessory & proceeding from some part outside the heart.

From observations made upon the vascular mechanism of the heart, it is found that if the vague be stimulated (if the stimulation be short & strong), that the beats when they are resumed are frequent, & beyond their former 3 fold & frequency—this may be partially explained by the trunk of the vague containing some augmentor fibres.

If the sympathetic be stimulated the beat of the heart is increased in frequency, & this if kept up for any length of time is followed by exhaustion.

Now the sympathetic is also in very close relation to the arteries & the blood vessels of
The body by means of the vaso
motor nerves, which last are
found to take the most part in
the dilatation of the blood vessels;
it is moreover found that the
rate of the beat of the heart is
in an inverse ratio to the
arterial pressure.

As has been mentioned
previously, with the high temperature
in fever, the capillaries of the skin
valve those of the other parts of the
body are dilated (there need not
necessarily be a perspiration).

Now for a nerve to be stimulated
it is not essential that the form
of stimulation shall be electricity,
- it may be chemical or thermal,
(frost). Consequently when the
small blood vessels dilate, as
they have been shown to do, when
there is fever, the vaso motor nerves
are stimulated by the dilatation
of these in turn send impulses to the
heart, through the medium of the
brain), which increases the frequency of the beats of the heart to the pressure requisite for the existence of the organism to keep up.

Both the inhibitory & augmentor fibres have been found by Terrier (p. 99) to be capable of being excited to activity by reflex stimulations; the inhibitory by a strong stimulation of any of the nerves of sensation, & also by a stimulation of the intestinal sensory nerves, as by a blow on the epi gastrium; the augmentor fibres may be reflexly stimulated by a stimulation of the afferent nerves of the muscles.

Stimulation of sensory nerves in any part of the body excites the local motor centre, it causes a general contraction with a local dilatation. This last corresponding to the seat of the irritation.

Now in the feverish process of fever, there is an irritant (not
local, but general for it is carried by the blood) - it does not matter what the irritant may be; & the chief places of the cerebral process are found to be transacted at the periphery (mostly) of the organism; by periphery being meant that part of the organism connected with the capillaries.

In these positions the small terminations of the nerves are placed to the best advantage to derive stimulation & excitation from anything that may be in the blood as well as a mechanical stimulation caused by a dilatation of the small blood vessels, receiving such impressions they are reflected to the medulla & thence by the augmentor fibres to the heart.

First: -

Before proceeding to look at some of the more important signs peculiar to scarlet fever
Let us briefly glance at the symptom of thirst, which is such a constant complaint with persons who are feverish.

It is a symptom which is common to any person if he be the be feverish. It is in most cases said to be due to dryness of the tongue or failure of the action of the glands which supply it with its moisture. This is all very well, but can we find any cause for this failure of the glands at this special time? Why this dryness and thickened epithelial layers on the tongue? Is it possible for one to be the cause of the other or not?

I think that upon looking into the matter these three things can be referred to the common cause—namely, congestion of the glands by the much dilated blood vessels.
Epithelium with some few cells from the alimentary tract, taken during the second week of an attack of Scarlet Fever.
In this way as we shall see further on (when speaking of albuminuria) that the action of the gland is sometimes partially or at other times completely lost; the tongue showing in the general dryness of the skin, & the congestion leading to destruction of epithelial cells on the surface; indeed the process which goes on in the tongue & through the whole of the alimentary tract may be likened to the process of desquamation which goes on all over the skin & wherever there is a free surface of epithelium. If the mouth of a scarlet fever patient be examined microscopically there will be found to be very much epithelium (this at the time when the desquamation of the skin is in progress). True, it is normally present in the foetus, but in
Scarlet Fever more than any other fever is increased. And now to discuss the symptoms and signs which are found to occur especially in Scarlet Fever, perhaps they may be clearer if tabulated.

I. Rash
II. Induration
III. Sore throat
IV. Sensation of tingling & burning
V. Tenderness about the jaws
VI. stiffness of the neck
VII. stiffness of hands & feet (disfig.)
VIII. Confused bowels
IX. Allurnuria
X. Desquamation
XI. Complications

And now as to the rash of Scarlet Fever, what can we say in reference to it? It is most certainly an effect, not a cause.
It is no more possible at present to give a reason for the appearance of different cases of
illness than to account for the fact that an acorn will always produce an oak tree.
Perhaps when bacteriological methods become more developed, more may be said as to the
actual cause.

In scarlet fever it seems that the uniform rash is made up of a number of small red points.
Really it may be looked upon as an attempt at diminution by means of the sweat glands.

In other fevers, as in typhoid, chicken-pox, etc. this is not seen but each special fever has its special
rash to distinguish it.

If the rash of scarlet fever be closely examined it will be found to be made up of a number of bright
red points; and moreover these points will be found to correspond with
The situations of the papillae of the sweat glands of the skin; in reality, they consist of the dilated capillaries around the glands.

In speaking of certain symptoms in connection with the kidney that this effort of elimination is frustrated by a purely mechanical obstacle.

Ludancea.

While speaking of the rash of Scarlet Fever it seems to be a very appropriate place to mention the presence of Ludancea which are so often seen in cases of Scarlet Fever.

The typical morbid process in which they may best be observed is, without doubt, that of rheumatic fever; here we find that the skin in some cases is covered with a number of small blisters containing a clear watery fluid, but on the other hand, these
are not always observed. Why is this?

In a case of rheumatic fever, it will be found that when the skin is perfectly dry these eruptions are more plentiful, and on the other hand that when the skin is moist they are fewer in number or may be altogether absent. That presence may be explained by a purely mechanical cause.

The blood vessels are dilated and surrounded the necks of the sweat glands, and also the secreting parts of the glands. In this way all the secreting mechanism of the glands is neutralized, partly by the commencement of desquamation, partly by the actual mechanical pressure of the dilated capillaries. In this way nature's attempt at elimination is stopped. This process will be spoken
Of more fully when discussing the kidney symptoms.

The blood vessels around the secreting parts of the glands are so distended that they press upon one another, that for the structure of the gland would come into contact with one another, & in this way the pressure outside the blood vessels & in the neighborhood of the sweat glands is raised to the same as if inside the blood vessels & in this way no secretion takes place through the ducts of the glands. But in the blood vessels not immediately surrounding the secreting parts of the glands, the pressure is not raised & the more fluid part of the blood may find its way out through the capillaries into the lymph spaces connected with the skin.

As this goes on the pressure in the lymph spaces increases.
until at last the product forced out from the blood actually rose out between the layers of the skin.

But now it finds that there is no natural opening prepared for it to seek to escape right through the layers of the skin. In its doing it raises the horny layer and lets it and all then become dry and horny from the tos of the secretion from the glands. It is this layer of the skin which in most cases confines the fluid to leads to the formation of the small blisters known as induraria.

**Sore Throat.**

Sore throat is one of the most constant accompanying signs of Scarlet fever. In fact, in a doubtful case, the occurrence of the sore throat will very
Drawing of healthy tonsil. (taken from the late Sir Worell Mackenzie's work. — Diseases of the Throat &c. &c.)
materially aid the diagnosis. The incubation stage of
Malignant Fever cannot be fixed very exactly for it may vary
from a few hours to six or eight days, i.e., at the end of
this time, i.e., that the time of
the actual onset of the fever.
The sore throat with other
symptoms of illness are found
to develop. Now it cannot be owing
to the fact that the throat
is the place of entry of the poison
or the inflammation would
appear at this spot before
the onset of the fever.
The congestion of the throat
must be looked upon as part
of the same process which
constitutes the rash in the
skin—it is in all its particulars
identical.
But if this is the case, “Why” it will be asked, “Do not
the sore throat of the rash to appear at the same time?" for it must be remembered that the rash certainly may appear during the first few hours of the invasion stage, though it is sometimes delayed even to the fourth day — it is, however, most common on the second day of the invasion of the fever.

We must take into consideration that in the larynx the epithelium covering the structures is much thinner that there is no horny layer as in the skin; consequently any congestion there may be would show more readily in the larynx than in the skin.

The point I wish to accentuate is the fact that the two congestions — the larynx and the skin — are parts of the same
process—in each we have to deal with terminal branches of capillaries, with each we find congestion of the capillaries. With in the one case blocking of the sweat glands, it in the other blocking of the lymphatic follicles. In each we find the congestion followed by a desquamation of the epithelium covering the part; for if the discharge from a throat in scarlet fever be examined microscopically, at first it will be found to consist merely of inflammatory material, with here and there epithelial cells, but later on it will be loaded with epithelial elements. With squamous columnar, I later on we shall notice that the desquamation in the throat starts earlier than the desquamation of the skin, owing to the congestion of the one appearing before that.
of the other, I also partly perhaps to the fact of the epithelium in the pharynx being more delicate than that of the skin.

Another point in favour of this observation is the fact that taking the rash occurring in the skin, it will be found to develop first where the epithelium is thinnest, thus it most commonly appears first on the chest, hip of the abdomen, neck & from these parts it spreads to the limbs, the flexures of the joints are places where sometimes the rash is found to develop very rapidly, if in a suspected case of Scarlet Fever (before the rash appears) the skin of any part be gently rubbed to remove some of the epithelium it will be found that there the rash will most speedily
We notice much the same thing occurring when we examine the typical "strawberry tongue" of scarlet fever where the papillae (covered as they are by more delicate epithelium than their surroundings) are the first to show signs of congestion. They come into prominence by protruding far above the surrounding thicker epithelium.

In second attacks of scarlet fever, the patient may suffer from sore throat only without any sign of any rash in the skin. Very often the only proof that the attack has been real is the fact of the desquamation taking in all this tends to show that in the throat the local signs of a general ailment will show themselves more readily than elsewhere.
In some cases it will be found to persist for some days in others the symptom remains for a few hours only – it depends
to a great extent upon the
severity of the congestion \& upon
the strength of the terminal
flaments of the nerves to adapt
themselves to their altered
surroundings (or in other words
it depends upon the tension of
the nervous Constitution of the
patient).

\underline{Tenderness about jaws.}

The symptom of the complaint
of tenderness about the jaws \& the
neck feeling stiff has been
mentioned \& this will be
found upon examination to
depend upon the degree of the
severity of the inflammation
of the tonsils \& fauces.

It has been mentioned that
extravasation desquamation takes
place specially over those parts
which are observed to be congested,
but more than this — desquamation
takes place within the follicles
of the glands.
The lymphatic glands of the neck, especially those situated along the anterior border of the thyro-hyoid muscle, are found to become enlarged both primarily and secondarily, primarily when the congestion first shows itself. It thus must be looked upon as a sympathetic enlarged due to the congestion of the parts for as a rule it is somewhat transient. In many cases may not be observed at all.

The secondary enlargement of the glands, at or a little time after the concomitance of the desquamation of the skin is due to a different cause.

At the onset of the inflammation in the throat, the blood vessels in the loose connective tissue of the tonsils are found to become enlarged & dilated, the connective elements of the glands are found to increase & become swollen.
at the same time, the glands in the neck mentioned before, are found to share in the
same pathological process.
From this stage it is
possible that it happens that
both the tonsils and the lymphatic
glands in the neck, run on to
degeneration or abscess, but this
process is more the exception
than the rule, for it is more
commonly occurs in the
secondary inflammation of
the glands.

What then is the cause of
what the effect of this secondary
disease? Sometimes degeneration
of the lymphatic glands?

It has been mentioned that
degeneration not only takes
place over the pharynx and tonsils,
but that it also takes place
within the follicles of the glands
(tonsils), but prior to this—at
the time of the onset of the
inflammation, there is found to be a discharge of first a
slimey, sticky, mucus, then later as it becomes more purulent
in character.

This discharge (although some of it flows away naturally
from the crypts of the tonsils), gradually fills them up &
distends them; the next process in the pathology is that
degeneration sets in; the inner lining of the follicles
begins to be thrown off, but there is not with this invariable
discharge a sufficient channel for the removal of the epithelial
debri, & it then commences to press upon its containing walls
until at last it breaks down &
also becomes purulent.

Now if one of the lymphatic
follicles of the tonsils be examined
at this stage, it will be found
that it is the lymphatic part
Tonsil affected with inflammation, showing parts especially affected in the secondary enlargement of the gland.
of the tonsil which is found to be partaking of the inflammation more than the struma connective tissue as was the case at first, with the primary enlargement.

This must be accounted for not by a sympathetic disturbance but by a regular process of absorption taking place from the centriped of degenerating epithelium.

And now to examine the appearance of the glands of the neck in this secondary inflammatation; it will be found to correspond in all its particulars with the inflammation now present in the tonsil — instead of the primary swelling (the connective tissue of the gland) although this may in true Parocephalism it is essentially the lymphatic part of the gland which shows the pathological process which are taking place, the lymphatic cells being increased in number.
Semi-diagrammatic drawing of lymphatic tissue.

a. Part players in primary enlargement.
lying within a cloudy, thickened connective tissue.

From this point as is well known, the inflammation may of itself subside leaving nothing more than a subacute or chronic enlargement of the parts or it may resolve by the inflamed parts breaking down forming abscesses or effecting thus a natural cure of the local affection by discharging either in the pharynx or externally, or very much more rarely by causing death from the exhaustion of the products of the inflammation along the fascia of the neck into the chest, or by extirpation by ulceration into a neighboring artery—most commonly the internal carotid. This causing death by haemorrhage. It has been said it may even terminate fatally by the sudden discharge of a large abscess.
into the larynx & trachea, thus causing death by suffocation.

D W puffiness of hands and feet (dropy)

In very many cases of scarlet fever, especially about the time when desquamation is at its height, we find the patient to be affected with dropy to a greater or a lesser extent. If it chiefly affects the extremities (the hands & feet) it sometimes the face. How dropy may be the effect of very many pathological processes is generally said to be due to affections either of the liver, kidneys or heart; all these may certainly cause dropy but with the first two it is only in an indirect way. If we reduce the causes of the dropy by a process of exclusion we find that essentially it is the heart, affected secondarily by the
Pathological Condition of the Kidney, which is present at this time, which gives rise to the disease of Scarlet Fever.

Look at the main points in the circulation of the kidney; in the first place it is an organ which under certain circumstances is able to contain a great deal of blood, for it contains a network of arteries, arterioles, and capillaries.

The arteriole from which the Malphigian tuft of vessels is derived is always a branch of one of the interlobular arteries. This arteriole after a short course is found to split up into a number of capillaries forming the Malphigian tuft. The resulting efferent vessels now split up into a network of sinus capillaries which surround the unicellular tubules.
Now when from any cause or other, the tension in the sinuous tubes is raised, the main effects are at once felt at first in the cutaneous tuft of vessels of high degrees. The pathological increase of tension is caused, becomes reflected backwards to the heart, so if the obstruction still continues, the venous circulation also in its turn suffers.

Now it has been mentioned that at the same time that desquamation sets in about the skin, it also commences in the pruriform tubes of the kidneys. If the desquamation be slight or what is of even more importance if it take place gradually, there will still be a flow of urine through to the tubules which will equalize matters by keeping the epithelial debris...
wasted away; but on the other hand, if the desquamation is the tubules be profuse and if it takes place rapidly, more serious symptoms must be expected to develop.

The first thing to be noticed is that the urine becomes scanty, concurrent with this, the pulse varies from its usual state up to this time. There is no need for the heart to be increased in frequency, indeed, in very many cases, it will be found to have diminished. But if there is this diminution the pulse will be more prolonged. Upon examination of the sounds of the heart, the first sound will be prolonged a little, while the second will be a little sharper and clearer than usual; indeed, if the sounds of the heart be carefully examined from day to day, the above
Alteration in the character may sometimes be most clearly defined.

This recognition of the alteration in the character of the heat.

Sounds will afford most useful information as to the state of the kidney, enabling the medical man to take measures to rectify the mischief, if this occur before any albumen appears in the urine.

In this way most successful results may be obtained in the preventive treatment of the disease of albuminuria of scarlet fever, for if the special treatment for the condition be delayed until the time when albumen is present, or the urine by testing shows albumen, it is an indication that a certain amount of mischief at least has taken place in the kidneys, which mischief I repeat, can be to a very great
extract avoided, or at least minimized, if careful attention from day to day be paid to the condition of the heart.

But to return more immediately to the presence of Dopey in Scarlet Fever, as has just been mentioned, it is an index that the action of the heart is to a greater or lesser extent interfered with by the increase in tension due to the presence of the epithelial debris in the renal venules.

There is a point worthy of notice in connection with this Dopey S.: Why should the Dopey first show itself in the ankles and the feet? About the loose tissues of the eyes and the face as it so often does?

I feel on reference to some of the works already published, that it is Ralph when speaking
Of Carlatine nephritis (as related) has partly anticipated my course. Sir Ralph says that general atrophy is a sign of a pathological affection of the kidneys, while local atrophy is a sign of some impediment to the action of the heart. Sir Ralph also mentions that the local atrophy has most immediately as its cause known engorgement and that general atrophy has for its cause arterial distension.

Now the fact of the swelling in Scarlet Fever occurring in the hands and feet those tissues of the face is a sign that it is the heart primarily which is the cause of it, though the condition of the heart is brought to some extent by the condition of the kidneys. The force of the tension in the arterial system has been shown to be thrown backwards.
on to the left ventricle, from there in turn on to the venous
circulation, so the trunks of the veins more immediately
connected with the heart are larger and more distensible than
those farther from the heart.

These large trunks of veins will at
first bear the force of the backward
pressure, but let this pressure be
kept up for any length of time
from any cause e.g. blocking of the
arteries in the kidneys, then the
pressure becomes gradually reflected
more and more backwards until
it reaches the limits of the
venous circulation. Now the
smallest venous trunks are those
which bear the pressure, moreover
the walls of the trunks are thinner
I cannot withstand the pressure
of the blood as readily as the
large veins near the heart.

Hence death occurs in these
parts first.
Portion of transverse section of the intestine, taken in the third week of the fever, showing affection of villi.
Again in the case of the suffusion about the eyes, although in this case the veins from which the exudation takes place are not very far removed from the centre of circulation yet when there is any backward pressure from the heart, these veins soon partake in it, and being embedded in tissue which is much looser than larger lymphatic spaces than most parts of the body, they are not able to withstand the pressure within them & the engorgement already present now gives way to the pus.

***Confused writing***

As a rule in Scarlet Fever constipation is one of the constant complaints. Though this may at times give way to diarrhoea,—the former is however more common,—let us glance shortly at the cause of it.

The contents of the stomach
Section of Plate V more highly magnified, showing cloudy condition and degradation of fili.
And thebowels in their healthy condition are semi-fluid and afford the chief means whereby the strength of the body is maintained.

The villi (occurring throughout the small intestine) hang as it were loosely into these semi-fluid contents. By means of the vessels in the villi, pass the nourishment to absorbed onwards into the circulation.

The constipation present in scarlet fever must be looked upon as the effect, partly of the heat of the body at this time, partly to the increased activity of the villi in the intestine in absorbing the nutrient necessary for the main funcntion of the system.

The heat alone (not only in scarlet fever, but also in any febrile condition) will partly account for the constipation.
Which almost always accompanies it & this is due to the watery
contents of the bowels being used up in the attempt of nature to
equalise matters.

But in addition the pulse
is raised in frequency, during
the first week or ten days at any
rate & with this there is congestion
of the blood & they are by this raised
to a greater degree of activity &
absorption of the nutrient part
of the bowel contents goes on faster
than in health; the contents of the
bowels in this way becoming to
a great extent more concentrated
in the more solid & nourishing
elements. The result is constipation.

But this only goes on to a certain
extent, for if the kidneys become
affected in any great degree, we
find the constipation is replaced
by diarrhoea & this must be
looked upon as a process of elimination
on the part of nature.
The urine from the affection of the kidneys cannot escape from the blood, I thus a product altogether foreign to the organism is retained. An effort is at once made to get rid of it by one or more of the many channels open for its exit.

The intestine is the channel chosen. It is when formerly speaking of the stomach (in respect to its secretory function) now it is like muscles, the function of the intestine or rather the villus is changed. From being purely secretory in its function, secreting the nourishment from the chyle, it now becomes purely secretory in its attempt to eliminate the products foreign to the blood, caused by the affection of the kidneys.

Albminiuria.

The condition of Albminiuria, like Scarlet Fever &c, common.
The cause can hardly be said to have been satisfactorily determined; some say it is due to the congestion of the kidneys, which takes place in the second week of the fever, others say it is due to the desquamation which takes place in the tubules of the kidney, while others assert that it is caused by the effort of the kidneys to eliminate the special poison, (whatever it may be), pathognomonic of the fever.

It is a very hard matter in a pathological condition such as Marlet fever, where there are so many deviations in most of the organs from the normal condition, to fix on any one cause. I say this or that accounts for the presence of the albumen in the urine.

To briefly look at the...
Physiology of the kidney. We find that the water and the salts are secreted in health through the Malpighian tufts. Moreover, this takes place by a process of filtration. The area of the other solids of the blood are secreted by the walls of the tubules. From the blood in the various network of capillaries which result from the splitting up of the efferent vessels from the Malpighian tufts, but when the structure of the kidney is changed or its functions altered, the albumen is said to proceed from the Malpighian tufts of vessels.

And now to look at the action of the kidney from a pathological point of view; we should find here it is possible for the whole structure to be so if these inverted, laid out on a flat surface, that we have a condition in all respects resembling
The condition of the skin at the time the rash appears, not only would the appearance be the same, but the congestion of the kidneys would be found to exist under very much the same condition as the congestion of the skin—that is to say, in the skin the congested vessels would be found to be in immediate connection with the glands of the skin, while in the kidneys they would be in the same immediate connection with the Malpighian Capsules. With this difference however, that in the skin the congested vessels would be found to surround the glands, while in the kidneys they would be surrounded by the Malpighian Capsules.

Some of the latest literature on the subject is contained in Dr. Grainger Stewart's book on "Ephemeraria," where the causes
of albuminuria are grouped as
follows: 
1. Faulty condition of
   the blood. 
2. Altered state of
   the filtering apparatus.
3. Abnormal vascular tension.
4. Inhibit action of some of the
   structures of the kidney.

I quote again from Prof. 
Froward's work: “If Digitalis
is administered in some forms
of albuminuria, the quantity of
urine rises & the albumen
diminishes.”

What is the cause of this?
Digitalis has the power of
contracting the perihilar arteries.
(Those found in the Malpighian
tufts are the only ones which
serve perihilar as regards their size
from their being far removed
from the centre of circulation,
though not so in relation to
the body); this at once raises
the tension in the Malpighian
tufts & if the albumen were already
proceeding from these parts, we should reasonably expect that there would be an increase, but there is not, — there is a diminution. This shows that it is not primarily from these parts the albumen proceeds.

The next situation to look for its primary appearance is from the renal tubules, & here I think the condition of matter will be found to account for the presence of a great part of the albumen in the urine.

If a fresh kidney be removed from a sheep recently slaughtered (the blood vessels being left a moderate length) & a weakHere a solution of salt & water be injected through the arteries by means of an engine two facts may be noticed, viz. if the solution be injected gently I with only a moderate amount of pressure, the solution will be
found to flow through the veins but now if the state of matters be altered or the solution be injected with greater force, we find that as the amount of pressure is increased with which the solution is injected, in such proportion will the flow be diminished through the veins until at last the flow may be entirely stopped by bringing the pressure to a certain point.

In like manner if digitalis be given to a healthy person we find the flow of urine is increased. This means there is a corresponding greater flow of blood through the circulation of the kidneys owing to the greater pressure. But now if the digitalis be continued we shall find the heart becoming irregular in its action & the urine becoming scanty. What is more, the urine will in some
Cases upon being tested show the presence of albumen. How are we to account for these facts?

In the first case, on examination we find that the flow of the solution through the veins is hindered by the congestion of the Malpighian tufts with the solution. We also find that the contents of the glomeruli capillaries around the uriniferous tubules are at a standstill.

In the second case, the administration of Digitalis the results are due to very much the same causes, — the Digitalis at first raises up the blood vessels causing an increased flow, but on the administration being stopped, a condition very much allied to strangulation takes place in the Malpighian capillaries, of the glomeruli stasis in the blood vessels around the
Section of the kidney taken during the second week of Yellow Fever, showing commencement of desquamation.
Urineferous tubules is found to result as before.

In support of this condition being the cause of albuminuria, a paragraph occurs in Prof. Hewets' chapter upon albuminuria to the effect that: "Clinical evidence does not support the fact that increase of pressure in the Malpighian tufts causes albuminuria, but it is possible to cause it in a secondary manner, by giving rise to the tubules under already described in the kidneys about the tubules of Senator (New Confederation Society) has shown that they to where the albumen first comes from.

To sum up then it may be said that the albuminuria of scarlet fever is the result partly of an aberration of the natural functions of the kidneys, heart, and that it is partly due
to mechanical causes, for in
the first case the heart is
disturbed both in the frequency
and force of its beat, the blood itself
in an emaciated condition, the
small vessels themselves are
also affected both organically
and functionally by these pathological
conditions of the heart of blood
when passing the circulation.
Further the epithelium both in
the Wallis from left to it in the
mucinous tubes is found to
be in a state of degeneration
and being tubulated surrounded
with pure blood circulating
in diseased vessels under
abnormal conditions, little
room for the rise remains that
the secretory or filtering powers
of the cells should be
diminished or in very many
cases entirely lost.

The mechanical condition
of things concerned in the
Section of kidney taken during the third week of Scarlet Fever, showing the enlargement of the blood vessels of the progress of desquamation.
Production of albuminuria of scarlet fever is found in the fact of the destruction of the epithelial cells, not so much from their being supplied with impure blood, but from their being actually devitalised by the pressure brought to bear upon them primarily by the congestion of the Malpighian tuft of vessels and secondarily by the congestion around the tubules.

In almost any preparation of the kidney, taken in the third week of scarlet fever, this may be very well seen, where the Malpighian tuft of vessels, by being so congested, presses upon the structures around it. This pressure makes itself most evident by the destruction of the delicate epithelium immediately, in connection with the congested areas, the destruction and disintegration of the cells being
characterised, not merely, by a
edquamation as that which occurs
in the skin, but by an actual
breaking up of the cell from purely
mechanical causes, kept up for some
length of time & being favoured by
the attendant pathological conditions
already discussed.

15. Desquamation

Up to the present I have
merely avoided speaking of
scarlet fever as having been
proved to be caused by a micro-
organism, but how when
speaking of the process of
desquamation it is perhaps a
fitting place to mention the
subject.

Both Klebs & Edington have
discovered micro-organisms — the
former one, the bifillococcus scaldatiace,
the latter two, the sflillococcus rubricenosus,
& Bacillus Scaldatiace (these last
latter being probably the same), in
connection with the tissues in
 Scarlet fever, but it can hardly be said that it has been decided for certain whether these organisms are actually the cause of the fever and accompanying conditions or whether they are only accessory products of the fever.

With the process of scarlet fever can be made definitely abortive in its character by the injection of a preparation of these microorganisms into the system, the theory that these organisms are actually the cause of the fever, must at least be open to doubt.

By some it is held that the process of desquamation is merely a natural means by which the system gets rid of its poison. By this way explain the death of degeneration of the cells in the urinary tubules of the kidneys, the cells undergoing degeneration in their effort to remove the micro-
Drawing of healthy epithelium taken from the inside of the cheek.
organisms from the blood & to get rid of it.

It is probable that future research in this matter, now that bacteriological methods & cultivation of organisms are beginning to be more understood, will clear up a great many questions which at the present time to say the least of it are doubtful.

And now to look at the process of desquamation as a whole. It is found to take place all over the body, after the rash has subsided, & it may last for six weeks, during which time the infection is at its height.

On the parts where the skin is thinner, as in the flexures of the joints &c., the epithelium is found to desquamate in the form of a rust or powder, but in the parts where the skin is thicker, more horn, it will be observed to
Drawing of epithelium taken from the mucous membrane of the mouth during the third week of Scarlet Fever.
Pall off in large pieces, sometimes many inches square, 1 over the
hands & feet very often the
epithelium may be found
to desquamate, forming perfect
casts of the fingers & toes.

What is the cause of this
difference in the manner of
Desquamation?

Over the thinner parts of the
Skin before mentioned the epithelium
is healthy at first but under the
influence of the irritant (whatso-
et' may be) it desquamates as has
been mentioned in the form of
an almost unpalpable powder.
But in those parts where it is
found to desquamate in large
pieces sometimes forming casts
of the parts, the more lateral
Cells of the scales are dead before
the process of Desquamation commen-
ges, so that it is owing to these dead cells
being naturally cemented together
with Keratin, that such large pieces
Are found to come off in some places but in others.

The dead cutaneous cells of these large scales are probably non-infective, for if the inner surface be examined, the epithelium there will be found to be thin, the former of the fine powder mentioned before, this last is probably the infective part, being held together by the dead cutaneous cells in the manner mentioned—it is partly a mechanical and partly a natural process.

This desquamation does not take place only in the skin, it affects probably all the parts in which there is epithelium communicating with the outside of the body, thus in the linings of the tubes, although these are, as it may be said, placed centrally, they may be likened to an invagination of directly by means of the urinary track they communicate with the exterior of the body.
In the mouth it has been shown that this process goes on also in the throat to the trachea tubes, all through the digestive tract reaching to the rectum.

It is probably a process of desquamation which takes place over the eye ball, sometimes giving rise to conjunctivitis & keratitis.

Complications of Scarlet Fever.

The complications & sequelae tabulated below are taken from Roberts' text book 8th Edit pg 1620, they may be briefly considered.

1. Dispay without albuminuria.
2. Inflammation of throat.
3. Affections of joints.
   a. Pharyngitis
   b. Endocarditis
5. Affections of ear.
6. Abscesses (especially in neck).
A. Dyspepsy without Alhuminaria.

This complication comes on after the time of decapsulation nearly at the time when the patient shows signs of convalescence, though its presence should always make one suspicious. Remembering the frequency with which alhuminaria occurs in Scarlet Fever, the examination of the urine should never be omitted, even when after several trials it is found to be free of alhuminaria.

The cause of the dyspepsy without alhuminaria appears to be due to the heart hardly being able to meet the demands.
made upon it—when the patient is becoming convalescent, the heart far taking in the general weakness of the other organs of the body, it being supplied with blood, impoverished from the recent affection, the trophic nerves chiefly about the feet. As long as there is no albuminuria & the trophic does not result from any organic affection of the heart resulting from the fever, it need not give rise to much anxiety, for with the returning strength of the patient, the judicious treatment for the improvement of the blood, the condition will gradually disappear, the system at the same time gaining in tone.


This has been already partly considered, it is primarily due to the congestion of it to be often increased by the process of
As graduated, unless it is accompanied by prostration of the patient or by severe constitutional disturbance, the prognosis is favourable. It will be found to随处 under treatment by suitable gargles 4 month waters.

C. Affections of joints.

This is very often a troublesome complaint after Scarlet Fever. By most authorities it is looked upon as of a rheumatic character.

During the process of the fever, elimination of waste products has been below normal. Consequently the fibrous structures are often found to suffer as in rheumatic fever.

It seems to be due to the frustration of the attempt of elimination on the part of nature, chiefly by the kidneys. Furthermore, it is hardly ever found to persist unless the attack of Scarlet...
Ever gives way to a june attack of Rheumatic fever, which it sometimes does. Then the proper treatment for that condition will evidently be necessary.

II. Serous Inflammations.

The most common forms of serous inflammations noticed after Paroxysmal are pleurisy, Pericarditis, etc. It is hardly yet settled how much they depend upon affection of the kidneys and how much upon other diseases. The serous parts of the pericardium and pleura are in close connection with one another and it is quite possible for either of these serous inflammations to occur independently as a result of the other.

The pericarditis resulting from pleurisy, affects the heart primarily at the base.
But in many cases occurring after Scarlet Fever, the affection may start at any part of the pericardium—(in these cases it is most often found to be accompanied by more or less pleurisy).

This being the case, the cause seems to lay more in the incomplete action of the kidneys than in the rheumatism.

**e. Laryngitis.**

This sequel of Scarlet Fever is sometimes explained as being the effect of the disturbed functions of the kidneys. It is often found in conjunction with the whooping cough to which sometimes follows Scarlet Fever, though how much of the laryngitis may be a cause by how much an effect it is difficult to say.

As a rule it consists merely of a congestion of the larynx, causing cough and loss of voice, but it sometimes...
runs on to an edematous condition. In this case, the kidneys (by not performing their functions properly) are usually the source of the condition.

It is possible for it to consist of merely a congestion, the same as occurs in the skin, or this occurs at the time of the general sequestration — the milder cases are probably the same process.

2. Endocarditis.

This is a process partly taking of the nature of pleurisy. Pericarditis, Endocarditis following Scarlet Fever does not differ in any of its particulars from Endocarditis coming on from any other cause. It is probably due to the defective action of the kidneys sometimes no doubt increased by the presence of the inflammation following the fever.
9. Affections of the ear.

Concluded under this heading may be taken all inflammations connected with the ear, including the Eustachian tubes.

The changes found may take partake of a tendency to suppuration, sometimes forming ulcers and abscesses in the Eustachian tubes, sometimes leading on to perforation of the tympanum.

The whole of the tract takes in the process of desquamation, and if not likened to the condition in the tonsils, the affection at the commencement sometimes resolving naturally, but at others becoming intensified by the blocking of the natural channels of exit by epithelial debris and inflammatory discharge.

The normal process of inflammation is in this case...
interfered with, for in addition to the inflammation occurring in the lining membrane of the Eustachian tubes, the pharyngeal opening is very often diminished or even obliterated by the swelling of the throat. In this way the drainage of the waste products is prevented.

The immediate result of this condition is that if the obstruction in the pharyngeal opening of the Eustachian tube does not disappear naturally, in very many cases perforation of the tympanicum takes place to allow of drainage of the pent up inflammatory products.

When these complications arise, special treatment, depending upon the nature of the case, is called for.

The absence (specially in youth).

Remarks upon this subject have been partially anticipated.
When discussing the throat symptoms, the abscesses are the result of a prolonged inflammation of the glands of the neck, resulting from their secondary enlargement. The lymphatic part of the gland being the part which suffers to the greatest extent.

It is probably due to the absorption of devitalized and digested inflammatory products from the throat to the sinuses, the first lymphatic part of the gland being not sufficient to prevent the matter so absorbed from reaching the circulation.

As to any treatment, repeated gargling and washing the mouth and throat with warm antiseptic are very good, but if the suppuration has occurred the abscess may be very advantageously opened with a Page's knife.
J. Langridge (Continued)

This is really a form of stomatitis (sometimes known as gangrenous stomatitis); it seldom shows itself except after an exhausting illness, especially specific fevers.

It is an inflammation of the whole thickness usually of the cheek or lip. It may progress until the upper or lower jaw bones are eroded.

As to its causes; it is never seen in patients who have been well attended, both in regard to dieting and to hygienic surroundings.

The form occurring after Scarlet Fever, has probably for its predisposing cause, neglect, dirt or a lowered condition of the system from underfeeding & for its exciting cause, the poison peculiar to the fever, would certainly
Find, in a very great degree, to cause such a complication in a constitution already predisposed to such a condition. Its occurrence is just a sign of either a very low condition of the system, or of great severity of the preexisting attack, perhaps both.

Keratitis or Keratitis.

These conditions affect the eyes, at, or a little after the time of desquamation; it probably results from a process of the same kind, (though not occurring to such an extent), as that which takes place in the skin.

C. Whooping Cough.

Whooping cough is noticed as a frequent sequela of scarlet fever, but with no much difference in the opinion as to the cause of this.

68.
Cough, it is very difficult to trace it as being an effect of any of the pathological processes of the scarlet fever.

Most of the symptoms of the Whooping Cough may be explained by desquamation taking place in the respiratory tract.

The cough is just such an one, as occurs on the entry of any small irritating particle into the respiratory tract, more especially the trachea, if it can easily be understood that, were desquamation going on, the epithelium in these parts may get partially detached to act as a foreign body, give rise to the fits of successive spasmodic coughs which are the special feature of the disease.

At the time when Whooping cough is at its most typical.
Stage, the temperature is normal. The normal condition of the temperature is also found in
Scarlet Fever during the progress of desquamation, unless there are any other causative tend to
raise it.

By stage, a microorganism has been asserted to be the
special cause of the whooping
Cough, it having been discovered in the alveoli.
With this view, if whooping
Cough is really, a sequela induced
by the Scarlet Fever, that an
accidental occurrence, then this
micro-organism must be
looked upon as a second
place of a micro-organism
Causing the Scarlet Fever. And
perhaps altered in its condition
and appearance by the processes
under which it was first
developed & from which it has perhaps
acquired its fresh character.
Jaundice.

This is only an occasional sequela of Scarlet Fever. The cause of its presence is not far to seek.

During the time that the process of desquamation has been taking place throughout the digestive tract, it can very readily happen that the bile duct may be wholly or partially subjected to the same process.

As in the kidneys, if the process go on slowly, all will be well, but should it be excessive the bile duct becomes stopped up; the bile which naturally would flow into the intestines, now, after distending the gall bladder, fills up the liver and then is finally absorbed into the blood, thus causing the condition of yellowness & pallorment which is known as jaundice.
II. Acute Tuberculosis.

This affection occurring after Scarlet Fever partakes of the usual character of the disease. It is probable that for it to occur as a complication or sequel, the patient must already have a predisposition to tuberculosis.

The lowered state of the system of the unfortified blood will account for the susceptibility of some people to this affection.

In a person already with a predisposition to this affection, it is quite likely to be excited by the process of elimination going on in the lungs.

It differs in some of its particulars from the ordinary form except perhaps that there is more prostration with it; the patient being in a weak and exhausted condition after the Scarlet Fever.
Acute mania.

This is mentioned by Roberts as being a rare sequel of Scarlet Fever.

It is probably never seen unless there is a certain degree of hereditary tendency in the affection with the patient, it being excited by the abnormal conditions of the fever (high temperature) taking some of the usual characters of an attack of acute mania.

The special symptoms of Scarlet Fever have been discussed in relation to their cause and effect—The complications and sequelae have not been discussed so fully, for the reason that they are not constant and less opportunity has been afforded of examining them minutely.
Cause and Effect — to distinguish the one from the other; to define exactly the limits of each; to recognize the stage at which the one passes sometimes almost imperceptibly into the other; the symptoms being accompanied by so many conditions, varying at different times so much in their character, it is not surprising that the cause is often overlooked while the attention is directed to what is supposed to be the effect.

Literature I.