PHLYCTENUAR CONJUNCTIVITIS

by

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District Surgeon and Medical Officer of Health, Calhcart,
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135 Bedford Street,
Liverpool.
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Introduction and Historical Outline.

Phlyctenular conjunctivitis although one of the most frequent of eye diseases has not until comparatively recently received the accurate investigation and consideration from ophthalmologists which its importance merits.

The disease however has long been known and descriptions of it are found in some of the early writers on eye diseases. Boulton (1) in "A Treatise on the King's Evil" published in 1714 describes it thus:—

"Phlyctenular phthisis is very difficult of cure especially in children if the cornea have been long ulcerated the sight is in danger."

In his book "The Art of Surgery" published in 1722 D. Brown (2) writes:—"An ophtalmia is supposed to be serious when it has been going standing and yielding next to the common remedies of bleeding, blistering,
fusing with the anodyne collyrium already prescribed. Still known to be so when complicated with a thick, chapped lip, a crusty reddened nostril, especially if there be any obvious glands about the sides of the neck or under the chin.

Phlyctenular conjunctivitis is a children's disease, and Sydney Stephenson states that it accounts for 20 to 25 per cent of the patients who come to the ophthalmic department of children's hospitals. In my experience so large a proportion has not been met with. Figures dealing with the frequency of the disease vary considerably.

Some of the older writers give the proportion as high as 50% of the total cases of inflammation of the eye. There are not as yet reliable figures dealing with the incidence of the disease upon the entire population and although certain observers have recorded the total number of new cases during a given period and have determined frequency figures therefrom the results differ so much that they are
not of great value.

The disease is a painful and often tedious one, and if the unfortunate patient does not receive proper treatment for his local condition and general treatment for a constitution usually endangered by bad or insufficient food and neglect, serious consequences may ensue and permanent injury to sight result.

Although it is not a frequent cause of blindness there is no disease according to Dr. Hume(3) which is responsible for more damaged eyesight than this, true 40 per cent gall cases developing a severe relapsing and chronic keratitis running on for months even years the corneal changes frequently resulting in regular astigmatism.

Stephenson examined 17,021 poor law children for the local Government Board and he found that out of that number 871 had damaged cornea (5.12 per cent). Of these 1.63 per cent had resulted from Trachoma and 3.49 per cent had been caused by Phlyctenular disease.

Among these who have contributed to our
Knowledge of the subject George Mackay of Edinburgh occupies a prominent place, some of his lines of investigation being quite new and his treatment so accurate with the most recent advances.

There for many years been much interested in Phlyctenular Conjunctivitis where had considerable experience of the disease. I have recently devoted a good deal of attention to it in the course of preparation for the Diploma in Ophthalmic Surgery at Liverpool. I propose in the present Thesis to deal with the different aspects of this interesting condition and but make a contribution towards light from knowledge of the subject.

The disease has been variously named, some of the names having been given with the idea of pointing out the pathology, others descriptive of the local disease.

We have for example the synonym Conjunctivitis Egerenatae @ Donaldson (4) of London deny that true to receive the Egerenata theory. I think there are indications for considering this affluence analogous to Egerena of the skin. As there is no uniformity
The pathology of Legema under the analogy between this form of conjunctivitis and Legema of the skin is not established. It would be well to discard what is Legema is still a common nomenclature.

The disease is very often present with Legema and impetigo which would incline me to the belief in a common origin.

The term "Periploea" was employed by some writers many years ago, and is yet in use as denoting that the disease has its origin in the Periploens disease, there is here a great deal to be said for such a connection. Other forms of conjunctivitis however are frequently met with in otolaryng and tubercular patients and it frequently happens that Periptonic conjunctivitis is preceded by some other form of conjunctivitis, so that the term is not appropriate. The terms "Conjunctivitis punctata", "Conjunctivitis exanthematica" and "Herpes Conjunctiviae" have all been employed and have not yet vanished from the nomenclature.

The last mentioned term which might be easily confused with a condition arising sometimes after influenza, pneumonia, etc.
originates from the old view (and one which
has recently been revived) that the effluvium
in the conjunctiva is a true vesicle filled with
fluid in contradistinction to the tears held by
Pamoa and others that the effluvium is really
not a vesicle in the true sense, but a pellicle
though a moist conjunctiva formed chiefly by an
accumulation of leucocytes invading the intact
epithelium. This term was condemned as far
back as 1873 when Ischberg Wells (5) stated
that "some of the variations of the true conjunctiva
do not bear any resemblance to itapes in
their course." He considered Ischberg's
term as itapes conjunctivae, and believed that
local irritant acting on the eiliated nerves
gave rise to it. He held that the irritation was
propagated from other branches of the 5th nerve
to the eiliated nerves as in cases of rhea,
epiphora of the cheek, the mucous membrane of the
nose. Professor Ihms of Zurich suggested
many years ago that Myostenus were to
be looked upon merely as an ocular manifesta-
tion of rhea and Stephens found in a careful
examination of 100 consecutive cases of
Myostenus disease at the Einhein Hospital.
But Sezema existed in 58 per cent of the cases.

After the discovery of the specific microorganism of Sezema by Koch, the term 'Plasmodium conjunctivitis' fell into disuse and there was an almost general adoption of the term 'Phlyctenularis' (Φλυκτένυ-απούσιον) which had many years before been suggested by William MacEwing of Glasgow.

There is still a tendency to employ the term Phlyctenular conjunctivitis @ Φλυκτένυλας κρύτης as if they denoted distinct affections but there are no good grounds for such a division. Even when the disease occurs on the cornea it can still be looked upon as a conjunctival disease, for the upper layers of the cornea are simply altered epithelium and in practice it is often found that the keratitis is coincident or follows an extension from the conjunctivitis.

The first to investigate the pathology of the subject was Isamhoff Morii 1860 who found nodules of cells upon Bowman's membrane which caused elevation of the epithelium.

1864 and Wagenmann ten years after discovered similar nodules beneath the epithelium.
and within the last ten years Bénédictine
\( T. \) Mathelin described the same appearances,
and Wecker of Liège has microscopically
examined 27 cases of phlegmonae in different
stages of their evolution. Barn, Haenfeld,
and Saller have also given some attention to
the pathology of the disease. He last mentioned
made in 1891 a very elaborate contribution to the
subject of Tuberculosis of the conjunctiva.

The first to investigate the Bacteriology of
the disease was Gifford who in 1866 found
the Staphylococcus pyogenes albus and the
Staphylococcus aureus in 37.6% of his cases, but
in examination of the phlegmonae themselves
Rostand most recently after very extensive investigation
was unable to find the Intercle Bacillus, the
Staphylococcus or any other kind of microorganism.
Liber Listeriae made a large number of
observations and could discover no Intercle
Bacilli. Mace and Back discovered
Staphylococci but they were led to the belief
that they were not causal but accidental.
Astrology

I have looked for evidence of Horoscopes about the Phlyctenular disease may be observed in children whose health is of the most
faint condition among whom all local tuberculous infection may be nearly eliminated, and when
we are not at liberty to apply the usual
treatment, but have failed to convince myself that 'indeed of health' is at all
common in the subjects of Phlyctenular symptoms.

Some many times been children whose first
sight appeared to be particularly healthy. They
were alert and had a good colour, but I
done found them actually to be the patients
of Pulmonary Tuberculosis. The cases
which on slight iinquiry there were blemished
at some cyanosis.

In my experience of eye Hospitals
the children who have suffered from Phlyctenular
disease @ from those cases statistics are
compiled have not been medically examined
in the true sense unless there were some indications
of a gross lesion.

The disease occurs in children between
the ages of one and puberty, and according to Fuchs (6) and Newman states that the bulk of the cases occur in the school age group and he gives the fifth year as the year of greatest incidence.

Maitland Ramsay (7) is of the opinion that it attacks girls often than boys and occasionally even on for the first time just before menstruation is established.

The disease seems to be more prevalent in the winter months and certain observers state that all the symptoms are greatly exaggerated by a sudden change to cold and wet, relieved if to dry and warm weather. According to the Schrödinger (8) however the cases are more aggravated in warm or moist weather.

During a long experience of general ophthalmic practice in England as a Government surgeon in South Africa I have had to deal with many different types of patient. My experience in England has been chiefly confined to hospital patients where there has been a large number lately in London and Liverpool.
my South African patients fell into 3 distinct groups (1) The well-to-do Europeans (2) The poor Europeans mostly Dutch and (3) The natives, chiefly Kafirs and Hottentots.

In the first class I had only 4 cases in 6 years out of these children who had come from England had tubercles opened in the neck. In the second class I saw a larger number of cases, but not many in all, and thought the trouble to inquire into the factory and general health of these cases was not important. The majority of these patients lived in insanitary and unhygienic conditions, seldom having a bath or having their clothes changed.

In the third class there was a larger relative number of cases than in the preceding, but unfortunately I have not sufficient data to make useful comparisons between the frequency of the disease in the 2 latter classes, but of the many thousands natives who came through my hands the number of phthisic-tubercle cases was very small.

I am firmly convinced that the disease is not nearly so common in South Africa as it is
in England. In a number of my native cases there are evidences of tubercular disease manifested by enlarged glands in the neck, but only in a small proportion were I able to observe actual pulmonary Tuberculosis. Tuberculosis of the lungs seems to be very common in South Africa. The average mortality of tuberculosis in the Transvaal is about 4 per 1000 population of all ages. It is not an unusual occurrence in its accompaniments, and these symptoms which however are very common among native children are met with in some of the cases. While Whites admit the greater prevalence of the disease among the Kafirs and Hottentots in the Eastern Province of the Cape Colony, while myriads are most prevalent among all classes throughout South Africa owing to the strong winds and the great amount of dust with which these are accompanied. The same disease is by no means frequent. The factors operating in the case of the latter disease are in my opinion (1) the influence of climate; (2) the effect of diet.

Native children are fed on maize (maize) and "calabash" milk. This article of diet is also largely used along with bread and meat by the poor whites.
Maize is quite as nutritious as wheat in all except its mineral ingredients while it is richer in fat than any cereal except oats, containing twice as much of this important constituent as wheat or barley or three times as much as rye. Its composition according to Hutchinson is as follows:—

Water ................ 12.6
Protein ................ 17.7
Fat ..................... 5.4
Carbohydrates ........ 68.9
Cellulose .............. 2.0
Mineral Matter ........ 1.5.

And in addition to its having this high nutritive composition it has the further advantage of being very easily digested in the human body.

The natives of South Africa use maize as mealies chiefly in the form of samp which is obtained simply by pounding or stamping the cereal. The preparation of the food is most primitive but the result is good. The samp is well boiled in a three legged pot over a carefully fired and in many districts it forms the natives' staple article of diet.
Its excellence as a nourishing food is well shown in the splendid physique of those whose diet consists almost exclusively of it. It must be remembered that the poor classes of Great Britain were it adopted as a substitute for the miserable stuff on which children are commonly fed.

"Calabash" milk is fresh cow's milk made to curdle in a calabash. It has found its way into nearly every European home in country districts.

The curdling is due to the presence of lactic acid in the milk, which turns the casein out of its partnership with lime salts, so that the casein being itself not soluble then falls down as a flocculent precipitate. The presence of the lactic acid is due to the splitting up of milk sugar by the agency of the Bacillus acid. lactici - always present in milk - but the growth which is greatly facilitated by a warm atmosphere. The calabash is not shaken from time to time, as the curd is here firmly broken up. The milk is found to be very easily assimilated and as the full proportion of fat remains - half subdivided.
It proves to be most nourishing. This of course is similar to the preparation made by doctors, but it was used long before Metchnikoff published his theories.

In this connection it is interesting to note that at Moorfields the number of alien patients to British has been found to be 1.6 to 3.5 and the ratio of incidence of Phlyctenula Conjunctivitis 1 alien to 3 British. Norman(1) says that "The poor Jews present a very much smaller proportion of Phlyctenula conditions than might be expected from the excessive prevalence of dirt diseases amongst them. The staple food of the British poor is tea with bread and butter and not too much of tea. The staple food of the alien is richly impregnated with oils. Oil comes into their diet to an extent we could not tolerate. For the best medicinal cure for Phlyctenula is cold linseed oil by the mouth and plenty of it."

I am convinced that the absence of good nourishing food is an important factor in the production of this disease.
There are many diseases which act as infective causes.

The evanthemata, especially measles, whooping cough and scarlet fever are frequently associated with this oculæ condition.

Scarcely was a condition greatly resembling it in its cause and in its general and special appearance is met with.

Dr. Has considerable experience of this disease, having had charge of many extensive outbreaks in Cape Colony, mostly among the natives on the borders of the Interior.

In many of the severe cases, in which there was a profuse pustular eruption on the face, the eyes were affected. Pustules were often seen in the conjunctiva and in these cases a very acute and painful inflammatory condition was observed. It was especially interesting to note that the pustules appeared at the limbus - at the site where phlyctenular ulcers are most usually seen.

In one or my cases of vaccinia plague there was a very acute hyperæmia of the conjunctiva & on the following day there was the appearance of a small ulcer and much
At my entrance the minister of the right corner.
As the patient was in a hut and as I had
seen some after my entrance received unmistakable
intimation of the verminous character the examination
was not made prolonged. The patient died next day.

Vaccination has been given by some writers as
a common exciting cause but I have not
been able to regard it as a prominent factor
in the promotion of this disease, although as
Public Vaccination I have vaccinated over
ten thousand persons. I have always been
careful however not to vaccinate any person
suffering from other diseases or otherwise
enjoying unless absolutely necessary.

Facts and figures have forms the disease
occurred after Typhoid Fever.

There seems in two cases in South
Africa a condition resembling Pneumonic
disease coming on after malariab fever and
then in Ceylon last year I was shown a
case which followed shortly after an attack
of "Februm Day Fever."

In Britain Influenza runs to be
The frequency of this as well as any other unfortunate conditions and even during an attack the invasion of the cornea is not infrequently met with. The conjunctivitis in this case is thought by some to be of origin in the intense catarhal affection of the nasal mucous membrane.

Dr. Clair Thomson (2) thinks that adenoids play a part in the causation of conjunctivitis, blepharitis etc. and that their removal is often followed by cessation of these symptoms. Charles Goulston of Holkham (3) believes that from the ophthalmic and genic point of view there is in the mouth a source of infection which in all probability is at the root of much mischief that occurs in the eye. He instances a series of 24 cases of iridocyclitis in which adenoids were responsible for 4 while in a case of sympathetic ophthalmia which lasted 16 in which another cause had to be found. These might he says have been dumped as rheumatic, gouty, plastic or but a search was made for a focus of septic absorption.
In no case the focus was found in the
trachea, the patient improving rapidly as soon
as these received attention in spite of more
than 12 months previous treatment which had
caused no improvement. In 2 cases no
cause could be discovered but in both cases the
patients were women and no actual examination
was made of the uteri. In 3 cases repair
in connection with the teeth was present and
although not every case improved as rapidly as
Gulden could have wished all the teeth were
removed yet in many instance the improvement
was so marked as to leave little doubt as
to the connection between the malakopsia
and the iridocyclitis. This induced to think
this malakopsia has an influence also in producing
phylymenite disease.

Henry Power considered that there was a very
intimate relation between diseases of the teeth
and eyes and he was of the opinion that
malakopsia conjunctivici might be caused by such causes.

Foreign bodies, irritant particles, dust and
other elephantine matters are said to be caused by nitrogen. The rearmost parts of the occasion most exposed to irritating foreign bodies, viz. the upper nasal quadrant is the seat of the incision of Phlegmolin drains both in some limbs and conjunction. My experience in South Africa convinces me that this is not a likely cause, otherwise the whole population would at times suffer from the affection.

Birchell (14) thought that intestinal worms kept up the symptoms by their irritation, but I have never seen cases where the persistence of the condition could be attributed to such a cause.

Braga (15) thinks too little attention is paid to the presence of vessels enoplosis in these cases. He thinks that these act as excipients of the disease. After their removal is often followed by rapid recovery from the smaller trouble. Zachariah quotes Herz on the subject and is inclined to agree with him. Hahnemann at no time formes such a view, but he recently investigated the presence of vessels...
in the girls in a school of average cleanliness 328 82% had nits in their head and only one per cent of the children showed traces of past or present Philoxenus disease.

It is believed very rightly that the parasites were undoubtedly associated with the disease but could hardly be held to accentuate the liability to it.

Cataracta Ophthalmia is undoubtedly frequently seen before an attack of Philoxenus Cymothoe and it is not infrequently found that the two conditions coexist.

Auerfeld (17) gave cataracta ophthalmia as one of the excitable causes and mentions in addition a very noticeable possible cause viz._eye strain. This has been noted by other observers and MacKay (18) describes an interesting case of the disease in which there were recurrent attacks with a tendency to attack the cornea within the cornea of a high degree of hypermetropia astigmatism, coupled with local and constitutional treatment checks the disease for three years.

In my opinion, one of the foregoing conditions
can be regarded as really accountable for the
disease and the play of a subsidiary
part, as nevertheless should not be overlooked.

Dr. Gyans describe, under the name of The
Endemic Chilblain, a constitutional anomaly
of symptoms which have been known for years
but which in former years were classed with
the affections, especially tuberculosis, affecting
the title "congestions." One of the earliest
signs of the endemic chilblain he says is
the occurrence of mild scarlet fever, one of
which at one time was considered to be due
to the fault in the quality of the milk.
Other conditions are characteristic, harsh
scab, etc. Sometimes also catarrh of the nose,
the pharynx or the bronchi.

Reticulated children Gyans says will
bear signs of the endemic chilblain without
intermission for the first 10 years of life if
they are kept home extreme as one paved
satisfaction with milk and eggs in the chief
instruments. The fact be that, however
and an indirect influence. Gyans instances
the abnormality as definitely hereditary.
and he says that in tuberculous families the exudative diarrhoea is not more frequently nor more strikingly encountered than in others, but it is often observed in families with a nervous history.

He holds the view that "pathology is a sign of the exudative diarrhoea."

If the primary cause of the condition is to be considered in the light of practical experience it must seem he says that "in the exudative diarrhoea there is a constitutional defect which concerns especially those tissues which make possible the great variations in the water contents of the organism; the greater the amount of water, the more obvious the diarrhoea — a fact which explains the frequency of the symptoms in the first year of life."

And he adds, "the intake of fluid by the tissues of the body brings about corresponding changes in the manifestation of the condition."

Judging from my own observations there is little doubt that a certain type of constitution exhibiting enlarged glands in the neck, e.g., goiter, to which we want
Of a better name may still be called "stromous" is especially liable to the disease. But it may be that defective nutrition is at the root of the liability to such a constitutional state. Be this as it may I have been my experience that the subjects of Pterygium cornuaeum are as a rule the reverse of robust, and Strangfeld has been among those who regard its occurrence as consistent with apparently perfect general health and admits that even in these there is probably some inequality of nutrition up which the great tendency to recurrence of the eye affection is evidence.

Norriss and Oliver (21) say that "lymphatic" and "irritable" are predisposing causes, and though they may not probably do require a special germ for their causation, yet the condition of the general system and the state of the nutrition are important if not prime factors.

Strangfeld found that the stromous diathesis was present in 100 out of 200 cases and he says that probably the decisive points to a special
reaction in the conjunctiva of scarplets

Nettership (22) tells that "phylytemal occurs

prophylaxis in phlytemal subjects that we are

justified in suspecting scarplets tendencies in

all who suffer much from them."

Lafora says: "former ocular phlytemal he

looked upon as manifestations of scarplet but

that as a result of phlytemo memorable with

it was shown that certain scarplets lesions

are of tubercular nature. The generalisation

was special made that the two words phlytema

@ tubules, were interchangeable and synonymous

terms": after the discovery of the tubules, the

scarplet became a "modality of tuberculosi occurring among lymphatic children.

It was shown known that certain so called

"scarplet" manifestations were really due to

heredo-sarphilis, that others had a gastro-

intestinal origin, that still others were due

to exogenous causes and so forth.

With regard to ocular phlytema he was

pointed out that they differed from tubercular

lesions in the conjunctiva by their symptom,

cause @ structure; by the constant absence
of the Koch bacillus, and lastly, by the possibility of producing them experimentally.

It was suggested in reply that the phlyctenulosa were probably provoked by dead bacilli, or by toxins carried in the circulation, hence the terms "phlyctenulosis", "disphlyctis" and "tuberculosis" were tuberculous lesions.

Later analyses the possible connections between tuberculosis and phlyctenulosis disease.

1. The phlyctenulosa are caused by tubercular infection.
2. The two lesions are from the same cause.
3. The two lesions are independent of each other, and he argues that against the theory of phlyctenulosis disease being an extrinsic cause and being merely a local lesion, where the negative results of bacteriological investigation, the localization of the lesion @ the clinical association of the condition such as the commonly associated eruption on the skin of the face, slight febrile disturbance and trivial intestinal conditions. It came to the conclusion that the origin is in the conjunctive action of internal @ external causes, the former including the toxins of the tubercle bacillus and the latter
The toxins of these microorganisms chiefly
are of phylocoenous product amens.
Beauh says that the stimulus to the formation
of phyllocoenous is indigenous or non-indigenous.
In connection with possible exogenous and
indigenous toxins, the recent work of Böckle
in tuberculosis of the conjunctiva is interesting. He
states that tuberculosis conjunctivitis may occur as
part of general tuberculous infection as shown by
an experiment of Theobald Smith "in which a rabbit
 inoculated subconjunctivally with a culture of tubercle
bacilli developed true flattened disc-like
excessences - lesions of the conjunctiva correspod-
ing to granuloma as it occurs in the human subject".

Theobald Smith's example of an infection
of the conjunctiva from the blood stream was the
only instance observed throughout the course of the
experiments. Even tried to repeat it with
without success even when an attempt was made
determine localization of the bacilli to the
conjunctiva by trauma. It holds that true
infection of the conjunctiva of certain types

* Hypertrrophic Tranformation
Vig. Those of ulceration, milking tubercle and pedunculated tumour in which the diagnosis has been placed beyond a doubt either by the recognition of the tubercle bacillus or by the positive result of an experimental inoculation or practically always the results of the direct inoculation of tubercle bacilli proves (1) between the interstices of the epithelial cells of an apparently normal conjunctiva (since we know that such infections can readily take place in the case of another organism—*Micrococcus melitensis*).

(2) into a broken down phlyctenule (3) into an occluded or partially retracted lacrimal gland and (4) into some abrasion or other Rieschk trauma.

Eyes prove that the infective virus may be introduced (1) from contact with pathogenic relations, friends, playmates.

(2) by conveyance from similar sources by means of handkerchiefs, towels and so on. (3) by dried particles of infective material floating in currents of air, assuming as he does that the majority of infections are due to inoculation with the human type of tubercle bacillus, and
(4) possibly by the transference of infective
milk by fingers or otherwise to the conjunctiva
etc.
Later injected sterile dead tubercle bacilli
into the cornea and also into the blood
vessels. He observed that from cocci
cultivated from the eye a similar affection
could be produced in the Pia without any
abrasion but not in the conjunctiva even after
abrasion of the epithelium.
Wehner has studied the action of
bacilli on the conjunctiva of animals found
and tuberculous. He has, never been able
to produce the formation of phlyctenulae (acids)
to Marcel Danio (25) after inoculation of
tuberculous into the eye of healthy animals
soon after irritating the conjunctiva. In these
animals the epithelio-neo-reaction is not obtained.
On the contrary among tuberculous animals
by injecting an emulsion of bovine bacilli
into the peritoneum he has succeeded in
provoking upon the conjunctiva an eruption that
serves a great likeness to tuberculous phlyctenulae as
they occur in human beings. The epithelio-
neuropatitis was positive.
Riviere and Morland in the preface of their recent book dealing with "Treatment of Tuberculosis" mention what they describe as the "interesting and reasonable hypothesis" of Rosenbach that phlyctenular conjunctivitis is due to circulating tubercular toxins with the addition of a local irritant due to many cases to a haemophoracous infection.

The phlyctenules caused by the toxins of tubercle write Butler (27) "can often be differentiated from some that similar conditions caused by other agencies - from the ordinary phlyctenules which as Harman has pointed out may depend upon a certain nerve distribution and is generally found in one situation. The phlyctenules were of the elongated type which appears to be characteristic of the tubercular variety."

The positive results obtained in phlyctenular cases by the employment of the different specific tests for tubercle have been very uniform although not of very great value they are especially interesting and suggestive when one observer like Weckers found that milk the
Von Pirquet's test he got positive reactions in 142 out of 156 cases (91 per cent) while the same test applied to children under treatment for other eye affections was positive only in 11 per cent.

Strebel injected tuberculin into 28 patients when he got a general reaction in 20 (71 per cent).

Stephenson in 1907 obtained a positive reaction in 6 out of 76 cases, with the Calmette Ophthalmo reaction. This reaction is obtained by placing a drop of 0.5 or a 1 per cent solution of old tuberculin on the conjunctiva. When it is positive then follows in the course of 24 hours distinct congestion of the conjunctiva, characterized by hyperemia of the cunonucle and plus seminalis, injection of the conjunctival vessels, and lacrimation which may increase in severity and give rise to a discharge of a mucopulent secretion.

There are distinct disadvantages in its use and in one of the first cases by Stolz Thorson (28) had under observation the sight of the eye was permanently impaired.
by its employment.

The belief of opinion is now strongly against the use of this reaction owing to the occasional occurrence of false local reactions, and J. Vermein Butler considers that "the test is dead." (30) Eysen in the other hand.

This regards this as a most valuable indication of the presence of an active tuberculous focus, and its employment (provided an eye is absolutely normal in appearance) with the object of determining whether a tuberculous individual under treatment with tuberculin is or is not cured.

Barbara and Lewis obtained a positive tubercle reaction in 10 healed cases of phthisis pulmonalis diseas.

The Von Pirquet Cutaneous Test

The Von Pirquet cutaneous test is easily employed. It depends on the reaction of the skin to tuberculin in a susceptible subject. In 98% of tuberculin adults, a positive reaction has been obtained when inoculated tuberculin was used. But the
The disadvantage is that the test is generally positive in latent as well as active tuberculosis. The positive reaction is however of great value in childhood i.e. at an age before the tuberculous process has had time to become dormant.

It may be taken that in a child not in an advanced or febrile state of illness a positive reaction is definite proof of the presence of active tuberculosis and a double negative reaction with 25% tuberculin an equally strong proof of its absence.

There is sometimes associated with the cutaneous reaction a general disturbance from absorption of tuberculin. This is shown by a rise in temperature and slight malaise and denotes an active tuberculous focus or at any rate one which is perhaps quiescent but easily activated.

I have used the Von Pirquet test in a series of 13 cases of phthisis tubercle disease and in every case was a positive reaction usually obtained. This result of course can only be said to denote the existence of a tuberculous focus, active, quiescent or healed.
in some part of the tissues, and it is not necessarily an indication of the conjunctival condition being itself tuberculous.

The case long ago passed the stage when because two lesions are concomitant it is to be assumed that one is the cause of the other, but in view of the fact that there frequently coexist with the phlyctenular lesion other evidences of tuberculosis, such as enlarged lymphatic glands, or joint, pleuritic, thoracic, dactylitis, etc. I am inclined to the view that the condition occurs in persons who are the subjects of tuberculosis latent or otherwise.

Sydenham Stephenson and J.A. Jamieson (31) point out other facts in support of this view:—

"The frequency with which a family history of tubercle can be obtained from the subjects of phlyctenular disease."

"The fact as shown by Bliss and Paton (32) that the blood of patients suffering from phlyctenular disease behaves in a manner which is typical of a definite tuberculous affection."
As the result of examination of the blood of upward of fifty patients with phlyctenular disease these authors claim that their observations of the osmotic index go far to support the hypothesis that phlyctenular ulcers are due to the escape of attenuated or dead bodies from some distant foci, identified or otherwise, of tuberculous disease.

Westers of Liego found tubercles in 36 per cent of his cases and further a family history of tubercles in 56 per cent.

Eyes will not admit the tuberculous character of the disease and will only be satisfied by an actual demonstration of the tubercle bacillus in an extended series of phlyctenules.

He wishes regards the ulcers as "an expression of expected vitality and lowered resistance in an individual whose vascular system is habitually in a state of irritative tension", for practically he says "every phlyctenular patient suffers from some error of function—a combination which enables any microorganism to provoke a reaction out of all proportion to its virulence." This is an idea that I do not care to accept.
Despite his disinclination to regard the phlegmone as primarily tuberculous he admits that it "may have assigned itself an important rôle in the causation of tuberculosis of the conjunctiva - that of serving as the portal of entry to the tubide bacilli."

**Account of Personal Observation**

of The Van Deque and Moro Reactions in Cases of

Phlegmonous Disease

After studying the modern methods of diagnosis and treatment of tuberculosis at the Liverpool Consumption Hospital, I asked through the kindness of Mr. D. Barron the Ophthalmic Surgeon to the eye as the ophthalmic department of the Van Deque reaction in a series of 12 cases of phlegmonic disease and the Moro reaction in a series of 17 cases.

The skin of the forearm was thoroughly cleaned with hot water and soap and spirit and a drop of a 25% solution of oleum tuberculin was placed on the skin. An annular cicatrix made as in vaccination with a needle previously sterilised by heat.
Human Tuberculin was used on the right arm and Bovine Tuberculin on the left arm on each arm above the site of the scarification with Tuberculin, and the scarification was made as a control through a drop of a solution containing carbolic 5% Formalin Chloride and distilled water.

The Non-Project reaction proved to be positive in 11 cases as there developed toward the end of 24 hours an erythema formed by a popular condition at the site of the inoculation with Tuberculin. Both human and bovine, the controls showing at most a little redness. In the case when no cuti reaction appeared a second scarification was made a week after with a 50% solution of old Tuberculin on this occasion the result was positive although not pronounced. In 2 of the other cases also the positive reaction although present was not very marked, but no repetition of the inoculation was made. All the cases in which the Mere vegetation test was used gave a positive result,
four however with a very weak reaction
the number and size of the papules and
the accompanying redness being small.

The moro test with both Roine
human tuberculin made from Pasteur
Davis' tubes 50% Landau and 30% Landau
Apiece the edge of a pen and rubbed
on an area of the chest about 4 inches
square for 12 minutes and the effect
observed on the second day. In this
test plain Landau was used as a control.

A positive reaction is evidenced by a
pooperular eruption which develops on the
side of the injection. The papules usually
have disappeared at the end of a week.

In nine of the cases 2, many as 280
papules were seen, but in 4 of the cases
only 4, 5, 8 or 9 small papules appeared
@the reaction in these cases could not be
paid to be very marked.

According to Nord's classification of
(1) weak (2) medium strong and (3) strong
of the cases might be classified in the 1st group
11 in the second and
3 in the third group.
and it was noticed that in the majority of the cases the reaction with the bovine tuberculin was distinctly more pronounced than with the human variety.

The tests were all made in children between the ages of 4 and 75 years.

Eighteen were girls and twelve were boys and they represented different stages of the disease.

There was a family history of Tuberculosis in 10 of the cases, but in no case was there active Pulmonary tuberculosis.

3 of the cases followed after whooping cough. These children being weak and anaemic.

4 of the cases occurred sometime after measles.

4 of the cases has recently suffered from diphtheria.

In 9 there were enlarged tubercles, some of these cases appearing to have adenoids as well.

12 of the cases had enlarged cervical glands.

6 then tonsillitis and 14 exogenous. In 16 there was also pharyngitis.

But whether this was an infection of the hair follicles, probably staphylococcal secondary to the conjunctivitis 7 and 9 determined.
Several of the foregoing conditions were of course found to coexist, but in the majority of this series of 30 cases there appeared minute
instances of constitutional weakness in addition to the evidence furnished by the tuberculin test.

34
The Bishop of Montebell states, that he obtained in nearly half of his cases of miliary tubercular
Koch's test, a positive reaction to the Piquet's test. He judged, that in the phthisical variety the reaction was very uncertain and he was not disposed to regard more than a small percentage of these cases as tubercular in origin.

The own experience of the tests in the cases of phthisical conjunctivitis was quite at variance with that above quoted, but as they were carefully performed I am satisfied that they furnished very significant and suggestive results.

Never been any ill effects follow the use of the more or the Mon
Piquet test, but Lyen, Craighead (35)
quote a case reported by Dr. E. Wipmann
that was an unfortunate result in the case of
Silvesterheim, Germany in which a boy 4
A boy of 12 who had suffered from relapsing ulcers of the corners. He had eczema of the mouth and nose. When the ulcers were healed the child was treated with van Pignell's antineurasthenic test and on the following day the reaction was seen. Two days after he began to lose his appetite, became pale and apathetic, and died with the symptoms of meningitis on the 14th day.

Whether the meningitis was a chance complication which might have occurred in a tuberculous child without circulatory cul-de-sac of course be determined.
Pathology, Pathological Anatomy and Histology

Recency 16. Parme the first to investigate the pathology of the subject was Stammel, who half a century ago found nodules of cells upon Bowman's membrane which caused an elevation of the epithelium.

Leber and Wegennman 10 years after discovered the same nodules situated beneath the epithelium, and within. The last 10 years von Mikul has also described nodules grown out of infiltration, the epithelium being raised, then thinned and eventually broken. The infiltrating cells were small polymorphons; the cells were small at the periphery, large at the centre, flattened near the surface, and nuclei were smaller and stain less. Theiry commencing necrosis.

Leber found giant cells in 3 out of 4 cases, not always in the nodules, but under the epithelium.

Winterstein found them only at the periphery of the ulcer. Winterstein holds that a phlegmon is always solid, and that it forms a "cutaneous ulcer."
Phlegethorules were regarded by the earlier observers as minute abscesses, they described an escape of fluid - then and columb - from them and did not consider that there was anything unusual in their character.

Hermann states that he has often noticed fresh phlegethorules and he thinks that it is collapsing as though fluid escaped from them. He believes much like "thistles" and he does not think that the description of the histology differs from that of a hypertrophic blister, except that the hypotetic eruption definitely contains fluid.

In truth, recently demonstrated the existence of some phlegethorules of a fluid containing cavity.

Heller says that phlegethorules originates is characterized by the presence of one or more small vesicles @ that their contents are at first clear and transparent, but soon become yellowish indicating the formation of pus.

I don't agree with Hermann's view as to the hypertic nature of a phlegethorule but I am of the opinion that in its simplest form it commences as a small papule or tumor in a
opposed round cells covered by the superficial layer lymphoid epithelium which later collapse down forming an ulcer. It might be called a pseudo-veinule.

Three stages are described by writers:
1. Infiltration
2. Ulceration
3. Cicatrization

In the first stage the lymphatic vessels are abundant, and the capillaries so dilated as to give a spongy aspect to the phlyctemone. These vasculitis and perivasculitis, the epithelium then becomes infiltrated with polynuclears and lymphocytes. Protagonisms are pushed into the depths of the phlyctemone.

In the next or ulcerative stage the epithelium becomes thin and vascularized, and the base of the ulcer so filled with leucocytes, method to fibrin.

In the process of repair there is abundant protagation of the epithelium, so as to form protagonisms towards the surface, and in the depths, and the leucocytic infiltration gives place to cicatricial tissue.
On the conjunctiva 2 types of the disease are seen
1. The solitary Phlycten
2. The multiple.

Stephenson describes the appearances as:
1. This is a local inflammation of the eyeball, consisting in the appearance of one or several round, soft nodules of subepithelial infiltration situated usually at the limbus. Tendency of these nodules to a leap of blood vessels, which proceed from some point in the circumference of the eyeball. These nodules become larger, their surface gets abraded, and finally they heal without trace. In general, it may be said that the larger the number of elevations, the smaller their individual size.

2. Second variety, on the ocular conjunctiva at some distance from the cornea, is occupied by one or more large phlyctenules. This form was once known as punctula of phlycten. 

3. The third variety there are no definite phlyctenules, or merely a suggestion of them, but the limbus is whole or in part is raised slightly above the level of the surrounding conjunctiva, and the eyeball
is noticed in a more or less diffuse fashion.

Of the solitary or simple variety, the phlyctenule varies in size according to that of
from 1 mm to 4 mm. and the vascular injection
is immediately around it, and not diffused
over the conjunctiva, although it is true that
occasionally any form of phlyctenular disease
may be associated with simple conjunctiva
which is to be regarded as secondary to
the phlyctenular affection.

The phlycten is usually of the form of a
small, circular, slightly raised, grayish white
infiltration, afterwards converted into a shallow
ule or by doing its epithelial covering.

If the ulceration become progressively extended
especially if the punctum ventre (which is on found
to be a not infrequent visitor to the conjunctival
is incapable of setting up a mild form of phlyctenular
ophthalmic ec.) hyperopyon may result,
then may be perforation, escape of the
aqueous humour, or pustules of the iris
and other unfortunate results.

But these are not always with all
common and the results meet the feared
The punctate opacities of the cornea which may be and sometimes are permanent.
In the multiple variety of the disease these minute phospheneae take on many forms, and this condition is accompanied by the appearance of severe irritation. The phospheneae here are always situated in the limbus of the conjunctiva, and there may be a considerable amount of discharge. In this form there may be a shedding of the corneal epithelium, a very characteristic feature which is very difficult to heal.

A phosphenea may form the starting point of what has been termed, "the vascular fasciculus of Fisher" or "fascicular keratitis.

A mildly raised crescent of pink, white colour is seen upon some portion of the membrane, and a mesh of vessels connects the concavity of the crescent with some part of the neighbouring limbus.

The condition pleiably advances across the cornea. This fascicular form has never been known to perforate but it may seriously injure the surface of the cornea.
by interfering with its transparency, the

\[ \text{In "punctural keratitis," this appears} \]

to be a considerable irritation of the terminal

\[ \text{branches of the 5th nerve, marked blepharo-} \]

\[ \text{phryism.} \]

\[ \text{(38) Stephen Shawon calls phlyctenules "minute} \]

\[ \text{abscesses in the deep layers of the conjunctiva} \]

\[ \text{which rupture through the surface with the} \]

\[ \text{formation of an ulcer," and thinks the cases} \]

\[ \text{within large ulcers from are probably} \]

\[ \text{of a tuberculous nature, but he thinks} \]

\[ \text{"actual proof of this is still wanting.} \]

\[ \text{Harriem Breeze, on the other hand, goes} \]

\[ \text{so far as to say that phlyctenules due to} \]

\[ \text{tuberculous toxemia may be differentiated} \]

\[ \text{from those from other causes by being more} \]

\[ \text{elongated.} \]

\[ \text{It does not seem to be generally known} \]

\[ \text{that phlyctenular disease is especially} \]

\[ \text{if accompanied by marked} \]

\[ \text{evidence of conjunctival exudate, may be} \]

\[ \text{associated with the presence of some more} \]

\[ \text{phlyctenules upon the tarsal conjunctiva.} \]
of the lower or (more usually) the upper eyelid. They generally take the form of small granular elevations lying near the free edge of the eyelid. Since reading this remark of Stephenson's I have looked in the popular literature for phlyctenules, but have not yet seen them in any of my recent cases.

Harran having noticed that the lower temporal quadrant of the conjunctiva was the commonest seat of phlyctenules tried to discover the reason and as he thought found it in the nerve distribution to that area. The supply is afforded by a loop uniting the lacrimal branch of the first division with the motor branch of the second division of the fifth cranial nerve and he looks upon phlyctenule as having been previously mentioned as a peripheral trophic lesion of specific nature resulting from irritation either of the loop of supply or of various terminals in the distribution of the fifth. But why asks the Medical Record (39) should the peculiarity of the nerve distribution to the lower temporal quadrant determine the greater...
 Evidence of phlyctenule in this situation? German thinks the answer lies in the probability that the influence received by a loop derived from distinct divisions of the same nerve is less stable than when the supply comes from a single source.

George Mackay recently made an excellent contribution to our knowledge of this subject by, although he has no hesitation in pronouncing a phlyctenular patient a tuberculous subject also at the same time has glandular cases in the neck or other known manifestations, he hesitates in relegating to the same category cases which were no common manifestation of tuberculosi, in which the phlyctenules perhaps disappear under a few days treatment with calomel dusting or under geltol and mercury ointment, but he mentions a very suggestive case which strengthens the opinion that I have previously expressed that phlyctenule may actually be tuberculous when present as distinct feature of the disease, as in whom perhaps there is evidence of some constitutional disturbance, anemia, or dyspeptic symptoms, or in them...
then are no noticeable manifestations, although the result of inoculation of the tubercle bacillus affects the nerve centres in preference to other parts.

The case alluded to was that of a little girl aged 13 in whom there was a deep punctate paretic and massive exudation in the anterior chamber. The child had been examined at the time by so eminent a clinician as Dr. S. B. Stimson and reported free from signs of tubercle. These were communicated to the child died of acute tuberculous meningitis a few weeks after. The eye condition of course never has actually been tuberculous.

Klein and Catlin (41) examined the blood in 164 cases of 50 patients suffering from phlegetonular disease and found that it behaved in a manner which is typical of a definite tuberculous affection. They claimed that these observations of the opthalmic order went far to support the hypothesis that phlegetonular ulcers are due to the escape of tuberculated or dead bacilli from some distinct focus of tuberculous disease.

George Buchanan and Dr. Paul Ritchie
have done a large amount of work in this
direction and Maclean regards the
phagocytic series as very helpful in diagno-
sis, found it valuable in indicating
the presence of mixed infections.

Bacteriology

Bacteriological Examination of the
Case of Phlyctenular Disease.

With a view to ascertaining for myself
that these organisms are present in Phlyctenula
cases I was able through the kindness of Mr.
A. S. G. Brown, Ophthalmic Surgeon, Liverpool,
to carry out an investigation in a small series
of ten cases of typical phlyctenulae disease.

I endeavored to get half the cases of
unbroken phlyctenulae so that seemed to be un-
broken, as I thought the bacteriological results
might prove different to those in the cases with
actual ulcer.

In half the cases, the EMPHIDRIS Bacillus was
irrigated with sterile water on the news was gently flushed with a sterile platinum tube which on afterward passed into three sterile culture broth. In one case, the contents of the culture tube were examined, the sac having been washed out with sterile water. After drops of sterile broth were instilled, then injected away, and the three taken one added to the same medium. After the organism had been flushed and washed, sterile milk the contents (in 3 cases) of the culture tube were removed, the milk contained being freed of their contents and the contents removed by a sterile needle.

The tubes were incubated at a temperature of 38 degrees C. Next day, they were placed out in plate on agar and the colonies carefully examined. Subculture of the microorganisms discovered were made in gelatin and agar and then prepared on agar.

The results are given in the following page.
Table of results of a Bacteriological Examination of the Cases of Pylethamule Disease

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Age</th>
<th>Description of lesion</th>
<th>Examination of lesion</th>
<th>Microorganisms</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASE I</td>
<td>ALICE B.</td>
<td>8</td>
<td>Pylethamule on ear and of 3 days duration and apparently unbroken</td>
<td>1. Exudate from Pylethamule.</td>
<td>Staphylococcus aureus.</td>
</tr>
</tbody>
</table>

**AGE**

CASE II | MARY R. | 16  | Pylethamule Composed of 40 days duration apparently unbroken | Contents of Pylethamule. | Staphylococcus aureus. |

CASE III | LIZZIE C. | 6   | Pylethamule on ear and of 2 to 3 days duration apparently unbroken | Contents of Pylethamule. | Staphylococcus aureus. |

CASE IV | WILLIE S. | 5   | Pylethamule on ear (onopharynx) of 2 days duration. | Scrapings from ear. | Staphylococcus aureus. |

CASE VII | ROBERT P | 10  | Pylethamule on ear 7 days pass. | Scrapings from ear. | Staphylococcus aureus. |

CASE VIII | KATIE B. | 12  | Pylethamule on ear (ear) 2 weeks. | Scrapings from ear. | Staphylococcus aureus. |

In the apparently unbroken pylethamule in one case the Staphylococcus aureus was not found, while in one case I obtained a negative result. In the cases of longer
Antimicrobial phagocytic cells were found in all.

Although unfortunately this list is a very scarce one it is perhaps reasonable to conclude that the phagocytic cells play a part in the prevention or attenuation of the disease.

In all the above cases I stained for the Bacillus Bacillus the best observed zone.

Morris and Oliver state that in phlegmonous disease the ordinary microbes of inflammation are found in the affected areas. and according to them Staphylococci are always present in the small areas. Providing that the comminution begins on the first or second day.

This is in accord of the belief that microorganisms may be shown to be the determining factor in the vast majority of cases.

Lippes in 1886 found the staphylococcus pyogenes albus and aureus in 24% of his cases.

Moran has also found these organisms very frequently.

Lyon (44) says the common organisms associated with the disease are the Bacillus bacillus. @
Uphypocroceus.

The trouble neither has not been discovered.

Lind in 1907 made a large number of observations with a view to detecting it but he was unsuccessful.

Symptoms and Diagnosis

Children are usually brought to hospitals by their
mothers who state that they are suffering from bad
eyes, are afraid of the light and frequent the
darkest corners in the house. In some cases
children are said to bury their heads in their
pillows at night and refuse all interference
which might result in the light rays of light
falling upon the closed lids.

As appetite is said to be poor, there are
enlarged glands as common erythema affecting
the child generally looks unhealthy.

There is sometimes the greatest difficulty
in getting a child to open the eyes, but by
placing the patient with the back to the light
at not attempting to touch the eyes the lids
may be opened. The nature of the trouble
quickly determined without resort to force or chloroform.

Phlyctenule may be found to be solitary or multiple. There is vascular injection immediately around the phlyctenule, but frequently there is general injection in the periphery of the conjunctiva in very marked. If the phlyctenule is not situated near the cornea the case may be considered of a milder type @ the milder stages are quietly listened.

Photophobia is usually a prominent symptom @

Blepharospasm is sometimes very marked.

The blepharospasm is not abolished by the dark.

It is often so severe as to give rise to exanthema facies at the outer canthus @ sometimes a temporary anaesthesia has been observed after a short and if continued blepharospasm has passed away. Lehr @ Wolff used to regard this as having a cerebrovascular origin - a functional paralysis of the visual centres.

It has been thought to be due to interference with the nutrition of the retina from the pressure effects on the eyeball of the blepharospasm.

Lacrimation is also a prominent symptom @ is usually present.
The disease however varies widely in its intensity, of the symptoms, and sometimes a small trickle especially fatiguated in the corner will give rise to the most severe symptoms of pain @
induration, photophobia, @ induration lasting for weeks, while several large ulcers especially
for the conjunctiva may not be detected by
any severe symptoms. In cases such disorders
precise in the form of general mischief which
spread more extensively @ penetrate more deeply,
and the lesions of irritation are often slight.
If the conjunctiva only is affected photophobia
is not a prominent symptom. According to Acanzo
(45) the photophobia in the other cases varies more
with the number than the size of the phlyctenules.
Sometimes relapses of the affection on the
corner then may be seen a superficial pannus
like condition at the site of the old affection
@ irregular opacities may be observed.

Differential Diagnosis.

The disease may here to be differentiated from:
Syphilis, Cataracts, Tuberculosis, Uterus Cataracta
<table>
<thead>
<tr>
<th>Title</th>
<th>Phlyctenular conjunctivitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author</td>
<td>Robertson, George Henry Whiteside</td>
</tr>
<tr>
<td>Qualification</td>
<td>MD</td>
</tr>
<tr>
<td>Year</td>
<td>1913</td>
</tr>
</tbody>
</table>

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http://libraryblogs.is.ed.ac.uk/phddigitisation
Conjunctivitis, Conjunctivitis 2nd acuta, milky turbid, of the Conjunctiva.

In spring catarrh, which is not particularly common, the bulbar conjunctiva is injected, reddened, and at the limbus may become hot elevated with gelatinous looking or nodular greyish swellings. Occasionally the cornea is seriously involved.

In this condition however the tarsal conjunctiva of the upper lid is involved of flattened bodies of pale pink color and the resulting teat divided appearance is characteristic.

In the same way "desfulous" pannus is distinguished from "trachomatous" pannus of the absence of trachoma on the palpebral conjunctiva.

In herpes of the conjunctiva which may result from herpes zoster ophthalmicus or from herpes cataradonal vesicles (or the resulting ulceration) are seen. If these are arranged usually in a line or in a circle, the limbus is not often involved. The epithelial tear

lachrymatotin as a rule disappear after the vesicle rupture. "When vesicle definitely occur as in herpes the walls fall together after the burst whereas epitheliotonic is always
solid and forms a crateriform ulcer (6th) (46) but clinically it is not easy to differentiate from this feature alone.

Catarhal Conjunctivitis

In catarhal conjunctivitis there may be some difficulty in making a differential diagnosis unless the characteristic differences have appeared. In catarhal conjunctivitis minute grey infiltration may break down and form ulcers, sometimes at the margin of the cornea, or at the apex. They may coalesce and a crescentic ulcer result. This occurs usually in old people who are not the subjects of phlyctenular disease.

The disease may have to be distinguished from conjunctivitis exudative: it is that curious transient purulent exudation of the conjunctival tissue.

The diagnosis of phlyctenular disease when mistaking the bulbar conjunctiva may have to be made as below a later stage of milking buboes of the conjunctiva.
condition which however is rare, the cornea in a later stage of the disease become involved and thus a certain amount of pannus with the eye becomes greyish-red nodules.

Occasionally they undergo necrosis and give rise to distinct ulceration of the cornea which much resembles the ulcers of ulcers and can only be distinguished by bacteriological investigation.

The differential diagnosis however of phosphorus disease from the foregoing @ see other conditions such as Belcher's, lymphangiecstasia and gives any difficulty.

There examined a good number of cases (in which photophobia was not complained of) @ have been unable to detect with the ophthalmoscope any abnormal appearances.
Treatment.

The general treatment of pulmonary disease should be the first consideration.

Fresh air, mild exercise, good easily digested food, milk, eggs, bread, rice, fish, etc. I have found many cases to have been kept too long on carbohydrates, a change of diet has proved most beneficial.

Fresh surroundings and country air spas are indicated, but they are not often procurable by the class of patient usually affected.

Glenison, M.D. (12) believes that "many of the cases are made worse by a stay at the seaside - a change he says which should not be ordered under any circumstances until acute symptoms have disappeared." While many other hand-books recommend a change to the seaside, baths are useful especially salt water baths followed by brisk walking. There should be no schooling (Benn) (59).

The mouth should be carefully attended to and all possible sources of irritation such as decaying teeth, eczema or nipheigo rash. Discharge, periodontal pocket be removed.
as quickly as possible.

Internally cod liver oil and malt vin
Roping of the corneous region, scraping of the phosphate
Singe, arsenic and other tonics are indicated.
I am in the habit of prescribing doses of Hydro
caste especially to young children.

The appetite is often capricious and depraved
This requires appropriate treatment.
Vinice
and bitter are useful. Do not be most important
unless there be an ulcer - capricious or with a
tendency to purpura, exercise should be encouraged.
The patient should not have his eyes bandaged
or be allowed to wear a shade unless perhaps
it be of a large wide variety. It may however
be given tinted glasses to relieve the photophobia.
He need not be advised to frequent the shady
spots and groves as he did do this of his own
accords.

The old treatment consisted of tapping,
leeches, venesection, leucine, blister, but with
the exception of leeches, occasionally none of these
are now employed.

As microorganisms are so common associated
with this condition and as they are certainly
always found in cases in which the phosphate
his broken and an ulcer is present, local antiseptics should naturally be largely employed.

The solitary ulcer, unless it is best treated by

frequently bathing the eye with warm boracic


e solution of the hypophosphoric acid, 0.4 per

cent to begin with. This should be

made very carefully and only fully precipitated

and freshly precipitated yellow oxide mercury

employed, because it has been found that

if any large grains of the oxide be present

they prove to be particularly irritating.

The base should consist of pure white

vaseline and arachis lanoline. I am

in the habit of adding the jopg hyposm ab. 2. 2. 2

percent of the phlorotannol with a spirit of clean

white paper or one or two once a day.

If the irritable causes any hyperemia and inflammation of the membrane or redness, the

substitutes of colloid are given by some and

are found to be efficacious. I will give a

thin application of hypophosphorus acid. If the

eye is much discharged, some of the posterior]

are useful. Williams (6) Cincinnati

proposed to employ the Hyp. Phosphoric Acid. Plow
but he gave it up for the brain cutaneous
infection which he considers more efficacious
and less irritating.

An excellent treatment in the stage of acute
exudation and photophobia is to begin by the
application of the base of atropine ointment.
In cases producing phlegmon in an eyelid.
In the human being the attack may be quickly
cured by touching the eyeball itself with a
piece of gauze dipped in a 1 per cent solution of
nitrate of silver.

In cases in which there is an extension of the
ulceration to the cornea there is little doubt
or even a threatening of perforation atropine must
be used. The patient kept in bed and the eye
kept absolutely at rest (by means of a bandage),
by application may be made to the ulcer
ulcerative nitrate of silver, with a fine camel
hair pencil.

Continuing the ulcer with the galano cautery
is recommended.

Warm fomentations are found to be grateful
to the patient. In these cases strong
after bringing the pupil will render the influence
of severe hypertrophy of the iris patiently
Vascularisation of the anterior chamber through the floor of the ulcer, after which the fluid that the pain disappears, the ulcer becomes vascularised and healing sets in.

For fascicules keratitis of the Temp. Syringy. Acid. Has been found ineffective if the cavity may be applied to the name taught by an east to the touch and pressed (just before it passes the body) to break against the cornea at least as possible, as to just to make a minute white scar. Animal should then be included. The eye bandaged, the finger that on the second day the reaction has caused the white with black haemorrhage and the ulcer healed in one to two weeks.

While assisting in St. Paul's Eye Hospital, Liverpool, I saw a large number of cases, cases treated or assisted in their treatment.

If this case is serious, in children, a minor Walker always performs keratony. He adopts the same method which was used by his father, the late John Walker (51) and the latter described thus:

Standing behind the recumbent patient he uses the speculum and fire with toothed
forceps the conjunctiva opposite the lowest point of the cornea. Then insert a broad needle through the plica, just behind its junction with the cornea, until the shoulder of the needle is visible in the anterior chamber. Hence the blade must be held nearly parallel with the plane of the iris, but the puncture should be oblique to valvulae pectinatae in the middle of the aqueous escape. The puncture should be repeated until the circumference be traversed. In some cases the bridge between the incisions should be of the same width as the incisions themselves, in cases of less gravity twice or thrice the width of the latter. Depending upon about 2/3. The incisions with the right hand and the remainder with the left. Occasionally performed the operation causes no loss of aqueous or if it does the fluid is replenished rapidly so that the anterior chamber is as full after the operation as before. It is important to operate so as to ensure this in order to prevent the additional pain consequent on an empty chamber and what is more
important to make one incomplete the incisions without endangering the lens.

The long incisions should be made just so that the field of operation is not obscured. The operation is usually done at Park Hospital under chloroform if the case is a serious one with prominent symptoms in a child. The operation says A. W. Walker (52) is based on sound pathological principles and its curative action lies in the free drainage of the cornea at the relief which attends to the condition of stasis in the lymphatic channels or to reform it in language of present day theory in the removal of toxic substances and its substitution of fresh immunity of fluids.

There is a very speedy improvement in the appearance of the cornea and in fact the whole clinical picture is improved by the performance of Keratotomy.

Examine eyes in which there were symptoms of a large number of microorganisms. I have seen the operative ones without any septic infection of the interior of the eye resulting. In my opinion Keratotomy should be more practiced as it is simple and the results are few.
Blepharospasm is frequently so severe as to require specific treatment. Strong (53) recommends in addition to the use of atropine, plunging the child's head into a basin of water, keeping his face under the water till the patient struggles for breath. It repeats this immersion two or three times in rapid succession a dose at daily. Then tried this process once and found it accompanied by much fever on the part of a young sufferer that I do not feel disposed to repeat it again.

Mitchell used to administer Belladonna internally, giving one minima for each year and giving it twice in the hot season.

I have found the instillation gradually of cocaine 2% to 5% several times a day particularly useful. To allow of this being done in grave necessity at times, I employ forcible instillation of the lids. I also give cocaine in the form of spray, and.

In using cocaine in keratitis it is advisable to simply apply to the eye 0.5% perchloride of mercury. The corneal epithelium may be raised by the action of cocaine to the use of perchloride of mercury may be followed
by piaetipsyropoiesis.

170. Tubercine instead of cocaine is recommended by Stinchfield of Glasgow (24).

Darii cases of Myelinalis Secare which were not yielded to by Mg. Gyrong. Dr. Har. found a cure of the patient with the treatment of quinnet 1% to be useful.

There is never when there is likely to be much opacity salvarsan 5%.

If Myelinalis Secare appears in arthritic subjects, the saliurel is all alkaline should be given in the administration seems to have a decidedly beneficial effect in the ocular condition. If the toxi saliurel is toxic, but its Scint. or both because passion should be given. Then used aspirin in acute cases which were not rheumatic with good results.

There is always a tendency to re-occurrence within three years and it is well to continue using the form. Hypnotic acid, for a month or two after the disease has apparently disappeared. Salvarsan 5%
Should also be used if necessary @ every effort made to clear up the resulting corneal opacity. Force should be central to influence to vision may result.

To prevent recurrence or reinfection all sources of irritation which have not been removed during the attack should be attended to. Adenoids should be removed, and any other rhino-pharyngeal or oral condition treated. After the disease is better, errors of refraction should be corrected.

Dr. Steele (of Chicago) draws a clinical distinction between the initial and subsequent attacks of phlyctenular disease. He has treated 4 cases of the last mentioned which failed to improve under ordinary treatment by Staphylococcus Vaccine. E. Sydney Stephens, in every instance improvement uncertain after the first vaccination continued at a regular rate after the 2nd @ 3rd.

Dr. Mollison at the last annual meeting of the British Medical Association held at Liverpool @ as while I was present gave an interesting account of his recent
work in cases of epidemic & phlegemal erysipelas. In many cases he found
for hemocytometric index of staphylococci, pneumococci, micrococci, staphylococci, and
contagious bacilli. He found also that
the staphylococci index was the most frequently
disturbed and he was led readily to attach
considerable importance to the staphylococci
index. In a number of cases he used
staphylococci vaccine with splendid results.

Since this recorded cases in which there
was an ill defined, rather buffy exudation
phlegemal, the hemocytometric indices were taken
for staphylococcus aureus, staphylococcus
pyogenes, and staphylococcus aureus having
given the most marked variation in the conjunctivitis
index. It was taken as an indication for treated
by injection of staphylococci vaccine which
resulted in rapid improvement.

Three months after this was a return of
the symptoms and by injections of the same vaccine
"the pain was gone, the redness flattened, and
the injection less in a week."

In case of interstitial keratitis which
respond to Mr. Mackay's letter recommends the use of tuberculin ad dextrin
in many cases of M. tuberculosa disease
(affecting the cornea) in which there is some
evidence of a tubercular focus its use
would be of marked benefit, although
up to the present I have not used M. tuberculosa
tuberculin and ad dextrin in cases of M. tuberculosa
disease it is my intention to employ them in
suitable cases, where the methods of treatment
which I ordinarily adopt appear to be inapplicable.
Conclusions

Pulmonary Constrictions is not nearly as prevalent in South Africa as it is in Britain.

The better living (even of the South African natives (Kafirs and Hottentots)) is in some measure responsible for this.

The disease does not depend on foreign bodies entering particles, dust, etc., while I have treated many large numbers of cases of phthisis in South Africa which were undoubtedly due to these causes. There are not met with any cases which could be attributed directly to these external matters.

The disease occurs most commonly in a certain type of constitution exhibiting enlarged glands in the neck, sepsis, impetigo, etc., and generally occurring in poorly-nourished children.

My investigations with the Morse and Von Pirquet anti-reaction lead me to the belief that the
is an almost constant presence of some tuberculosis focus in cases of phlegmonous disease.

In the cases I examined bacteriologically, the staphylococcus aureus and allies was commonly found, but no tubercle bacilli were discovered.

The disease is probably due to endogenous combined with exogenous causes, the former including the toxins of tuberculosis circulating in the system, and the latter, those especially of the staphylococcus pyogenes aureus acting as a localized irritation.

Keratotomy is in my opinion a most valuable form of treatment in some cases in which the cataract has become involved, its performance being attended by excellent results.

Staphylococcus vaccine or tuberculin (where there is some evidence of a tuberculous focus) should be given a trial if other methods of treatment prove slow or ineffectual.
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