The microscopic examination of the secretion
via conjunctiva.
The microscopical examination of the secretion in conjunctivitis, with remarks on nomenclature and classification.

Although much has been written with regard to the bacteriology of the conjunctiva, both healthy and diseased, there seems to be but little movement in this country towards the practical application of our knowledge of the pathology of conjunctivitis.

Various reasons may be suggested for this apparent apathy. Conjunctivitis is perhaps not as formidable here as it would seem to be on the continent, so that it has not received the same attention.

It is only within recent years that the pathology of conjunctivitis has been largely investigated, and the connexion between its pathology and its diagnosis, prognosis and treatment is only now beginning to be appreciated.

Lastly, the time, trouble and expense, not to mention the special training, required for complete bacteriological examination constitute an effective deterrent.

It is they present object to urge regular bacteriological examination in conjunctivitis, and to endeavour to show that for practical purposes a complete examination is unnecessary, and that in the great majority of cases sufficient evidence on which to base sound prognosis and treatment may be obtained from simple microscopic
examination of a dried film of the secretion.

Within the last ten years great progress has been made in regard to the pathology of conjunctivitis owing to the work of Auenfield in Germany, Monax in France, Weeks in America, Gasparini in Italy and many others, mainly on the continent. In England, Sidney Stephenson advocates the more exact diagnosis of conjunctivitis, but there have been few other workers at the subject in this country.

The work of these and other observers has demonstrated the close connection with— one might almost say dependence upon— bacteriology, of the various inflammations of the conjunctiva and has introduced a new element into their diagnosis.

In 1879 Neisser showed the micro-organismal origin of cases of ophthalmia in newborn infants, and the bacterial character of diphtheritic conjunctivitis was established by Babes (14) in 1886, although this affection was clinically described as long ago as 1854 by von Graefe. In 1886 Weeks (142) described the bacillus which now bears his name; his researches were closely followed by those of Koch and Cartulis and in 1894 the identity of the form of conjunctivitis due to this organism was fully established by Monax (167, 84) under the name of 'conjunctivitis aigue contagieuse'.

In 1896 Monax (86) described the diplobacillus which has
been named after him and the affection to which it gives rise as conjunctivitis subaiguë.

Many other organisms have been found in association with conjunctivitis although the above are by far the most important, and the endeavor to associate each special organism with a definite variety of the disease in causal relationship is still being carried on by many workers.

A great deal of evidence has been produced, which goes to show that affections apparently similar from a clinical point of view and not previously differentiated, are in reality produced by different microorganisms (Minne 82), while it is practically impossible to associate a fixed clinical picture with each special microbe, as both the evidence of the latter and the susceptibility and reaction of the individuals affected vary within wide limits (Wirthoff 133).

As yet, however, but little use has been made of this knowledge in ophthalmic practice and it seems pertinent to ask two questions:

1. Is a bacteriological investigation of cases of conjunctivitis necessary or advantageous as a guide to diagnosis or treatment?

2. Is it feasible for the ordinary practitioner?

I wish to consider the subject from the point of view of the busy general practitioner, rather than that of the specialist. Conjunctivitis is very common in general practice either sporadically or in epidemics. General practitioners are
usually very busy and may say, "There is no necessity to spend time on bacteriological examinations, conjunctivitis may be treated quite well without them."

I shall endeavour to show that this is not the case, and that if accurate diagnosis is to be considered an essential preliminary to rational prognosis and treatment, then bacteriological examination is required.

In connection with diagnosis, it is convenient to have some form of classification, the terminology of which shall have a direct reference to the factors made use of in distinguishing the various forms included.

Under the system at present in vogue conjunctivitis is classified upon a clinical basis. The primary divisions of acute and chronic are further subdivided according to some prominent feature such as the nature of the secretion — catarrhal, purulent etc., or the state of the mucous membrane — phlyctenular, membranous, granular and so on. Such a classification would certainly be satisfactory did each of these terms denote a pathological as well as a clinical entity, and did each group include cases, really as well as apparently similar in nature, that is, having essentially similar etiology and treatment.

Recent research has shown that terms such as "catarrhal" or "purulent" conjunctivitis include in reality cases of the most diverse nature, with corresponding variations in prognosis and
treatment, and moreover such cases often cannot be clinically
differentiated but only by bacteriological examination.

Maxx and Beach (93) in 1896, speaking of acute conjunctivitis,
said that its varieties were then only beginning to emerge from
the chaos into which pathological anatomy had plunged them.
The objective aspect of inflammation has ceased to be the only
thing and etiological classification has been reached. Terms
such as catarrhal, purulent or pseudomembranous are in-
sufficient without an etiological qualification. It is now known
that the same infection can take on different clinical forms
and an anatomical lesion is a deceitful criterion to be
boldly cast away as a basis for classification. Gonococci,
Weisse bacilli, streptococci or Leffler's bacilli may determine
equally a fibrinous or a pseudomembranous exudation (94, 13, 93).

Thus the trend of modern opinion is towards the recognition of
the bacterial factor in the causation of conjunctivitis, and
Towards the expression of this recognition in the nomenclature
and classification of the various forms. (Udithoff 133).

Maxx (84), Gouin (47) and Petit (104) condemn the old
clinical classification as insufficient on account of the
want of precision of terms, such as "purulent ophthalmia"
and "catarrhal conjunctivitis," and consider it necessary
to base a classification on the etiology and the evolution
of the lesion as well as on the clinical appearances.

Petit (104) points out that, in this connection, etiology
should not be considered synonymous with bacteriology.
Axenfeld and Pick (12), and Sidney Stephenson (129) express the hope that conjunctivitis may be classified etiologically in the future but, together with Schanz (117) and Wirthoff (133), hold that it is not possible in the present state of our knowledge.

Coppée (30) in 1896 discussed two alternative methods of classification, which recognised the bacteriological factor. The first is the old classification with the terms qualified by the names of the microbes present. The second the bacteriological classification, the various clinical forms being included under the heading of each micro-organism. Coppée, with Wirthoff, Axenfeld and Pick, and Stephenson, favours the first method, considering that it separates all the forms and connects the clinical signs with the etiology, while the diagnosis is easy and the treatment can be at the same time symptomatic and prophylactic. The second form, he considers to have the advantage of exactly recognising the etiology of the affection and of pointing out prophylaxis and the treatment most definitely indicated, as, for instance, serotherapy. His objections to it are, that some cases are not included at all, that mild and severe cases are classed together, and the difficulty of bacteriological examination which may take longer to complete than the patient to recover.

According to Vaxax and Petit (94), bacteriological classification is only possible in connection with gonococci, streptococci and diplococci; and the liability to conform etiology with bacteriology should be guarded against. A bacteriological
classification, including all forms, is premature and illusory, though as knowledge of pathology advances it will become more complete. (II, p. 94).

The chief point here, in connection with the present subject, is that a bacteriological examination is equally necessary, whatever form of classification is adopted, and I hope to show that it is only in exceptional cases that this will occupy a length of time sufficient to rob it of its advantages.

Gonin (47) has endeavoured to solve the problem by producing a classification, which is a compromise between the new and the old. He considers the information obtained by a knowledge of the bacterial factor more useful, although less accessible, than that obtained by other methods. He says (p. 189): "Il est evidentement plus simple d'appliquer à une conjonctivite l'effet du catarrhal ou de pseudomembranose que de decider si elle est provoquee par le bacille Wecks ou le bacille diphteritique; mais la question est de savoir où sera la plus grande utilite, dans l'estimation faute et rapide de la forme clinique, ou dans l'appraisition plus delicate de la cause agissante. Une description clinique n'est point encore en diagnostique..."

Gonin defends his classification thus: (p. 192)

"L'essentiel n'est pas de trouver des aujour'd'hui une classification moddle capable de reunir en un systeme uni-
forme toutes les formes connues et a connaitre, mais de
construire du tout y va de la conjonctivite catarrhal..."
"et de la classe aussi complexe des conjonctivites pseudomembranées les quelques types morbides mieux étudiés que des indications précises, séparent des autres types moins connus. À ces derniers il faut donner les cadences élastiques, qui permettent d'accueillir toutes les formes nouvelles jusqu'à ce qu'une étude plus approfondie permette de les classer à leur tour en connaissance de cause. Comprise de cette façon la classification étiologique restera incomplète ou plutôt inachevée, mais non pas étroite comme le lui reproche Lopez, sinon moins étroite que celle où les types de catarrhal, de granulée et de pseudomembranée sont donnés comme incommensurable.

The terms trachoma, phlyctenular conjunctivitis and spring conjunctivitis are retained by Savrin, as they carry additional significance than that expressed in the names alone. The first indicates a clinical and pathological entity, not merely any conjunctivitis with granulations, any more than the second and last indicate either any conjunctivitis which occurs in the spring or any form which presents phlyctenular.

In this classification conjunctivitis is divided into three main groups.

The first includes forms due to known microorganisms, the gonococcus, Weeke bacillus, diplobacillus of morax and the diphtheria bacillus. These forms are mentioned as gonococcal, Weeke, diplobacillary and diphtheritic conjunctivitis.

The second group contains firstly those forms whose specific cause is not known, or where the microbes present give
no special indications. That is to say, all cases form due to infection not included in the first group, for instance due to pneumococci, streptococci, staphylococci and other microbes, but which cannot yet be considered as definite entities according to the particular organism present. In these neither prognosis nor treatment is fixed and definite.

This arrangement is intended to be provisional so that any one of the included forms may be transferred to Group I when it is sufficiently well known to be made a distinct entity. Pett, for instance, considers that pneumococcal conjunctivitis is too well known to be classed along with staphylococcal. (Annals d'ophtalmique, Tome 12, p. 78).

Trachoma and phlyctenular conjunctivitis are placed in the second group as forms whose specific cause is unknown. Should the latter turn out to be essentially enteric and due to the diathesis of the patient it would be transferred to Group III, which includes acute, catarrhal, traumatic and chronic conjunctivitis, forms not associated with the presence of specific microorganisms.

Mixed forms would be placed according to their most prominent features.

Finally Gouin remarks that etiological classification is possible for the great majority of cases and is greatly facilitated by microscopic examination of the secretion.

This classification seems tome to be superior to either of Aspég's two alternatives, and I have used it as a basis in this essay.
Much has been done recently to show the great diversity in actual nature of forms of conjunctivitis having the same outward appearance. Thus the researches of Bach and Neumann (185), Auguste (4), Gounin (479) and Veasey (136) have shown that various affections are included under the name of catarhal conjunctivitis: Gounin, Joseph (64) and Roscher (110) have done the same for necrotaneous conjunctivitis, and Gounin, Vincent (567) and Von Ammon (138) for ophthalmia neonatorum.

The necessity for due recognition of the various organisms is well illustrated by an analysis of these researches, which I have arranged in tabular form.

<table>
<thead>
<tr>
<th></th>
<th>Bach and Neumann</th>
<th>Auguste</th>
<th>Gounin</th>
<th>Veasey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases examined</td>
<td>110</td>
<td>26</td>
<td>310</td>
<td>64</td>
</tr>
<tr>
<td>Description</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Simple Catarh.</td>
<td>35</td>
<td>17</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>Diplo-bacillus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of Morax</td>
<td>1?</td>
<td>1?</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Bacillus of Weeks</td>
<td>15</td>
<td>10</td>
<td>5.3</td>
<td></td>
</tr>
<tr>
<td>Streptococcus</td>
<td>87</td>
<td>83</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Staphylococcus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Streptococcus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roeffer's bacillus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various bacilli</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Various cocci</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No organisms</td>
<td>2</td>
<td>4</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>
I have omitted the works of Pea (99) from this scheme as his heterodox views as to the identity of the Weeks bacillus prevent his results being compared with those of others.

In 76 cases of catarrhal conjunctivitis Pea found pure infections - i.e. with one organism only - in 47. Of these 6 were due to the diplococcus of lentaal, 17 to the bacillus of Loeffler, 2 to the diplococcus of Monax, 2 to streptococci and 8 to one were associated with the staphylococcus aureus albus and cereus albus respectively. The large number of cases due to the Loeffler bacillus originated in Pea's view that this organism and that of Weeks are identical, a view in which he is supported by Schiang alone.


<table>
<thead>
<tr>
<th>Description</th>
<th>Gonin (187)</th>
<th>Roether (119)</th>
<th>Jessup (120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of cases</td>
<td>13</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>No. of Loeffler</td>
<td>7</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>No. of Weeks</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Streptococcus</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>4</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Gonococcus</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xerosis bacillus</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. Ophthalmia of the Newborn

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Cases</td>
<td>38</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Gonococcus</td>
<td>22</td>
<td>41</td>
<td>56</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>4</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Bacillus of Webs</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Streptococcus</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Colon bacillus</td>
<td></td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Bac. pneumonie</td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Pseudomonosoccus</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Micrococcus lutius</td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td>2</td>
<td>40</td>
<td>22</td>
</tr>
<tr>
<td>No organisms</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Much more similar evidence exists but the above represent the chief recent researches and show that the recognition of the bacterial factor is necessary for correct diagnosis. Besides demonstrating the fact that the same clinical appearances may be produced by different microbes, these researches and others — to be referred to later — show that the same microbes often produce different clinical appearances.

Now turn to some further evidence in favour of bacteriological examination. Sehanez (117) considers
that the modern practitioner is compelled ("jejunum") to
examine his cases bacteriologically. In cases where the clinical
picture affords no definite diagnosis a coverglass preparation
will often clear up the nature of the affection.

Morax (86) says that the pathological reactions known as con-
junctions are caused by different microbes. The appearance
and above all the clinical course of the affection is in intimate
connection with the bacterial agent. Yet, beside the typical
cases where a purely clinical diagnosis is possible there are
many others in which bacteriological examination is
necessary: the inflammations caused by the same agent
may be very variable in anatomical form, intensity and
complications. The factor governing the prognosis is above
all the causal agent, and it is necessary to recognize this
in each case. (Morax 86), (also Henneker and Beach 93)

According to Sidney Stephenson mere inspection will not always
suffice for diagnosis and bacteriological examination of the
discharge is often necessary. By this means differential diagnosis
of the greatest value may be established, which cannot be obtained
by any other method of investigation, and sound and convincing
evidence procured upon which to base prognosis and treatment.
The diagnosis of syphilis, he says, "nowadays rests mainly
upon the particular kind of microbe found in secretion from
the inflamed eye." Again - "In short, ... a particular disease
germ does not always give rise to a particular reaction. Hence the
paramount importance of a bacteriological examination of the
"secretion for purposes, not only of prognosis and treatment but also of diagnosis." (Stephenson, 129).

Petit considers that the clinical study of a case should include a study of its etiology, as well as of its anatomy and relation to contagion. Microscopic examination in conjunctivitis may show the cause and clear up doubts as to diagnosis, prognosis, and treatment. (Petit 106)

Corsini states that in conjunctivitis bacteriological research is the sole means of establishing a diagnosis with certainty.

"The bacteriological report is a sure means of classifying the affection, many cases of conjunctivitis which present all the clinical data necessary to place them in one class or another, when studied from the bacteriological standpoint, often represent attenuated cases of a conjunctivitis due to quite a different pathogenic agent, which, in a condition of greater virulence would have produced an exudation of a very grave and deleterious nature." (Corsini 33).

In commencing catarhal cases, in epidemics, and in single acute cases bacteriological examination is necessary, while in simple forms it is very serviceable, according to Marx and Petit (94) find bacteriological examination especially useful in cases of mixed infection. It should be complementary to clinical examination, the diagnosis being based on the clinical appearance of the case, the surroundings of the patient and the history, especially if infection. In 14 cases out of 18 they found that the clinical diagnosis was reversed by bacteriological examination.
 Pasadena much farther in holding that neither microscopic examination nor culture is sufficient unless inoculation experiments to prove the virulence of the organisms found are provided to. This can only hold good in the case of diphtheria for organisms such as gonococci, Haemobolus, and the diplobacillus of Mox do not grow on ordinary media and the demonstration of their virulence would be difficult to effect in any case, while their mere detection affords the necessary indications for prognosis and treatment.

The practical necessity of bacteriological examination is, I think, undoubted. At the same time any tendency to base a diagnosis entirely upon this is to be avoided. It should rather, as Jolin suggests, take its place as a part of the clinical examination of the patient, having the same relation to the eye as the routine examinations of urine, blood, or sputum have to internal medicine.

It now remains to consider the feasibility of bacteriological examination and its suitability for daily, I ought say for consulting room, use. I repeat here, that I do not wish to treat this question from the point of view of scientific research but rather from that of actual practice, the object being to obtain indications for prognosis and treatment in a rapid, reliable, and inexpensive way.

The question naturally arises here as to the nature of the bacteriological examination to be undertaken.
We have cultivation and direct microscopic examination to choose from. The method by cultivation is obviously not suited to our purpose, requiring as it does a considerable amount of time and expense and labour.

A suitable method for practical requirements must be rapid, cheap and reliable. No busy practitioner will use even the most reliable method if it occupies too much time or causes expense out of proportion to its advantage.

The examination of a film of secretion by the microscope is the method which fulfills our conditions, as it requires only the simplest apparatus and very little special training, in contradistinction to what is necessary in order to work with cultures, and chiefly because it can be completed within five minutes.

There is a large body of evidence in favour of the value and reliability of microscopic examination. That of Schang and Petit has been quoted already.

Sidney Stephenson says: "Happily in most of the cases of ophthalmia that fall under the notice of the practitioners, the making of cultures may be dispensed with. Indeed, bacteriological investigation may be reduced to its simplest form, namely, the staining of coverslip preparations from pus or membrane..." (Stephenson, 129)
Axenfeld and Fick (12) also write in support of this method, and Wulff (133) speaks strongly in favour of the advantage of microscopic examination in many cases.

Collomb quotes the following proposition as generally accepted by those versed in ocular bacteriology.

1. In health the conjunctival secretion is poor in bacteria. Coverglass examination is negative.

2. Many different non-pathogenic organisms may occur accidentally in the conjunctiva, but the ordinary flora are the Aerococcus bacillus and the staphylococcus albus.

3. In pathological secretion only the pathogenic agent is seen. This is Nixen's view but Collomb thinks the statement too absolute. Some saprophytes may develop sufficiently to be visible on a coverglass. (Collomb, '27)

Axenfeld and Fick agree with Nixen and Beach (93) that as the height of the inflammation, the causal bacteria are in such numbers as to eclipse its non-causal or accidental organisms, though this may not be the case in diphteria. Nixen and Petit (94, 104) lay stress upon the number and disposition of the bacteria seen by the microscope as being of great importance and a reliable basis for diagnosis. Nixen says that in acute conjunctivitis the microscopic examination of the secretion gives in all cases a certain diagnosis (M. 84), and that only the causal organism is seen in a coverglass preparation (M. 86); in any case important evidence in demonstrating the predominating species of
microbe is to be obtained in this way. (Harrison 85).

According to Corin and microscopical examination of conjunctival secretion is of great value in diagnosis and may be necessary to determine the exact character of a conjunctivitis. It is, however, not equally satisfactory or easy in all forms, though comparatively certain in the usual examples of catarrhal conjunctivitis.

Gorsin (47) is strongly for this method. He says (p.96) that ophthalmologists are agreed, that, apart from the question of virulence, microscopical examination is of much greater practical value than culture or inoculation. Notwithstanding this, it is not able to, and ought not to replace diagnosis made by the clinical signs, it merely strengthens the diagnosis.

Gorsin tabulates the following points:-

1. It gives more information about the probable origin of the disease than the simple clinical examination.
2. It permits of the institution of a rational prophylaxis with more certain assurance.
3. It gives indications for treatment which the clinical form present can only slightly modify.
4. It authorizes prognosis with more certainty than the anatomical appearance alone of the lesions.

However, it shows, better than cultures do, the exact relative numbers of the various organisms present, which gives it an advantage in cases of mixed infection as the bacilli.
present may not all develop equally readily in the same
medium.

Gruin states his results as conclusive in about 70% of
the cases examined, negative but none the less useful
in about 25% and equivocal in about 8%.

At the same time he mentions that it might have been
omitted, without damaging the diagnosis in about 55% of
the cases. That is to say that in these cases the clinical
diagnosis was confirmed, purely a confirmation not
to be despised. On the other hand in as many as 22% of
the cases it was indispensable for correct diagnosis.

In view of the support given by these authors I think
the advantages of microscopic examination are evident.
in confirming, amplifying and it may be, correcting the
clinical diagnosis.

Microscopic examination may give either a positive
or a negative result. It is positive when numerous specific
organisms are evident, typically arranged in relation to
each other and to the cells, and giving definite staining
reactions. It is negative when only a few organisms,
whose relation to conjunctivitis is doubtful, or not at all
are seen. In the former case attention is directed immediately
to some special forms of conjunctivitis, in the latter a number
of special forms are excluded.

In this connection the classification of Minax & Petit (94, 104)
is of interest.
Group I. Microbes which only occur in man, and not on all of his
mucous membranes. They cause inflammation by their mere
presence without any previous traumatism and are destroyed
unless transported directly from one mucous membrane
to another. This group includes the pneumococcus, bacillus
of Weeks and the diplococcus of Morax.

Group II. Microbes which occur normally on some of our
mucous membranes and which, in certain badly ascertained
conditions, can proliferate and cause inflammation.
This group includes pneumococci and some varieties of
streptococci.

Group III. Organisms which can only cause inflammation
on ground prepared by previous infection; there are
diphtheria bacilli and various streptococci & staphylococci.
It is only in reference to the members of the second and third
groups that any difficulty can arise, as they may be
confused with each other and with non-pathogenic organisms
while their causal relation may be questioned.
As mentioned above, however, the number of organisms
seen are a clue to the causal relation in most cases.

The non-occurrence of the bacillus of Weeks on the healthy conjunctiva
is disputed by Rychnovitch (112) who found it in 6 out of 100
cases examined, while Plant and Zelenowski (116) found it three
times in the conjunctiva after excision of the tear sac but in the
absence of disease. I have myself seen a bacillus, microscopically
indistinguishable, in the normal conjunctiva.
Two microorganisms must however be mentioned which may proliferate in a conjunctiva, inflamed from some other cause, and thus form a prominent feature in a film. These are the Aerobacillus and the Staphylococcus albus, which according to Menax, Auerfeld and Trik, Bell and Boll, Goin, Hyman and others are normal inhabitants of nearly every conjunctiva and often proliferate enormously, especially the former, in irritated conjunctivae.

I have not found any author who has mentioned difficulties in microscopic diagnosis due to these organisms, excepting in the case of diphtheria in which the resemblance of Streptococcus and the Aerobic bacilli may cause confusion. This point is mentioned under diphtheritic conjunctivitis. In practice the eye soon gets very familiar with the appearance of the Aerobic bacilli as it is seen so frequently.

It will now be convenient to consider the various forms of conjunctivitis separately with special regard to the bearing of microscopic examination on their diagnosis, prognosis and treatment.

For the sake of convenience I shall follow Goin's arrangement.

The first group contains four forms, namely, mucocerebral, Weeke's, diplobacillary and diphtheritic conjunctivitis. The first three are bacteriologically the best known (Menax & Pette 94) and it is here that
Microscopical examinations are most successful and reliable. From a bacteriological point of view, they are also definite in their results, the prognosis and treatment being governed almost entirely by the organisms present.

An analysis of the works of Jourin, Monax & Petit and Lundsgaard (77) will show the numerical importance of these forms in proportion to other forms of conjunctivitis.

<table>
<thead>
<tr>
<th></th>
<th>Jourin</th>
<th>Monax &amp; Petit</th>
<th>Lundsgaard</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases.</td>
<td>785</td>
<td>243</td>
<td>107</td>
<td>1135</td>
</tr>
<tr>
<td>Gonorreal.</td>
<td>30</td>
<td>10</td>
<td>5</td>
<td>45</td>
</tr>
<tr>
<td>Weeke.</td>
<td>19</td>
<td>94</td>
<td>3</td>
<td>116</td>
</tr>
<tr>
<td>Diphtherialy.</td>
<td>185</td>
<td>63</td>
<td>38</td>
<td>286</td>
</tr>
<tr>
<td>Other forms.</td>
<td>551</td>
<td>76</td>
<td>61</td>
<td>688</td>
</tr>
<tr>
<td>Percentage</td>
<td>29.8</td>
<td>68.7</td>
<td>43.0</td>
<td>48.0</td>
</tr>
</tbody>
</table>

The proportion apparently differs according to the locality. Lundsgaard has, for instance, hardly found the Weeke bacillus in Copenhagen, while Jourin's percentage is reduced by the presence of a large number of traumatic cases and chronic non-inflammatory irritations of the conjunctiva in his collection. The general average is seven forty percent.
1. Gonococcal Conjunctivitis.

This form of conjunctivitis is known in this country as "gonorrhoeal" and on the continent (Menax, Grounnow etc) as "blistnerahagie" although axenfeld and rich prefer the term "gonovshell". Gounin uses the term "conjunctive gonorrhoeique."

It is usually discussed as affecting infants as "ophthalminaacneonatum" and adults as "purulent ophthalminia". The name leukanastic ophthalminia has also been used to designate especially a form affecting female children who are usually also suffering from vulvovaginitis at the same time. Menax(84) states that this affection differs in no way from blemonanachic conjunctivitis of adults and infants. There is also the "conjunctive blemonanachique spontanea" of Tournier (40) (89) which Menax considers to be a manifestation of general gonococcal infection. The question however, of metastatic gonovshelf conjunctivitis does not concern us here.

Petit (104), Grief (49) and Von Ammon (131) propose to get rid of all these names at one sweep and to designate the affection according to the presence or absence of gonococci, which is the basis of proctoxia. Following these authors, and in view of the fact that Gounin, Grounnow (50), Von Ammon and others have shown that purulent ophthalminia at any age is not always associated with gonococci, and that these may give rise to a conjunctival secretion of a catarrhal nature. I prefer the term "Gonococcal" although in opposition to Schanz (119) who considers that the present
state of our knowledge does not justify the separation of a
gonococcal class.

Schanz (120) has also recently thrown doubt upon the
pathogenicity of the gonococcus but it is unnecessary to devote
than barely refer to the discussion between this author and
Axenfeld on the subject (Axenfeld 11).

A few years ago, purulent ophthalmia in infants was
thought to be always gonococcal, Massar (84) considered
it so much so that as to render microscopic examination
unnecessary in all cases.

Weitkoff (133) states that neither in infants nor in adults
is purulent conjunctivitis due to gonococci only.
Axenfeld and Tiek (12) state the percentage of gonococcal
cases as unknown and mention pneumococci, colon
bacilli and staphylococci as causes of purulent conjunctivitis
in the newborn. Stephenson (129) finds in the
practice of seven observers (446 cases) 72.83% of gonococcal
cases and in his own practice (45 cases) 66%.

I have already given an analysis of the cases of Gouin,
Gronowos and Von Alshon. The latter are interesting
as being all purulent cases (Augenentzungen) and
therefore to be expected to be gonococcal, and yet his gonoco-
coccal cases are two percent less than Gouin's, who
included all forms of conjunctivitis, while 11% above
Gronowos, who did the same.

Francisco's (43) percentage is rather higher as he found
gonococci in 30 out of 40 cases of ophthalmia neonatorum and the bacillus of Weeks in the remainder.

Recently the diplobacillus of Merax has been described as a cause of infantile ophthalmia by both purulent and otherwise by Collomb (28) and Andrade (2), and Zin Kedden (144), and the influenza bacillus by Jundell (66) and Zin Kedden (144, 146).

Reynolds (109) divides ophthalmia neonatorum clinically into mucopurulent and gonorrheal, and as the latter is also purulent he divides the three forms according to the causal microbes. He mentions four classes. (a) Neisseria, (b) Pneumococcus or bacillus of Weeks, (c) Staphylococcus and (d) gonococcus.

In the adult we find the same conditions prevailing, namely, that a great variety of other bacteria besides gonococci may produce a reaction identical with what is generally accepted as the typical clinical picture of a gonococcal ophthalmia, and only to be distinguished clinically by its milder course and lesser tendency to affect the cornea in most cases.

Without going into great detail here I may mention Arsenfeld (10) who considers the bacillus of Weeks, pneumococcus, diplobacillus of Merax, pseudo gonococcus, colon bacillus and Loeffler's bacillus in cases where a membrane is present as causes of purulent conjunctivitis and Carini (33), who divides ocular blepharoconjunctivitis into four groups according
to the bacterial cause: (1) Gonococcus, (2) Pneumococcus, (3) Diplococcus, (4) Bacillus coli, (5) Diphteriae, (6) Staphylococi, and the meningococcus intracellularis. (124) To these must be added the influenza bacillus.

Of these organisms, with the clinical appearance they produce will be referred to in turn, in order to avoid repetition; it will be preferable here to turn to the second point in favour of a bacteriological examination, namely, the variations in the clinical aspect of the inflammation produced by gonococci.

The typical clinical picture of gonococcal ophthalmia needs no description here. It is a violent purulent inflammation associated with great danger to the cornea. In view of the evidence of Groenow and van Ammon and others we must believe that there is an unbroken chain of intermediate forms from a simple cataract to the typical purulent form all due to the gonococcus. Davies (34) holds that there is no true purulent ophthalmia without gonococci, but that all forms of gonococcal inflammation are not equally severe.

According to Uhleff (133) there may be a membrane in the early stage of gonococcal conjunctivitis, and Recher and Lindgaard (79) quote cases of membranous conjunctivitis due to gonococci.

Groenow (50) states positively that there is no certain diagnosis from the clinical aspect.
It would appear then, that, however great the probability may be, that a typical purulent ophthalmitis is gonococcal, it need not necessarily be so. While in the same way, the most unlikely case may in reality be associated with this organism. In the first case we are entangled into giving a serious prognosis and adopting a wrong or unnecessary treatment, while in the second the source of infection is missed and prophylaxis is neglected. Even though the individual affected with a mild form may not suffer severely himself, yet we have no assurance that other cases infected from this source may not be of the greatest severity.

Even in the less atypical forms, purely clinical diagnosis is not always of the easiest. Schneider (122) mentions a possible difficulty, diphteria of the conjunctiva, acute trachoma, acute chalazion, lid sycosis palpebrae, and purulent chorioiditis.

Riblee (63) in urging the use of the microscope to diagnose gonococcal conjunctivitis, mentions the treatment of atypical cases as simple cautery, and asserts strongly that it is not possible to say that a case is not gonorrhoeal by the clinical signs only. He also brings forward evidence of the possible medicolegal value of a labelled and dated microscopic preparation of conjunctival secretion.

Rhapp (71) in supporting Riblee gives an illustration as amusing as it is instructive. Having a doubtful case, he
sent the patient to a distinguished dermatologist, from whom he returned with a letter to the effect that a great many diseases with very long names had successfully been excluded, that the affection was probably ophthalmic, and that another interview in about four days time would be advisable to decide the matter. It occurred to Professor Knapp to examine the secretion microscopically with the result that an abundance of gonococci were observed.

Andrade's (2) case is a good illustration of the desirability of examining the secretion in ophthalmia neonatorum. An infant three days after birth developed a conjunctivitis with purulent secretion and reddeness of the lids. On the strength of the clinical evidence alone proctarol was prescribed and later on silver nitrate 2% solution.

The inflammation although modified persisted obstinately and on microscopic examination the diplobacilli of Winax were found—even inspite of the constant treatment. The exhibition of zinc now rapidly cured the condition which under other treatment had persisted for three months.

The appearance of gonococci in a microscopical preparation of pus is well known. They are described by Schanz (117) as "zellen-förmig" or kidney-shaped, 0.8 to 1.6 µ in length. Kiefer (89) considers that they do not vary much in size in contradistinction to the corresponding meningococcus intracellularis. Each member is a diplococcus,
formed of two of the kidney-shaped cocci having their straight or concave sides in apposition.

The arrangement and disposition of the cocci is very characteristic: they lie in little groups in the protoplasm of the leucocytes, occasionally in the nuclei (Kiefer). Unless these intracellular groups are seen the diagnosis is not certain (Schanz 117). A few may be seen free also, Carini (83) says that it is only when the conjunctival secretion has been reduced by treatment, that they are found only inside the cells.

Most authors are agreed that the detection of gonococci by the microscope is both simple and reliable. Mann (84, 88) holds that they are characteristic whether in a seropurulent, purulent, or pseudomembranous exudate, and that if the observer is familiar with Gram's method and searches inside the cells it is impossible to confound them with other cocci. Decolourisation with absolute alcohol should not be prolonged more than half a minute as the gonococcus is very easily decolourised. The coffee bean shape should not be too much insisted on as rounded or irregular forms are equally characteristic (Mann 88).

Again Mann and Becher (93) say that for anyone accustomed to the use of the microscope the search for and recognition of gonococci is an elementary matter, and confusion is impossible when two preparations are made one with a single stain and the other by Gram's method.
According to Minne (82) the three special characters of the gonococcus, namely its shape, its reaction to Gram's method, and its presence inside the leucocytes if found together are sufficient to establish the diagnosis.

Gowenrour (50) considers the appearance of gonococci in the leucocytes and in or on the epithelial cells and their reaction to Gram's method as characteristic. They may be distinguished from staphylococci and pneumococci by the greater numbers in the cell. After reviewing the question of possible confusion with cocci, which decolourise by Gram's method, he decides that these are rare, are if present at all on the conjunctiva and put down Paneth's results to bad workmanship. He considers that diplococci which decolourise by Gram's method may on this ground alone, with the greatest probability be considered to be gonococci. In his 600 cases, the only cocci which decolourised were gonococci. Finally, Gowenrour holds that the coverglass method is superior to that of culture, which never demonstrates the presence of gonococci where the microscope has failed, and that the latter always gives a correct result.

Gowenrour's authority is certainly deserving of all respect, but in view of the statement of Reinkenborg (204), it seems possible that in rare cases mistakes might occur.

The only organisms likely to cause confusion are the meningococcus intracellularis and diplococci belonging to the staphylococci including the so-called pseudo-gonococci.
which are gonococcus-like diplococci which decolorize by
Grain's method.

With regard to the first two, Grain's method of staining
is to be relied upon and its constant use is insisted upon
by Menkes (88), Reissfeld (110), Weller (133), Stephenson (129) and
every writer on the subject. According to Kiefer (69) and
Szauder (122) the reaction of the meningococcus intracellularis to
Grain's method is doubtful, but it seems to decolorize less
easily than the gonococcus which loses its colour very rapidly
(Menkes 88). The greater number of the meningococci present
and their variability in size are also points of difference.

Szauder (122) and Hayland (54) describe cases of conjunctivitis,
clinically resembling gonorrhea. Microscopic examination
showed groups of diplococci of 15 or 20, often intracellular and
very closely resembling gonococci. They stained by Grain.

Diplococci which belong to the step by step are easily distin-
guished according to Gravenour (50) as they stain by Grain's
method and have not the typical arrangement, the intracellular
groups consisting of only three or four members whereas
gonococci fill the cells completely.

Weller (133) also supports the reliability of Grain's method
in regard to the pseudogonococci of many authors.

There would however appear to be more difficulty in
connection with the pseudogonococcus of Kuenen.

Kuenen (72) considers that as a rule there is no
difficulty in diagnosing gonococcal ophthalmia.
Differential diagnosis is important on account of the difference in prognosis and treatment. A courseless preparation usually suffices. He goes on to describe a diplo coccius, morphologically identical with the gonococci and which decolorises by Gram's method. Such cocci were found in 3 out of 140 cases in which there was no sign of external beyond slight injection.

Krebs concludes that such cocci are not seen on the human conjunctiva, and that although microscopic examination as a practical means of detecting the gonococci loses nothing in value, yet in future outbreaks or slight cases apparently showing gonococci should not be considered to be gonococcal until the organism has been further investigated by culture.

In practice such an investigation is not likely to be made as, although a busy practitioner might make a culture from a specially virulent case, he is not likely to do so from a mild case.

Marx (90) considers Krebs' cocci to be a variety of gonococci, while Hapland (64) suggest that it may be a form of diplo coccius intracellularis meningitidis.

I have myself seen diplococci resembling gonococci very closely, but with certain differences. The groups are very frequently extracellular and do not contain more than eight or nine members, very rarely more. They are more grouped together than gonococci which usually lie just barely touching one another, evenly distributed. I have not seen the typical
appearance of a cell completely filled by diplococci, with anything else than gonococci.

That all staphylococci do not hold the stain equally tenaciously in the presence of alcohol, I am convinced, as I have seen in one preparation showing groups of cocci, one group being stained and the other decolourised. I have not noticed a group with some members decolourised and others stained. I incline to think that with somewhat prolonged decolourisation all would have retained the stain. More observation on this point would be interesting.

Besides their shape I consider the characteristics of gonococci in secretion to be the following: (1) Rapid decolourisation by Gram's method, (2) Position in purulent secretion practically all intracellular. (3) The characteristic appearance, bow and there, of a cell quite filled with evenly distributed cocci which barely touch one another. (4) Absence of the slightest tendency towards the grape bunch or cannon ball heap arrangement.

Any gonococcus-like diplococci which I have seen, whether staining by Gram or not, have not presented the last three characteristics.

For practical purposes Kutscher's pseudo-gonococci may be neglected and the conclusion is legitimate that, as Greenough and the great majority of observers assert, the detection of gonococci by the mucoperoxide is reliable.

With regard to a negative result in a suspicious case Stephenson points out the necessity of making several
examinations before deciding on the absence of gonococci. He also mentions that other organisms such as xerosis, bacilli, and ordinary pyogenic cocci may occasionally be present. Gonenoun found the bacillus coli occasionally and the bacterium pneumonieae once, in association with gonococci. Gornia found the bacillus of Pate in one case.

As already observed, however, no other organisms are to be seen. 

Wang, however, as Petit (104) says, in other organisms are to be seen. Mention (54) states that the more intense the inflammation, the more likely are the gonococci to be in pure culture.

When gonococci are detected in a case of conjunctivitis, the prognosis at once becomes more serious. Van Arman's (130) nongonococcal cases had one third less ulcers than the gonococcal ones. Gonenoun's (50) cases show that it is the presence of the gonococci rather than the severity of the inflammation that is to be taken as an indication of danger to the cornea. In none of his 100 cases, which were not gonococcal, did ulceration occur while the fact of a gonococcal case being catarrhal proved to be no indication of security.

The numbers of gonococci present seem to have very little relation to the severity of the case. When in moderate numbers the case may be severe or light, if in very great or very small numbers, the case is more likely — but not certain — to be severe or light respectively.

The detection of other organisms, such as those mentioned above, does not appear to modify the diagnosis proposed.
treatment. It is interesting to note however, that the worst case of corneal ulceration in Finne's paper showed few gonococci but numerous pneumococci.

By making further examination during the progress of the case, the results of the treatment may be appreciated better than by mere clinical observation, which may easily sanction the cessation of treatment while gonococci are still present in the secretion and thus leave the case free to spread infection.

Mcray (38) says that the termination of the affection is marked by the complete disappearance of the gonococci.

Naturally, the discovery of the absence of gonococci in a prevalent case of ophthalmia neonatorum improves the prognosis although I cannot agree with Greg that it contraindicates the necessity for any treatment beyond constant washing with weak lutions. The indications for treatment in non-gonococcal infective ophthalmia depend upon the clinical features of the case and on the nature of the causal agent, in the same way as in gonococcal cases.
Week's conjunctivitis.

The second of the bacteriologically well known forms of conjunctivitis is that known by the awkward name of *Week's conjunctivitis* first described by Weeks (142) as "acute conjunctival catarrh". This name was retained by Cunax (147) in 1892 but changed by him in 1896 to "acute contagious conjunctivitis" because the character of the secretion was found to vary from catarrhal to purulent and on account of the markedly contagious character of the affection.

Gorin prefers the term "Week's conjunctivitis" as being simpler and more direct, other forms being both acute and contagious. In this country there is apparently no generally accepted name and it is known by any of the above titles, and also as acute focal uncompensant conjunctivitis. (Steele 129)

This term is open to the same objection as the term acute catarhal conjunctivitis as it associates the affection with a particular form of secretion.

"Week's conjunctivitis is certainly better than any of the other names, but better still, I venture to suggest, would be the term "microbicillary conjunctivitis." This is simple and less awkward than Weeks' conjunctivitis, while it is less definitely directing attention to the most important point, namely, the presence of the bacillus of Weeks which, to my mind, has every claim to the name of microbicillus that the organism named after Von Heave has to that of diplococci.

Not only is the bacillus of Weeks the smallest bacillus, which...
occurs on the conjunctiva but it occurs nowhere else, and also ranks amongst the smallest of all bacilli, while its appearance, arrangement and staining reactions further characterised. In view of these points, I consider the term "uncinabarilary conjunctivitis" as superior to any of the others mentioned above.

Although the identity of the Weeks bacillus is generally accepted by the authors I have quoted, it should be mentioned that Reo (99) and Schanz (120) consider it to be a variety of the diphteria bacillus, while Smit (124), Jundell (66) and Regnault (111) hold that it may be identical with the influenza bacillus. Axenfeld (11) and Bütt (20) disagree with Schanz, while Marax (66) opposes Jundell.

As regards the practical importance of this form of conjunctivitis, the evidence is somewhat conflicting which is what might be expected in the case of an extremely infectious disease often appearing in epidemic form. Corsini found the Weeks bacillus in 20 per cent of cases resembling acute catarrhal conjunctivitis; Marax (147) in every case; Veesey (136) found it only occasionally in Philadelphia; Forin in only 10 out of 310 cases of catarrhal conjunctivitis; Marax and Petit (94) in 94 out of 243 cases of all kinds; Back and Heurnaan (15) and Lundsgaard (79) appear to have found it practically not at all. In Edinburgh and Leith it is quite common, especially in Leith. The clinical features have been repeatedly described. I need only refer to the accounts of Weeks (142) in 1886, of Marax in 1892 (147), and 1894 (144), of Marax and Beard (83) in
1896, if Wachsmuth and Muller (143) and Unna and Petit (98) in 1898, and Petit (104), Stephenson (129) and Hoffmann (61) in 1900.

From these descriptions it appears that the typical condition is a non-necrotic, acute, granular or uncommon conjunctivitis of slight or moderate intensity. The ocular conjunctiva is injected, as well as the palpebral, and may show little hemorrhage. There is some swelling and a pink tinge of the lids. In children corneal complications are rare and slight when they do occur, in adults they are relatively more common and more serious.

The usual type is both frequent and widely departed from. The beneath branches may produce an inflammatory reaction simulating, to a greater or less degree, almost every other form of conjunctivitis, thus rendering clinical diagnosis impossible. Accurate diagnosis is important, not because it is inflammatory conjunctivitis is a dangerous affection which must not be allowed to escape detection but because in an atypical form it might be mistaken for a more serious disease, and the prognosis and treatment modified accordingly, with intensely infectious character might be overlooked and prophylactic measures neglected.

The following points will illustrate and explain these views.

The affection may be chronic (Unna and Beach, 93) and in this case may be associated with papillary hypertrophy of the conjunctiva (Hoffmann 61) or granulations (Unna, 92).

A clinical picture resembling phlyctenular conjunctivitis may be
be produced (Monox, Markus 80, Petit 94 + Tenn), resembling
pseudocorneal conjunctivitis even to causing corneal ulcers, (Monox
147, 92).

A membrane may be present leading to confusion
with the milder forms of diphosteric conjunctivitis, (Hoffman, 1917, 94)
It may cause the development of follicles (Fromakowski 81)
and according to Axenfeld and Hick 12, Petit 105, and Bearey 131
is clinically indistinguishable from pseudocorneal conjunctivitis.

The clinical appearances described by Markus (80) in an
epidemic of pseudocorneal conjunctivitis in Buttenfeld present
as wide a departure from the type as to merit separate consideration.

Markus observed in all 150 cases. All the fresh cases presented phytothen-  
ulacae on the corneal margin. Some cases presented the
appearance of acute trachoma with swelling of the follicles. Many
became chronic, the bacilli being present in great numbers after
five or six months, and liable to subacute relapses, although
acute commencement was the rule.

In five adults phytothenulacae were present. In these the clinical
picture differed somewhat from that in the children, the being
more severe pannus and injection, atropin - never necessary in
children - was required and only dilated the pupil partly. In the
adults one eye escaped in three cases, never in the children.

In 60 cases examined by the microscope the thicken bacillus was
found in a pure state. Its presence was re-established in all the fresh
and nearly all the chronic cases.

This would tend to show that this affection may, under one
circumstances of some special nature, assume a form much
some resilient or more troublesome than it does usually.

According to Lennax and Beach, the phlyctenulars caused by the Bacillus
bacteriæm differ from those of ordinary phlyctenular conjunctivitis
in being little accumulations of exudates lifting up the conjunctiva,
whereas the latter are accumulations of leucocytes. This distinction
is however not always easy to make by mere observation
especially in young children with marked photophobia.

It is obvious then, that purely clinical diagnosis although
reliable in many typical cases, may often be misleading.

Marx and Pettit (94) found that the majority of cases were
diagnosable without the aid of the microscope, but that in mild
or complicated cases, errors were common. It is just the mild
cases which ought not to be allowed to escape detection for, as
the same authors say (p.173) "La benignité d'un cas l'implique
sûrement la benignité des cas aux quels il donne naissance."

Here also, as in pneumococcal conjunctivitis, the affection is
much more severe in adults than in children. Marx (84)
and Pettit (184) state that corneal lesions occur practically
only in adults. Thus a mild case of microbial ophthalmia stand in
a child, overlooked and treated as if of no importance, may be
the origin of permanent damage to sight in one of its parents.

Relapses are also not uncommon, especially if more than one
member of a family are affected, rendering it necessary to
treat all infected members simultaneously.

These facts indicate the advantage of a microscopic examination
which is strongly recommended by Marx and Beach.
who consider microscopic diagnosis as both necessary and
certain, and that it is unnecessary to make culture for this
purpose.

Gouini (47) considers the clinical symptoms too irregular for
diagnosis, which presents no difficulty if the microscope is used,
and according to Petit the use of the microscope is indispensable as
it is in the early stages that a diagnosis is required. Though by
waiting for the evolution of the affection it may be differentiated
from true diphtheritic or hemorrhagic conjunctivitis.

Gouini (33) stands alone in finding the Treibs bacillus in
cultures in cases in which it had been missed by the microscope.

Stephenson (129) considers the presence of this bacillus as the
"central fact of ordinary uncomplicated ophthalmia" and says that
it may always be seen in greaseless preparations of the discharge.
A preparation of the secretion from a case of microbeillary con-
junctivitis shows the following features, according to Linax and
others.

Numerous leucocytes are seen, usually of the polymorpho-
nuclear variety. Both free and in the cells lie number of a
small, thin, short bacillus measuring from 0.75 to 1.0 µ in length.
They do not stain as deeply as other organisms such as staphyo-
cocci or microbic bacilli. Petit describes them as staining
more deeply than the protoplasm of the cells and less deeply than
the nuclei, when a simple stain is used, and suggests staining
the preparation for a longer time or as to overstain the other organ-
isms. I do not think that this is necessary, while it is certainly
inconvenient. The poles often stain somewhat more deeply than the centre and the bacilli decolourise by Gram's method. Sometimes two or three are seen end to end forming a short chain. There are always organisms in the leucocytes and their membranes. There may be only one or two on the protoplasm of the cell may be encumbered with them. Weisselbaum and Müller, with the presence of masses of the bacilli closely packed together. De Haas observed this feature: the masses seem to consist of a pure culture of the bacillus and occupy an area in the field about equal to the size of a large squamous epithelial cell.

As a rule, no other organisms are seen or only a few, often are present and may be demonstrated by culture, but are not often seen in emeritus specimens, and according to Luxax and Petit, never in a way to cause confusion.

The size, appearance, arrangement and staining reactions of the Waser bacillus are characteristic. Morphologically it has been compared by Luxax and Beach to the bacillus of pneumocephalaeum and tere tubercle bacillus, confusion with either of which need hardly be apprehended.

Stephenson warns against confusion with the colon bacillus and Friedlander pneumonia bacillus, both of which occur in the eye and react negatively to Gram.

Simpson and Junkell consider that it is morphologically indistinguishable from the influenza bacillus, which also decolourises by Gram's method.

No confusion in my opinion can arise with any of the above.
if the observer be at all familiar with the appearance of the organism.
The colon bacillus is much larger, does not present the same
number or grouping, stains more deeply and is only rarely
met with in the conjunctiva. The same applies to the pneu-
monia bacillus of Friedlander. According to Zin Wadden 146 a
glare is sufficient to distinguish between the influenza
bacillus and the Weeke bacillus, and he goes so far as to suggest
that Jundell never could have seen a Weeke bacillus.

I venture to contradict Zin Wadden's opinion, unless either or
both of these bacilli vary very widely in form and arrangement, of
which there is no evidence.

The numbers and position of the bacilli present vary with
the stage and intensity of the affection. According to Netter 84
in the first few days they are in small numbers and mostly
inside the phagocytes. By the third or fourth day they are very
numerous. In intence cases they may be inside every cell.
Stephenson 179 mentions the relation of the number of the
bacillus to the severity of the case as a marked peculiarity of the Weeke
bacillus and says that a mere inspection of a microscopical preparation
of the discharge will afford information as to the intensity of the affection.
In some mild chronic cases I have also seen very numerous
free bacilli. After treatment they become scarce and mostly
intracellular.

Although, as mentioned above, the Weeke bacilli are usually
in a practically pure state, yet mixed infections occasionally
occur. Gower mentions a case of combined pneumococcal
and micrococcous infection, and Zin. Mearan and Stephenson
cases presenting both the bacillus of Webs and the diphteracillus
of Mear. The latter author observes that if cases of trachoma
become affected by Mear bacilli an acutely infectious form
of trachoma is set up and its spread greatly facilitated.

Mear and Beech (13) consider the recognition of the Mear
bacillus as important in order that parents may be warned and
the children excluded from school, and also as necessary to
a correct prognosis in imminent cases for example.

According to Pettit (104) if the bacillus of Mear is found, the case
can be mastered in a few days, and if no corneal trouble is present
when seen, none will arise after the adoption of proper treatment.

Thus the discovery of the Mear bacillus in a case of
conjunctivitis, however severe and grave it may appear
modifies the prognosis greatly for the better, while in a case
of mild extent its presence indicates the institution of
prophylactic treatment, and the use of some more active
germicide than the basic lotion which is the usual
application for such cases.
Diplobarillary Conjunctivitis.

This form of conjunctivitis, like the last-mentioned, has enjoyed several names before the present one.

First described by Henox in 1846 under the name of "conjunctivitis sub-acute," Axenfeld (7) and Peters (107) called it "chronic diplo- 
barillary conjunctivitis"; in 1899 Collomb (23) and Bielli (99) 
dropped the term "chronic" and it is now known as diploobarillary 
conjunctivitis.

This history emphasizes the fact that here, also, clinical has 
had to give way to bacteriological terminology.

The identity and pathogenicity of the special organism has been 
formed by Henox (86) and Axenfeld (7) and though disputed 
at first, for instance by Blanchard (25), are now thoroughly 
established.

Diploobarillary conjunctivitis is very common, whether epidemic 
or sporadic, and constitutes a large proportion of the cataral 
cases. Bach and Kneum (15) give 32.9% of their cases as 
diploobarillary, Acqueiros (4) 65 percent, Goniin (47) 60 percent. 
Even in regard to conjunctivitis in general its proportion 
seems to be considerable: it constituted 26 percent of Henox's 
(94) pete's cases, 24 percent of Goniin's, 35 percent of Lindalparr's (79) 
and a large number of Collomb's (23), who however, units to state 
the exact number. In Simbrugh and Leith it is very common.

The course and clinical picture have been frequently des- 
cribed by Henox (86), Axenfeld (7), Peters (107), Bielli (99), 
Collomb (23), Stephenson (129), Zun Heiden (45) and others.
it may be seen,

from these authors that, as in other forms of conjunctivitis of
microbial origin, there is a typical symptomatology for the
majority of cases, but the deviations from this are so frequent
and so wide as to destroy the reliability of a purely clinical
diagnosis.

Persons of both sexes and all ages and professions are
liable to attack, and at all times of year, though country people
adult ages, and hot dry periods seem to be factors of greater
prevalence. In a typical case the clinical characteristics are
well marked. The onset is often very insidious, and if one eye is
affected first the other follows almost within two or three days.
There is a little itching especially at the commissures, slight
secretion, mostly at night, so that the lids adhere in the mornings.
This secretion accumulates in little greyish yellow balls in the
internal angles, while a few flakes of fibrinous pus lie in the
superior conjunctival cul-de-sac. Special characters are
held to the frequent association with blepharitis, and the special
infection, tenderness, and not infrequent exudation of the
palpebral commissures, on account of which Axenfeld (8)
develops the term "Angular blepharo-conjunctivitis." The ocular
conjunctiva remains unaffected or nearly so.

So much for the type. Axenfeld, Gowers, and Zinka-Miller
(145) have pointed out, as I have also been able to observe,
that some or all of these symptoms may be present in the absence
of the diplostene of Monex.

The most important variation in the acute purulent form
resembling acute gonococcal or microbacillary conjunctivitis, which is mentioned by Axenfeld, Hoffmann (60), Zur Heden and Collomb. André’s (2) case of fulminating uveitis in an infant due to diplobacilli has already been mentioned.

Corneal lesions are rare and not severe according to Axenfeld, Hoffmann and Peters. Beet, Zur Heden & Collomb also note cases, which appear to occur in the proportion of about 3 or 4 percent. According to Pritt an ulcer may be present with such a slight conjunctivitis, that the former may be alone observed and the latter missed.

The affection may be mistaken for phlyctenular conjunctivitis according to Axenfeld (6). There is some difference of opinion as to whether the phlyctenulae occur merely as a coincidence or as an effect of the diplobacilli. Collomb (29) and Axenfeld (145) consider that the diathesis of the patient is responsible for this complication, while Zur Heden holds that in some cases the direct action of the organisms is the cause.

Follicular conjunctivitis may also be simulated, and here again similar views are held. Gomes believes the follicles to constitute an "épiphénomène fréquent," and not a mere coincidence, which is the opinion of Axenfeld, Zur Heden and Peters.

On the other hand, the diplobacilli may be present without producing their characteristic lesions. According to Zur Heden there is often no blepharitis; Collomb found this symptom in only seven percent of his cases.
It is similar with the characteristic of angularity on which Bietti (19) lays stress, remarking that although all cases of angular conjunctivitis are not diplotrecillary, yet unless both commissures are affected, the disease is not of this nature. He failed to find the bacilli in cases in which the inner canthi alone were affected.

Collourd found angular conjunctivitis in only 28% of his cases and Bach and Neumann in 54% percent of theirs. My own experience is that either both, or neither of the commissures need be affected.

Thus we are again compelled to resort to bacteriological examination for definite information, and of all forms of conjunctivitis this is the one most amenable to microscopic diagnosis.

The following description of a culture preparation is according to Junius (86 et seq.) and Ax-enfolds (20 et seq.).

The reaction is more fibrinous and the leucocytes less numerous than in the other forms. The bacilli are large with rounded ends, which may appear thickened, and are arranged in couples and end to end. Each is 2-3 μ long and 1 to 1.5 μ broad, a couple measuring about five or six μ in length. They are mostly free, a few may be seen inside the leucocytes, and they show a marked tendency to aggregate into masses on the epithelial cells. The number present varies but is usually very great.

The bacilli stain readily and deeply with many aniline dyes, occasionally Heidenhain appear more strongly coloured than the
centre. They decolourise by Gram's method.

My own preparations confirm these points. The noticeable features are the fibrinous rather than leukocytic nature of the secretion in which numbers of epithelial cells are present. Very few bacilli are seen inside phagocytes. One can often detect their presence with a low power (105 diameters).

The evidence in favour of the use of the microscope is practically unanimous. Vrana holds that in all doubtful cases diagnosis is easily established by the microscope, as the organisms are very easily recognised, and their number leaves no room for doubt. Axenfeld (741) found that reliance on clinical symptoms led to error, and considered microscopic examination decisive; "ist dieser Deckglasbefund bereits äuβerst charakteristisch."

Vrana and Petit (94) state definitely that they have never seen any organism in conjunctival secretion which could be confounded with the diplobacillus.

According to Corsini (33) confusion can only occur between the diplobacillus and the pneumobacillus of Friedlander and the ozonbraehillus. Vrana's bacillus has no capsule and has a strictly bacillary shape. Moreover, according to Axenfeld ozonbraehillus do not occur in conjunctivitis. A closer resemblance exists in the case of the diplobacillus descriptions of Petit (103) which has the same appearance though smaller and reacts similarly to stains. Its grouping and arrangement are, however, quite different and it occurs only in corneal ulcers.
It is hardly necessary to add more details of evidence as to the reliability of the microscope in this affection. Gouërin, Collomb, Petèi, Zum Heddern, Peters (84), Mithoff (88) and Bietti all write in its favor.

Beyond the diagnosis there is little information to be obtained from microscopic examination. According to Peters (104) there is no relation between the number of bacilli seen and the intensity of the case. Unna (87) holds exactly the contrary view, namely that the number present vary with the intensity of the case. According to Zum Heddern a good deal depends upon the part from which secretion for examination is obtained, if this is taken from the inner angle, whether all foreign bodies from the conjunctival surface are swept, great numbers of bacilli will be found even in mild cases; but if secretion is taken from the cul-de-sac in all cases, a different result is obtained.

Axenfeld (87) points out that the causal bacilli quite eclipse any accidental organisms, which may be present. As the case becomes more chronic, the accidental organisms become more numerous and the diplococci less.

Usually the diplococci are seen in pure culture, especially if the secretion from the cul-de-sac is examined. Secretion from the caruncle after showing other organisms such as aerobic bacilli and staphylococci, whose presence has no influence on the case.

Cases of true mixed infection have been observed. Combined
diplo- and micro-bacillary has been mentioned already. Back and Heumann (16) in 38 cases had one with pneumococci and one with Friedlander's pneumobacillary besides others in which Staphylococci, Streptococci and Xerosis bacilli were present.

Collomb and Zen Hebben believe that Staphylococci are to a greater or less extent concerned in the production of the acute variety of diplobacillary conjunctivitis.

The prognosis in diplobacillary conjunctivitis is good. The detection of the diplobacilli indicates the exhibition of zine preparations and attention to prophylaxis. Careful search should be made for unnoticed source of infection in the patient's family and to ensure success, all should be treated at the same time.
Diphtheritic Conjunctivitis.

Although Berclaud in 1821 was the first to describe diphtheritic conjunctivitis, it was von Graefe, who in 1864 really established it as a clinical entity. The distinctive feature of this affection was the presence of a membrane, deeper interstitial inflammation to the conjunctiva, to which it was adherent.

At the same time another membranous affection of the conjunctiva was recognized under the name of "ophthal-mia omepra," or croupous conjunctivitis. This affection was milder in character, the membrane being of a superficial nature, easily separated from the conjunctival surface.

These two diseases were, as Roscher (110) mentions, considered to be essentially different, and so described.

Recent observers, amongst whom may be mentioned Coppéz (31), Walther (132), Stephenson (129, 130), Haab (152), Baumgarten (17), Joffin (47) and Vossio (139) have shown that variation in the nature of the membrane, or even its presence or absence, is quite compatible with diphtheria, in the sense of the affection caused by Koëffler's bacillus, and that there is no distinction beyond that of degree between a superficial or croupous exudation and an interstitial or so-called diphtheritic infiltration on the conjunctiva.

Cesnini (33), who quotes Serendille as his main authority, shows that since 1841, when Gallemez was the first to find Koëffler's bacillus in croupous conjunctivitis, there
has been no lack of evidence to show that all grades of con-
junctivitis, from the simple catarhal through the
croupous to the diphtheritic form may be caused by
Hoffmann's bacillus, while membranous cases of the
graves-nature have occurred in which this bacillus could not be
found.

Waltzoff (155) supports these views and Stephenson (136)
describes 43 cases in which the diphtheria bacillus was
found, which present every gradation between a mild
inflammation and severely complicated membranous oph-
talmia.

Baumgarten (17) considers, that as far as the anatomical
structure of the membrane is concerned, there is no essential
difference between croupous and diphtheritic inflammation.
Coppes (31) holds intimal and superficial pseudo-membranous
conjunctivitis to be bacteriologically identical and clinically
joined by numerous intermediate forms.

According to Vossius (139) the diphtheria bacillus may cause
a purulent, croupous or deep membranous conjunctivitis, the
clinical picture being determined by the virulence of the
bacillus and the response of the individual.

Haab (82) discusses a case of croupous conjunctivitis due
to diphtheria bacilli and Steffens (127) gives a case of gan-
srene of the eyelid, with absolutely no sign of diphtheria which
was apparently caused by the same organism.

There is much more evidence of the same kind but
enough has been given to show that the diphtheria bacillus is capable of producing the most widely separated clinical conditions.

In the same way typical membranous conjunctivitis, both deep and superficial may be caused by a variety of organisms. Ulthoff (133) mentions besides the bacillus of Leffler, streptococci, staphylococci and pneumococci; of these, according to Roche (110) Leffler's bacilli are the most common and streptococci the most dangerous.

I have already given an analysis of some cases of membranous conjunctivitis by Gouin, Roche and Jessup (64) showing that it may be caused by various organisms including the staphylococci, gonococci and neisseria bacillus as well as those already mentioned. Similar evidence is given by Coppes (29), Auerfeld and Field (12), Lec (78), Eple (37), Schenz (117), Stephenson (129), Petit (104), Kempel (70), Schlesinger (121), Vossius (139), Hyde, Standall (136), Darov (33) and others, whose observations add the meningococcus of Weichselbaum, the colon bacillus and the pneumococcus of Escherich to the list of possible causes of membranous epithelium. Although as Auerfeld (13) has shown Leffler's bacillus is high on the most common.

As might be expected, on account of this complicated pathology, the nomenclature and classification of diphtheritic or membranous conjunctivitis has recently been the subject of a good deal of discussion.
Josop (65), Jessop, and Stephenson suggest that terms such as erosive and pseudomembranous should be dropped and all such forms united into one class of "membranous conjunctivitis."

Van der Straeten (135) holds a similar view, but prefers the term "pseudomembranous." Jessop and Stephenson then divide the membranous forms into diphtheritic and non-diphtheritic, the presence of Koeppel's bacillus in the former being the differentiating factor.

Van der Beugel (154) and Gorin (47) use the term diphtheritic to include all forms of conjunctivitis caused by Koeppel's bacillus, whether membranous or not, and the latter aptly expresses his point of view by using the phrase "conjunctivitis koeppeliana" (p. 94).

Stephenson, however, himself points out that there may be no membrane in conjunctivitis due to Koeppel's bacilli, although Jessop (64) says, "There yet to learn that a conjunctivitis can be set up by the diphtheria virus without the production of a membrane."

If this is so, Stephenson's view is correct; then the expression "membranous conjunctivitis" does not include all forms due to diphtheria, and it would be better to adopt Gorin's terminology and consider as diphtheritic only such forms as are caused by Koeppel's bacillus without reference to the clinical appearance.

"The presence of a membrane then is very little beyond
evidence of the possibility of diphtheria, and its absence, although strongly presumptive, does not absolutely exclude diphtheria.

Other signs may often be of assistance in diagnosis. Jessup lays stress on the presence of enlarged glands, albuminuria and fever, in the true diphtherial cases, while Stephenson mentions the purulent and stringy secretion and the usual unilateral infection; in his cases albuminuria was present in only 11 percent.

Other writers prefer to direct their attention to the presence of Locicero's bacillus and its presence.

Petit (184) considers that the history of a previous throat affection, the general condition of the eye, and the presence of a false membrane on the conjunctiva are to be considered merely as presumptive evidence.

Stephenson (129) remarks (p. 44): "Although it cannot be too often repeated that the only scientific way of diagnosing the condition is by discovering the diphtheria bacilli, yet in many cases the objective clinical signs are quite enough." However, this may not always be the case as the observations of Cepheus (29) and Loc (18) show, who describe cases exactly simulating severe diphtheria but caused by strepto- and gonocoeei respectively.

The existence of a membrane is nevertheless an indication of the massiness of a bacteriological examination according to Stephenson, Hunan + Beach, Worrie, and others.
Even though the diagnosis of diphtheria could be made clinically, no indication would be given of the presence of mixed infection, with streptococci a point mentioned by Roche (110) Corini (33) and others as important for prognosis.

Minne (82), after reviewing the question, concludes in favour of the necessity of bacteriological observation in order to obtain promptly the necessary indications for treatment.

As regards relative frequency, membranous or diphtheritic conjunctivitis seems to be comparatively scarce. Stephens' 43 cases represented 1.25% of the cases seen at the ophthalmic hospital during the same time. Gourni's figures show in 785 cases of conjunctivitis 1.68% of membranous and 0.9% of diphtheritic nature. In Edinburgh and Leith both forms seem to be uncommon.

Diphtheritic infection, however, on account of its infectious nature and the danger both cornea, gains in importance what it loses through its comparatively early and accurate diagnosis is of the greatest importance.

The microscope, though very serviceable, especially when the method by exclusion is practised, is not quite so reliable here as in other forms of conjunctivitis, both because diptheria bacilli are more apt to be missed on account of small numbers than Neisseria diptheriae, and on account of their resemblance to a common, non-pathogenic organism the scorpio bacillus.

On this account the preparation of specimens for the
detection of Leifler's bacilli is a little more troublesome than in the case of an organism like the diphtheria bacillus of diphtheria for instance.

A particle of discharge or a shred of false membrane is smeared over several coverglasses which are stained (1) with Thionin blue or Rick and Jacobsohn's stain, (2) with Gram's method and (3) with Heimser's stain.

Stephenson describes the appearance of the organism as follows:—"They are rods of irregular size and confused grouping, often clubbed at one or both ends and of uneven contour. They are usually a little curved. When treated with certain samples of methylene blue or thionin blue, polychromatic effects may be observed, that is to say, small points lying in the protoplasm may be coloured differently from the rest of the organism. The Leifler-Leifler bacillus stains with Gram's plan. When treated by Heimser's method it appears as a rod stained brown which shows within its substance two or three small oval granules of a dark dirty-blue colour; the coloured particles are seldom seen except towards one or other end of the bacillus. Heimser's method often affords a rapid method of diagnosis. My experience leads me to attach great practical value to its systematic employment in cases of suspected diphtheria."

Although in 1900 (see 129) Stephenson considered that for certain diagnosis the making of cultures was often necessary on account of the resemblance between Leifler's and the
xerotic bacillus, which he styled a "pitfall for the unwary," in 1902 (130) he calls the latter organism "that bugbear of ophthalmic bacteriology," and holds that by Heiser's stain the two may be differentiated in the clearest way. He bestows the strongest praise on Heiser's method as enabling a diagnosis to be made during consultation. The fact that the xerotic bacillus retains the stain much more tenaciously than the Koeppen bacillus, when treated by alcohol in Graed's method, is also mentioned as a point of distinction. Finally he says, "In short in moderately experienced hands, there should, in my opinion, be no confusion between the organisms named. " But then one examination should be made, as failure to find it does not prove its absence.

Then before the publication of Heiser's method Leman (88) supported the use of the microscope in the diagnosis of conjunctival diphtheria. According to him, from a practical point of view, microscopic examination is superior to cultivation, as the latter method brings into evidence bacilli which would not have been seen by the microscope, and which resemble diphtheria bacilli in culture, requiring inoculation experiments for differentiation. The delay of from four to eight days, necessitated by this procedure, entirely destroys the value of the examination. The microscope, however, gives an immediate decision and it is to this, rather than to the results of cultivation, that one should turn.
for indications for xerotherapy. The bacilli, although very numerously seen, are easily recognized by their irregular aspect and tendency to swelling at one end. Gram's method should be used and the bacilli cannot be confounded with any other conjunctival organism.

In Heiseer's (96) original method the double staining is performed upon a young culture of the suspicious organism.

As it is my object to examine the value of immediate microscopic examination this method cannot receive further consideration. I will only mention that Heinekel (47), Hertzen (81), Schaper (51), and Bronstein (23) are in favour of it, the latter very strongly, while it is discredited by Kaus (148) and Schanz (114 etc.), who indeed doubt any method, which proposes to diagnose diphtheria within 24 hours.

Heiseer himself warns against reliance upon his method in connection with coverslip preparations from fresh material, although stating that it may be successful in a few "happy" cases. Stephenson, as already pointed out, attests its virtue when used in this way. Bronstein (23), whose paper refers to diphtheria of the pharynx, is a most decided supporter of the direct method. In 132 out of 172 cases he diagnosed diphtheria by the microscope. Cultures were made at the same time, and in no case did these fail to show Loeffler's bacilli when double-stained organisms had been observed microscopically. Even in the presence of numerous other
organisms the suspicious bacilli were clearly re-obsolete.

Not having seen any diphtheritic conjunctivitis in Edinburgh or Berlin, where it seems to be rare, I cannot say much myself upon this subject, but, considering the evidence of Stephenson and Brennstein, it seems to me that too much reliance should not be placed on laboratory experiments, such as the work of Gauss (148), in connection with what I really a clinical observation. What is wanted is an extensive series of cover-glass examinations of conjunctival secretion, from all kinds of conjunctivitis, stained by Heidenhain method, in order to show how other organisms met with in the conjunctiva, and especially the one known as the Xerosis bacillus, react to this method of staining. Such an investigation would be of more practical value in this connection than the work of Gauss, as I see no reason why it should be assumed that bacilli in the conjunctiva and bacilli in test tubes should react in the same way to stains; indeed, Lennarz has shown that the Wassermann bacillus ceases to react altogether if grown on artificial media for a few generations. Incubation experiments would be required to test the virulence of any double-staining organisms found, and cultures in order to ascertain the proportion of cases in which double-staining was obtained in this way and not by the direct method.

Into the question of the identity of the Xerosis bacillus and that of Greffier, asserted by Schanz (116), Peters (100) and Plopp (99) and disputed by Coppens (81) and von Munk (70) it is not necessary to
Biëtti (20) believes in the pathogenicity of the exogenous bacillus. Corrini (33) and Peters (106) believe that cultivation and inoculation are necessary to differentiate the two, while Skronzak (128) required the inoculation to be controlled by antitetanic serum.

Although Peters (99) believes the bacillus of Rabl and that of Drefler to be identical, this cannot affect microscopic examination by which these organisms are clearly differentiated.

Peters (98) holds that in suspected diphtheritic conjunctivitis, microscopic examination is of more value in eliminating other forms, caused by organisms readily recognized such as gonococci, pneumococci or Morax baccilli, than in demonstrating the presence of Drefler's bacilli. Hunax (117) reviewing Peters' works, remarks that although the number of diphtheria bacilli seen in a preparation may not be great, sufficient facility to enable a probable diagnosis to be made, may be attained with practice, while in connection with mixed infection and the presence of other organisms, the microscope gives more reliable information.

Petit (104) also considers microscopic examination of the greatest importance, and especially valuable in excluding other forms of conjunctivitis. If there is doubt it will be more often easier to decide against diphtheria, but not unless abundance of typical organisms is seen. The presence of a
number of bacteria, morphologically resembling Streptobacilli, is to be considered as presumptive evidence of true diphtheria. More than one examination should be made, using Gram’s method, and if no bacteria are seen, no conclusion at all is derivable. Goričin (47) holds that in diphtheriae, too much reliance should not be placed on microscopical examination, yet the presence of bacilli resembling those of Streptobacilli in a membrane justifies a diagnosis of diphtheria and indicates specific treatment.

Sporonke (125) says that true diphtheria bacilli occur in the conjunctiva in numbers only in true diphtheritic infection, in other cases only seldom and then isolated specimens. The cultural and morphological resemblance between the true and the pseudo-diphtheria bacilli is very close.

Minnic (82), while supporting the use of Weigert’s stain, does not consider it microscopically reliable in diphtheria. A well-diluted preparation, he remarks, will convince the observer of its difficulties. According to Corsini (83) the microscopical diagnosis of diphtheritic conjunctivitis requires special care and some patience.

Besides the bare diagnosis of diphtheritic or non-diphtheritic nature of the case, some further information may be obtained by the microscope.

Corsini (83) quoting Sundell, says that long, thin, straight bacilli, few in number are found in the mildest form of conjunctival diphtheria, in conditions of medium gravity,
the bacilli are shorter, larger and bent, and in the severe form they are curved, twisted, numerous and associated with many streptococci. The gravity of the case depends upon polybacterial association and toxemia of the bacilli.

According to Marx and Beach (133) the bacilli often occur in pure culture but frequently streptococci and staphylococci are seen. In Stephenson's cases the diphteria bacilli were pure 6 times out of 43, in 38 there were various streptococci and in seven streptococci besides a few other organisms. He could trace no correspondence between the various forms of the bacillus and the nature of the case, nor between the associated organisms and the severity.

Other authors, however, agree with Cussini that the presence of streptococci makes the prognosis less serious as the efficiency of antitoxin therapy is less assured. For in two most serious cases, one of which lost both eyes, were associated with streptococci. He thinks the prognosis, although good in the severe cases, should be guarded in general. According to Stuhlf (133), the presence of streptococci need not necessarily indicate a severe case, yet, on the whole, cases of pure diphteria infection are more favourable.

Petit (104), referring more particularly to existing corneal lesions, considers that the prognosis is subordinated to secondary streptococcal infection of the cornea, and that in the presence of this it is doubtful and good in its absence.

Despaques (35) treated ten cases with serum and found that
the membranes persisted in the mixed cases for fifteen days
and in the others for eight days.

Matthew (81) concludes that serum, although good in the purely
diphtherial cases, is of less value in the mixed forms. Serum
should be injected before waiting for a bacteriological examination if
the clinical signs point towards diphtheria.

Jessop (60) lays stress on the importance of diagnosis in
diphtherial cases in connection with treatment and isolation.

It is obvious that rapid diagnosis is of the greatest value to
the general practitioner who has to act himself whether
serum is to be used and whether the case is to be notified.

Petit (104) holds that if diphtheria cannot be eliminated by
the discovery of other specific organisms by the microscope, then
the case should be treated as one of diphtheria. The presence of
pneumoccci in the bacillus world, in his opinion, exclude
diphtheria. In any case the withholding of serum is to be
considered less risky than its possibly unnecessary administration,
an view supported also by Schlesinger (121).

According to Roscher (110) Per and Whitty advise the use of
serum in all cases of groupous epiglottitis without waiting
for a bacteriological examination.

Lagrange (75) upholds the use of the microscope as giving
an immediate and exact decision. Bad results from
serotherapy are due to waiting too long, and serum should
be used if the clinical signs indicate it.

Haas (52) and Withall (183) recommend serotherapy in
doubtful cases.

The necessity for recognising streptococcal cases of membranous
ophthalmitis is urged by Morax (13) as antitoxin serum
has no action in such cases. Cottrez and Funeke (32) after
investigating the statistics of cases of membranous ophthalmia
treated by antitoxin serum conclude that it has no
action in the streptococcal cases.

Morax and Bever (93) consider that serum is only of use
where Reffler's bacilli are found.

Rinkel (70) gives a case due to diplococci and Cottrez (29)
are due to streptococci, in which the use of antitoxin serum was unsuccessful. Schlesinger (171) and Morax (89)
give similar cases and suggest the use of Mann's cholanti-
streptococcal serum in these cases.

Vossius (139) seem to be alone in the opinion that anti-
toxin serum is also useful in non-diphthetic cases.

On the other hand, the prognosis in a severe case of
membranous ophthalmia is improved by the discovery of an
organism such as the bacillus of Reffler, and the treatment
therefore correspondingly modified.

The evidence points to the conclusion that
in suspected diphthetic conjunctivitis microscopic examin-
ation is of the greatest importance, and often results in itself by
positively demonstrating Reffler's bacillus, or otherwise by adding one
more link to the chain of evidence required for diagnosis and prognosis.
The second group in Gonić's arrangement includes all the remaining forms of conjunctivitis due to bacterial infection. For clinical purposes he distinguishes those associated with inflammation of the tear ducts or lacrimal sac, from which the infection reaches the conjunctiva, from those in which this is absent and infection is from without. As far as concerns microscopical examination it is unnecessary to observe this distinction.

Excluding the four microorganisms already discussed a variety of others are found in conjunctivitis, including pneumococci, streptococci, staphylococci, the influenza and colon bacilli, Friedlander's pneumonia bacillus, the ozena bacillus, the meningococcus intracellularis, the organisms of tubercle, leprosy and glanders and various forms of mycosis.

Some of these are mere curiosities, others as the pneumococci are of more importance.

The value of microscopic examination in these cases is greater as a means of excluding members of the first group, than in establishing a definite diagnosis in respect of any one organism.

Positive evidence may, however, usually easily be obtained in regard to the more important forms, especially in epidemics.
Pneumococcal Conjunctivitis.

Applying the same rule here as in other forms of conjunctivitis, by the term pneumococcal conjunctivitis is understood that form, which is due to pneumococci, whatever its clinical aspect may be.

In this country pneumococcal conjunctivitis has not the same claim to consideration as it has in America where it is very common. Gifford (45) and Reasey (830) found the pneumococci to be the most common cause of acute catarrhal conjunctivitis in Philadelphia and Omaha.

Müller and Petri, Lundsgaard, Ronin, Pic and Back, and Neumann having few pneumococcal cases. In Edinburgh and Leith it does not appear to be common.

Epidemics may occur, as mentioned by Axenfeld and Stephenson (29).

The clinical character of pneumococcal conjunctivitis have been described by Müller (84), Axenfeld (16), Whiteoff (133), Gifford (45), Junius (67) and many other, according to whom the character of the inflammation is that of a mild acute catarrh. There is slight rose-coloured edema of the lids at first, diffuse redness with a little swelling of the conjunctiva, on which a superficial grey membrane frequent-ly forms. The ocular conjunctiva is also injected and may present small hemorrhages. The secretion is fairly free, and is watery with little flakes of pus floating in it.
The same conditions prevail here as in the forms of conjunctivitis already discussed: other microbes, notably the Weeks bacillus produce an identical clinical picture, while pneumococci themselves produce practically any clinical form. Axenfeld and Tiek (12) quote Guanzanini's view that pneumococcal is clinically indistinguishable from Weeks conjunctivitis. Neely and Gifford (45) corroborate this view and urge the advantages of bacteriological examination as a means of distinction.

A comparison of the two clinical pictures will show that they are practically identical. Pneumococcal conjunctivitis has been said to affect children only, to be unilateral and noncontagious (Hennek 84), but Axenfeld (6) and Gifford (45) have disproved these points and clearly shown the very close resemblance to the microabscess form. Membrane formation occurs more frequently in association with pneumococci, phlyctenulosis occur frequently in both (Axenfeld 85).

Wetherell stated that dermal, phlyctenular, granular, and membranous forms may occur, and although the clinical diagnosis may often be correct, it is not sufficient. Axenfeld and Tiek (12) and Gifford (45) mention the occurrence of an acute form resembling pneumococcal keratitis.

Roscher (110) gives a case of membranous conjunctivitis with corneal ulcer, stimulating a severe dephthentic infection.
but due to pneumococci alone, and Eusinale (44) a similar
case complicated with an abscess in the eyelid.

In adults a chronic form may occur (Morax 82, Axenfeld 172)
Axenfeld 68, Gifford (45), Venax and Petit 94, and Blotzoff 133
all urge the necessity of bacteriological examination and con-
sider the microscopie efficient in the great majority of cases,
although Gifford thinks that unless serum cultures are made
the organism may sometimes escape detection. So this it might
be replied that this method might in the opposite direction
and detect pneumococci more often than they are the
real pathogenic agents, as the pneumococci has been frequency
found on the healthy conjunctiva.

According to Morax (88), Stephenson 129, Halle 539 and
Morax 82 the microscopic examination present few difficulties
the cocci elongated shaped diplococci, with then broader ends
apposed, are seen from in the cells. They may be only in pairs
or in short chains of from four to six members. Capsules
apparently may or may not be seen. Gifford 45 and
Venax 88 consider the capsules distinctive. Axenfeld and
were while Goun states that they are always indistinct and
sometimes absent. In some of my preparations the capsule
are obvious in others not.

Gifford and Schrader 45 1 say that the lancelet-shaped is
not always present, and that phagocytes may be seen
encircled with the organisms as occurs with the bacillus
of Weizen.
The only possible causes of confusion mentioned are the pneumococci from which it is of course easily distinguished by Gram's method, and the diplococci of Wilbrand, Bauer, and Oechslin mentioned by Axenfeld, which, however, are very different in shape and size.

Grunin (87) thinks that badly stained pneumococci may be mistaken for M. bovis; Gram's method of course avoids this error. Grunenroth (50) mentions septated xerosis bacilli, resembling short chains of pneumococci, as another possible element of confusion. The former are distinguishable by their club-like form, general appearance and arrangement and the fact that they are rarely intracellular.

The pneumococci are usually in pure culture. Halla (51) detected no other organisms either by the microscope or by culture. A few xerosis bacilli or staphylococci may be seen but not in a way to confuse the diagnosis.

Mixed infection seems to be more uncommon than in other forms of conjunctivitis; Grunenroth mentions a case with pneumococci, and one of my preparations shows numerous diplococci of borrel and pneumococci together.

Although this affection is generally benign, severe cases leading to destruction of the eyes have been described by Hertel (B7) in children whose condition had been reduced by measles.

Axenfeld urges the importance of differential diagnosis on account of the good prognosis in pneumococcal
conjunctivitis. The affection lasts only a few days and heals without treatment, so that it is unnecessary to adopt vigorous measures. At the same time prophylaxis must be considered, as adults are apt to suffer more severely and the affection is often very infectious.

**Streptococcal Conjunctivitis**

This is a comparatively rare form of conjunctivitis. From has had only 6 cases of streptococcal infection in a total of 785 cases of conjunctivitis. Minax and Petit (31) and Lundgaard (79) do not mention it, Reo (99) and Jernvall (98) each mention two cases.

Arenfeld and Tice (12), Herzog (53), Roth (37) and others mention two clinical forms, the catarhal and the membranous, the latter occurring more frequently.

Minax and Beach (93) mention the membranous form as especially seen in children during the declining period of measles and scarlet fever and sometimes independently. It may evolve rapidly and seriously damage the cornea, being even more dangerous in this respect than diphtheritic conjunctivitis with which it has long been confused.

As already pointed out, there is no clinical distinction between true diphtheritic and streptococcal membranous
conjunction; and it is unnecessary to repeat the evidence here. In connection with treatment, however, the differential diagnosis is very important.

Maurin (89) mentions two cases reported by Aubier. The clinical picture was that of diphtheria, and antitoxic serum was injected but without avail, even after a week. Bacteriological examination having shown only streptococci and atypical streptococci, Maumuson's serum was used with immediate beneficial effect visible within 24 hours. Lagrange (76), Képine (87) and Schlesinger (121) also recommend this treatment.

The catarhal form was described by Parinaud (97) in 1892 and afterwards by Maurin (87) in 1894, as conjunctivite lacrymale à streptococques. The clinical picture is that of conjunctivitis combined with serous iritis and usually accompanied by acute inflammation of the mucous lining of the tear sac. There is intense injection of the conjunctiva which may be darkened or violet, it is both circumcorneal and general and affects the subconjunctival vessels. The secretion is fluid with flakes of pus. As a rule only adults are affected.

This characteristic combination is not always present. Gouin (47) besides two such cases, had two associated with edema, one with cicatry blepharitis and one, in an infant, resembling pemphigus ophthalmia and which resulted in the loss of an eye.
Grosvenor (50) mentions a purulent and an ordinary catarrhal case. Corsini (33) also uses a purulent case of purulent phthisialm.

(86)

Menax mentions a form resembling severe purulent phthisialm, occurring in children and tending towards corneal complications.

Clinical diagnosis is not always likely to be successful and microscopic examination is required to definitely ascertain the nature of the case.

According to Parinaud (197), Menax (86) and Hirne (82), the streptococci may easily be recognized by the microscope. Their arrangement in chains and reaction to Gram's method suffice to distinguish them. The chains are composed of from two to eight members. Schinz (117) notes the occasional presence of a specially large individual in such a chain. The average size is about 1.0 μ in diameter, some twenty per cent. larger than other streptococci. According to Menax (86) they are less numerous in the lacrimal than in the membranous form.

Parinaud found that these cases react much better to perchloride of mercury than to silver nitrate, a practical point in favour of exact diagnosis. The discovery of streptococci is also a warning of possible trichiasis.

In other respects the prognosis and treatment are governed more by the condition of the iris and lacrimal sac than by the microscopic finding.
Staphylococcal conjunctivitis.

The relation of staphylococci to conjunctivitis is not yet thoroughly understood. Whipple (133) doubts whether there is a form due directly to staphylococci. As Henle and Tietz mention, the difficulty here is that these organisms in greater or less numbers are an almost constant accompaniment of most forms of conjunctivitis especially if chronic.

According to Gounin (47) and Groenouw (50) cases of conjunctivitis may be considered as staphylococcal in which these organisms are present in relatively the greatest abundance, in the absence of other known pathogenic microbes such as gonococci or diplococci. Gounin admits that the presence of staphylococci do not necessarily mean that they are the cause of the affection, and he includes as “conjunctivitis due to staphylococci” only cases in which large numbers of staphylococci form the main feature of the microscopic appearance.

The practically constant presence of the non-pathogenic staphylococci allus is also a source of confusion, especially in connection with microscopic diagnosis, as it of course cannot be distinguished in this way.

According to Groenouw (50) the clinical appearances produced by this organism are (1) phlyctenular conjunctivitis, or a similar affection, (2) purulent or catarrhal, and (3) membranous conjunctivitis.
Stephenson (19, 9) mentions staphylocoecal conjunctivitis as a "pus infection of the conjunctiva", resembling clinically Wecks conjunctivitis, and having a tendency to phlyctenulate around the cornea and slight membranous exudation. It is frequently associated with impetigo or eczematous dermatitis of the eyelids or face.

Casini (33) had 97 cases, in which only staphylocoeci were present, but hesitates to ascribe a pathogenic action to them.

Per (99) attributed 19 cases of catarhal conjunctivitis, only 17 to staphylocoeci.

Jepp (64) and Monay and Petit (96) quote cases of membranous conjunctivitis due to staphylocoeci.

Such cases cannot be clinically recognised as staphylocoecal and yet they are necessary in connection with prophylaxis and treatment, as the prophylactic and other measures required in microbacillary and diphteretic conjunctivitis are not required in the staphylocoecal form which heals easily.

According to Schenz (117), Binne (12), Grelon (130) and others, staphylocoeci are easily recognised by their shape and grouping and positive reaction to Gram's method. They are round, about 0.7 µ in diameter, sometimes they vary in size; they tend to lie in irregular or grape-bunch-like clusters. Short chains of three or four members may occur and do not indicate staphylocoeci. They may be distinguished
from pneumococci by the absence of the capsule and lentiform shape and by the occurrence of other forms mixed up with the diplococci forms.

From gonococci they are distinguished by their positive reaction to Gram's method, and by their shape, grouping and more frequent extracellular and less frequent intracellular position. When they do occur inside the cells only a few pairs are seen as a rule, never the characteristic crowd of gonococci inside a leucocyte. Sometimes however the resemblance is close, in these cases Gram's method with short decolonisation is essential.

Staphylococci are much more commonly seen in connection with other organisms than alone, and it is in the former case only that their presence is to be regarded as causal. Their influence on prognosis and treatment, when seen along with organisms such as diplococci or diphtheria bacilli, is discussed with these forms.

The value of the diagnosis of staphylococcal septicemias is practically entirely negative, that is to say the prognosis is improved and the treatment simplified by the exclusion of more dangerous or more infectious forms.
Tubercular Conjunctivitis.

Primary tuberculous of the conjunctiva is so rare that it may be discussed very shortly.

Eyse (38) in 2,500 consecutive ophthalmic cases found only eight of tubercular conjunctivitis.

Other observers give the proportion as considerably less.

The clinical appearances seem to vary greatly, Eyse give the following five varieties:

1. With small ulcers.
2. With sub-conjunctival nodules.
3. With hypertrophied papillae and granulation tissue.
4. Exces sament excrecences of jelly-like consistency.
5. With pedunculated tumours—true conjunctival polypus.

Other varieties may occur. Lewy (77) gives a case of conjunctivitis diagnosed clinically as croupous and isolated, but which turned out to be tuberculous. Wagem (14) mentions the simulation of trachoma, a point carefully gone into by Heinzelhoff (58), who gives an illustrative case. His conclusion is that clinical diagnosis is insufficient.

Kirsch-Hirschfeld and Hausmann (71) describe three cases two of which resembled trachoma. They consider that in former times many cases of tuberculous infection have been treated as trachoma. Gurnein (48) notes a case of glanders clinically resembling tubercular conjunctivitis.

According to Eyse (38) it is often extremely difficult to satisfactorily settle the diagnosis without the aid of the microscope.
or even the inoculation of an animal with a fragment of the diseased tissue. Brodie (22) says that the latter is the most certain method, an opinion one must certainly subscribe to, adding the rider that it is also the most tedious and troublesome.

Vierecke (137) believes microscopic examination to be unnecessary, and Lumma (49) holds that clinical diagnosis is as a rule valid but may be supported and confirmed by bacteriological examination.

The search for indications of tuberculosis by the microscope is more troublesome than the previous examinations for other bacilli. The most rapid method is to smear a coverslip with scrapings from the floor of an ulcer or a collection and to stain this by Ziehl's method. If the stain is and apparatus sections may be prepared from a portion of the tissue.

The form and appearance of tubercle bacilli is well known. According to Kühne (87) they appear as thin rods 1.5 to 4.5 long, straight or slightly curved. Egge (38) describes them, as seen in sections, as lying scattered in the tissue without relation to the giant cells, singly or in groups of 3 up to rarely in groups of from ten to thirty. They are more easily found in cases belonging to groups (1), (2), and (6) than the others. In his 8 cases tubercle bacilli were seen in four and giant cells in five. In sections tubercules structure with giant cells may be seen without the bacilli.
Chung and Haemmer (53) give cases in which the bacilli were seen by the microscope. In Fischer's (39), Heinrichs (58) and Luyk's (77) and one of Berinst-Hirschfeld and Hausermann's cases, giant cells and tubercular cellular growth were seen but no bacilli. Arnaudine (3), Beise-Hirschfeld and Hausermann (21), Pupp (107) and Holt (62) report the success of the evergreen method of examination in demonstrating the bacilli either in debris from a nodule or in scrapings from an ulcer.

The discovery of tubercle bacilli makes the progress in view serious, as although some cases occur, often in genital tuberculosis. Beise-Hirschfeld and Hausermann (21) call attention to the modification in treatment indicated by the establishment of the tubercular nature of a case previously considered to be tuberculosis.

I think it will be reasonable to allow to microscopic examination the same value here as it has in the case of the opium from a case of suspected phthisis, that is, to consider it as a procedure giving strong support and confirmation to clinical diagnosis.
Other forms of Conjunctivitis due to infection.

Conjunctivitis due to the influenza bacillus has recently been described by Zen Hedden (144, 146), Suit (124) and Jundell (66) who have investigated about thirty cases.

Zen Hedden (144) describes a case of typical purulent conjunctivitis in a child two days old, which was supposed to be gonococcal. Microscopical examination, however, showed no gonococci, but enormous numbers of a small plump bacillus in oculo-bacillus, mostly extracellular in position and decolorized by Gram's method. Cultivation identified them with Quick's influenza bacillus. The same organism was subsequently found in two and simultaneous cases in one family, and this year Zen Hedden (146) gives an account of ten cases, nine of which occurred in children under one year.

The clinical picture varies from a mild extant to a purulent conjunctivitis. The majority of the cases were severe, a very mild form occurring only once, in a man of fifty years.

Zen Hedden's conclusion is that the influenza bacillus causes a mild to moderately severe conjunctivitis; affecting the balstbral conjunctiva and fornices. The clinical appearance is not characteristic. Infants are predisposed to this form and the younger they are the more severe the inflammation.

Suit (124) mentions a purulent case in a young adult, resembling gonococcal conjunctivitis, in which the influenza bacillus was found, and subsequently from more influenza cases.
Jundell (66) observed an epidemic of influenza affecting 102 children in an hospital. In some cases of conjunctivitis he found the influenza bacillus. Six cases were very mild, two were severe, and one was fulminant.

From the variability of the clinical appearances it is evident that clinical diagnosis cannot be relied upon. Although Jundell says the bacilli are not always well seen in cover-glass preparations, according to Jen Neden their appearance is characteristic and this method is reliable.

The bacilli are very small, robust, and avoid and decolourise by Gram's method. They differ from the Weeks bacilli in being thicker in proportion to their length than these are, and in being nearly intracellular. Although Smil, supports a movement and Jundell (66) in the view that the Weeks bacilli and the influenza bacilli are the same, Jen Neden says that the first glance excludes the former. In one of my preparations from a case of chronic catarhal conjunctivitis which the patient described as the "recurrence of influenza," there is a bacillus corresponding in shape and arrangement to that described and figured by Jen Neden (44). It is certainly quite distinct morphologically from the Weeks bacilli.

Jen Neden found staphylococci and pneumococci occasionally in addition, and in one case in which a membrane was present, staphylococci to whose agency he ascribed this formation. In my case numerous Gram staining organisms corresponding to Jen Neden bacilli were present.
According to Zin Bleden the prognosis is good as the affection is generally benign and if well treated heal in a short time without complications. He believes however that the eye may be primarily affected and that therefore this form of conjunctivitis is not to be regarded as a harmless condition, as it may be the precursor of general influenza infection.

Therefore the affection requires recognition and energetic treatment with a 2% silver nitrate solution.

The remaining microorganisms are the color bacillus mentioned by Berti (18), Gournier (60) and others, the pneumonia bacillus of Friedlander (84, 85, etc.), the meningococcus intracellularis (Fraenkel 42, Halstead 84), the ozena bacillus (Müller 88, etc.), the bacillus of glanders (Grafin 48, Pajerowski 131), the leprosy bacillus and several forms of mycosis, cases of conjunctivitis due to which are given by several authors.

The relation of most of these microorganisms to the present subject has already been discussed. From a practical point of view the distinctive identification of these organisms is of no particular advantage once the more important bacteria have been excluded as, except in the case of glanders and leprosy, the prognosis and treatment vary according to the clinical appearances rather than the pathogenic agents. The two exceptions are sore
that they can hardly be said to influence the general question under consideration.

The remaining forms of conjunctivitis in Group II of Gorrin's classification are phlyctenular conjunctivitis and trachoma.

The much discussed etiology of the former has no connection with the present subject. After searching the literature I have been unable to find any evidence that the very common affection generally known as phlyctenular conjunctivitis, which recurs so frequently in tuberculous or consumption children, can be distinguished from other forms of conjunctivitis by any positive character in the secretion.

On the other hand, there is abundant evidence which has already been given that this affection is to be distinguished from other, clinically similar, such as diploë axillary, microsaccial, or pneumoconital conjunctivitis, by the absence of any specific microorganism, when the secretion is microscopically examined.

The practical outcome is, that if such an examination give an indefinite or negative result the usual tonic treatment is indicated; if, however, a specific organism is found, the treatment must be modified in the direction of exterminating it by suitable measures.

I mean, that assume cases of trachoma or phlyctenular
conjunctivitis are associated with Weiss bacilli or diphterbacilli, and some are not, it is insufficient to base a treatment on the general and local condition of the patient as clinically observed, in ignorance of the presence or absence of such organisms.

The possibility of a combination of affections must of course be kept in mind.

In some cases, especially in the epidemic of micro-bacillary conjunctivitis discussed by Markus (80) the organisms present seem to have caused the phlyctenular, in others there may be, as Axenfeld (8) believes, purely the individual response to any irritant, depending more on the diathesis of the sufferer than the nature of the exciting cause. Thus one case of phlyctenular conjunctivitis may be infectious and another not, one may require Zinse treatment and another merely boracic lotion and a tonic, and in the absence of microscopic examination these points may be missed.

As regards follicular conjunctivitis and trachoma a similar state of affairs prevails, with this difference that, especially for the latter, from time to time specific organisms have been described, which were each in turn asserted to be causally related to the affection.

Sisson (123) after reviewing the work done on trachoma
fonds that the question of a causal organism is still in
status quo; not so Syedacker (132), who, after
minutely describing a small diplococcus which he
had isolated from cases of trachoma, and with which he
had produced a similar affection in the human subject,
says (p. 215)—"In the early stages of trachoma, and frequently
even after the lapse of some time, it is often impossible
by means of the methods now employed to state with certainty
whether the case before us is one of that disease or not. Can a
diagnosis be made with absolute positiveness?

Unquestionably yes. If one can find within the
secretions or in the contents of the expressed follicles, an
organism such as I have described, he may with absolute
certainty call the disease trachoma....

Recent writers, Addario (142), Duzinski (141), Gronowicki (140)
Menas (141) and others have failed to confirm Syedacker's
results. Ulthoff (132) quotes Nageli's view that trachoma
stands in the same relation to conjunctivitis as phlyctene, as
being the expression of a particular diathesis rather than the
result of a particular irritant. Ulthoff regards the various
diplococci described as indicating merely a mixed infection
with gonorrheoe, as Zin, Heiden (146) regards blastic bacillus
as merely the influenza bacillus in cases of trachoma.

According to Menas (141, 142), under added infection by
pathogenic organisms is often present and it is necessary to
appreciate the part they play. This may be done by microscopie
examination of the secretion. In diagnosing a case which presents appearances similar to those of trachoma two types of granulations must be borne in mind; those which constitute a hypertrophy induced by the chronic action of Wehr's bacilli or pneumococci and the true trachoma granulations which are independent of microorganisms. The two forms can be differentiated clinically and the former last only a few months. Although Wecker (141) holds that the diagnosis of trachoma rests rather upon clinical features than upon the absence of pathogenic organisms, Lenné thinks that the diagnosis should be reserved until this has been demonstrated.

Stephenson (129) points out that acute trachoma may be associated with the pneumococcus, bacillus pyrogenes and the diplococcus of Menax. Should a community containing sufferers from trachoma become infected with Wehr bacilli conjunctivitis, an intensely infectious form of trachoma is set up by which the disease is often spread. (Stephenson 129) Dedzinski (30) found the Wehr bacillus in acute cases and also the diplococcus of Menax.

Rudzinski (5), who agrees with the views of Cozzi mentioned above, found the Wehr bacillus in 8 out of 11 cases of acute superficial follicular conjunctivitis, and in 15 out of 42 cases of deep follicular conjunctivitis. In chronic cases he found only pneumococci and pus organisms.

Peters (102) finds that the diplococcus of Menax flourishes
on the trachomatous conjunctiva without producing any clinical alteration beyond slight secretion. The trachs bacillus causes extensive swelling of the conjunctiva associated with papillary growth in the neighbourhood of the ciliary border. Peter holds that in many cases of acute and subacute trachoma without secretion the trachs bacillus influences the duration of the affection on account of these obstinate swellings.

It is obvious that the detection of these organisms in cases of trachoma has a practical value, for, in order to produce the most favourable conditions for recovery, they must first be removed from the conjunctiva by appropriate means, after which the case remains a pure and uncomplicated trachoma.

The point suggested by Stephenson (129), that an individual suffering from trachoma with trachs bacilli is far more dangerous to his fellows than one suffering from either separately, is also of practical interest.

Thus in trachoma the use of the microscope may assist the diagnosis and indicate special points in the treatment.
Gowin classifies all remaining forms of conjunctivitis in a third group as spring, catarrhal, traumatic and chronic conjunctivitis. These forms all yield negative results to microscopic examination, which need only be undertaken in order to exclude the presence of any of the organisms already mentioned.

Spring and traumatic conjunctivitis are characterised by their history and appearance, but it will often be advisable to exclude the possibility of the superaddition of bacterial infection. The source applies with even more force to the catarrhal and chronic forms which only include cases, in which the absence of specific organisms, such as the diplococcus of lues, has been shown.
Appendix.

Microscopical Technique.

The method of making films is so well known that it is only necessary to mention here a few details, attention to which facilitates success, without lengthening the process. According to Henle and Beach (93) it is necessary to obtain a flake of secretion and to examine at the beginning or at the height of the inflammation, or else its causal nature may be missed and only accidental or non-pathogenic organisms seen.

My experience leads me to agree with them for the most part, for unless cells are obtained upon the slide it is very hard to find any organisms. Occasionally, however, in cases with very little watery secretion, I have found a considerable flake of diplococci of Henle on the slide with only a few or no cells, when it was impossible to obtain a flake of pus.

With regard to the second provision, I have found many cases only applying for advice after the acute stage has passed off. Possibly, if all cases came early, the number of positive diagnoses made microscopically might be much increased and the number of negative or indefinite results reduced. It is of course in the incipient or acute stage that the organisms are more easily found.

The secretion if possible should be taken from the
deeper part of the conjunctival sac rather than from the inner canthus. In the former position the pathogenic agent is more likely to be obtained in a pure state, in the latter greater numbers may be found as the secretion is to some extent concentrated there but also numbers of accidental organisms will be found as all foreign bodies from the conjunctiva are accumulated at this spot.

It is better to gently scrape the secretion over a coverslip or slide with a platinum wire, endeavoring to make as thin and even a layer as possible, than to squeeze it out between two coverslips, which distorts the cells and alters the natural relations of the organisms to each other and to the cells. For the same reason it is not advisable to add a drop of water to the secretion, so as not to alter the apparent relative proportions of organisms to cells in a fibrinous matter.

The proper amount of secretion to take is the least quantity which will make a thin film.

The film is dried over any smokeless flame. Holding it in the fingers ensures that it will not be overheated. It is unnecessary to fix the film either by corrosive sublimate or by passing it through the flame.

After staining, the coverslip may be mounted on a slide in Canada balsam, or if the preparation be made on a slide and it is not wished to keep it, a drop of cedar oil
may be applied and the coverslip dispensed with.

In ordinary work, especially where not very much
is being done everyday, as in general practice, I can
recommend to stain so much as thionin blue.

It should be applied for from ten to thirty seconds.
If time is a consideration a modified Pick and
Jacobson's stain may be used. (See P. 2, 108).
I have found the following a good formula—

Water 20 c.c.

Ziehl's Carbol-fuchsir. 50-60 drops.

Saturated alcoholic solution of methylene blue 20-40 drops.

Stain in this mixture for one second, not longer, wash
rapidly, and dry immediately in filter paper. The
cell bodies are stained pink and the nuclei blue and the
organisms blue or dark red. Yersinioe are beautifully
picked out by this stain. The original Pick and Jacobson's
(108) stain colours the cells and nuclei too weakly to
show the proper relations of the organisms to them, besides
requiring 8-10 seconds to operate.

If there is any doubt about the organisms seen, or if
Yersinioe or diphtheria bacilli are being looked for it is
necessary to stain a second preparation by Gram's
method. Axenfeld and Gruenewald give very similar
formulæ. I have found Axenfeld's plan answers very well and the preparation is complete within
five minutes. His solutions are as follows:
1) Methyl violet 5 to 8.8, Aniline oil 2, absolute alcohol 10. Mix just every fifteen days.

2) Iodine 1, potassium iodide 3, water 150.

3) Absolute alcohol.

4) Saturated aqueous solution of safranin.

After staining in (1) for 45 seconds, wash well, and dry the preparation in filter paper. Then dip the iodine solution for 25 seconds and dry, without washing. Decolourise for one minute in absolute alcohol. Wash and counterstain with safranin for 15 seconds. This method produces very pretty contrasts.

It is necessary to have a film very thin and very even if it is to be decolourised in one minute by absolute alcohol. It is further necessary to observe a time limit for decolourisation otherwise the method loses its value.

In dealing with Gram's work, Monax (84) considers that decolourisation should not be prolonged for more than half a minute, otherwise various staphylococci may also decolourise. My own experience leads me to believe that some staphylococci decolourise more quickly than others, and that clove oil applied for a minute destroys decolourise the bacillus.

If diphtheria is suspected Gram's method and Heidenhain's stain should be used as Stephenson recommends. It is unnecessary for me to give the formula for this stain here.

Brenstein (23) recommends that in staining diseases...
preparations longer time should be given than that allowed by Kii and distilled water should be used for washing, as the CO₂ in ordinary water spoils the colouring.

For tubercle bacilli, Ziehl's method is the one to use, which also hardly requires description here.

Conducted in this way, microscopic examination can hardly be said to be a laborious process. The preparation may be examined within less than five minutes, and in my opinion, the results repay the trouble.
My own work has consisted in the microscopic examination of the secretion in 108 cases of conjunctivitis in Edinburgh and Leith.

These divided the results obtained by the microscope into positive, that is, giving information about the nature of the case by demonstrating a characteristic organism, and negative in which no indications for prognosis and treatment were obtained. In this way, beyond the knowledge of the exclusion of other forms.

The negative cases include all in which the microscopists seen were too few in number to allow all their characteristics to be observed, such as their grouping and relation to the cells. No case has been classed as positive in which only one or two organisms were seen.

Clinically the cases were mostly extensive, of varying degrees of intensity. Unfortunately there were no severe acute cases, which would have made the aetiology interesting.

In 38 cases characteristic organisms whose connection with conjunctivitis is understood were seen. These are therefore classed as positive results.

Of the remainder 30 showed either very few or no bacteria, 11 showed large numbers of the Aerobic bacillus and 13 crowded of Staphylococci. As the presence of these organisms carries with it no special indications these cases are classed as negative.
<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Simple Catarrh</th>
<th>Stenosenoel (phlegmonous)</th>
<th>Purulent</th>
<th>Membranous</th>
<th>Totals</th>
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<tbody>
<tr>
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<td>4</td>
<td>12</td>
<td>9</td>
<td>5-</td>
<td>26</td>
</tr>
<tr>
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<td>1</td>
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<td>4</td>
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<td>24</td>
<td>32</td>
<td>25</td>
<td>21</td>
<td>105</td>
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</table>

In the catarrhal cases it will be observed that there are no acute cases associated with the diplococcus of Neisser, while both sub-acute and chronic microbacillary cases occurred.

In connection with diagnosis, nineteen cases presented clinical features resembling microbacillary conjunctivitis. On examination, the bacillus of Neisser was found in eleven, that of Neisser nonae, Neisseri bacillus in three, few organisms in two and more in two.
In eight cases in which the bacillus of Weeks was found, there was no clinical indication of its presence.

In thirteen cases diagnosed as diplococcic, the bacillus of Weeks was found in ten, while one was indefinite and two showed no organisms. In exactly the same number of cases, the same organism occurred without clinically betraying its presence.

Forty-nine cases gave no clinical signs sufficient to make any definite diagnosis. Of these, eight were micrococcal, nine diplococcic, two pneumococcic, one showed the influenza bacillus, seven Xerosis bacilli, eleven were indefinite and followed no organisms.

Sixteen cases presented philophthalme. Of these, three were associated with the bacillus of Weeks, two with that of Weeks, two with the Xerosis bacillus, while four were indefinite and five showed no organisms.

Five cases presented the features of what is commonly called subacute conjunctivitis. In three there was a subacute or chronic inflammation, without much secretion, and considerable photophobia. Usually, the complaint dated from an attack of measles. In these, the diplococcic of Weeks occurred three times, the pneumococcic once, and the other showed no organisms.

Two cases were associated with a thin grey adherent
pellecile. one showed pneumococci and the othcr (which
had been under treatment for some time before being
examined) stentis bacilli only.
In six cases there was associated blepharitis so
that they might have been called blepharo-conjunctivi-
cities. Three of these only were diplobacillary, so that,
in these cases at any rate, this feature is not
particularly associated with the diplobacillus.
Two cases only occurred in infants under three
months. Both had been attached on the third day
after birth. One was gonovocal and the other showed
enormous numbers of the diplobacillus of the max.

From the literature and from these cases I
have drawn the following conclusions.
1. The evidence is against the possibility of a complete
bacteriological classification of conjunctivites
in the present state of our knowledge.
2. For practical purposes such a classification is
not necessary.
3. The recognition in a practical way of the bacterial
factor in conjunctivitis is absolutely essential for
rational diagnosis, prognosis, and treatment.
4. Although in many cases a certain amount of
information may clinically be obtained on this
point, yet bacteriological examination is in all cases
of great service and quite essential in most.
5. The microscope affords a simple, rapid and—\textit{in practical purposes—} reliable method of bacteriologically examining a case.

6. In no way wish to suggest as a general principle that the morphological appearance of an microorganism is sufficient to distinguish it, yet I consider that, in the conjunction which has to a certain extent its own pathological flora, the microscopic appearance of the inflammatory exudate is in many cases sufficiently characteristic to afford indications for diagnosis, prognosis, and treatment, otherwise unobtainable, or obtainable only after delay.

7. Microscopic examination is a necessary part, if not the whole, of diagnosis. Its function is to support and confirm, it may be to amplify or cancel, clinical diagnosis, but not to supplant it.

I have to thank Dr. Perry, Dr. Mackay and Dr. Sym for their kindness in allowing me to use their cases.
Description of Preparations.

No. A.1. From nose in a boy of 4 years, with phlyctenulae.

The bacillus of Weeks are seen inside the phagocytes. He has

B.8. From a child of 14 months. Acute catarrhal conjunctivitis.

Face eczematous. The bacilli of Weeks are in great numbers, scattered and in masses on the epithelial cells. Stained Thionin blue.

C.27. From a woman of 66 with typical clinical features of diplobacillary conjunctivitis. Few leucocytes and large numbers of epithelial cells in the secretion. Th. blue.

D.128. From an infant three months old which had had one eye since the third day after birth. Fibrinous secretion with large numbers of diplobacilli. Stained Pick & Jacobson modified.

E.133. Also stained by Gram, showing numerous diplobacilli.

E.133. From an infant 4 weeks old. Slight purulent secretion.

Stained Pick & Jacobson modified and Gram.

F. 670. Mucopurulent conjunctivitis of two weeks duration in spite of treatment in a woman of 36, dating from an attack of influenza. The bacilli are quite unlike those of Weeks. The cocci bacilli are characteristically arranged. Stained P. J. mod. and Gram.


H. 33. Mucopurulent conjunctivitis of two weeks duration associated with keratitis in a girl of 16. These
are diplococci present which sometimes very closely resemble gonococci but there are very few leucocytes and the cocci are free and scattered. Stained P. I. J. (original formula) and Gram.

I. 87. Catarrhal conjunctivitis of two to three weeks duration in a girl of 13. Numerous staphylococci and diplococci, some decolourise by Gram, others do not. The resemblance to gonococci is only very superficial. Possibly in this case the decolourisation might have been absent if the manipulation had been more rapid.
Literature.

   Ref. in Michel-Hagel Jahresbericht. 1902, p.1900.
   p.263.

2. 1902. Audrard. A case of ophthalmia neonatorum caused by the diplopodes of Moos and Axenfeld.
   The American Journal of the Medical sciences.
   Vol. 123. No.2.

3. 1897. Arnaignac. Primary tubercle of the palpebral conjunctiva and of the canaliculi followed by
   pulmonary and laryngeal tuberculosis.

4. 1897. Angiolas. Congres Socieite francaise d'ophthal-
   and Recueil d'ophtalmologie July 1897.

5. 1896. Axenfeld. Congress of the Ophthalmological
   Society of Heidelberg. August 1896.

6. 1896. — A school epidemic of conjunctivitis
   caused by pneumococci.
   Aerztlicher Verein zu Marburg Nov. 6. 1896.
8. 1897. — Further experience of the chronic conjunctival conjunctivitis.

9. 1898. — How far are the so-called xerotic bacilli of the conjunctiva identical with the Hoffmann-Koëffler pseudo-diphtheria bacilli of the pharynx?
Berliner klinische Wochenschrift. 1898. p. 847.

Medical Society of Rostock. Nov. 12. 1898.
Ref. Annales d'oculistique. Vol. 120. p. 382.

11. 1902. — Answer to Dr. Schanz.
Last words to Dr. Schanz.


15. 1897. Bach and Heumann. Researches on different forms of
the so-called catarrhal conjunctivitis (simplex).
Archiv. für Augenheilkunde Vol 37. No 2.

16. 1898. — Researches on keratoconjunctivitis eczematosa
and conjunctivitis catarrhalis simplex.

17. 1897. Baumgardt. Researches on the pathogenesis and
etiology of diphteriae mucopus.
Berliner klinische Wochenschrift 1897 pp. 666-691.

18. 1899. Berti. Typical blennorrhoea neonatorum caused by
the bacterium coli commune.
Klinische Monatsblätter für Augenheilkunde Vol 37. p 311.

Annali di Oftalmologia, Pavia Vol 27. fasc. 2.

ophthalmo logical Society in Florence, October 1902.
On the frequency and pathogenic significance of
diphteriae bacilli and so-called xerosis bacilli
in the clinical picture of simple conjunctivitis.
Ref. Klinische Monatsblätter für Augenheilkunde.

Thus cases of conjunctival tuberculosis.
Klinische Monatsblätter für Augenheilkunde Vol 38
pp. 634-731.


Berliner klinische Wochenschrift 1900. p. 146.


Archives d'ophtalmologie. Nov. 1896.


Ref. Ophthalmic Record. October 1902.

34. 1898. Darier. Some therapeutic indications furnished by the bacteriological examination of conjunctival seerum.


38. 1897. — Tuberculosis of the conjunctiva.


56. 1898. Henkersdorff. On the occurrence of microorganisms resembling diphtheria bacilli (Henrics bacilli, bacillus septatus, bacille en masse) in the human conjunctival sac, especially in the normal conjunctiva, together with a contribution to the early diagnosis of diphtheria.

Von Graefe's Archiv. für Ophthalmologie Vol 46. fasc. 1. P 1-64.

57. 1898. — The rapid diagnosis of diphtheria, especially conjunctival diphtheria.


58. 1899. — Conjunctival tuberculosis with the appearance of trachoma.


59. 1902. Hertel. On three cases of serious bilateral pneumococcal infection of the eyes after measles.


60. 1899. Hoffmeier. On diplobacillary conjunctivitis.


Chicago Ophthalmological and Otological Society  
December 12, 1899.


63. 1895. Jessop. Transactions of the ophthalmological society  

64. 1902. — On membranous conjunctivitis.  
 Ibid. Vol 22, p 41, 1902.


66. 1903. Jundell. Some clinical and bacteriological  
observations on influenza conjunctivitis in infants.  
Ref. Klinische Monatsblätter für Augenheilkunde.  
Jahrgang 51, Band 1, p 71. Also annales d'oc. 1912, p 155.

Zeitschrift für Augenheilkunde, Jan 1899, p43.  
Ref. Annales d'oculistique Vol 2, p 140.

68. 1898. Ribbe. A plea for the more general use of the microscope in  
diagnosis by ophthalmologists.  

69. 1896. Rießer. The differential diagnosis of the causes of epidemic  
encephalitis meningitis and of aseptic meningitis.  
Berliner klinische Wochenschrift, Vol 33, p 628.

2. 1899. Huchtenberg. On a new kidney-shaped intracellular
pseudo-gonococcus, decolourising by Gram, on the
human conjunctiva.
Klinische Monatsblätter für Augenheilkunde, vol 37, p 271.

3. 1900. — Is the diplococcus described by me identical with the
gonococcus? Ibid. vol 38, p 289.

4. 1901. — Further observations on the gonococcus-like diplococci,
decolourising by Gram, on the human conjunctiva.
Ibid. vol 39, p 604.

5. 1897. La Grange. Société de Médecine et de Chimie de Bordeaux.

6. 1899. — Ibid. vol 121, p 128.

7. 1901. Levy. A contribution to the spontaneous healing and
clinical picture of conjunctival tuberculosis.
Klinische Monatsblätter für Augenheilkunde, vol 839, p 386.

Annales d'oculistique, vol 17, p 37.
79. Lundsgaard. Bacteriological research on conjunctivitis.


Bacteriological studies on conjunctivitis.

Franq. Dissertation, Copenhagen, 1900.


80. 1901. Markus. An epidemic of conjunctivitis (Schwellungskatarrh) caused by the Koch-Meheles bacillus.

Münchener medizinische Wochenschrift 1901, p. 2187.


82. 1901. Minne. Bacteriology in ophthalmic practice.


84. 1894. Monax. Bacteriological research on the etiology of acute conjunctivitis and on a reseau in ocular surgery.

Bibliothèque générale de médecine.


86. 1896. — Note on a diphtheriette, pathogenic for the human conjunctiva.

Annales de l’Institut Pasteur, 1896, Nov. 5, p. 337.

87. 1897. — Subacute conjunctivitis. A clinical and bacteriological study.

88. 1897. Morax. The microscopic examination of the secretion in conjunctivitis.


90. 1900. Answer to the open letter of Reckenberg.


Also Annales d'oculistique. Vol 122. p 394.


92. 1902. The diagnosis of granular conjunctivitis.

Bid. p 45.

93. 1896. Morax and Beach. The bacteriology of the different varieties of acute conjunctivitis in general and of acute contagious conjunctivitis in particular.


95. 1897. Müller. On the bacteriology of Trachoma.

Meine klinische Wochenschrift 1897 p 20 and p 986.


98. 1896. Plo. A clinical and bacteriological contribution on
the etiology and treatment of some cases of pseudomembranous
conjunctivitis. Journal de l'académie de médecine de Tunis.

Ref. Annales d'oculistique vol 116. p 156. (Miner)

99. 1902. — Clinical and bacteriological observations on
acute conjunctival catarrh.


100. 1897. Peters. On the connection between the xenobi-
bacillus and the diphtheria bacillus with remark on corneal conjunctivitis.

Deutsche medizinische Wochenschrift. 762, 5, 1897.

101. 1897. — On chronic diplococcal conjunctivitis.

Klinische Monatsblatter fur Augenheilkunde.
Vol. 35. p 181.

102. 1903. — Remarks on the question of trachoma.


103. 1897. Petet. On a particular form of corneal infection
of surpignous type.

Annales d'oculistique. v. 111. p 166.

104. 1902. — Clinical and bacteriological researches on the acute
infections of the cornea. Paris, 1900.

bacteria in dried preparations, especially the gonococcus

Klinische Monatsblätter für Augenheilkunde 1899, p. 369.


109. 1900. — Ophthalmia Neonatorum.

Journal of the American Medical Association 1900, Vol. 34, p. 221.

110. 1902. Roscher. The bacteriology of conjunctivitis.

Klinische Monatsblätter für Augenheilkunde. July 1902, Jahrgang 40, Band II.

111. 1901. Rykovitsch. The bacillus of acute infectious conjunctivitis and its relation to the influenza bacillus.

Russk. Arch. pathol. klin. med. i bakt., vol. 12, p. 481.


112. 1902. — On the microbiology of the normal conjunctiva.


113. 1896. Schanz. The significance of the so-called xerotic bacillus in the diagnosis of diphtheria.

Berliner klinische Wochenschrift, 1896, No. 6, p. 135.

114. 1897. — The differential diagnosis of the diphtheria bacillus.

Arch. 1897, p. 1092.
115. 1897. Schanz. The rapid diagnosis of Loefffer's diphtheria bacillus.

Berliner klinische Wochenschrift. 1897. p 48.

116. 1899. — The so-called tenuis bacillus and the noninvent Loeffler's bacilli.


117. 1899. — The bacteria of the eye.

Augenärztliche Unterrichtstafeln. Breslau. 1899.

118. 1900. — On the diphtheritic conjunctival inflammation.


119. 1901. — On the etiology of the eye-inflammations of the newborn.


120. 1902. — Ophthalmic bacteriology.


P. 247 + P 421.

121. 1901. Schlesinger. A contribution to diphtheria of the conjunctiva.


Ibid. No. 4. p 157.

123. 1898. Sisson. Bacteria one of the chief etiological factors in diseases of the eye.


125. 1896. Spronck. On the supposed "weakly virulent diphtheria bacilli" of
the conjunctival sac and the differentiation of the same from the genuine
Diphtheria bacilli by means of Behring's serum.

126. 1896. Standish. Congress of the Heidelberg ophthalmological


128. 1900. Stephenson. Diphtheria of the conjunctiva.

129. 1900. — Contagious Ophthalmia.
Medical Monograph Series. No1. London.

130. 1902. — Diphtheria of the Conjunctiva.
Transactions of the Ophthalmological Society of the United

Centralblatt für allgemeine Pathologie und pathologische
Anatomie. 1901. p 169.


133. 1897. Wulff. On the present condition of bacteriology in
Conjunctival and corneal inflammations.
Comptes rendus du Congres International de


Ref. Annales d'oculistique Vol 121. p 878.

138. 1900. Von Mummor. The diagnosis and treatment of purulent

ophthalmia of the neonate.

Münchener medizinische Wochenschrift 1900. h. 12.

139. 1901. Vorsese. A contribution to the etiology, pathology

and treatment of diphtheria of the conjunctiva.

Deutsche Praxis III. Heft 22.


Also Berliner klinische Wochenschrift 1901. p 1001.

140. 1894. Wachter. Tuberculosis of the eye and the result of the use

of Koch's Tuberculin.

Münchener medizinische Wochenschrift 1891. p 266.

141. 1902. de Wecker. The differential character of the granulations

and of the inflammations of the conjunctiva.

Annales d'oculistique Vol 128. p 41.

142. 1896. Weeks. The bacilli of acute conjunctival catarrh or

"Pink Eye."


144. 1900. Zur Kedde's. Disease of blennorhoea neonatorum caused by the influenza bacillus.

Klinische Monatsblätter für Augenheilkunde 1888. p. 178.

145. 1901. — Observations on diplobacillary conjunctivitis in the Royal University-Augenklinik in Bonn.

Klinische Monatsblätter für Augenheilkunde Jan. 1901.

146. 1903. — Conjunctivitis due to the influenza bacillus

Kbd., March 1903, p. 209.

Supplement.

147. 1892. Morax. Bacteriological and clinical research on catarrhal conjunctivitis.


Centralblatt für Bakteriologie. Originales