A STUDY OF TRACHOMA IN BALUCHISTAN.

THESIS

FOR THE M.D. DEGREE

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A STUDY OF TRACHOMA IN BALUCHISTAN.

I. INTRODUCTION AND SCOPE OF THESIS:-

Trachoma, though rarely found to any extent in the British Isles nowadays, is still one of the unsolved problems throughout the Empire and in the protectorates in the East.

In Egypt and Palestine the disease is still widespread, and one of the main causes of blindness and disablement among the masses. MacCallan[1], referring to the disease in the former country, states that, until quite recently, practically the whole indigenous population was infected.

In India likewise, the disease causes loss to the state, widespread misery and incapacity among the sufferers, and a problem to the medical authorities. Strother Smith[2], in his address on the subject at the Seventh Congress of the Far Eastern Association 1927, stated that it causes more blindness in the East than any other disease, and is one of the chief causes of blindness among the two million blind in India, while Wright[3], from his work in Madras, where trachoma is much less common than in Northern India, classifies it among the six eye affections causing most damage to the eyes in early life.

In studying the problem in relation to the enlistment of Army recruits in India, it was found that the knowledge of the disease here, and the methods for dealing with it, are much less advanced than in Egypt.

The Director Medical Services, India, in his most recent instructions (5th April 1932), regarding the enlistment of recruits suffering from trachoma concluded" It is evident that our difficulties in connection with trachoma have been greatly enhanced by our lack of knowledge of the disease as it occurs in India".

Since, in recent years,this Trachoma Problem has been the chief one among the eye diseases affecting the Army, this present investigation was carried out in various classes of soldiers and civilians,in an endeavour to obtain more accurate knowledge of the disease, as it occurs in the various classes of the people,and any differences resulting from their surroundings,mode of living,occupation,etc.

In this thesis, a study has been made of the disease in Baluchistan,the results being derived from the examination of troops serving here and comparisons made in the different classes and with the civilian inhabitants.

The treatments were carried out in active cases with the object of finding a short effective treatment for the disease which,bearing in mind ,the general illiteracy of the masses,their inherent dislike and fear of Western methods,would be suitable for use, not only in the hospitals and large institutions,but also by the village and bazaar doctors practising European methods.

From such a study of the incidence,nature ,and course of the disease as seen in Baluchistan,and comparisons with other observers in this and other countries,an insight is obtained of the measures necessary for combating the disease on a National scale.

SUMMARY OF LITERATURE AND HISTORICAL REMARKS.

II. EARLY HISTORY.

Trachoma can be traced back to the days of Hippocrates and Celsus,and even in the Egypt of the Pharoahs, epilation forceps for its trichiasis have been found in the excavations from the early Egyptian tombs,pointing to its existence at that time ,(vide Fuchs[4], Swanzy[5], Cuenod and Nataf[6], MacCallan[1], Wilson[7], etc),and it is established that the ancient Egyptians knew of its existence at least 1500 B.C.

Though the ancients knew and dealt[2] with Trachoma by methods still adopted by some today, there was not, until comparatively recently the differentiation made between it and the other more acute conjunctival infections,or at least as suggested by Wilson[7], it would appear that the difference was lost sight of.

EARLY CHRISTIAN PERIOD.

Ali Ibn el Aissa[8], an Arab of Christian origin,living in Baghdad in the Tenth Century,noted clearly the distinction between true trachoma and superadded conjunctivitis,and Omar el Mausili's works,written about 1000 A.D.,demonstrated the same differentiation.

LATER PERIOD.

Later,according to Talbot[9], trachoma was present in Italy, where it is thought to have been introduced by the Crusaders.

EIGHTEENTH AND NINETEENTH CENTURIES.

It was not till the end of the eighteenth and beginning of the nineteenth century that trachoma appeared to be widely prevalent in Europe. During the Napoleonic wars, the disease was widespread,affecting the French and British Armies,and later also those of Prussia and Austria

The history of these wars show that great numbers of the soldiers of France,Britain and Germany were infected with eye diseases during and after these campaigns. Thousands were temporarily incapacitated and others invalided back to Europe.

It was found that the nature of these affections varied, so that from the clinical manifestations,acuteness, course,results,etc,they could be differentiated.

First variety:rapidly spreading to whole armies,and though temporarily very acute,leaving no permanent blindness.
Acute Koch Weeks Conjunctivitis-

Second variety:similarly very acute,but resulting in a high percentage of permanent damage to eyesight.

The Gonococcal Egyptian Form.

Third Variety:leading to gradual impairment of vision with slowly advancing lid deformities,and corneal changes,becoming steadily worse after the soldiers had returned to their homes.- True Trachoma-

The British surgeons appear to get the credit of recognising and emphasising the contagious nature of these diseases,their spread from one individual to another, and from an infected eye to a healthy.

It would thus appear that in recent times,trachoma was brought to Europe from Egypt and the East,but according to MacCallan[1], there is nothing definitely known about its spread to China and India.References to scarificatio in the treatment of the disease,and operations for trichiasis are shown by SHROFF[10], to have been mentioned in the Indian classies by Sushrut on Ayurveda during the period of Laws and Philosophy,800-320 B.C.

However like most external eye affections,its home is probably in the East, and its lessening severity,though perhaps chiefly due to gradually improving hygienic conditions,may be the result of increasing immunity to a long endemic disease.

LAST FIFTY YEARS.

In the last fifty years, the knowledge of the contagiousness of the disease has never been seriously challenged,and though recently ,various other theories (vitamin deficiency lymphatism,etc) to which I will refer later,have been put forward,medical opinion today regards trachoma as a contagious disease.

PRESENT KNOWLEDGE AND CHANGE IN OPINION.

As a natural sequence to the generally accepted contagious nature of the disease,research in recent times has been concentrated on the finding of a microbic agent. Some workers, e.g.Hertzog[11], regard the disease as due to the organisms which cause the acute ophthalmias(Gonococcus, Koch Weeks Bac.etc),but these simple acute infections are still common in European countries where trachoma is now rare.

The majority have tried to find some specific agent not yet discovered and in these researches,various organisims have been blamed.

Towards the end of last century,various observers, Sattler[12], Michel,Petresco,etc,regarded various organisms found in the conjunctiva of trachomatous patients as the causal agents;some implicated a microsporon and others a sarcinus. In 1904,Raehlman[13],obtained an ultramicroscopic,filtrable virus which he considered the causal agent,but it has not been generally accepted as such,although,even in recent years Nicolle, Cuenod and Blaizot[14],

from their experiments on baboons and chimpanzees, concluded that the trachoma virus is filtrable. Guenod and Nataf[6], reassert this in their textbook on the disease(1930), while more recently they give the opinion that a filtrable virus is at least in part the causal agent in trachoma, whether alone or associated with an organism such as Noguchi's B. Granulosis.

Trapesontzewa,[15] on the other hand, as a result of inoculations carried out in human subjects with filtered material from trachoma cases, could produce no more than a transient inflammation, and is of the opinion that the cause of trachoma is a non-filtering virus.

The discovery of the inclusion bodies of Prowaczek and Halberstaedter,[16] for a considerable number of years, dwarfed all other findings in this field. These bodies, first found in the epithelial cells of the conjunctiva in trachoma were regarded as the causal organisms, and, though they are today regarded by many as being non-specific products of cell degeneration, some workers - Lindner,[17] Aust,[18] Taboriski-still[19] insist on their parasitic nature.

Collins and Mayo,[20] record that they have been found in normal conjunctivae and in the urinary tract and are probably chromatin filaments from cell degeneration by either pyknosis or hyperchromatosis. Von Szily,[21] and Solovieff,[22] likewise consider them to be products of nuclear degeneration.

Bengston,[23] induced Prowaczeki-like bodies in guinea-pigs by inoculating the conjunctiva with Gram-negative organisms from trachoma cases, so she thinks they are a modification of the organisms originally introduced.

Trapesontzewa[34] shows that degenerative changes in conjunctival epithelium are secondary, and due to the direct action of a virus which is fixed in the adenoid layer of the conjunctiva. However, what she considers the inclusion bodies are not accepted by Afanassiewa,[25] who completely disagrees with her interpretations.

So the present position regarding the most widely accepted view of the significance of inclusion bodies in trachoma is best summed up by Rivers[26] who concludes that "Under properly controlled conditions the presence of inclusions, accepted as significant, will undoubtedly in the majority of instances be indicative of the presence of a virus in the immediate vicinity".

Of the other theories on the causation of trachoma, that regarding its relationship to the lymphatic diathesis has been sponsored chiefly by Angelucci.[27] He, while pointing out the importance of constitutional states in the production of local disease conditions, has brought forward a lot of evidence to show that trachoma is an adenoid syndrome, that trachomatous children show marked activity and hypertrophy of tonsils and adenoids, and that their trachoma is improved and sometimes completely relieved by the treatment of adenoids. He does not, however, exclude a local organismal primary cause of trachoma, but considers that adenoidism produces a more suitable soil for the invasion.

Pascheff[28] also, in all his publications, has emphasised that "The Lymphatic constitution is an important factor". He also questions a relationship to tracheobronchial tuberculosis.

This general tendency for the disease to be more marked or more severe among patients of the lymphatic type is recognised by many (Cuenod and Nataf[6],Piquero[29], etc),but in countries where the disease is widespread such constitutional relationship seems secondary in importance to infection.

Other general conditions such as Syphilis and Tubercle have been found related, and as it is well known that as the disease is found to its greatest extent and in its most severe forms where hygienic conditions are worst it has been found in relation to vitamin deficiency.

In 1926 Royer[30], suggested that trachoma was a deficiency disease,and the same opinion is held in this country by Kirwan[31]. However experimental evidence of the relationship between trachoma and vitamin A deficiency was not shown by the work of Kendall and Gifford[32] on white rats, though the possibility of high resistance of the white rat to trachoma may negative these conclusions. That trachoma is definitely due to some vitamin deficiency has not been proved,for,though occurring in its worst forms under conditions where deficiences in diet are most frequent,such as in the very poor,in these conditions also,the opportunity for the contagious spread of such a disease is greatest.

Baldanzella[33], as the result of examination of 100 cases, found a high percentage giving positive skin tuberculin reactions,so concludes that the local trachomatous nodule bears a close relationship in its development, cause and final result to that of the tubercle nodule.

Fehmi[34] has drawn attention to the efficacy of Tuberculin therapy in trachoma,while Janawoska[35], in the examination of 500 tuberculosis cases for trachoma,found no definite relationship.

It would seem that, as regarded by Cuenod[6] and Nataf, any relationship is no more than that there is a soil favourable to the two diseases; while, on the other hand Angelucci[27] has insisted on an opposition between Trachoma and Phthisis.

The greatest stimulus to trachoma research in recent years was the discovery by Noguchi[36] in 1927 of his Bacillus Granulosis from cases of the disease in North American Indians. This organism which he isolated was a small Gram-negative rod, resembling Bacillus Xerosis and the diphtheroids, which required special mediae for its growth and under certain conditions showed motility.

Inoculations of pure culture in the conjunctivae of Macacus Rhesus monkeys produced a granular conjunctivitis resembling trachoma. Inoculations of crushed infected conjunctival material, however, failed to give the disease. In a later posthumous communication he recorded transfer of the disease from monkeys of the Rhesus type to Chimpanzees and back to Rhesus again, but isolation was difficult.

The position of the investigation at the time of Noguchi's death was according to his statement "Whether or not the parasite is related to forms of trachoma other than that occuring in American Indians remains, of course to be determined by the isolation of the micro-organism from cases in other localities, and possibly also by serologic examination".

His investigations have been carried on by Olitsky,[37] who, after isolation of the organism has produced, in Macacus Rhesus monkeys, typical trachoma follicles with scar formation; the lesions corresponding mainly to early trachoma (Tr.I of MacCallan). In later work Olitsky, Knutti, and Tyler,[38] by introducing secondary infection, with the organisms found in the conjunctiva in trachoma and the acute ophthalmias, have produced more advanced lesions corresponding to Tr.II b and IIc of MacCallan, but without Pannus or lid deformity from the scarring.

Investigations on these lines have been carried out in various countries, but so far most positive results have been recorded by the observers in America.

In 1931 Finoff and Thygeson[39] recovered an organism indentical with Bacillus Granulosis from 6 out of 13 infected individuals; they claim to have produced pannus and advanced scarring in all but 2 cases, so they conclude that B.Granulosis is at least more characteristic of trachoma than Prowaczeki and other cell bodies, and explain the failures of other investigators by their use of unsuitable media and lack of the optimum 30°C temperature for growth, and emphasise the fact that the organism is easily destroyed by even weak solutions of cocain.

Thygeson[40] in a more recent paper concludes that monkey inoculation alone will not prove the aetiologic relationship of B.Granulosis to trachoma, but that human inoculations are necessary.

Among observers elsewhere Lumbroso[41] and Cuenod and Nataf[6] in Tunis have claimed successes. The former isolated an organism like B.Granulosis in 5 out of 7 cases of Trachoma and produced granular changes in healthy baboons so he favours Noguchi's claims. In a later communication

he records results obtained with new strains, and grades them A,B and C of which type B is found to give the most marked lesions in monkeys and human-beings and he concludes that it may be concerned in the aetiology of trachoma.

The latter workers from their work upon chimpanzees and magots(Macacus Innuus) consider that they have produced a typical experimental trachoma is these animals. They sound a warning, however, regarding monkey experimenting, as does also Nicolle, that all except the Algerian baboon (Macacus Inuus) are unsuitable as they may get a granular conjunctivitis from simple scarification of the conjunctiva.

Reimann and Pillat[42] likewise got an organism like B. Granulosis which gave a folliculitis in monkeys, but was not typically trachoma.

Addario[43] working in Italy, has confirmed Noguchi's findings and in later experiments has infected a blind human eye with cultures of B.Granulosis. Baroni and Michael[44] also report the inoculation of blind eyes with trachoma, after an incubation period of 5 to 7 days, the virus having been conserved in glycerine for varying periods.

Ochi[45] and Nogami[46] isolated organisms like the causal agent of the epizootic lymphangitis occurring in horses and cattle, which proved negative on animal inoculation and positive to human beings and was agglutinated in high dilutions by the serum of trachomatous patients.

Other observers such as Tong,[47] and Morax[48] and Nida[49] have failed to obtain results like Noguchi and the American observers. Tong[47] failed to cultivate B.Granulosis, and could only isolate one organism like it which was a-typical and produced no lesion in rabbits or monkeys, while the latter observers obtained negative results with

Noguchi's, Olitsky's and Lumbroso's strains. So, Howard, summarizing the results of recent investigations in the etiology of trachoma considers that "The possibility of Bacteruim Granulosis as the etiological agent must still hang in the balance until further studies have been pursued". Lastly, Noguchi's findings have not yet been verified by workers in Egypt, the home of trachoma, and until this is done, considerable doubt must remain regarding the role of B.Granulosis in the causation of the disease.

Wilson, working in Egypt, has reported failures from 1929 onwards, and in the 5th Annual Report of the Giza Memorial Hospital Laboratory summarizes his results as follows:-

1. Pure cultures of B.Granulosis in 13 monkeys utterly failed to produce chronic granular conjunctivitis.
2. Inoculations of monkeys with infected monkey tissue (animals infected in the United States with B.Granulosis and brought to Egypt) or secretions therefrom never failed to give good positive results even in monkeys refractory to pure cultures.
3. B.Granulosis is capable of inducing in the human conjunctiva an acute conjunctivitis of short duration. The inflammation is accompained by granular lesions which, however, disappear without treatment leaving no permanent sequelae.
4. Tissue transfers from monkey to human conjunctiva have so far failed to produce granular lesions.
5. B.Granulosis has never been recovered from Egyptian trachoma.

Such are the advances made up to the present time regarding the organismal cause of trachoma, and though there are greatly varying views, the trend of opinion is to regard an organism, probably Noguchi's B.Granulosis, whether modified or in conjunction with another as yet unknown element,

such as a filter-passer,as the most likely cause of the disease,while the cell inclusion bodies are regarded at the most, as non-specific evidence of microbic activity in the tissues where they are found.

Even earlier than these,researches into the nature of the disease have been those carried out on the pathological anatomy of the condition. Over more than sixty years ago important observations were made on this,though then as at present,different interpretations were given to the findings.

De Graefe,[52] Wolfring,[53] Blumberg[54] and Scmid[55] compared the lesion to the lymphatic follicle,while Saemisch,[56] Hairion,[57] and de Wecker[58] regarded it more as a lymphoblastic neoplasm.

Later observers including Villard,[59] Ivanof,[60] and Junius[61] amplified these findings till the discovery by Prowaczek and Halbestaedter[16] focussed attention on their intracellular bodies. As I have previously mentioned,in the opinion of most workers the significance of these has lessened.

The interpertation of histo-pathological findings given by Stanculeanu,[62] Solovieff,[63] Michael,[64] Aubaret,[65] Collins and Mayou,[20] Cuenod and Nataf,[6] etc,indicate the present position of this work.

Thus in a stained section of the trachomatous lid(best by Pappenheim's methylene green method) there is found considerable thickening of the conjunctival mucous lining,chiefly at and above the superior tarsus.This is found to be due to diffuse infiltration of the adenoid layer extending into the chorion and prolongated towards the free surface as a collection of small fringes which are pressed together and covered by epithelium. These are the papillae,which,however,are also found in other chronic inflammatory lid conditions.

In between them in the subepithelial layer are seen very large round or oval bodies 0.5 to 2mm in diam.,sometimes more in evidence than the papillae- These are the characteri-istic trachoma follicles. The centre of the follicles is made up of large lymphocytes 12 to 20 M diam,and among them certain modified endothelial cells the cells of Villard[59] and Leber-which are regarded as phagocytic in nature ,together with rudimentary bloodvessels and,specially in the older follicles,a quantity of cellular debris.Here we have the germinating centres of the follicles regarded as typical of trachoma,and characterised by karyokinesis and multiplication of the cells.

The peripheral follicular zone is made up of small lymph-ocytes 6 to 8M diam,with scattered plasma cells throughout. In the later stages fibroblasts are present in quantity, corresponding with the natural healing of the disease,and if,as may happen in the later periods,the follicles have ruptured on the surface polymorphonuclear leucocytes are in greater evidence indicating superadded secondary infection infection from the surface.

The conjunctival epithelium over the follicles is seen to be altered,often flattened in type,thicker than normal and infiltrated with lymphocytes,or it may be thinner or have disappeared in part.The surface cells are often seen to contain Prowazek bodies. Alterations in Krause's glands,in the form of pericaniculitis and periadenitis are very often seen and are considered by Michael[66] to be the initial trachoma changes.

Scrapings from the conjunctival surface of the follicles show similar cells present e.g.large and small lymphocytes a few red cells, true epithelial cells,the endothelial cells of Leber,showing marked fragmentation and karyokinesis, plasma cells, organisms of complications,polymorphs and fibroblasts,these last depending on the stage of the disease.

By this method the Prowaczek bodies are easily demonstrable in the epithelial cells and such a collection as above enumerated is considered almost certain evidence of trachoma.

Pascheff,[67] who for over twenty-five years has concentrated his attention on the histopathology of trachoma, has in his most recent work emphasised the charactistic features of trachoma as he has found it in Bulgaria, and the essentials wherein it differs from allied conditions. He classifies follicular disease of the conjunctiva into three kinds:-

1. Conjunctivitis follicularis simplex: in which follicles are found in the fornices and which are lymphocytic infiltrations, with few if any generative centres, and considers this is possibly the reason why such follicles disappear without leaving scars.

2. Conjunctivitis or ophthalmia follicularis miliaris: A very rare condition first described by him in 1916, and charactised by miliary follicles with germinating centres, occurring in the scleral conjunctiva and even throughout the cornea, and followed by cicatrisation and Kerophthalmia.

3. Conjunctivitis (hyperplastica) follicularis confluens or folliculomatosa:- This is true trachoma and differs from the abovementioned conditions in its follicles containing germinating centres which even coalesce into what he has termed folliculomas, showing that it" is the result not only of lymphocytic local infiltration, but of intensive lymphoblastic and endothelioid germination giving birth to many follicles and folliculomas".

This he considers the essential of the lesion, and he demonstrates histologically that pannus is true trachoma of the cornea and not a simple complication, and proves the existence of trachomatous follicles in the cornea.

In this he differs from Quenod and Nataf[6] who consider that true corneal follicles have not yet been satisfactorily demonstrated(A more recent communication[68] by the latter authors show that,as a result of biomicroscopic study they have modified this view) Pascheff's view however,has been confirmed by Morax,[69] Addario,[70] Collins and Mayou,[20] etc,and is in accordance with the clinical findings of Herbert,[71] and others to,which I will refer later.

As the result of his research Pascheff has formulated four laws of trachoma:-

1. There is no trachoma without follicles.
2. The trachoma follicle is a confluent follicle.
3. The folliculoma of trachoma can develop on the cornea as well as on the conjunctiva.
4. True trachoma(like all Lymphadenoid tissue) finally passes into spontaneous cicatrization or hyaline degeneration.

The most modern addition to these histological findings in trachoma is that obtained by the study of the living histology by means of biomicroscopy using Gullstrand's methods.This has beem carried out by Dusseldorp.[72] In the different stages of the disease,corresponding to McCallan's clinical classification he found:-

In Tr.I,increased vascularisation of the conjunctiva with an increase in the capillary network,the small subepithelial end-vessels terminating in a distinct capillary bunch showing as a multitude of small red points,with in between pale,circular spaces. These latter are the trachomatous follicles,and they are bigger,more numerous and less transparent than the normal lymph follicles,and are always more or less encircled by little bloodvessels,and situated at the bifurcation of these capillaries,or between the parent and young branches.

In Tr.IIa, the large vessels are much less prominent and the capillary network has disappeared, while the surface shows as a mosaic composed of little irregular plaques, quite defined and forming diamond and hexagonal shapes. Each of these is coloured by a red dot; a cluster of fine capillaries as in stage Tr I. These plaques represent the ends of the papillae which are thus hypertrophied and pressed together.

Scattered here and there and defined by the papillae are hyaline opalescent swellings sometimes bi or tri-lobed 4 to 6 times the size of the papillae, with capillaries around and in their centres.-the characteristic trachoma follicles.

In Tr.III and IV, here is found cicatrization to a greater or less degree with islands of granulations in between the fibrous tracts, and the formation of Arlt's[73] Line and star cicatrices which are characteristic.

By the aid of biomicroscopy, in trachomatous pannus it is found that, where the limbus is crossed by the new-formed fine parallel capillaries, the epithelium is very lightly raised by little elevations of 0.2 to 0.4 diam. They are simple opaque spots which may form in a ring inside the limbal curve, and are neatly situated in between the capillary trunks which go on arborising in branches deep to the epithelium. All the vascular region of the cornea has a greyish appearance and in between the vessels there is a linear formation suggesting lymph channels. These are the elevations previously described by Bonnet[74], the controversial corneal follicles, and they occasionally result in little depressions described by Herbert[71] a considerable time previous to Bonnet's observation.

In the clinical field the greatest achievements have been due to MacCallan,[75] and his successors in Egypt. Not only have they brought out the distinction which has been made between trachoma and the other ophthalmias even from olden times, but have distinguished between the uncomplicated disease and the changed clinical picture resulting from secondary infections. Still more important is MacCallan's classification of the disease into different stages, which has greatly simplified its study and requires much more universal adoption.

It is referred to by Strother Smith,[2] in India, and has been adopted by Cuenod and Nataf[6] in Tunis. It is seen from the literature that observers elsewhere (Collins and Mayou,[20] Puscariu,[76] Szymanski,[77] and others) recognise that many of the so called different forms of the disease are really only different stages in the trachomatous process, but lack of uniformity in the clinical study, however, is apt to result in confusion. Thus one finds that Trapesontzeva[78] records that trachoma is not contagious in its "Late cicatricial form". This observation obviously refers to MacCallan's TrIV, which is clearly shown by the latter to be healed trachoma after all active infections inflammation has subsided-the final stage, the result of previous trachoma.

Szymanski[77] offers a different classification into various forms and stages, which, however, is much too involved for practical use.

MacCallan's classification on the other hand has stood the test of time, and has resulted in a great increase in the knowledge of the disease. With it as a basis and minor modifications depending on the climatic, social, etc differences of the observers' country in comparison with Egypt (as I will attempt to show later comparing India)

the complex clinical manifestations of trachoma are easily understood, and greatly simplified for working and teaching purposes,and for treatment to be efficiently carried out on a national scale; for the treatment depends entirely on the stage in which the disease is seen.

MacCallan[75] has classified the disease as follows:-

Stage I or TrI Early stage of "Pin's head"follicles.

" II or TrII subdivided into

TrIIa where follicles are large and gelatinous

TrIIb1 papillary enlargement as well as follicles

TrIIb11 follicles with the added complication of spring Catarrh.

TrIIc trachoma complicated by gonococcal conjunctivitis.

" III orTrIII where cicatrization has commenced: often non-contagious.

" IV or TrIV where cicatrization of the conjunctiva is complete.

This stage is non-contagious.

This classification is practically self explanatory. Wilson,carrying on MacCallan's work,has added an earlier "Prototrachomatous" Stage before any actual trachoma signs are present,practically indistinguishable from mild chronic conjunctivitis,but which he finds always develops into true trachoma.

It is charactised by increased vascularity in the vascular network of the lid conjunctiva,with red punctations,and a stippling of the surface,a picture resembling that described by Dusseldorp[72] under the slit-lamp.

The history of trachoma diagnosis is partly seen from the references I have already given,showing the progress of the disease through the ages,starting with the recognition of it as a separate entity by the ancient Greeks and Egyptians,and the confusion which appears to have occurred in the later period upto the records of the

Napoleonic wars,after which it was again clearly separated from the other ophthalmias.

The separation is now firmly established,and uncomplicated(by this I mean not secondarily infected with superadded conjunctivitis),well-marked trachoma,e.g.with pannus and lid deformity,or cases showing the corneal signs described by Millet[79] and referred to by Aubaret[80], can be easily differentiated clinically but,as pointed out by the latter author, Wilson,[7] Cuenod and Nataf[6] and most modern authorities,the modern diagnostic difficulty is with the disease in the early stages, and still the question is asked " What is trachoma"?

The main problem is to distinguish trachoma from innocent conjunctival affections showing follicular growths. At present this is based on clinical differences,to which I shall refer later,and on the findings in the scrapings which have been mentioned in the review of the histopathology. However,in the stage of the disease where the difficulty is greatest ,-namely early Tr I-it is not feasible to excise the conjunctiva and tarsus of the affected lid for section,and the acurracy of the diagnosis depends on the clinical experience of the observer.This point is emphasised by MacCallan[1] who states as his experience" that a period of two years special ophthalmic work under the continuous supervision of a highly qualified surgeon is necessary before a graduate in medicine is made fit to be placed in charge of a clinic which may be mainly for trachomatous persons".

Until the specific organism causing the disease has been satisfactorily demonstrated the problem must remain ,and so far none of the diagnostic tests or reactions have proved infallible.

That of Abderhalden used by Dejust Defoil[81] is a general reaction common to a large number of infections,and has not proved of practical value; while the blood changes,

especially the eosinophilia, have not yet been proved satisfactorily to be free from the fallacy of greatly increased eosinophil counts so regularly found in the non-trachomatous in tropical countries, resulting from other causes e.g. helminthiasis, etc., vide results of Marcus and Weiner[82], and Francois[83].

Similarly the recently reported findings of Pascheff[68], of an increase of the blood's lymphatic elements does not agree with the previously accepted formula of Sgrosso[84], namely eosinophilia plus leucopenia, nor have investigations in to the serological reactions in trachoma to Sachs-Georgi Kahn and other tests, such as that carried out by Haig[85], given any constant results.

The intradermic reaction of Tricoire[86] has not completely satisfied other workers than the author. Its antigen is prepared from trachomatous material from follicles in untreated cases, which is triturated and left to macerate at 37° C for two weeks after which the product is centrifuged, the supernatant fluid drawn off and diluted with one volume of physiologic salt solution. Tinct. Iod. 2 drops to 10 cc is added as a preservative. The dose intradermally is o.25cc, the positive reaction of a painless red papule (persisting for two to three days) appears 48 hours after inoculation. The author has recently reported positive results in 68% of trachomatous individuals. Mickelian[87] has previously reported the same figure, apart from patients presenting a general lymphatic constitution, while he has failed to demonstrate a specific intradermal reaction using B. Granulosis filtrate as emulsion, while Sedan's[88] results using Tricoire's methods are not conclusive.

On the other hand Belot[89], from an examination of 400 trachomatous and 111 non-trachomatous individuals found the test positive in 59% of the former and 43% of the latter, and is inclined to consider the test of no practical value.

The treatment methods of the early physicians are still in modified forms used by some today.
The curettage or scraping was practised by Hippocrates and his students who used a skein of rough wool for the purpose. Others used a fig leaf for the same ,while these early efforts were perfected by Paul of Aegina in using what he termed Blepharoxystron.
Massage of the membrane is said to date from the time of Severus,who first upheld the specificity of the disease.He performed this with his finger covered with a copper salve. Boracic powder was used by Costomyris.

At the present day the treatments in use for trachoma are legion,some of which I will enumerate;and vary from this curettage and massage under some guise,through the strong caustic and antiseptic agents to end with the newer aids of surgery,electrotherapy and biochemistry.

1 Simple Scraping: though generally conjunctival scraping is followed by the local application of some caustic,this method alone is still employed today in Eastern countries and found useful especially in severe cases.Peters[90] has recommended it as the best means of preventing scarring.

2 Simple Massage: also long in use ,is still strongly advocated by Likiernik[91] and Rechnitzer[92], the latter of whom employs a cottonwool covered glass rod for the purpose and attributes the benefit to the local depletion resulting.

3.Strong Caustics: of these,various have been employed, the two which have been for long found most useful being silver nitrate and copper sulphate,and they are referred to in the treatment of trachoma in various standard textbooks(Fuchs[4], de Schweinitz[93], Swanzy[5], etc.). Silver nitrate used chiefly in 2% solution painted on the affected conjunctiva has proved most useful in the treatment of the disease when complicated with

a secondary conjunctivitis, the drawbacks to its use being a lack of response after a time B Argyrosis of the conjunctiva. MacCallan uses it thus in TrI. In the form of a silver stick it is used by Cuenod and Nataf[6], and Strother Smith[2], who also uses the drug in the form of 15% solution over a short period.

Copper sulphate in the form of bluestone has been greatly used in the active stage TrII and TrIII, and also as 2 % drops or ointment, or combined with silver (Ung. Cupro-Argenti (Italian)), but for a successful result its applications have to be continued over a period of six months or even considerably longer.

Jequitry in powder or infusion was introduced for this purpose by de Wecker in 1882, and used by him and Panas (1883) Its use resulted in a profound inflammatory reaction, which was often followed by marked improvement in the trachomatous condition. De Lapersonne[94], in advocating the use of glycerine extract of the same drug under the name of Jequitrol, reports good results and absence of corneal complications occasionally caused by jequitry. Cassimatis[95] has used Jequitrol in four grades in Egypt, the first two producing only a feeble reaction and the latter giving marked acute inflammation which, if excessive is controlled by Anti-jequitry serum, and has found it of considerable value.

Iodine has been used considerably, chiefly by Russian and Polish workers, beginning with Nieznamoff[96] in 1895, in 1 to 3% solution in white vaseline, and recently in 10% tincture by Neumann[97], who has found it of value in severe cases which were either aggravated or not improved by silver or copper. In Kashmir it is used with carbolic as 10% Iodised Phenol.

4. Scraping or Expression plus Strong Caustics or Antiseptics

this method in some form is probably the most widely used today. MacCallan[1 &75] and the Egyptian workers and Holland in[98]

Shikarpur and Quetta use expression by Grady's forceps or curetting, together with swabbing of the denuded conjunctva with Hydrarg.Perchlor.1%. McHenry[99] carries out a similar procedure using a Graefe's knife, followed by Hydrarg.Perchlor 1 in 500 and 20% Ung.Iodoform.Fox[100] in treating cases of the disease among Red Indians in North America uses a similar method, while Howard,[101] working in China favours the same procedure, but Pillat[102] working in the same country prefers copper sulphate. Strother Smith relies on swabbing of the affected surface with 20% silver nitrate, after washings with 1 in 80 Electrolytic Chlorine solution, and scraping with Volkman's spoon in severe cases.

5.Massage plus Mild Stimulate:-Pellathy and Schneider[103] recommend sodium bicarbonate in powder or solution for this, which was suggested to them by a displacement of the hydrogen-ion concentration towards an acid reaction in trachoma, and gave good results. Martinez Salaberry,[104] has used finely powdered sodium chloride for the same purpose and has found it comparitively painless and giving 80% clinical cures.

6.Subconjunctival Irritants: are also in general use, chiefly cyanide of mercury. This has been used by Cuendet and Natal[6] in their Xysis treatment of trachoma for the past twentyfive years. This treatment consists of an active curettage of the whole of the palpebral and the affected limbal area of the conjunctiva after full cocainization, and followed by subconjunctival injection of 0.1 to 0.2cc of a cocain, mercury cyanide solution viz :-

Hydrarg.cyan...	...	...	0 gr 14
Dionin ...	...	...	0 gr 10
Cocain.Hydrochlor	...	...	0 gr 20
Aqua distill	...	..ad	20 gramm.

The procedure is followed by considerable reaction and may necessitate atropin to prevent corneal complications and ointments in case of symblepharon, and followed by twice-weekly copper sulphate drops or ointments for about

two months.The second eye can be done about ten days after the first. The authors claim 75% cure after a treatment of some months duration following a single throughly carried out Xysis.

Subconjunctival injections of cyanide of mercury have also been used for pannus and the corneal complications of the disease.[105] Sedan, while recognising ill effects from the drug in stronger solutions,has found much benefit from injections of 1 in 5000 combined with cocain.[106] Fuchs, in discussing the rationale of trachoma treatment,has argued that ,since trachoma follicles are situated in the deeper layers of the conjunctiva,they are more likely to be affected by sub-conjunctival applications than by treatment of the surface.

On the other hand Strother Smith,in reviewing his own earlier good results with subconjunctival cyanide ,is forced to conclude that the cases which responded were not true trachoma,but innocent follicular conjunctivitis.However, Sedan's successes with the treatment of the corneal manifestations,though not specific,are borne out by the benefit obtained from the use of subconjunctival mercury cyanide or even hypertonic saline,both in ordinary septic, dendritic and in trachomatous corneal infiltrates and ulcerations.

7.Chaulmoogra Oil:-is one of the drugs more recently employed in trachoma,and is now widely used,but its true position in relation to the older remedies has not yet been proved.[107] Introduced by Delanoe who used it every alternate day on a cotton-wool-covered probe,it is massaged over the affected area generating a soapy foam,and sufficiently firmly to cause slight oozing leaving a bleeding surface. This is the method still in general use.Its efficacy is upheld by Foa,[108] who states that the average course of treatment is eight to twelve weeks,by Labernade and Govindaradjassamy[109] , and by Gubbay[110] who,after using the drug :

in Kashmir for over two years ,has given up all other forms of treatment,and suggests 10 to 15 treatments,daily or on alternate days,as sufficient. Wilson,however,conclud-es that it is not a specific but its application gives as good a result as any of the more commonly used substances, while Bernard[111] working in Tangiers,where however,he states trachoma is extremely rare,regarded its efficiency as definitely inferior to copper sulphate , Regarding this finding it is to be noted that in the Fifth Annual Report Giza Memorial Ophthalmic Laboratory 1930 good results are recorded from the use of "Tragynol" (Bayer) a preparation of neutral chaulmoogra oil combined with copper sulphate in ointment form,and the conculsions are that with this preparation there is obtained:-

1 More rapid scar formation.

2 Uniformity of scarring,without lid deformity.

3 Good toleration.

4 No serious complications,though occasionally a temporary corneal infiltration.

8 Specific Agents: so far unfortunately there has been no true specific for trachoma but the drugs used in this sense have been employed subconjunctivally and intravenously.

(a) "Tracolysin" was introduced by Angelucci[112] and consists of glycerophosphate and nucleinate of soda with some phenol .He used it in about 1cc doses subconjunctivally in the lower cul-de-sac twice weekly.His pupil Nicolle de Feda[113] also records excellent results, while Salvati[114] found that under its effect trachoma follicles undergo obsorption and corneal complications soon disappear.Thirty was the maximum number of injections found necessary.

Stastnik[115] , has employed injections of this sulphate and copper sulphate intravenously ,a total of ten injections being given,with only mild systemic effects and good results.Wilson[116] has likewise used 4% copper ammonium sulphate,

0.5cc to 4cc daily for 14 days,and found acute cases responded well,but no change in thick pannus etc.

9.Carbon dioxide Snow: Harrison Butler,[117] used this successfully in Palestine and Sjogren[118] working in Sweden,judging from his results in over 40 cases ,strongly recommends it. He indicates the technique most suitable and the precautions necessary,and reports extrusion and absorption of superficial and deep follicles after the reactionary oedema and pseudomembrane formation;however, the usual after-treatment with copper etc is still required.

10.Physiotherapy:-(a)Ionisation,chiefly with copper sulphate has been used by the Russian workers Donin[119] and Malkin.[120] They conclude that it has no specific value but is useful only as an adjunct to other established methods.

(b) Diathermy was first advocated by Monbrun,[121,122] who uses sterilised sewing needles for the application of the current and applications of one to two seconds.He considers secondary infection a contraindication for this method.Norms and Bidault,[123] have also obtained encouraging results with the same technique,giving applications at from 10 to 12 points at a sitting,with intervals of 6 to 8 days between the treatments.The success of this method is also reported by Kalloch,[124] Ragain,[125] and more recently by Coppez,[126] and Hester.[127] Ragain,however,only gives ¼ sec. application resulting in marked local reaction and the formation of a superficial eschar which is completely healed by the twelfth day. He finds that pannus is especially benefited,but recommends that other forms of local and constitutional treatment should also be employed.

Cuenod and Nataf[6],in comparing Monbrun's results with those after their Xysis method consider they are no better and are of the opinion that the method is only applicable to mild cases with a few follicles,having seen disasters in the

more active stage of the disease. It would appear that Ragain's[125] modification is more likely to prove of use.

(c) Galvanopuncture: used by Abadie[128] has similar disadvantages to diathermy, the resulting scarring often being excessive.

(d) Ultra-violet Light Therapy: various workers using the Birch-Hirschfeld lamp have found this of value in the treatment of conjunctivitis, corneal ulcers and keratitic conditions and Nicent[129] has suggested its use in trachoma, while Harston[130] has reported pleasant rapid and definite cures in trachoma in China. He considers the mercury vapour lamp of much less value than the tungsten arc lamp which he uses. After denuding the eyes of blood by 1% adrenalin drops, each eye is irradiated for two to three minutes, the patient sitting opposite a 6 to 10 amp. lamp at distance of three feet with the eyes gently closed, the treatments being given at 3 day intervals. He records 200 cases successfully treated in Hong Kong, but does not state how many treatments were required.

11. Serum and Vaccine Therapy: according to Morax and Petit[131] neither of these methods has produced satisfactory immunity, but more recently they have been used by various investigators with varying results.

(a) Autoserotherapy was found by Fehmi[132] to have only a slight value in trachoma. In using Angelucci's method in 50 cases he found a diminution in symptoms after about six injections, but there was no improvement in follicles and hypertrophy. Medvediev[133] however, reports good results from autohaemotherapy in the treatment of pannus, explaining them by a rise of the biotonus of the individual. Comes[134] similarly has had excellent results with both the conjunctival and corneal lesions. He injects 1cc of the patient's blood subconjunctivally around the cornea or into the retrotarsal conjunctiva, the blood disappearing within 10 days, and has had no complications in 300 cases.

(b) Vaccines in the form of scrapings from the trachomatous follicles have been used by Cuenod and Nataf[6]. They combine this subconjunctival autoinoculation with their Xysis treatment and regard it as a factor in antibody production against the disease, and having used it for many years consider it of value. Esteban[135] recently reported satisfactory results from the injection of triturated trachoma granulations in saline, and with doses of 0.5.0 cc at 3 to 4 day intervals he found that disappearance of the follicles took place. Addario while carrying out investigations on B.Granulosis established that the organism had two spheres of action, one superficial in the conjunctiva and corneal epithelium, the other deeper in the follicles, which latter consist of minute neoplasms penerated by the bacterium, and without scraping do not respond to the vaccines. So, in using a vaccine from the above organism in a lanolin base medium which quickly influenced the conjunctivitis and keratitis manifestations he combined it with mechanical or irritant (i.e. silver or copper) applications for the follicles, and by such a combination effected cures in from 20 to 30 days. This method at present must be regarded as no more than an adjuvant in the treatment of the disease.

12 Surgery: In addition to the surgical methods already noted, from the time of Paul of Aegina (A.D. 625-690) through the ages surgical aids have been used in the treatment of the complications and deformities resulting from trachoma e.g. for trichiasis, entropion and pannus. For these conditions the standard operations quoted in the text books in ophthalmogy (Fuchs[4], Meller[136], Maynard[137], Swanzy[5], etc.,) are in general use, though minor modifications are recommended.

For trichiasis the combined tarso-conjunctival excision with partial tarsectomy through a skin and lid margin incision as done by Saunders (1810) is still recommended by MacCallan[1] and by Cuenod and Nataf[6],

Tarsectomy(Kuhnt's Combined Operation)often combined with Canthotomy or Canthoplasty has been recommended recently by Fox[138] and Rabinowitsch[139] for the healing of trachoma in the later stages,the latter also suggesting the operation as a cure for entropion;while for trichiasis he performs tarsi-nomargino-plasty with or without mucous transplant.

For pannus modern controversy is ranged around the respective merits of Peritomy and Denig's graft. Though this latter method was originally adopted by Denig in the assumption that the mucous membrane of the mouth was immune to invasion by trachoma,Friedman[140] and Kaminski[141] have shown typical trachomatous infiltration in the grafted tissue,but as the essential feature of both methods is the production of a barrier to the trachomatous process spreading to involve the cornea,each method produces this effect to a certain degree.The former of these workers has obtained better results from peritomy,which view is endorsed by Karbowski[142] Vejdovsky[143] and D'Amico[144]. Satisfactory results similar to Kaminski's with Denig's method have been reported by Lowenstein,while further modifications such as Kolen's[145] conjunctival transplant and Addario's[146] modification of Steiner's pterygium flap have been recently suggested as the most suitable measures.

TRACHOMA PROPHYLAXIS.

The above quoted surgical measures deal with the disease in its latest stages and with the deformities resulting from it, while in recent years it has been universally recognised that any real solution of the trachoma problem depends on tackling it in its earliest stages or better still preventing its occurrence and controlling its spread.

With this in view"La Ligue contre le Trachome" was founded at the Pasteur Institute in Paris in 1913 by Morax and other French Ophthalmologists,and later,in 1929,after the 13th International Congress of Ophthalmology in Amsterdam the "Organisation Internationale de la Lutte

Contre le Trachome" took shape. By these means an attempt has been made to coordinate trachoma work throughout the world, to study the disease as it occurs in its varying aspects in different countries and to develop uniformity in its diagnosis and therapeutics.

Over forty years ago Fuchs[147] emphasised the fact that all prophylaxis of trachoma, whether personal or general should be dominated by the idea of cleanliness, and today this is recognised by most workers as a main essential.

The subject has been generally divided into various sections, namely:-

1. Personal 2, Family, 3, School. 4, Occupational. 5, National. 6, International.

1. Personal. In this cleanliness is recognised to be the main factor and even frequent washing of the face and eyes with soap and water has been advocated (MacCallan[1], Cuenod[6] and Natal to be of considerable value in preventing the disease. Mild antiseptics, such as zinc sulphate, argyrol, etc, are similarly recommended by these workers in Egypt and Tunis, and by David[148] in Palestine. Lister[149] and Cunningham and Wharton[150] record their value during the great war among trachoma-free troops open to contamination from contact with infected comrades.

2. Family. Various authors have noted the frequency of trachoma in early infancy, and MacCallan[75] and Puscariu[151] record cases of infection spreading from nursing mothers to their suckling infants. Accepting the infectious nature of the disease, it is easily recognised that opportunities for its spread in the home are very great., especially where toilet measures are not as private as they should be, and where segregation of trachomatous members of the family and their trachoma contaminated articles is not carried out. My findings in young infants at school show that this is the chief source of infection in this part of India.

3.School. Prophylaxis in the schools is probably the most important of all,for here with the help of hygiene-discipline and education,aided by the cooperation of the lay teachers,an organised campaign can be carried out. Its importance was emphasised long ago by de Lapersonne[152] who advocated "Trachoma Schools" for the complete segregation of trachomatous children,which today are in use in most trachomatous countries throughout the world.

4.Occupational.This sphere of prophylaxis has been studied chiefly in connection with military employment,and depends on more accurate diagnosis before enlistment,treatment of the slightly infected,and segregation of the infected into trachomatous units such as was carried out during the Great War by Lister[149] and has been in force in Indo-China since 1917. The subject has been referred to by De Grosz[153] in Hungary, Angelucci[154], Morgano[155] in Italy and Schousboe[156], Dodereau[157], and Talbot[158],in relation to French Colonial troops.

One aspect of the subject the relationship between trachoma and occupational injuries although discussed at La Ligue contre le Trachome"in Paris,January 1927 is not widely referred to in the literature.

The problem is a difficult one and commonly met with in trachoma countries such as India.The present attitude of the army authorities here is to regard trachoma or its after-results,even though they may have been proved to be aggravated by an accident during military service,as "Not due to military service",nor do they admit of the existence of trachoma initiated by trauma;but;as pointed out by Gouzien[159] at the meeting of the league in 1927,the subject may become very important to industrial undertakings in trachomatous countries and present a difficult medico-legal problem.

5.National.National efforts at prophylaxis are well shown by the present position of the anti-trachoma campaign in Egypt and in the other countries already mentioned,while in France trachoma has been notifiable as an infectious disease since 1924.

6.International. The adoption of the strict immigration laws in force in the United States of America(since 1887), in Australia,the Argentine and elsewhere ,has proved to be one of the chief protections against the spread of the disease into trachoma-free countries throughout the world, and the coordinating influence of the "Organisation Internationale" should still further consolidate this scheme.

III. EXPLANATION OF PERSONAL VIEWS ON TRACHOMA.

At present in various standard textbooks of ophthalmology the terminology used for trachoma varies. Fuchs[4] refers to typical trachoma granules or granulations, explaining that these should not be confused with granulation tissue as their structure is entirely different. Elliot[160] also uses the former term, while Swanzy[5] designates them either trachoma bodies or granulations and Cuenod and Nataf[6] use the term granular follicles.

To the beginner, these multiple terms tend to lead to much clinical confusion, for, depending on the stage of the disease the appearance of the conjunctiva may present a much varying picture. Apart from the trachoma bodies or granules giving the typical frog spawn or sago grain appearance, in Stage III Trachoma (MacCallan), where follicles have ruptured and an attempt at healing is taking place, an appearance remarkably like true granulation tissue is given by the combination of papillae, scar tissue and ulcerated follicles.
This process, however, is much later than when showing the typical sago grain appearance, so the beginner can form no accurate idea of the course of the disease or determine what form of treatment should be adopted.
Also Strother Smith's[2] advice" Do not diagnose a case as trachoma simply because he has granular lids" is valuable, for in India, as in other Eastern countries there is a vast amount of simple chronic conjunctivitis due to the local irritants peculiar to the East-dust, smoke, sand, etc. together with chronic follicular conjunctivitis and trachoma, but the term"Granular Lids" is applied to all of these conditions whether accompanied by the formation of granules or not, with the result that not only are vast numbers of innocent conjunctivitis cases diagnosed as and wrongly treated for trachoma,

but proper advance in the clinical knowledge of the trachomatous process is greatly impeded.

Since a study of the histo-pathology of the disease(vide part II) shows that the compound follicle,similar in structure to the lymphoid follicles elsewhere,is the essential lesion in the disease process,I consider that a greater standardisation of the terminology according to the two main clinical features of the disease,namely-the follicles and the papillae-would result in an easier understanding of the character and course of the disease,ar and coupled with the adoption of MacCallan's classificatior would result in a much more accurate clinical knowledge of what is or is not trachoma.

The difficulty in separating trachoma from allied conditions especially those characterised by innocent follicular formations,is shown well by a study of the conflicting views enunciated by presentday workers. Nicolle,[161] for instance,does not regard trachoma as a specific disease of a peculiar type but as the most widely disseminated,most serious and best defined clinically of a very numerous group of diseases- the granular inflammations of the conjunctiva,while Aubaret[162] regards it as a specific entity. This difficulty is recognised by the Egyptian authorities, and in India Strother Smith,[2] Doppinger,[163] Wright[3] and others record that nine-tenths of cases so diagnosed and sent to them for treatment are not trachoma;while the former author in quoting his early sucesses with mercury cyanide sub-conjunctivally,in 1912 in the treatment of trachoma,has now come to regard the cases showing the marked improvement of which he wrote as cases of simple folliculitis.

Clinically simple folliculitis and trachoma may be differentiated thus:-

EARLY TRACHOMA.	SIMPLE FOLLICULAR CONJUNCTIVITIS.
1. Follicles embedded in the conjunctiva.	1. Follicles sit on the conjunctiva.
2. Follicles always in an inflamed lining.	2. Follicles on a normal or slightly inflamed surface.
3. Small Areas of pin points, petechial haemorrhages, around follicles.	3. No haemorrhages visible.
4. Follicles more marked on upper lid than lower.	4. Follicles more marked on lower lid than upper.
5. Follicles definitely encroaching on to tarsal plates of lids-site of election upper margin of tarsal plate and angles.-	5. Follicles confined to fornices lower and upper, showing no tendency to invade the tarsal area of the conjunctiva.

The other points of difference quoted in the standard works viz:-

1. Ready improvement of follicular conjunctivitis with treatment.
2. More common occurence of the innocent condition in children.
3. Lack of lid scarring and corneal involvement.
4. Lack of spontaneous rupture of follicles on double eversion of the lid, are of no value in the diagnosis of the class of case which presents real difficulty in India, namely the Doubtful Early (Tr.I.) case versus the Chronic Folliculitis case.

For a clear understanding of trachoma as I have seen it in India, both in North West Frontier Province and Baluchistan, MacCallan's classification is the practical basis for working on. In a few respects, such as the absence of (a) complicating Gonorrhiyal Ophthalmia and (b) Spring Catarrh, the disease differs from the Egyptian:-

(a) is no more common than in United Kingdom.
(b) is only very occasionally found with trachoma.

I would classify it thus:-

1. EARLY TRACHOMA.-(Tr.I and Tr.II MacCallan) confined to the conjunctivae of the lids as papillae and follicles situated in and just under the conjunctiva.

2. MEDIUM TRACHOMA.-(Tr.III MacCallan) consisting of chronic tarsitis and chronic lymphatic infiltration of the conjunctiva together with attempted healing.

3.Late Trachoma.TrIV MacCallan): completely healed trachoma. In Early Trachoma(TrI) there are few papillae and follicles the former chiefly along the upper border of the upper tarsal plate; the latter especially in the upper fornix,encroaching on the tarsal conjunctiva centrally and at the angles,but definitely embedded in the conjunctiva and surrounded by little engorged areas or minute haemorrhages.In TrII the above changes are much more in evidence,but the whole process is still superficial as shown by no true thickening of the tarsus itself,any thickening being of an oedematous nature.

In Medium Trachoma(TrIII)I consider the chief criterion is involvement of the tarsal plate itself,which is more or less grossly thickened and can be so demonstrated clinically by the difficulty experienced in double everting the upper lid with the hook.It is in this stage,after the extrusion of the follicles on the surface-ulceration-that in between the cicatrices there is the appearance akin to granulation tissue as opposed to the typical sago-grain follicles. The conjunctiva in this stage also often presents the appearance of felt over the whole of the conjunctival surface of the upper tarsus with no evidence of papillae or follicles,the fornix by now being almost obliterated and no definite cicatricial bands to be seen. This stage more or less merges into the next.

In late Trachoma(TrIV) the tarsal conjunctiva is completely cicatrised,with one or two bands of scar tissue such as Arlt's[73] sulcus. The tarsal plate in this stage is thin again, and if evenly so it may be difficult to diagnose the case as healed trachoma. If the cicatrisation has occurred unevenly the effects of this,such as entropion,may be visible.

These are the main landmarks in the course of the disease, though sometimes it may be found difficult to separate them in practice, as the change from one to the other is gradual. Of two of the main features of the disease, namely ptosis and pannus something further must be said.

PTOSIS. Strother Smith[2], Bishop Harman[164], Galal Aboul Seoud[165] etc, mention drooping eyelids, trachomatous ptosis as it is called, as the most noticeable point about trachoma which differentiates it from any other conjunctivitis, but I have found that there may be no ptosis in the early cases, and not until stage III. is the condition well marked. The only early cases showing marked ptosis have in my experience been those complicated by secondary acute conjunctivitis, when the ptosis appears to be oedematous, inflammatory in origin. The typical ptosis met with in TrIII is in my opinion the result of the chronic tarsitis which is the essential of this stage and which has caused chronic hypertrophy and thickening with increased weight of the tarsal plate.

In this connection Herbert[166], has demonstrated "The Sinuous Lid Border" as an almost exclusive sign of trachoma, his description of the condition being" The inner portion of the lid margin arches upwards in a normal manner, but the outer half presents a curve with its convexity downwards. It (the distortion) is nearly always bilateral. "He found the condition always associated with marked ptosis and confined to rather severe cases of the disease, but considered that the distortion was not due to cicatricial contraction for he found it was well-marked after contraction had already taken place. His explanation, (as Elliot[160] remarks), of its probable cause being blepharospasm remoulding a softened tarsus is difficult to follow. I consider it is much more probable that this condition is the result of incomplete cicatrization of the hypertrophied, thickened tarsus of TrIII in severe cases, which is not completely converted into the smooth contracted

condition

found characteristically in TrIV. Instead, the centre of the tarsus has undergone this change, becoming thinned, while the angles remaining thick give this pathognomonic appearance to the lid, This explains Herbert's finding that it is confined to severe cases of the disease in which also the ptosis is most marked, for it is well recognised by MacCallan[1] and the others that large numbers of healed trachoma cases show no ptosis and have been so mild that the only evidence of the disease is scanty horizontal scarring of the surface of the membrane, or in others not even these diagnostic signs remain.

Pannus. The original discoveries of Herbert[71] in this respect which have been described under different names by various observers since (Bonnet[74], Millet[79], etc) and are now regarded as a true extension of the trachomatous process to the cornea, resulting in follicular ulceration on that surface (Cuenod and Nataf[67], Morax[69]) are certain evidence of active trachoma, but in India large numbers of lid trachoma cases never show corneal involvement and the only evidence in others is a faint haziness of the upper region of the cornea resembling a faint Arcus Senilis but without its sharply demarcated edge. So the corneal signs are diagnostic only in active cases of the disease.

IV.DETAILS OF PRESENT WORK.

The work on which my conclusions are based has been carried out in order to appreciate Trachoma as it occurs in India. Quetta,where the examinations were carried out,the largest military station in British India has a total population of 60228 in 1931 census(Town and suburbs 34892,Cantonments 25336),with a garrison of over 12000(British 3000 Indian 9000 approx).It is situated at a height of between 5000-6000 ft.above sea level. Unlike the greater part of India there is no monsoon with its sudden break in the hot spell, but a gradual change throughout the year from winter cold with freezing temperatures,rain and snow from December to March, a European spring gradually increasing to summer heat of June,July and August with the temperature over 100°f (average weekly temperature during these months 80-85°f cooled only for short periods by a few hours rain.

Humidity is very low,4-5"annual rainfall(weekly relative humidity during these hot months is 50-70%).The soil is sandy throughout the province,Quetta itself being situated on a large sandy plain surrounded by mountains,barren rocks absorbing heat and radiating light-so that ground glare is particularly troublesome.

In the winter,cold,strong,biting winds from Afghanistan are prevalent,while for four months of the year during the hot weather dust storms occur often two and three days a week. These dust storms sweep throughout the town and district often continuing throughout the day,the dust rises in huge whirlwinds of so called"Dust devils" reaching 300-500' high, penetrating everywhere-dwelling houses,work places,parade grounds-collecting in all eyes,and depositing therein dust containing dried infection from conjunctivitis cases,from faeces and filth deposited throughout the countryside and from flies which are the inevitable plague of Indian villages and bazaars.

As Specialist in Ophthalmology for Baluchistan District I have had an opportunity of studying the eye diseases affecting the military population stationed in the province and noting the conditions chiefly responsible for temporary disablement, permanent unfitness for service and permanent damage to sight. It was early found that the majority of Indian Troops reporting sick with eye complaints were suffering from external eye disease-Diseases of the Lids, Conjunctiva and Cornea-the numbers being out of all proporation to British troops leading the same type of army life under the same climatic conditions.

My statistics for 1931 and 1932 shows:-

1931. Diseases of lid, conjunctiva and cornea		(British):	25
	Incidence per 1000	"	0.083
		(Indian)	283
	" " 1000	"	0.314
1932. Diseases of lids etc.		(British)	19
	Incidence per 1000	"	0.063
		(Indian)	239
	" "	"	0.265

But in comparison with similar affections in British troops or in the same diseases as seen in Great Britain, it was found that those cases complicated by trachoma proved more serious and much more slow in responding to treatment. Further, most trachoma cases reporting sick on account of eye symptoms were found almost invariably to be suffering from complicating secondary acute or subacute conjunctivitis Cases with uncomplicated early (Tr.i, II) trachoma rarely reported sick on this account.

So to study the incidence of the disease throughout the Indian Garrison and determine the factors which might influence its occurrence, spread and course, examinations were made of various classes of Indian troops and, for comparison with these, examinations of civilian recruits and school children.

These are detailed in Part A of this section of the thesis; Part B shows the results of treatment measures adopted in active cases of the disease reporting sick or discovered with trachoma signs.

PART A.

I. An examination of men of the Indian Hospital Corps was carried out in September 1931:-

(a) to determine the propartion of the uncomplicated disease in the unit.

(b) to observe and classify the different forms and stages of the disease.

(c) to record the findings and reexamine the unit after one year.

The results of this examination are shown in Appendix table I, from which it is seen that the unit trachoma incidence, is 43% in 1931, 27% in 1932.

The re-examination after one year was with the intention of forming a check on the original observations, and to note the changes occurring within this period. Unfortunately, owing to the retrenchment of the Indian Army since 1931, of the 383 men examined in that year only 61 of these were present for re-examination in September 1932. The whole Gurkha section of the unit having been disbanded and the total unit strength reduced by two thirds-so that the figures have not proved as valuable as they otherwise might However, the results show:-

1. Only 16 out of 61 minor changes in classification, 10 of these, doubtful cases being later regarded as free of trachoma.

2. No case previously regarded as free of trachoma was considered to have shown signs at the second examination

3. Only 1 case of Tr.III was considered on the second examination to be free of trachoma (This a mild case which had undergone treatment after the first examination)

4. No case of early (Tr.II) had become later (Tr.III, IV.) Bearing in mind the above results the fall in trachoma Incidence in the unit from 43% to 27% must be regarded as

due to the disbandment of the most heavily trachoma infected men of the unit.

II. An examination of a Punjab Infantry Regiment was carried out.The results of this are shown in Table II,from which it is seen that the unit's Trachoma %:30.0,while the only marked community variation is found among Sikhs in whom the incidence is twice as great as among others.

III. Punjabi and North West Frontier Mussulmans in a cavalry unit (vide Table III)show an incidence twice as great as among the similar classes of Infantry.

IV. The necessity for the segregation of the infected into trachomatous units as was carried out during the Great War by Lister[149], and in Indo-China since,and emphasised by Talbot[158] and others,prompted the examination of a mixed unit(Royal Bombay Sappers and Miners),the results of which are shown in Table IV. In this unit two thirds of the men are Punjabis (Mussulmans and Sikhs) and one third Mahrattas(natives of Bombay the Deccan and Southern India).Table IV b shows Trachoma %:26 among the Punjabi Mussulmans,corresponding to a similar figure among Infantry men of the same community (c.f.Table II) while out of 75 Mahrattas only 1 showed very mild Tr II.,giving a Trachoma %: 1.4 (Table IV a.)

V. To determine the Trachoma % among the classes of the civilian population supplying the army I arranged to examine all recruits enlisted in Quetta(which,however is not a big recruiting station),the results being shown in Table V.This shows the Trachoma% in these classes,between the ages 17-21 years:43%,the communal incidence among Mussulmans remaining fairly constant around the figures of the serving soldiers of this community-28.8%-while the incidence among Sikhs recruits is mush greater 75.0%

For comparison with this a further examination, of Gurkha recruits, was made. The examination of recruits newly arrived from Nepal-Table VI-shows entire freedom from trachoma. Recruits of one year's service show a slight incidence Table VIa-. But in view of a limited amount of the disease being found in Gurkha riflemen of varying service in British India, with occasional severe cases, I examined Gurkhas who had served for 5-10 years. This examination showed a Trachoma Incidence: 8.7% (Table VIb)

As well as recruits from Nepal a small proportion of Gurkha "Line boys"-sons of serving or pensioned soldiers-who have been born and lived in their lines since childhood, are enlisted. Table VIb shows that the incidence of the disease among these is considerably increased "23.5%

VII. Since Gurkha families regularly suffer from an acute Koch-Weeks Conjunctivitis in epidemic form each summer, beginning about May or June and gradually subsiding in September or October, these were investigated. Charts of the incidence of these epidemics among Gurkha families in Quetta during the summers of ~~1931,~~ 1932,-Graph I shows the extent of this and Table VII shows the proportion of these families presenting evidence of early trachoma after the acute conjunctivitis had subsided: 27%.-This substantiated my opinion that apart from the suffering and expense for treatment these epidemics are serious chiefly on account of being the cause of the spread of trachoma among the families and thence to the men.

VIII. An examination of a purely Sikh Unit showed a high Trachoma Incidence : 82.8% (Table VIII.) Corresponding to a similar high figure: 75%-among Sikh recruits enlisted for other units in Quetta (Table V)

IX. In addition to these examinations of the military population, nearly 2000 Quetta day school children were examined. These results furnished a comparison with the Military and gave a fair indication of the extent of the disease among the civil population. 50% of the children were of Punjabi birth or parentage, the remainder being mostly inhabitants of Sind with a few Baluchis. This examination was carried out in the first place by a Civil Sub-Assistant Surgeon whom I taught the recognition of Trachoma according to MacCallan (in so far as applicable to work in India) and later I checked his findings, when it was found that our results corresponded sufficiently accurately, the only difference being in doubtful or very early cases which I was more reluctant to regard as trachomatous.

These results - vide Table IX a, b, c, d, - show :-

Total examined: 1962 Trachoma Incidence: 40%

With varying age and community incidence, the latter represented by a minimum of 30.5% among Mussulmans and maximum of 53.4% among Sikhs.

PART B.

In treating the disease in India by the older methods-silver nitrate and copper sulphate-the chief objection is that these drugs are efficacious only when used over a prolonged period of months, so that such a treatment course involving severe reactions, results in a prolonged period of unfitness for duty in the soldier, and in the civilian inevitably results in him stopping treatment long before the disease is arrested. Such was found to be the case in the two years previous to changing from these older methods. Other strong irritants and caustics e.g. Iodine, Iodised Phenol 10%, Phenol were subject to the same disadvantages and gave no better results. So an attempt was made to find some procedure giving a more rapid healing.

125 cases treated by different methods were noted with a view to observing at intervals over a long period,50 were lost trace of shortly after they had completed their course of treatment, due to being transferred, to retrenchment and similar causes. The remaining 75 were observed at intervals of one to two months for periods varying from one to eighteen months.

TREATMENTS USED.

1. Silver nitrate 15%:as advocated by Strother Smith[2] and Henry Smith[167] was used in 5 of the cases,the drug being applied to the everted,affected lids twice or thrice weekly according to the reaction.

Treatment course lasted 2-4 weeks.

2.Berberine Sulphate 1% and Sodium Morrhuate3%: was tried in ½c.c.doses in 8 cases.Treatment course lasted 2-4 weeks.

3.Scraping:of the doubly everted lid with Volkman's spoon was used in 10 cases.Reactionary symptoms lasted 2 weeks.

4.Ultra Violet Ray Therapy;adopting Harston's[130] technique was used in 9 cases.Treatment course 2-3 weeks.

5.Sodium Chloride Massage:Pure,fine powder as recommended by Martinz Saliberry[104] was massaged into the affected surfaces under cocaine anaesthesia.This was observed in 20 cases. Treatment course 1-3 weeks.

6.Oleum Chaulmoogra:Used as recommended by Delanoe[107],etc,was observed in 5 of the cases.Treatment course 3-8 weeks.

7.Tarsectomy: was performed in 6 cases.Reactionary symptoms lasted 2-4 weeks.

For comparison,11 of the cases observed with doubtful or definite trachoma had no trachoma treatment,while 3 others, showing trachoma symptoms complicated by trauma,had a succession of treatments without benefit.

Results of treatment are enumerated below, analysis of treatment results (Table X) detailed progress reports shown i in Appendix.

Of the cases observed and treated:

1. 41% showed Tr I and II.
2. 51% " Tr III.
3. 8% were considered doubtful Tr I and II, or Chronic folliculitis.
4. 29% cases were found on inspection, not complaining of any symptoms.
5. 56% cases complained of recent Acute or Subacute conjunctivitis or Corneal Ulcer symptoms without previous complaint.
6. 11% cases (all TrIII) complained of typical chronic symptoms.
7. 6.6% cases first complained of symptoms after recent eye injury.
8. 57% treated cases showing TrI and II resulted in clinical cure.
9. 6.8% " " " TrIII " " "
10. 25% " " " Tr I & II treatment appeared to have no effect.
11. 37% " " " Tr III. " " "
12. 34% " " " " " resulted in rapid conversion to Tr IV.

Of the various methods employed best results were obtained from Sodium Chloride Massage:

In Tr I and II 100 % clinical cures.

" Tr III 14% " " and 78% rapid conversion To Tr IV.

It also had the great advantage that clinical cures resulted after 2-6 applications involving only 1½-3 weeks partial incapacity.

It will be noted that the diagnosis of these trachoma cases is based on clinical findings for none of the available laboratory or serological tests were considered more reliable.

Conjunctival culture for organismal growth, which was performed in the district laboratory in 56 cases of acute conjunctival infections of different origins, including scrapings from 10 trachoma cases, resulted in 50% sterile cultures in the trachomatous cases and the results on the whole were entirely unsatisfactory viz:-

Cases.	Sterile after 48 Hours.	Xerosis and Diphtheroids.	Staph.Alb.	Staph.Aur.	B. Morax. etc.
Tr. Cases.					
10.	5	1	4	-	-
Conjunctivitis all kinds.					
56.	25.	10	13	4	4

In spite of several of the cases being undoubtedly the epidemic Koch Weeks acute variety, showing the typical slender Gram negative intracellular bacilli in stained smears, yet on culture these were never isolated, but apparently were overgrown by Staph. Albus and similar organisms. Also, many of the cases which were clinically very acute with rapid secondary corneal ulceration etc. gave sterile culture results.

Thus culture of the conjunctival sacs on agar, serum agar, blood agar etc, mediae, the only laboratory methods available, were of no help in trachoma or even in studying the nature of simple conjunctivitis, and there were no facilities for using the more delicate methods and animal inoculation required for B. Granulosis research.

Conjunctival scrapings (stained by Giemsa's method and examined for cellular contents) showed:-

1. Predominence of large lymphocytes, with large granular nuclei often showing karyokinetic changes.
2. Small lymphocytes and plasma cells considerably less in number than the large variety.
3. Occasional irregular granular cells with deeply staining intracellular bodies corresponding in appearance to the cells of Leber. These were not prominent and were not very typical in appearance.
4. Epithelial cells in quantity, oftenest in collections together, but here and there as isolated cells with large nuclei and surrounding protoplasm taking a medium or light

blue stain. It was only in these isolated epithelial cells that faint pink granular bodies, corresponding to those described by Prowaczek and Halbestaedter, were seen.

Though such findings were confirmatory of trachoma the clinical evidence was found to be sufficiently reliable.

12 sections from cases in which tarsectomy was performed showed the classical changes due to the disease. Notable features in these were:-

1. In most of the sections the epithelium was missing or only remaining in islands over the surface.
2. Typical follicles were present in all, though in one case of late TrIII there was only one shrunken degenerated follicle which appeared strangled by the overgrowth of connective tissue.
3. The follicle centre in most cases had degenerated into a homogeneous mass with large lymphocytes in it. The outer ring of the follicle consisted of small lymphocytes and plasma cells which also infiltrated the surrounding tissue and especially the layers immediately adjacent to the epithelium itself.
4. The formation of new embryonic blood vessels in the vicinity of the follicles was a well marked feature in all medium Tr III cases, with small-celled infiltration in the new vessel walls.
5. In the late Tr III case, referred to above, the general diffuse small celled infiltration had given place in one eye to generalised fibrous tissue formation throughout the section.
6. In no case could Prowaczeki bodies be definitely distinguished in the epithelium in sections, nor was there much small-celled infiltration of the epithelium itself.

V. DISCUSSION AND COMPARISON OF RESULTS.

My experience in India shows that, as far as British India is concerned, the trachoma problem is one affecting the native population almost exclusively. I have seen no trachoma in British Soldiers in four years, and very few cases of doubtful chronic folliculitis suggestive of trachoma. Two British Officers presenting suspicious chronic folliculitis, after twelve months observation, were considered not to have suffered from trachoma. In only one European, the wife of a British Sergeant, whose eye trouble had begun in Egypt, did I find definite trachoma (in her case Tr III e.e.)

As far as British Troops are concerned there is no appreciable incidence similar to that reported by Kason[168] and quoted by MacCallan[169] as occurring among British Troops serving in Egypt and Palestine between 1916-1918, but undoubtedly occasional cases of Europeans becoming infected do occur, similar to those recorded by MacCallan[1] and Cuenod and Nataf.[6] As pointed out by the former from his work in Egypt, and by Motais[170] from Cochin China, the chief source of infection is probably the native servants.

Among Indian Troops the disease is much more common, the incidence being greatest among the inhabitants of the Punjab. Strother Smith[2] has mentioned finding 32 cases of Trachoma (all old-Tr III) among 700 Punjabi Soldiers - giving a Trachoma incidence of 6% - He does not state the community to which they belong, but his figure is much lower than my finding of a fairly constant minimum in Punjabi Muslmans[SU] - around 26-30%. Among Sikhs, the other Punjab community furnishing the majority of Army Recruits from that province, the disease is much more wide-spread. My figures for Sikh recruits - 75% incidence - and Sikh Sepoy - 82% incidence - ~~se~~ Show a constantly very high ratio which is in accord with the generally accepted state of affairs.

Previous to 1930 the attitude of Army Headquarters was to reject all recruits suffering from Trachoma. In 1926 a series of lectures and demonstrations to Recruiting Medical Officers were arranged by the authorities. In these Dickson, 171 after describing in detail the manifestations of trachoma, recommended a test treatment "to distinguish diseases which are not Trachoma". This consisted of Hydrarg.Perchlor 1-5000 and brushing of the lids with Silver Nitrate 2% alt.die. for 3 applications, followed by Argyrol 10% t.d.s. until 10 days had elapsed. It was explained that this would effect a cure in the majority of cases not due to Trachoma. If still doubtful, the recruit was to be rejected. Dickson, Quoting his experience among the labour Corps in France (men recruited from China, Egypt and the Cape) mentioned two Chinese companies where, at an initial examination, in the one 12 cases of Trachoma were found, in the other 15 while after 8 weeks without any precautionary methods or treatment being carried out, the members of infected had increased to 59 in the first and 81 in the second company. By segregration and treatment further spread was controlled. The conclusion to be drawn from this was that bearing in mind how the disease was intractable and liable to relapse, "the loss to the state in recruits is of no consequence compared with the danger of spreading the disease amongst the troops" and "the enlistment of these cases is a bad bargain to the state".

In October 1930 the experiment of enlisting otherwise suitable recruits who were suffering from "very mild Trachoma" was tried in three recruiting centres. Such recruits were to have three months constant treatment by their unit Medical Officers and inspection at the end of that time by the ophthalmic Specialist; at the same time instructions regarding segregation and hygiene were issued to the commanders concerned. After three months the cases

enlisted had progressed well though not yet considered clear, and the experiment met with such success that in May 1931 it was greatly extended.

During the nine months from May 1931 to January 1932,653 cases of trachoma enlisted were considered cured,and 65 only discharged as incurable .Investigations carried out about that time in the Jullunder district of the Punjab,by the Specialist in Ophthalmology,Lahore ,showed that 100% Sikh recruits-who totalled 95% of those offering themselves for enlistment-were infected. Of these

35% belonged to class a(corresponding to Tr I & II MacCallan)

52 " " b(" Tr III " moderately severe,

13% " " c(" Tr III severe or Tr IV gross lid deformity,corneal involvement etc.

It was also recorded that skilled examinations in many Indian regiments showed Trachoma % :25-30,who never reported sick- This percentage was higher where Sikhs only were concerned-and the great majority of such complained of no symptoms,were first-class shots,and throughout their service never reported sick with eye symptoms.

Therefore in June 1932 it was decided that all Trachoma cases in classes a and b above would be enlisted,and only the fact that they were suffering from Trachoma would be noted on their medical history sheets, but unless reporting sick they would be largely ignored. At present this is the position regarding enlistment of recruits for the Indian Army which occasioned the statement of the D.M.S.(April 1932) that "it is evident that our difficulties in connection with Trachoma have been greatly enhanced by our lack of knowledge of the disease as it occurs in India".

The results of my independent observations, carried out in an endeavour to obtain a working knowledge of trachoma in the military and civil population go to confirm these findings and support this change of policy by the military medical authorities in this country.

1. In Punjab sepoys(excluding Sikhs) the incidence remained 20-30%(with the exception of the cavalry unit examined, where men of the same community showed a Trachoma Incidence nearly double- 52 %.

2. In Sikh infantrymen the minmum incidence was 56% with an average figure of 82%. These figures are much higher than a similar avarage for any other community and confirm the opinion already held by Army Headquarters.

3. In Sikh recruits, excluding 10% classified as Doubtful, I regarded 75% as definitely trachomatous, which figure, though less than that found at the Jullunder inspection, is twice as great as the incidence in the recruits of any other community, and furnished the only rejections among all the recruits examined, viz: a rejection incidence of 3.8% in a trachoma incidence of 43% , instead of the 10% rejection mentioned by Army Headquarters, during nine months observation.

4. During the two years that have elapsed since the enlistment of trachoma-infected recruits has been in force, I have seen no cases of direct contact infection, and the results in Appendix, Tables I and IV confirm the opinion that direct contact infection among sepoys in the Indian Army is not a danger to be greatly feared.

Table I shows no case of fresh trachoma in a unit having 43% incidence at initial examination, Table IV shows only one very doubtful case among a community of Mahrattas from the Deccan, serving as one third of a mixed unit with one third Punjabi Mussulmans having a Trachoma Incidence of 86% and one third Sikhs whose Trachoma Incidence though not recorded can be assumed to be at least twice as great as the Mussulmans.

Concerning this problem of the spread of trachoma in armies which has greatly exercised military medical authorities in various countries, De Grosz[153] pointed out that trachoma cases should be treated in the Army and not discharged ,and Angelucci[154] and Morgano[155] later emphasised the same point,while Schousboe's[156] proposals for the classification of those enlisted with trachoma,and the advocation by Talbot[158] of the forming of trachoma units in which trachoma recruits serve till considered cured,indicate the present position of this problem in armies elsewhere.In this country it does not appear to be of such paramount importance ,and this departure by Indian military medical authorities from the measures adopted in the armies of other trachoma endemic countries would seem to be safe and justified.

Notable points are:-

1. Service in the Indian Army being voluntary there is no question of evasion as there may be in conscripted armies.
2. The decision of Army Headquarters to regard trachoma,even though apparently aggravated by accident during military service,as "Not due due to military service" for the purpose of invaliding pension,obviates the possibilities of self inoculation with trachoma referred to by De Gross[153] and Talbot[158].
3. The amount of direct contact infection,judging from the results mentioned above,is negligable.
4. The only danger is a loss to the state on account of accident or intercurrent conjunctivitis lighting up a quiescant trachomatous conditions,and resulting in severe corneal complications reducing vision below the required standards.

Though the examination of recruits (Table V) shows an average Trachoma Incidence of not less than 43%.,yet of those considered trachomatous only 4.3% were cases of early trachoma (Tr I and II) i.e.trachoma in the most infective stages; the vast majority being old-standing cases which,like most

trachoma

in India,had been present since infancy,with a tendency to progress slowly to a quiescant stage and natural healing" Tr IV."

Similarly disease which had been present since infancy,by the age of enlistment-18-20 years-had,either developed in a severe fashon with severe corneal involvement reducing vision below army requirements(6/18 e.e.roughly)resulting in rejection of the recruits,or had in a milder form gradually passed from the infectious stages Tr I and II to become late mild Tr III or IV by the time of enlistment.

The examination of Quetta School children does not show a change in the incidence of Tr I and II from over 40% to under 10% during school years as MacCallan[1] has demonstrated, but instead appears to point to a fairly constant incidence of the active infective stages among the children in Baluchistan ,remaining roughly around 20%,with the later stages Tr III and IV being a slightly higher percentage (up to 26% :) while the ratio of early Tr I and II to Tr III and IV changes from (upto 10 years) 17:15 to (Over 15 years) 15: 18. In comparrison with MacCallan's figures these are in children who have never received any treatment ,while the improvement he shows is influenced by constant school treatment extending over two to three years.

The slowness of this change from Tr I and II to late Tr III and IV shown by these school statistics confirms the opinion that the vast majority of the trachoma seen in Indian Army recruits and sepoys has begun in the early years of life and progressed slowly since that age.

This opinion,that trachoma infection in most cases begins in early pre-school life even in infancy is held by many trachoma workers.The emphasis with which Morax and others stressed this in the early part of this century is still recognised by workers in different countries.MacCallan has

demonstrated the certainty with which the infant of a trachomatous mother is bound to develop the disease. Morax[172] in more recent work has not modified his earlier opinion. Crouch,[173] from his experience among North American Indians holds the same view as does Talbot[174] in Tunis while Wilson,[175] working in Bhatim, found that of 140 children under one year old, 25% showed Tr I (and 38% of total had acute conjunctivitis) and is of the opinion that most trachoma infection occurs before one year of age.

Also among these school children the percentage of trachoma was considerably higher-57.9% among those children showing no signs of lymphatism and adenoidism (grossly diseased tonsils and adenoids) than among those showing definite signs of the adenoid syndrome-42.1%- This finding does not accord with the views of Angelucci[27] and Piquero[29] even to the extent of showing that adenoidism produces a suitable soil for the infection. It may be that in a trachomatous individual the disease is more prone to develop in a more severe form if the patient also suffers from lymphatism.

Although Quetta school children, especially Sikhs, show a lower incidence than might be expected judging from the Jullunder findings and my findings among recruits, it is due in all probability to the fact that the children examined, though children of Punjabi Sikhs have been born and reared in an enviroment different to their Punjab villages, and further because the majority are the children of town Sikhs who follow different occupations e.g. as carpenters, shop-keepers etc., from the agricultural class in which the disease is rampant in the Punjab and who furnish the Army recruits.

The varying community incidence which is seen in other countries as shown by Talbot,[176] with an incidence around 30% in the French schools and 53% in Franco-Arabic schools, also by Junes[177] with 10% incidence in the former, 50% in the

latter,and by Kanda and Takizawa[178] in Formosa (28% among Japs., 68% Formosan),and that recorded by Fonseca[179] in Brazil,is easily understood where in one class the native hygienic life is compared with that of the much more highly educated colonising race;but in India the varying community incidence is among people of the same race(descended from the same stock), living under similar conditions though differing in habits, It is said that in Indian villages the incidence varies greatly in individual villages of the same community and also probably in individual schools of the one community,just as is reported by Bakker[180] regarding Java schools and such is influenced undoubtedly by living conditions,individual hygiene etc.,but the remarkably constant difference in incidence among the agricultural class of Punjabi Mussulmans and Sikhs is more difficult to explain.It will be considered later.

The examination of Gurkhas stationed in Quetta provides the explanation for the cases of early trachoma Tr I and II,found in soldiers,which , though much less common than the cases infected in early life occur even in mild epidemic form. Gurkha recruits (age 17-20)on arrival in British India from Nepal are free from Trachoma,yet Gurkha Riflemen after five to ten years service in India show definite evidence of the disease(8.7%). Though the "Line Boys" furnish one source of trachoma among these troops the chief factor in my opinion is infection of men from their families .It is evident why this is a more prominent feature than among Indian units when it is seen that after two or three years service Gurkhas are allowed 80% to 100% married quarters in the unit lines,while Indian Units spend most of their service separated from their families.

Also ,Gurkha families annually suffer from Acute Koch-Weeks Conjunctivitis in epidemic form each summer. I have found this in Gurkha families both in Baluchistan and the North West Frontier Province-which after subsidence shows a definite (27%)evidence of fresh early trachoma(Tr I and II)

which in my opinion forms the source from which the men showing Tr I and II become infected. In confirmation of this I found that the only cases of advanced Tr III with corneal complications[7] in Gurkhas reporting sick for treatment have been in "Line boys" who were infected with trachoma in a similar manner during their early childhood in the unit family lines.

This role played by secondary conjunctival infections, especially Koch-Weeks, in the spread and course of trachoma is widely recognised. Strother Smith[2] referring to trachoma in the Punjab- the most highly trachoma-infected Province in India-states that 50% of the school children there are found suffering from some form of conjunctivitis. De Peyrelongue[181] in Syria and Zachert[182] in Tunis record the high proportion of trachoma cases in those countries which are secondarily infected, while the latter author considers such secondary infection the cause of serious corneal complications occurring in trachoma. Similarly MacCallan[1] and Wilson[7] recognise the linking of the diseases. To quote the latter, they consider " That trachoma is an infectious disease 'sui generis' and that preceding infections are not necessary precursors of the disease. At the same time, we believe that the trachoma virus will flourish more readly on an unhealthy conjunctiva and likewise that mixed infections are probably powerful potent causes of the spread of trachoma".

So these factors influencing the epidemic spread of such acute conjunctival infections likewise influence trachoma, and these authors show their relation to climatic conditions (variations in temperature, humidity etc), also the role played by flies is considered important. While it is generally recognised that the usual method of spread of trachoma is digital, by infected towels, handkerchiefs, etc., MacCallan[1] admits that flies do play a part, even though it be minor one, in the propagation of the disease, Wilson[7], regards them as important carriers of acute conjunctivitis infection, while Said Rizak[183] correlates the spread of trachoma in Syria with the associated plague of flies and

Cuenod and Nataf[6], from their experience of trachoma spread in the human being and as the result of their experiments with trachoma transmission by flies in baboons, are of the opinion that flies are largely responsible for spreading the disease.

In this connection Graph I shows:-

(a) the incidence of acute conjunctivitis (Koch-Weeks) occurring in Gurkha families in Quetta during the summer of 1932.

(b) the number of conjunctivitis cases among Indian Troops during the same period.

(c) climatic conditions including temparature, humidity dust, etc from which it is seen that the increase in conjunctivitis cases does not correspond with the period of maximum temperature, nor that of maximum humidity, but follows them and is more closely related to the period when flies are most prevalent than to any other factor. A similar though less marked relationship is shown to the amount of dust present in the atmosphere.

In judging the results of the treatments carried out in active cases of the disease observed, it is to be noted that the main endeavour was to find some procedure giving a more rapid healing than the older methods. Even bearing in mind the views of such observers as Bishop Harman[164] who is sceptical of the diagnosis when a case of suspected trachoma reacts speedily to treatment and Strother Smith[2] who, in the light of further experience, has come to regard those cases which he had reported in 1912 as showing successful rapid trachoma treatment, as cases of simple chronic conjunctivitis-, I am convinced that certain of the short courses recorded in my series achieved rapid improvement or clinical cures in cases of true trachoma.

Excluding the 8% Doubtful Tr I and II or chronic folliculitis which probably were innocent, of the 57% cases Tr I and II reported as resulting in clinical cures, at least three quarters were undoubtedly early trachoma which had not only resisted treatment measures for ordinary folliculitis but were becoming more severe until trachoma treatment was commenced.
All showing Tr III signs were unquestionably definite trachoma and of these 6.8% were rendered clinical cures and 34% rapidly healed to Tr IV after the treatment employed.

Regarding the individual treatment methods employed:

1. Silver Nitrate 15% though it resulted in rapid conversion to the healed stage in 60% of the cases in which used, suffered from the disadvantage that so strong a caustic could only be applied by experts, and was unsuitable for general use by the Indian general practitioner.

2. (a) Berberine Sulphate and (b) Sodium Morrhuate (a) to act as a stimulant to the rapid healing of a chronic inflammatory process, similar to its action in Tropical Sore (Cutaneous Leishmaniasis) and (b) to produce a sclerosing action sub-conjunctivally similar to its effect in varicose veins, did not seem to have any effect on the course of the disease, and were liable to the disadvantage that, injected into the fornix unless in a minimal dose of 2 to 3 minims, produced a troublesome ptosis, very slow in clearing up. Though such doses persevered with over a period of months might have appreciable sclerosing effect, a gradually increasing lid paralysis was considered equally probable.

3. Scraping proved successful in 46% of the cases in which it was used, but in some cases required repetition, and considerably number relapsed or were not improved (40%)

4. Ultra Violet Rays employed as recommended by Harston 129 did not achieve the results anticipated, though resulting in a temporary relief in symptoms while under treatment. The improvement seemed due to the general tonic effect of the treatment in chronic cases and in the improvement in the superadded infection rather than any true influence on the trachoma.

5. Chaulmoogra Oil. did not result in any definite improvement during the time of treatment, and after using it in a different series of cases I am of the opinion that any beneficial results with it are much more slowly obtained than with sodium chloride and do not appear more permanent.

6.Sodium Chloride massage,as suggested by Martinez Salaberry proved the most successful of all the treatments employed. Instead of the 80% clinical cures which he records,the results showed 100% clinical cures in stages Tr I and II with 14% in stage Tr III. By clinical cure was meant the return of the eye to a completely normal appearance and entire freedom from symptoms,so that on examination one could not tell that the patient had suffered from the disease. Since,from the nature of many old standing Tr III cases where permanent structural damage had been done before the treatment was commenced,clinical cure was impossible , the result achieved-rapid conversion to Tr IV-was considered very satisfactory and the best obtainable under the circumstances. They advantages of this treatment were:-

(a) Rapid effects of even two or three treatments in some cases ,and the full course not requiring more than three weeks unfitness for duty.

(b) Freedom from danger to the cornea etc.,only one case in the series appeared to be irritated by the treatment to the extent of getting increased photophobia and pin point dryness of the cornea which left no permanent ill effects.

(c) Required only 1.ordinary lid hook for double eversion of the lid.
2.Cotton-Wool covered probe
3.cocaine or other local anaesthetic.

(d) treatment occasioned only one hour's acute discomfort-watering,irritability,photophobia-followed by relief and decrease of the weighty feeling of the lid.

7.Tarsectomy,(Kuhnt's Method) was found necessary in Tr III cases showing gross chronic tarsitis with hypertrophy, especially if subject to active corneal complications.In such cases no chemical or other local therapeutic agent was capable of giving permanent relief from symptoms or arresting the condition.

It is difficult to estimate how much a grossly thickened, heavy lid with irregular surface is responsible for corneal ulceration

etc.,apart from the true trachomatous follicular and ulcerative lesions of the cornea. Regarding this Strother Smith[2] points out that if,in a case of trachomaous pannus the bulbar conjunctiva is ballooned out by a subconjunctival injection of Potassium Iodide(Gr, XX to 1 Oz)so that the thickened upper lid is prevented from rubbing that surface an improvement in the pannus occurs.He is unable to say whether the action is medicinal or mechanical.

However,after tarsectomy a similar permanent improvement occurs with benefit to any corneal infiltrates,recent nebulae etc.,which may be present and results in:-

(a) arrest of the active lid disease.

(b) cure of the gross ptosis

(c) arrest of the advancing pannus,corneal ulceration or keratitis liable to lead to blindness.

The disease was arrested in 66% of the cases quoted,the patient being made fit for enlistment in the Army,or in the very severe cases saved from the prospect of gradual blindness,the inevitable result of frequent recurrences with increasing corneal damage.

The results of conjunctival culture,using ordinary media, were unsatisfactory,the organisms isolated mainly being the constant inhabitants of the normal conjunctiva.Unfortunately the laboratory methods used were not as appropriate as those employed by Thygeson[184] who,in attempting to isolate B.Granulosis in cases of Egyptian trachoma,recovered in 31% cases Gram negative rods indentical with Noguchi's organism, though in all but one case differing from it biologically.

In the findings of conjunctival scraping there was no one special finding typical of trachoma sufficient to be diagnostic but the combined findings of abundant large lymphocytes,Prowaczeki bodies and Leber's cells,from which Cuenod and Nataf[6] consider an almost certain diagnosis of trachoma can be made,were seen;though,as Wilson[7] says "There is really very

little to distinguish the early stages of trachoma from other follicular conditions of the conjunctiva" though he considers a more marked proportion of large lymphocytes in follicular conjunctivitis. So by this means an infallible diagnosis could not be made. Similarly sections of the lining membrane and tarsus are not practicable for diagnostic purposes in the early stages, while in the later are unnecessary, so that at present microscopy does not supersede clinical diagnostic methods.

From this study of trachoma in Baluchistan certain features of the disease as it occurs in India are found to correspond to its manifestations in other countries, also local peculiarities, differences and difficulties are found.

1. Though similar in its manifestation to the disease met with in other tropical countries it differs from the Egyptian variety in certain ways

(a) The average incidence among inhabitants of the Punjab, the most highly infected district (as judged by the examination of Army recruits) may be no higher than 43%, while in Egypt more than 90% of the population are regarded as infected (EL-Bakly).185.

(b) The severe complicated variety with marked pannus and corneal ulceration is not so common in India as in Egypt, this form being at its worst only among those of the very poor- the lowest caste (sweepers) who besides being undernourished are always employed in the dirtiest of occupations and are rarely other than filthy in person.

(c) The form of the disease seen in town school children and military recruits differs considerably from that met with among the poor cultivator class, in the former being mild and showing a tendency to slow change to a quiescant or healed stage, in the latter more approaching that referred to by Egyptian workers.

(d) Like the Egyptian form it is most often found complicated by secondary conjunctival infections, especially by B.Koch.Weeks and B.Morax on account of which the patients demand treatment but only occasionally probably only in certain districts-with spring catarrh and very rarely (if ever innocently) with Gonorrhoel ophthalmia.

2. The incidence of the disease varies greatly in different localities throughout the country. Herbart and Elliot are quoted by Cuenod and Nataf[6] as estimating a trachoma incidence of 10 to 20% while Wright,[186] judging from his work in Madras has variously declared it to be from 3.3% to 6.5%, while my

figures for examination of Punjabis show an incidence of 20-30% among Mussulmans and 75-80% among Sikhs. So Wright's figures from Madras, where trachoma is undoubtedly uncommon, give an entirely fallacious idea of the average incidence of the disease throughout the country.

3. The majority of cases seen show a mixture of follicles and papillae with one or other type of lesion predominating in different individual cases.

4. The constantly high incidence among Sikhs is difficult to explain, and though no definite reason for it can be determined it throws light on certain points. The mode of life of this sect of purely Punjabi origin does not differ greatly from their neighbours. In their villages they are agriculturalists like the majority of Punjabis; in towns they are found chiefly as carpenters, joiners, etc. In habits they are if anything more cleanly than their Mahommedan neighbours, though, on account of their regilous custom of never cutting the hair their head ablutions may not be as easily or frequently performed as among other Punjabis with closely cropped heads. On the other hand as a community they indulge a lot in communal religious bathing ceremonies performed in sacred tanks at their temples. In my opinion this mistaken religious hygiene is a prominent factor in explaining the constantly high incidence of the disease among them without causing an equal spread to other communities of the same district.

5. The constant community incidence which has been shown among the various classes of soldiers and civilians is kept so by the caste system prevailing in the country. Though Sikhs Mussulmans and Hindus may mix together, at schools, games or in after life at work in the country or towns, or in army service, their intimate relations are confined among their own communities and homes. They will only eat with fellow religionists and their food and utensils are prepared either by their own coreligionists or by themselves, while any common sanitary arrangements such as washing, towels, etc. though they

may be common to their family or relations will not be more widely used.

6. Another feature of the prevalence of the disease among Sikhs is that in stature, development and physique the Sikh excels i being robust and muscular, showing no signs of predisposition to other deficiency disease, while the Punjabi diet tion to other deficiency disease, while the Punjabi diet is a good mixed diet-of Atta(Indian flour), Dhal(lentils), Meat, Ghi(fat) Milk and Fruit-nutritious and vitamine-containing, in comparison with the diet of the Southern Indian whose main articles of diet is Rice.

When it is remembered that such deficiency diseases as Beri-beri and Keratomalacia are uncommon in the Punjab and frequent in the south(Wright[187] regards the latter condition the chief cause of blindness in India) where trachoma is rare, it appears to negative the suggestion of Royer[30] and Kirwan[31] that the disease is a deficiency one.

7. The examination of a cavalry unit which showed a trachoma incidence twice that of Infantrymen of the same community, the greatest intra-community variation I found, together with the lower incidence among town-bred Sikh children born and reared in Quetta instead of in Punjab villages, suggests an enviromental influence. The increased incidence and higher proportion of earlier cases seen in the cavalrymen suggests a bigger percentage of recent infections comparitively late in life. I consider this is influenced by their constant contact with animals and the products of the soil, much more so than is the case with the infantrymen.

The lower incidence among Sikh children living in Quetta, in more urban though no less dusty and dirty surroundings than in their Punjab homes, is due to being less in contact with agricultural pursuits.

Likewise study of the countries where trachoma is endemic, shows the one common feature that they are agricultural countries, the majority of the sufferers being of the agricultural class. Egypt, India, Ireland, Russia and Poland all come under this category and though in these countries the infection is undoubtedly more common among the poor and dirty I do not think that the poverty, dirt, under-nourishment or lack of hygienic surroundings can equal those of the slums of the large European cities of industrial countries, where though trachoma is found it is distinctly less frequent. Is the trachoma virus a soil infection which infects those in contact with the soil and its products, spreading further in unhygienic home surroundings?

8. Though most trachoma workers consider that until the causal virus is discovered no great advances in our knowledge of the disease can take place, it is not certain that even though the microbic cause of the disease is found the main part of our problems will be solved. Though the discovery of the tubercle bacillus was made by Koch in 1882[188], yet we are still unable to find a cure for tuberculosis, though our knowledge of the pathology and hygienic management has advanced.

9. So in the study of trachoma, though researches for the microbic causes of the disease must be pursued, at present there are no immediate prospects of the discovery. The significance of Prowaczeki and other inclusion bodies has long been in doubt and apart from the American observers, Olitsky, Knutti and Tyler[189], the recent opinions of most investigators elsewhere Morax[48], Favaloro[190], Rieger[191], etc-is to regard Noguchi's B. Granulosis as typical of a folliculitis not necessarily trachoma.

Meanwhile the campaign against the disease must be continued and it would appear that more expert clinical methods, especially by the Slit-Lamp, will simplify the diagnosis of the disease.

Though El-Bakly[185] is of the opinion that the study of the cornea is not a great help in the diagnosis of the disease in the doubtful stage, Wilson[192] considers it of extreme value in the differential diagnosis in doubtful cases especially if mild, while Howard[193], in his recent review of trachoma-diagnosis literature conveys the impression that it is in this field that advances in our knowledge are likely to lie.

10. Apart from infection in infancy the main danger of trachoma infection lies in the spread of the disease along with acute conjunctivitis of Koch Weeks or other type. Whether the disease is latent and only rendered active by the secondary acute conjunctival infection or whether it is spread in epidemic form, a study of the disease among Gurkhas in British India shows a definite spread of fresh trachoma after such epidemics.

To combat this in such a community where laws of hygeine are little understood or practised, a polyvalent vaccine such as recommended by Durand and Lumbroso[194] should prove of service. From their work in Tunis they found that such a vaccine had no bad effects of any kind and only 9.3% of vaccinated children harboured the Koch Weeks bacillus as against 30% unvaccinated.

Towards the end of last year's epidemic I endeavoured to have such a vaccine prepared at the District Laboratory but so far without success in isolating the organism despite positive smear evidence. However, methods similar to those used by Thygeson[184] in Egypt are now being tried, from which I anticipate more successful results.

11. From the results of the treatments carried out in this series it is shown that in the majority of cases met with in the army a mild remedy such as sodium chloride in fine powder massaged into the affected conjunctiva, produces clinical cure very rapidly,

while in the more florid type seen especially among the peasant class, an initial scraping with Volkman's spoon removes the grossly unhealthy follicular masses, often leaving to view a non-infected though oedematous tarsus underneath, so that the cure can be completed by reverting to the sodium chloride massage.

I am convinced that if sodium chloride massage was used on a wide scale especially in children in the pre-school and early school years, instead of the therapeutic chaos which prevails at present among the rank and file of those practising European methods in Indian bazaars and villages (as evidenced by Kewal Ram's[195] articles in an Indian Medical Journal, wherein no fewer than fourty-four different remedies varying from native herbs to radium are recommended without distinction as useful in the treatment of the disease) marked progress could be made in clearing up the manifestations of the disease.

VI-CONCLUSIONS.

1. The trachoma problem in India is one which concerns the native population.

2. The incidence of the disease varies greatly in different districts being highest in the Punjab and least in Southern India.

3. Among the different communities the disease is present among the different classes of the same community in a fairly constant ratio.

4. Of all the various religions and castes, Sikhs are those mainly affected in which the incidence is at least 75%, while among Southern Indian Hindus it is practically non-existent.

5. From a study of the disease in the Indian Army the most of the cases met with are old, the disease obviously having begun in early life and a large proportion being healed by adult life.

6. On this account we can conclude that the scheme of enlisting recruits suffering from trachoma-which differs from the policy in the armies of other trachoma endemic countries-is safe and justified, and is unlikely to cause any wide spread to the healthy troops on account of (a) the better hygienic life of the sepoys in comparison with the overcrowding etc of Indian village life.

(b) the rigid caste system which prevails in army life even when men of different communities are brought together in barrack life.

(c) most of the trachoma being healed or almost healed by the time the age of enlistment is reached.

7. Like Egyptian trachoma most of the infection occurs in the homes of the agricultural classes among young children even before school life.

8. Fresh cases in adults are similarly derived from their infected families, especially during epidemics of Koch-Weeks ophthalmia.

9. A treatment measure such as Salaberry's[104] sodium chloride massage which is cheap, simple, quickly effective and safe in application, is required if the disease is to be efficiently treated by any other than the few ophthalmic experts.

10. A national anti-trachoma scheme is necessary, involving wide propaganda on the nature and results of the disease among

(a) those Indian practitioners who practise European methods in this country.

(b) school teachers and educated social workers.

(c) the agricultural classes themselves, especially the womenfolk by means of the two channels above mentioned.

Such a scheme could comprise:-

(a) The existing Research Institutes and Laboratories wherein animal and human experiments could be carried out to improve our present knowledge of the disease.

(b) The large Military and Civil Hospitals and Institutions where new treatments could be investigated.

(c) The Medical Colleges and Universities where the rank and file might be taught the manifestations of the disease in a practical form suitable for using themselves with safety.

(d) The village and bazaar doctors who alone can carry the treatment campaign to the masses of the people in the form of some standard simple treatment of sufficient prophylactic and curative value, while serious or complicated cases could be treated under the supervision of a District Trachoma Authority or operated on in one of the district centres.

11. If in the beginning such a scheme was confined to the most heavily infected province and limited to children as a child welfare scheme, it would serve as an introduction.

VII. APPENDIX.

Table I.

4th Indian Hospital, Corps.

1st Exam. 1931. No. of men Examined: 383. Trachoma % : 43.

2nd " 1932. " " " : 90 " % : 27.

Community and numbers.	Total	Clear.	Doubtful.	I.	II.	III.	IV.	
		Tr%.	(C)	(D)	Percentages. (MacCallan.)			
1931.								
(a) Gurkha men.	:88.	21.	50.	29.	3.	17.	1.	0.
(b) Garhwali "	:90.	56.	16.	28.	8.	21.	24.	3.
(c) Hindu*.	:117.	54.	25.	21	0.	2.	47.	5
(d) Mahommedan.	:88.	36.	51.	13.	11.	9.	14.	2.
1932.								
(a)	Disbanded.							
(b)	:21.	30.	65.	5.	5.	10.	10.	5.
(c) *.	:33.	61	39	0	0	3.	24.	34.
(d)	:36	22	6	72.	3	0	16.	3.

*including Sikh.

of 383 men examined in 1931, 61 of these were re-examined in 1932, showing:-

1. Change in classification from Doubtful to, clear : 10.
2. " " " Clear to Doubtful, Or Tr. : 0.
3. " " " Doubtful to Tr.IV. : 1.
4. " " " Tr.III to clear. : 1.
5. " " " Tr.II to Follicular, conjunctivitis : 2.
6. " " " Tr.I and II to Tr.III and, IV. : 0
7. " " " Tr.III to Tr.Iv. : 2

TABLE II.

4/15th Punjabis (Infanrty).

No: of men Examined: 158. Trachoma % : 30. (exclusime of Sikhs : 24 Sikhs alone : 56)

Community and numbers.	Total.	Tr%	C.	D.	I.	II.	III.	IV.	%s.
Dogras. (Hindus) men	:34.	27.	64.	9.	0.	2.	16.	9.	
Jats. "	:41.	28.	70.	2.	0.	0.	10.	18.	
Punjabis Mussulmans	:42.	20.	78.	2.	0.	0.	10.	10.	
Khataks. "	:32	21	70.	4	5	0.	16	5.	
Sikhs.	: 9.	56.	44.	0	0	0	44.	12.	

Table III.

Scinde Horse(Cavalry).All Mussulmans(Punjab & North West F.P.)

No: of men Examined :62. Trachoma % :62.

District.& numbers.	Total Tr%	C.	D.	I.	II.	III.	IV.	%s.
Rohtak men. :10	70	30	0.	0.	10.	10.	50.	
Gurgaon. " :12.	50	42.	8.	0	0	0.	50.	
Hissar. " : 6.	66.	6	33.	11.	0	0	50.	
Kohat. " :15.	20	80.	7.	0	0	0.	13.	
Peshawar." :16.	69.	31.	0.	6.	0.	19.	44.	
Elsewhere" : 3.	66.	34.	0.	0.	0.	33.	33.	

TABLE IV.

Royal Bombay Sappers and Miners.

(a) Mahrattas.

No: of men Examined : 75 Trachoma % : 1.4.

Age. Variation	Service. Variation	Average. Age.	Average. Service.	C.D. (Very)	Trachoma.Follicular. Tr.II.	Conjuntivitis
19-45Yrs.	1½-21Yrs.	27¾Yrs.	8¼Yrs.	73. 1.	I. Very mild, papillage & small marginal folls.	4 Mild chronic.

(b) Punjabi Mussulmans.

No: of men Examined :119. Trachoma % : 26.

District. & Numbers.	Total Tr%	C.	D.	I.	II.	III.	IV.	%s.
Gujrat men. : 43.	27.	73.	0.	0.	0.	9.	18.	
Rawalpindi" : 26.	8.	92,	0.	0.	0.	0.	8.	
Hazara. " : 22.	27.	73.	0.	0.	9.	4.	14.	
Mirpur " : 7.	29.	71.	0.	0.	0.	29.	0.	
Jhelum. " : 11.	45.	55.	0.	0.	0.	27.	18.	
Elsewhere " : 10.	40.	60.	0.	0.	0.	20.	10.	

TABLE V.

Indian Army Recruits.(All Units except Gurkhas.)

No: of men Examined : 212. Trachoma % : 43.

Community and numbers.	Total Tr %	C.	D.	I.	II.	III.	IV.	%s
Sikhs. men : 64	75.	15.6	9.4	1.5	0.	36.	37.5	
Hindus. " : 18.	38.9	61.1	0.	0.	0.	27.8	11.1	
Mussulmans " :129.	28.8	68.1	3.1	0.	2.3	15.4	11.1	

No: rejected a/c Tr. :8, comprising Tr.III :5, and Tr.IV : 3

% " " :3.8

Table V.(Continued).

Cause of Rejection:

Diffuse corneal haze:2. Corneal nebulae and pannus : 3.

Corneal leucoma :1. Old irido-cyclitis : 1.

Myopic astigmatism: 1.

all of which caused grossly defective vision.

Table VI.

Gurkha Recruits.(on enlistment).

No: of Recruits examined:207. Trachoma % : 0.

These included 3 "Line Boys",1 showing Doubtful Trachoma

VIa. Gurkha Recruits.(after one year's service).

Age:15-17Yrs. "Line Boys" Ages :10-15 Yrs.

No:of recruits examined:216. Trachoma %:5.
(Excluding"Line boys" %:3.7)

	C.	D.	I.	II.	III.	IV.
Percentages:	83.	12.	1.8	2.2.	0.5	0.5

of these numbers"Line boys" :11,with Trachoma %:27.3

" " 45.4 27.3 9.1 9.1 0. 9.1 .

VIb. Gurkha Riflemen.(5-15Yrs.service,ages 20-30 Yrs.)

No: of men examined:189. Trachoma % :8.7

	C.	D.	I.	II.	III.	IV.
Percentage:	82.5	9.5	3.2	1.6	2.1	1.1

These included 18 "Line boys"showing a higher Trachoma%:23.5

" ": 70.6 5.9 0. 5.9 17.6 0.

TABLE VII.

Gurkha Families.(Trachoma % after Koch-Weeks Conjunctivitis).

Age 1-4 Yrs.

No: of children examined : 39. Trachoma % :27.

	C.	D.	I.	II.	III.	IV.
Percentages:	38.	35.	20.	7.	0	0.

TABLE VIII.

2/11th Sikhs. (Infantry).

No: of men examined : 163. Trachoma % : 82.8

TABLE VIII (CONTINUED).

District and numbers.	Total Tr.	%	C.	D.	I.	II.	III.	IV.	%s
Patiala men :47	89.	4	10.6	0.	0.	6.4	40.5	42.5	
Ludhiana " :39.	87.	2	12.8	0.	0.	2.6	38.2	46.4	
Ferozepore" :23.	86.	9	13.1	0.	0.	4.3	30.4	52.2	
Ambala. " :25.	84.	-	16.-	0.	0.	4.-	36.-	44.-	
Elsewhere " :29.	72.	5	27.5	0.	0.	7.-	24.1	41.4	

TABLE IX.

No: of children examined :1962. Trachoma % :40.1

(a) D.A.V.School.(Hindu)-almost all Hindu boys,excluding Sikhs.

Class.	Number Examined.	Total Tr.	D.	I.	II.	III.	IV.	Unhealthy Tonsils in Tr.Cases.	Unhealthy Tonsils in Tr.Free
1.Infant ages 5-7 Yrs.	53.	15.	-	5	-	10.	-	-	-
2 " senior 7-8 Yrs.	70.	16.	-	3	1	12	-	-	-
3.2nd class 8-9 Yrs.	77.	20.	-	5	1	10	4	-	-
4.3rd Class 9-10 Yrs.	62	23	1	1	2	19	-	-	-
5.4th Class 10-11Yrs.	71.	32	9	10	6	7	-	1	9
6.5th Class. 11-12 Yrs.	51	17	3	4	2	8	-	2	3
7.6th Class. 12-13 Yrs.	24	11	-	4	2	5	-	1	-
8.7th Class. 13-14 Yrs.	50	22	-	12	5	5	-	7	4
9.8th Class. 14-15 Yrs.	53	15	-	7	3	5	-	2	4
10.9th Class. 15-16 Yrs.	49	23	1	4	3	13	2	1	3
11.10th Class. 16-17 Yrs.	45	25	1	11	3	10	-	1	3

TABLE IX. (Continued).

(b)S.D.High School.(Hindu)-Hindu Boys.Excluding Sikhs.

Class,	No: Examined.	Total Tr.D.	I.	II.	III.	IV.	UNHEALTHY	
							Tonsils in Tr.Cases.	Tonsils in Tr.Free.
1.	60	29	-	14	11	4	-	-
2.	84	29	-	19	3	7	-	-
3.	58	16	2	3	8	3	-	1
4.	42	21	4	4	5	8	-	2
5.	60	25	5	9	4	7	2	1
6.	39	27	-	5	3	19	2	3
7.	43	25	2	4	3	16	-	1
8.	24	14	1	1	1	10	1	1
9.	24	14	-	4	2	7	1	-
10.	22	13	-	5	-	8	-	2
11.	24	7	-	3	-	4	-	2
(c) Khalsa High School.(Sikhs)								
1.	14	8	-	-	1	7	-	-
2.	16	9	1	-	4	4	-	-
3.	42	24	-	6	6	12	-	3
4.	43	17	-	1	3	13	-	3
5.	45	23	-	1	6	16	-	2
6.	41	13	-	3	4	6	-	-
7.	25	20	-	6	1	13	-	1
8.	27	20	-	1	1	18	-	-
9.	22	12	-	1	-	11	-	-
10.	24	15	-	3	5	7	-	1
11.	27	15	1	3	2	9	-	1
(d) Islamia High School.(Mussulmans).								
1.	192	61	2	21	14	24	-	-
2.	86	21	4	11	2	8	-	1
3	65	24	1	12	6	6	-	-
4.	50	8	2	5	-	3	-	-
5.	50	13	1	8	1	4	-	-
6.	39	17	3	7	3	5	2	-
7.	26	7	-	2	1	4	-	1
8.	24	9	-	4	1	4	-	-
9.	19	8	-	2	1	5	-	2

TABLE IX. (Continued).

School.	% Tr. I, II.	% Tr. III, IV.	% Total Tr.	% Unhealthy tonsils in Tr. Cases.	% Unhealthy tonsils in Tr. Free.
(a) D.A.V. High.	15.5	18.1	33.6	42.5	57.5
(b) S.D. "	23.1	19.8	42.9	44.4	55.6
(c) Khalsa "	17.8	35.6	53.4	54.8	45.2
(d) Islamia "	18.7	11.8	30.5	26.6	73.4
% Average.					
Combined Total.	18.8	21.3	40.1	42.1	57.9

Ratio of Tr.I. II to Tr.III,IV in first four Yrs. at Schools: 17:15
(Age up to 10Yrs) (18.1 :16.5)%

" " to " Last three Yrs. " 15.18
(Over 15 Yrs) (22.6 :26.5)%

TABLE X.

ANALYSIS OF TREATMENT RESULTS.

Treatment Used.		Total Case.	Clinical Cure.		Rapid Conversion to Tr.IV.		Disease Arrested to Tr.IV.		Gradual Improvement.		Doubtful Result.		No Effect.	
in(a) Tr. I.ii(b)III,IV.			No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Silver Nitrate, 15%	(a)	-	-	-	-	-	-	-	-	-	-	-	-	-
	(b)	5	-	-	3	60	-	-	1	20	-	-	1	20
Berberine Sod.Morrh.	(a)	-	-	-	-	-	-	-	-	-	-	-	-	-
	(b)	9	-	-	-	-	-	-	-	-	-	-	9	100
Scraping. (Spoon)	(a)	10	6	60	-	-	-	-	-	-	-	-	4	40
	(b)	3	1	33⅓	-	-	-	-	1	33⅓	-	-	1	33⅓
Ultra Violet, Rays	(a)	8	2	25	-	-	-	-	2	25	1	12½	3	37½
	(b)	4	-	-	-	-	-	-	2	50	-	-	2	50
Sodium. Chloride	(a)	8	8	100	-	-	-	-	-	-	-	-	-	-
	(b)	14	2	14	11	78	-	-	-	-	-	-	1	8
Oleum Chaulmoogra	(a)	1	-	-	-	-	-	-	1	100	-	-	-	-
	(b)	4	-	-	1	25	-	-	2	50	-	-	-	-
Tarsectomy	(a)	-	-	-	-	-	-	-	-	-	-	-	-	-
	(b)	6	-	-	-	-	4	66⅔	1	16⅓	-	-	1	16⅓
Total.	(a)	28	16	57½	-	-	-	-	4	14	1	3½	7	25
	(b)	44	3	6	15	34	4	8	7	15	-	-	16	37

SUMMARISED PROGRESS OF TREATMENT CASES.

a, Proforma for recording Progress of Trachoma Cases, with
b, Abbreviations used in Appendix:

Name. Age. Service, Regiment No: Date.

Complaint.
History.
Examination.

Date.	Vision.	Lids.	Conjunctivae.		Tarsi.		Cornea.	
	R. L.	R. L.	R.	L.	R.	L.	R.	L.
	6/. 6/.	T. E.	P.	F.	T.	S.	Pn (h) (a)	L.
		Pt. Tr.	I.	U.	D.		Ft. N. H. Cu.	

Abbreviations.

Lids.	Conjunctivae.	Tarsi.	Cornea.
T.-Thickening.	P.-Papillae.	T.-Thickening.	Pn.-Pannus.
E-Entropion.	I.-Inflamation (Conjunctivitis)	D.-Deformity.	(h)-Healed.
Pt-Ptosis.	F.-Follicles	S.-Scarring.	(a)-Active.
Tr.-Trichiasis.	U.-Ulceration (Extruded Follicles)		L.- Leucoma.
			N.- Nebula.
			Ft.-Facet.
			Cu.- Corneal ulcer. (active)
	e.e.-each eye.		H.- Haze.

Example From Case 60, Appendix:

Date	Vision.		Lids.		Conjunctivitis.		Tarsi.		Cornea.	
8/1/32.	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.
	1/60.	1/60.	Txxxx.	Txxxx.	Pxx.	PPx.	Txxxx.	Txxxx.	Pnxx. (a)	Pnxx. (a)
	Hand movements.	Fingers at 3.	Ptxxx.	Ptxxx.	Fxxxx.	Fxxxx.	Dx.	Dx.	Nxxx.	Nxxx.
					Ux. Ix.	Ux. Ix.			Hxxxx. Ftxx.	Hxxxx. Ftxx.

Treated by Tarsectomy Both Eyes.

4/10/32.	R.	L.	R.	L.	R.	L.	R.	L.	R.	L.
	6/30.	6/20 (part)	T.x. Pt.-	T.x. Pt.-	-	-	T.x.	T.x.	Pn(h) Nxx. Hxx. Ftxx.	Pn(h) Nxx. Hxx. Ftxx.

A. Case, Year, Age, Service.	B. (a) Symptoms. (b) Signs.	C. Classification.	D. Treatment, Progress.	E. Period of:- (a) TREATMENT (b) OBSERVATION. (R) RESULT.
Case. 1.. 1931. (a) 22. (b) 4.	(a) Angular Conjitis.e.e. 1 month, duration. (b) Vision. 6/6. e.e. Lids.) Pt. X. Tarsi.) Tx. e.e. Conj.) N.X. e.e.	Tr.III. Well marked.	Silver 15% for one month. Resulting in conversion to Triv e.e. After six months, Triv without thickened Tarsi.	(a) 1 month. (b) 6 months. (R) Triv mild.
Case. 2. 1931. (a) 40. (b) 17.	(a) Mild Catarrhal Conjitis. e.e. 10 days duration. (b) Vision 6/6. e.e. Lids.) Txx. e.e. Tarsi.) Dx. Conj. Ftx. e. e.	Tr.III.e.e. of fleshy type.	After 6 applications silver 15% e.e. resulted in Tr IV.e.e. After 11 months was Tr.IV e.e. with Corneae clear of Tr.	(a) 2 weeks. (b) 11 months. (R) Tr.IV.
Case. 3. 1932. (a) - (b) -	(a) Corneal Ulcer R.E. Duration 10 days. (b) Vision R. 6/18. Lt.6/12. Tarsi.) Txx. e.e. Lids.) Sxx. Conj. R. Uxx. Ixx Corn. R. Pnxx. Cuxx. Lt.Pnx.	Tr.III Rt. Triv Lt.	Silver 15% Three applications. Then 11 Sub Conj: N.Salines injections over period of 6 weeks. After 6 months showed T,IV. e.e. with neb.Rt.Cornea.	(a) 2 months. (b) 6 months. (R) Conversion from Tr.III to Tr.IV.

A	B.	C.	D.	E.
Case 4 1932.	(a) Sub Ac Conjitis. Recurrent 1 month. (b) Vision 6/18 e.e. Lids } R Txx Sxx Ptx Tarsi. } L Lxx Sx Conj. R.Uxx. L.Uxx.	Tr.III e.e. moderate.	Iodised Phenol 10% Alt:Die: for three months,resulting in condition approaching Tr.IV. After Silver 15% thrice weekly for three weeks seemed definitely Tr.II,but examination 4 months later showed active Tr.III.Again 5 months later appeared healed but there was still chronic angular Conjitis which was also clear 3 months later.	(a) 6 months (b) 15 " R- Gradual Clinical conversion to Tr.IV with tendency to relapse.
Case 5.1932 (a) 22.(b) 2.	(a) Corneal ulcer L.e. after recent injury no Corneal F.B. (b) Vision R.6/12. L.6/18 (Atrop) Tarsi R.T- Lids L.T.x. Conj. R.P.x.F.x.U.x. L.P.xx.F.xx. U.x.	Tr.III.e.e. Lt.active after injury.	Treated successively with Silver 15%. Berberine 1%, Sub Conj:Iodine, each for about 3 weeks without benefit.Then I Sub.Conj.Saline and 4.sterile milk intramuscularly without improvement U.V.L. 10 applications.Relieved symptoms temporarily but Pn.still active and relapsed within 4Wks. 1933.2nd,relapse.Lt.F.xx.Pn.x. active Lids again scraped Sub. Conj.Saline course.	(a) 9 months (b) 9 " R-Resistant to various treatment

A	B	C	D	E
Case . 6 1932. (a) 22. (b) 7.	(a) Ac. Conjitis e.e. after recent injury. (b) Vision. 6/8. e.e. Lids. } T.x. e.e. Tarsi. } Conj. Rt. I.x.P.x. F.x. U.xx. Lt. I.-P.x. U.x.	Tr.III.e.e. Rt. Worse. with conjitis. R.	Conjitis subsided with Acriflavine 1%. in 7 days. R.e. treated with Berberine 1%. Sub.Conj. Resulted in troublesome Ptosis. Not repeated. L.E. treated with Sodium Morrhuate 3%.	(a) 3 weeks. (b) 3 months. R- No effect.
Case. 7. 1932. (a) 16. (b) -	(a) Acute Conjitis e.e. Tr. Symptoms 3 years. (b) Vision.-- Lids. } T.xxx.e.e. Tarsi. } Conj. Fxxx. Pxxx. e.e. Corn. Pxxx. e.e. Ft.xx.	Tr.III.E.e. severe.	Had a Sub.Conj. Berberine Sulph. 1% to ½ c.c.e.e. at three weeks, intervals during which had active Keratitis e.e. Rt. Worse. Then 4 Sub.Conj. Salines e.e. at weekly intervals with Ung. H.O.F. 2% After 9 months Rt. almost Tr.IV. Lt. Tr.III. late with Corneal neb Rt. Leuc. Ft.	(a) 9 months. (b) 9 " R-Still active corneae affected in spite of treatment.
Case . 8. 1932. (a) 17. (b) 3/4.	(a) Found on inspection. (b) Vision. 6/6. e.e. Conj. R.P.x. F.xx. L.P.x. F.xx.	Tr. I. e.e. Definite.	Sodium morrhuate R.E. Sub.Conj, 3% Alt:Die:R.E. Berberine Sulph, for 3 weeks. No definite benefit when transferred.	(a) 2 weeks. (b) 1½ month. R- no effect.
Case. 9. 1932. (a) 15. (b) 3/4.	(a) Found on inspection. (b) Vision. 6/6. e.e. Conj. P.x. F.x. e.e.	Tr. I.e.e.	Treated with Sodium Morrhuate. Sub.Conj. (3%). Alt.Die. Rt. Berberine for 2 weeks. Two weeks later showed definite florid Tr.II.e.e.	(a) 2 weeks. (b) 1½ months. R-No effect.
Case. 10. 1932. (a) 18. (b) ¼.	(a) Found on inspection. (b) Vision. 6/6. e.e. Conj. F.x. P.xx. e.e.	Tr.I.e.e.	As for Case 9. above.	As for case 9.

A	B.	C.	D.	E.
Case No.11. 1932 .	As for 10.	Tr.III.e.e.	As for 10.	As for 10.
Case No.12. 1932.	As for 10.	Tr.II.e.e. Definite.	As for 10.	As for 10.
Case No.13. 1931. (a) 35. (b) 14.	(a) Ac:Conjitis e.e.Duration 1 month. (b)Vision 6/6 e.e. Conj. R. L. Fxx. F.xx. Pxx. Pxx. I.x. I.x.	Tr.II. e.e. moderate with secondary infection.	Silver 2%.2 weeks without improvement.Then scraping e.e. Vision remained 6/6. e.e. F.x. P.-.	(a) 6 weeks. (b) 9 months. R-Clinical cure.
Case No.14. 1931. (a) 17.(b) 14.	(a) Ac:Conjitis e.e.Duration not mentioned. (b) Vision.6/6. e.e. Conj: R. L. F.xx. F.xx. P.xx. P.xx. I.xx. I.xx.	(d)Tr.II. e.e. modrate secodary infection.	Scraping all Lids,For observation.F.x. P.x. e.e. on Fornices. (Folliculitis)for 6 months then,F.-. P.-.	(a)1½ weeks (b) 15 months. R. Clinical cure.
Case. 15. 1931. (a) 22. (b) 14/6/12.	(a) Mild Acute Conjitis Rt.e. Duration 2.days. (b) Vision 6/8 e.e. R.Conj: R. L. F.x. F.x. I.x.	Tr.I. e.e. Rt. worse.	Acriflavine 1% e.e. without benefit to Trachoma signs. Scraping Lids e.e. Reaction for 10 days.Then conjunctivae remained normal.	(a) 4 weeks. (b) 15 months. R. Clinical cure.

A.	B.	C.	D.	E.
Case .16 1931. (a) 31. (b) 16.	(a) Mild Acute Conjitis e.e. Duration 9 days. (b) Vision 6/6. e.e. Conj: Rt. F.x. I.x. Lt. F.x. I.x.	Tr.I.e.e.with mild Conjitis (mucopur:)	2 weeks Acriflavine 1%.without benefit.Then scraping all Lids. Reaction subsided in 10 days. Then,Conjunctivae remained normal.	(a) 3 weeks. (b) 15 months. Clear of Tr. R.Clinical cure.
Case. 17 1932. (a) 32.(b) 11.	(a) Sub.Acute Conjitis e.e. Duration 11 days. (b) Vision 6/6. e.e. Conj: R- F.xx. Ixx. L- F.xx. Ixx.	Tr.II.e.e.with mild Conjitis.	2 Weeks Zinc Sulph 4% without benefit. After scraping all Lids reaction subsided in 7 days. Observed over 15 months Conjunctivae remained normal.	(a) 3 weeks. (b) 15 months. R.Clinical cure.
Case. 18. 1931. (a) 37.(b) 16.	(a) Recurrent Conjitis e.e. Duration 4 years. (b) Vision R. 6/12 L. 6/9. Conj: R. xx. F.xx. I. xx. P. xx. L. F.xx I. xx.P.xx.	Tr.II.e.e.with seconda ry infection.	Acriflavine 1% for 2 weeks. without benefit.After scraping reaction subsided in 7 days. Observed over 15 months.Still showed definite Tr.II.with F.x. P.x. e.e.	(a) 5 weeks. (b) 15 months. R. No effect.
Case. 19. 1931. (a) not (b) mentioned.	(a) Acute Conjitis e.e. Duration not mentioned. (b) Vision 6/12. e.e. Conj: R.F.xx. P.xx. I.xx. L.F.xx. P.xx. I.xx.	Tr.II e.e. with secondary infections.	Scraping all Lids.clear of symptoms in 17 days. Observed 9 months. Conjunctivae remained normal.	(a) 2½ weeks. (b) 9 months. (R) Clinical cure.

A.	B.	C.	D.	E.
Case. 20. 1931. (a) 33. (b)15.	(a) Mild Ac:Conjitis e.e. Duration not mentioned. (b) Vision 6/6. e.e. Lids. R. T.x. (Proper) L. T.x. Conj: R. F.xx. I.xx. P.xx. L. F.x. I.x. P.x.	Tr.II. e.e. Mild with slight Secondary infection.	7 weeks after scraping definite signs of Tr.II again present. Discharged on account of Retrenchment.	(a) 1 week. (b) 1¾ months. R. apparently not influenced by treatment.
Case .21. 1931. (a) 31.(b) 14½.	(a) Sub Acute Conjitis e.e. Duration 3 to 4 months, Vision. R.6/8. L.6/15.	Tr.III.e.e. with Secondary infection.	Treated for 3 months with Iodised Phenol 10% to Lids without Improvement. Symptoms subsided 14 days after scraping e.e.	(a) 4 months. (b) 5 months. (R).
Case. 22. 1931. (a) 28. (b) 8.	(a) Chronic Recurrent Conjitis. Conj: e.e. "Granular Lids" Duration 18 months. (b) Vision 6/60. e.e.(myopic) with glass 6/6 e.e. Lids. T.x. e.e. Tarsi. Txx. e.e. Conj. Txxx. P.xxx. I.x. e. e.	Tr.III. e.e. Gross.	Prolonged treatment elsewhere by Silver.Both eyes scraped twice. followed by Ung.H.O.F. and Ung.Cupro.Argent. Tr. signs cleared well and 3 months later Lids were normal without thickening or scarring After 6 months P.x. e.e. temporary improvement after U.V.L.6 times no definite Tr. signs.	(a) 8 weeks. (b) 16 months. (R) Clinical cure

A.	B.	C.	D.	E.
Case . 23. 1931. (a) 22.(b) 3.	(a)Sub.Acute Conjitis e.e. Recurrent over 3 years "Granular Lids" 10 years. (b)Vision Rt. 6/6. e.e. Lids. R. Txxx.S.x. D. x.Pt. x. e.e. Tarsi.R.T.xxx. Sx. L.Txxx.S.x. Tr. x.	Tr,III. e.e. Severe Old-standing.	Developed recurrent Corneal Ulcer while under treatment with Silver 2%.Iodised Phenol 1% Alt.Die.for 1 month.No improvement with this or Copperstick. 8 applications U.V.L. relieved symptoms. Gradual conversion to Tr IV. in 9 months after U.L.V.and Trichiasis operation.	(a) 12 months. (b) 15 months. (R) slow change from Tr.III severe to Tr.IV
Case 24. 1932. (a)32. (b) 14½.	(a)Acute Conjitis e.e. (b)Vision 6/6.e.e. Conj. T.F.x. all Lids.	Doubtful Tr.I e.e. Mild or Folliculitis.	4 exposures of U.V.L. inspections until 12 months later showed Conjunctivae normal.	(a) 2 weeks (b) 12 months. Apparent clinical cure.
Case. 25. 1932. (a) not mentioned. (b) " "	(a)Acute Conjitis e.e. Duration 3 days. (b)Vision 6/18. x.e.e. Lids. T.x. e.e. Tarsi.T---- Conj. P.xx. F.x. I.xx. e.e.	Tr.II.e.e. with Secondary infection.	Sodium Chloride massage 1 application without benefit. Then U.L.V.6 applications 3 mths later without benefit to Tr.signs unchanged. Treated with Zinc 3½ months.after which showed Tr.IV. signs e.e.	(a)4½ months. (b) 7 " (R) Gradual to Tr.IV.Mild.

A.	B.	C.	D.	E.
Case .26. 1932. (a)a 28 . (b) ←	(a) Acute Conjitis e.e.Duration 1 day. (b)Vision 6/6 .e.e. Lids.) T.x. e.e. Tarsi) T,?.e.e. Conj. P.xx. F.xx. I.x. e.e.	Tr.II. e.e. Definite with mild secondary infection.	U.V.L. twice weekly for 2 weeks. 5 exposures,after 1 month Tr.signs doubtful.	(a) 2 weeks. (b) 5 " R. Apparent clinical cure.
Case 27. 1932. (a) 19.(b) ¾	(a) Found on Inspection. (b) Vision 6/6. e.e. Lids. T.?. e.e. Conj. P.x. U.x. e.e.	Tr.III very mild e.e.	6 Exposures U.V.L. e.e.Twice weekly. Tr.Lesions appeared less when transferred from Quetta. 3 weeks later.	(a) 2 weeks. (b) 3 " (R) Apparent improvement.
Case.28. 1932. (a) 16.(b) ¾	(a) Found on Inspection. (b) Vision. 6/6 e.e. Conj. R. F.xx. Pxx. L. F.xx. P.xx.	Tr. I. e.e.	6 Exposures U.V.L. 7 days later Tr. signs unchanged, when transferred.	(a) 2 weeks. (b) 3 " R. Indefinite.
Case .29 1932. (a) 16.(b) ½	(a) Found on Inspection. (b) Vision. 6/6 e.e. Conj. F.xx. e.e.	Tr.I. e.e.	3 Exposures U.V.L.and 6 weeks later complained of defective vision since treatment. (Vision less than 6/60.e.e.) but showed no Fundus(etc) changes to account for this. Unchanged on transfer.	(a) 1½ weeks. (b) 2 months. (c) No,improvement in Tr. signs.

A.	B.	C.	D.	E.
Case . 30 of 1932. (a) 18.(b) ¾	(a) Found on Inspection. (b) Vision 6/6 e.e. Conj. F.xx. P.xx. e.e.	Tr,II. e.e.	U.V.L.6 times without any change in Tr. signs.	(a) 3 weeks. (b) 3 " (c) No improvement.
Case. 31 of 1932. (a) 20. (b) 1.	(a) Found on Inspection. (b) Vision 6/6. e.e. Lids. T. x. e.e. Tarsi.T.x. S. x. e.e.	Tr.III. e.e. mild.	U.V.L.6 times without any definite change in Tr.signs.	(a) 3 weeks. (b) 3 " (c) no improvement.
Case.32 of 1932. (a) 35.(b) 11½.	(a) Sub.Acute Conjitis e.e. Recurrent Annually. (b) Vision. R.6/12. L.6/8. Conj. F.xx. I.xx. e.e.	Tr.II e.e. with secondary infection.	Scraping e.e. once.Until 3 and 6 months later Tr.signs unchanged. Then treated by Sodium Chloride massage 6 times .e.e.at twice weekly intervals until 3 months later.Clear of Tr.signs.	(a) 1 month. (b) 9 " Clinical cure.
Case. 33. of 1931. (a) 24.(b) 6.	(a) Acute Conjitis e.e. Duration 6 days. (b) Vision 6/6. e.e. Conj. F. xx. I.xx. e.e.	Tr.II.e.e. with secondary conjitis.	Scraping e.e. and Zinc drops. Tr.signs unchanged 5 months later. Then 6 applications sodium Chloride massage. Conjunctivae normal 3 months later and 9 months later.	(a) 3 weeks salt. (b) 14 months. R. Clinical cure.

A.	B.	C.	D.	E.
Case . 34 1931. (a) 35.(b) 12½ .	(a) Acute Conjitis e.e. Duration 6 weeks. (b) Vision 6/6 e.e. Conj. F.xx. I.xx. e.e.	Tr. I. e.e.with secondary conjitis.	Zinc for 1 month without benefit after Sodium Chloride 3.applications clear of Tr. signs. e.e. Still clear after 14 months.	(a) 7 weeks. (b) 14 months. R. Clinical cure.
Case 35. 1932. (a) 26.(b) 7.	(a) Acute Conjitis.e.e. Duration 3 days. (b) Vision 6/6 . e.e. Conj. R.F.x. L.-.	Tr. I. R.E. mild.	Sodium Chloride massage.3 times. Conjunctivae Normal. After 4 and 10 months.	(a) 1½ weeks. (b) 10 months. R. Clear of Tr. signs.
Case 36 .1932. (a) not (b) mentioned.	(a) Acute Conjitis e.e. Duration 3 to 4 days. (b) Vision 6/6. e.e. Lids. T.x. e.e. Tarsi.T.x. e.e. Conj. U.xx. I.x. e.e.	Tr.III. e.e.	Sodium chloride massage 4 times e.e. After 2 weeks Conjunctivae smooth. Tarsus less thick. 1 month later when last seen before transfer,appearance of mild Tr.IV.	(a) 2 weeks. (b) 1 month. (R) very good. Rapid conversion to Tr.IV.

A.	B.	C.	D.	E.
Case 37. 1932. (a) 25.(b) 9.	(a) Sub.Acute Conjitis.e.e. Duration 3 days. (b) Vision. Not mentioned. Lids. } R.Txxx Tr. Tarsi. } L.Txxx. Tr. Conj. Fxxx. Pxx, Ix. Corn. R, Pnxx. L.-.	Tr.III.e.e.	Sodium Chloride massage e.e. 4 times. Examination 6 months showed Tr.IV.e.e.	(a) 2 weeks. (b) 6 months. Converted to Tr.IV.
Case .38. 1932. (a) 26.(b) 5½.	(a) Chronic Conjitis.e.e. Duration not mentioned. (b) Vision 6/12. e.e. Lids. } T.x. e.e. Tarsi. } Conj. Fx P. Uxx. e.e.	Tr.III e.e.	Sodium Chloride massage e.e. 5 times. Three months later Conjunctivae appeared normal.	(a) 2½ weeks. (b) 3 months. R. Clinical cure.
Case .39. 1932. (a) 29. (b) 10½.	(a) Sub Acute Conjitis e.e. Duration 4 days. Vision 6/6.e.e. Conj. P.x. F.xx. e.e.	Tr. I. e.e.	No improvement after 7 days Zinc Sulph. 3 months after 3 applications of Sodium Chloride massage e.e. Conjunctivae normal.	(a) 10 days. (b) 3 months. (R) Clinical cure.

A	B	C.	D.	E.
Case. 40. 1932. (a) 3. (b) 8.	(a) Sub Acute Conjitis.e.e. Duration 6 weeks. Vision 6/9. e.e. Conj. F.xx. P. x. I.x.ee.	Tr. I. e.e. Definite.	Sodium Chloride massage 3 times e.e. 4 months later Conjunctivae normal.	(a) 1½ weeks. (b) 14 months. (R) Clinical cure.
Case. 41. 1932. (a) 23. (b) not mentioned.	(a)Chronic Conjitis. e.e. Duration not mentioned. Vision 6/6.e.e. Lids. T.x. e.e. Tarsi. Conj. F. xxx. P. xxx. U.xxx. e.e.	Tr.III. e.e.	Sodium Chloride massage 4 times complicated by pin-point dryness of Cornea which left no defect. 2 and 3 months later practically Tr. IV. e.e.	(a) 3 weeks. (b) 3 months. R. Conversion to Tr. IV.
Case. 42. 1932. (a) 20½ (b) Nil.	(a) Found on inspection. (b) Vision 6/9. e.e. Lids. T.x. e.e. Tarsi. Tx. Sx. e.e. Conj. U.xx. F.x. e.e.	Tr.III. e.e.	Sodium Chloride massage 6 times Rt.e. Ol.Chaulmoogra.6 times Lt.e. After 4 months.Rt. T.IV. Lt. T.III slightly active U.x. e.e.	(a) 2 weeks. (b) 4 months. R. Conversion to Tr.IV.
Case. 43. 1932. (a) 18. (b) 1.	(a) Nil: Found on inspection. (b) Vision 6/6. e.e. Lids. T.x. e.e. Tarsi. Tx. Sx. e.e. Conj. Pxxx. Fxxx. Ix. e.e.	Tr.II. e.e.	U.V.L.6 exposures showed no change. Then 5 Sodium Chloride applications. 4 months later Conj: still normal.	(a) 5 weeks. (b) 4 months. R. Clinical cure.

A	B	C.	D.	E.
Case. 44 1932. (a) Not mentioned. (b)	(a) Chronic Conjitis e.e. Duration not mentioned. Vision Rt. 6/60: Lt.6/18. Lids. Tx. e.e. Tarsi Dx.e.e. Conj. Px. Fx. Uxx. e.e.	Tr.III. e.e.	After 5 applications Sodium Chloride massage. e.e. Conjunctivae definitely Tr.IV. 1 month later.	(a) 2½ months. (b) 7 weeks. R. Rapid conversion to Tr. IV.
Case. 45. 1932. (a) 17. (b) NIL.	(a) Nil: Hound on Inspection. (b) Vision 6/6. e.e. Lids. Tx. e.e. Tarsi. Tx. Sxx. e.e. Conj. Txx. Uxx. e.e.	Tr.III. e.e.	After Sodium Chloride treatment sent to Recruit Depot in Punjab. No further treatment. Inspection on return to Quetta after 8 months showed Tr.IV e.e.(mild)	(a) 10 days. (b) 8 months. R. Conversion to Tr.IV. e.e.
Case. 46 1932. (a) 32. (b) Nil.	(a) Nil: Found on Inspection. (b) Vision. 6/6. e.e. Lids. Txx. Sxx. e.e. Conj. Uxx. e.e.	Tr.III. e.e.	As for Case .45 showed Tr.IV. e.e.	(a) 10 days. (b) 8 months. R. Conversion to Tr.Iv e.e.
Case. 47. 1932. (a) 16. (b) NIl.	(a) Nil: Found on Inspection. (b).Vision 6/6. e.e. Lids. Tx. Sxx. e.e. Tarsi.Txx. e.e. Conj. Uxx. e.e.	Tr.III. e.e.	As for Case 45.	As for Case 45.

A	B	C.	D.	E.
Case. 48. 1932. (a) 15.(b) Nil.	(a) Nil.Found on Inspection. (b) Vision 6/6. e.e. Conj. F.x. P.x. U.x. e.e.	Tr.III.e.e.	3 applications Sodium Chloride massage e.e. 1 month later still mild Tr.III. e.e. 8 months later Tr.IV. e.e.	(a) 10 days. (b) 8 months. R. Conversion to Tr.IV. e.e.
Case. 49. 1932. (a) 16. (b) Nil.	(a) Found on Inspection. (b) Vision. 6/6. e.e. Conj. P.x. U.xx. e.e.	Tr.III. e.e.	3 Sodium Chloride massage. After 1 month showed Tr.IV.e.e. before being retrenched from service.	(a) 1 day. (b) 1 month. (c) Rapid Conversion to Tr.IV.
Case. 50. 1932. (a) 16.(b) NIl.	(a) Nil.Found on Inspection. (b) Vision.6/6. e.e. Conj. P.x. U.x. e.e.	Tr.III. e.e.	Sodium Chloride massage 3 times e.e. 1 month later suggested Tr.IV. e.e.,after 8 months Conjunctivae normal. -	(a) 1½ weeks. (b) 8 months. (R) Clinical Cure.
Case. 51. 1932. (a) 17. (b) ½ .	(a) Sub.Ac.Conjitis. e.e. Duration 6 days. (b) Vision. 6/12. e.e. Conj. P.x. F.xx. I.xx. e.e.	Tr.III. e.e.	After 2 applications Sodium Chloride e.e. Tr. signs cleared.Mild Folliculitis signs 4 months later.	(a) 1 week. (b) 4 months. (R) Clinical Cure.

A	B	C.	D.	E.
Case. 52- 1931. (a) 30.(b) 14.	a) Chronic Conjitis e.e. Duration 2 years. (b)Vision. Rt. 6/30. Lt. 6/12. Lids. T.xx. e.e. Tarsi. T.xxx. S.x. e.e. Conj. P.xx. U.xx.e.e. Corn. Rt. H.xx. Lt. -.	Rt. Tr.III. Lt. Tr.IV.	Silver Nitrate 2% Rt. e. for 2 weeks. then went on 3 months leave,during which Rt.e.became more active. Showed Rt.Pn.xx. Treated with Sodium Chloride massage. which appeared to aggravate .Then 3 weeks Chaulmoogra Oil which converted into Tr.IV. 3 months later Tr.IV.e.e. Vision 6/10. e.e.	(a) 2 months. (b) 12 months. (c) Conversion to Tr.IV.
Case. 53. 1931. (a) 21.(b) 2.	(a)Sub.Acute Conjitis.e.e. Duration 1 month. (b)Vision. 6/12. e.e. Lids. T.xx. e.e. Tarsi. T.xx. e.e. Conj. U.xx. I.x. e.e.	Tr.III. e. e.	Iodised Phenol e.e. for 10 days without improvement.Then Silver 15% with much benefit, but 2 months later still active Tr.III No.improvement with Sub.Conj.Salines. 2 weeks condition unchanged after 2 months Ol.Chaulmoogra when transferred from Quetta.	(a) 5 months. (b).6 months. (R) Resistant to treatment.
Case. 54. 1932. (a) Not mentioned. (b)	(a) Chronic Conjitis e.e. Duration 3 days. (b) Vision.Not mentioned. Conj. U.x. e.e.	Tr. III.e.e. mild.	2 applications Chaulmoogra Oil and until 3 months later, appearences of mild Tr.Iv.mild.	(a) 1 week. (b) 3 months. (R) Conversion to Tr.IV.(Rapid)

A	B	C.	D.	E.
Case. 55. 1932. (a) 15 (b) Nil.	(a) Nil. Found on Inspection. (b) Vision. 6/6. e.e. Lids. Tarsi. } T.xx. e.e. Conj. F.xx. P.xxx. U.xxx. e.e.	Tr.III e.e.	01.Chaulmoogra e.e. thrice weekly for 3 weeks.Condition unchanged,after 8 months.	(a) 8 weeks. (b) 8 months. R. Unchanged.
Case.56. 1932. (a) (b) Not mentioned.	(a) Nil. Found on Inspection. (b) Vision. 6/6. e.e. Lids. Tarsi.) T. x. e.e. Conj. P.xx. U.xx. e.e. Corn. R.-. L. Hxx.	Tr.III e.e.	01: Chaulmoogra e.e. twice weekly,for 3 weeks.After 1 month Tr.III. signs less marked.After 8 months condition not further improved	(a) 3 weeks. (b) 8 months. R. moderate improvement.
Case.57. 1932. (a) 2½.(b) ½	(a) Sub Acute Conjitis Rt. e. Duration 1 month. (b) Vision. 6/12. e.e. Lids. T.xxx. e.e. Tarsi. T.xxx. S. xxx. e.e. Conj. F.xx. P. xx. U.xxx. I.x. e.e. Corn. Rt.-Cu.x. Pn.x. H,x. Lt. Ft. x. Pn. x. H.x.	Tr.III. e.e.	Iodised Phenol 2 weeks. Then Atropin and Silver 2 weeks. No change in Tr.signs. Tarsectomy,performed e.e. after which continued to have fresh marginal Cus, then steady improvement. Still slightly active Corneal Tr. One month later when retrenched from service.	(a) 2½ months. (b) 3 months. (R) Moderate improvement.

A	B	C.	D.	E.
Case. 58. 1931. (a) 44. (b) 12.	(a) Chronic Conjitis e.e. Duration 7 months. (b) Vision. R-6/60. L-6/24. Lids. T.x. e.e. Tarsi. T.x. S.x. e.e. Conj. F.xx. P. xx. U.xx. I.xxx. e.e. Corn.-, e.e.	Tr. III. e.e.	Scraping e.e. and Acriflavine 2 weeks. Improvement temporarily Transferred from Quetta for 4 months. During which had acute recurrence, which was treated with Silver Nitrate 2% and Copper Sulphate. On return Corneal signs Tr. Ft. xxx. Pn.xx. e.e. Tarsectomy e.e. performed after which developed Striate Keratitis. L.e. This did not respond to local or Protein shock. (Sterile Milk) Observation 6 months later showed and 18 months later showed Pn. and Striate Keratitis active e.e. and resisting treatment with Sub Conj Salines. Vision Rt-6/36. Lt.6/60.	(a) 8 months. (b) 18 months. (R) Treatment did not arrest progress.
Case. 59. 1931. (a) Not mentioned. (b)	(a) Chronic Conjitis e.e. Duration 1½ Yrs. (b) Vision .6/18. e.e. Lids. T. xxx . e.e. Tarsi. T.xxx. D.xx. e.e. Conj. U.xx. e.e. Corn. H.xx. e.e.	Tr.III. e.e. severe.	Tarsectomy. e.e Free of reactionary symptoms. After 5 weeks examination after 3 and 5 months showed cornea clear Vision 6/6. e.e. No Tr. signs.	(a) 3 weeks. (b) 6 months. (c) Disease arrested.

A	B.	C.	D.	E.
Case. 60. 1932. (a) 24.(b) NIL.	(a) Chronic Conjitis. e.e. with defective vision. Duration over 5 Yrs. (b) Vision. R. less than 1/60. Hand movements. L.less than 1/60. Counts Fingers. Lids. T. xxxx. e.e. Tarsi. T.xxxx. D.x. Pt. xxx. e.e. Conj. P.xx.F.xxxx. U.x. I.x. e.e. Corn. Pn.xx. N.xxx. L.x. H. xxxx. Ft. xx. e.e.	Tr.III.very severe.With Ptosis xx.e.e. and Milky Cornea.	Sub Conjunctival Saline injections e.e. without benefit. Tarsectomy e.e. followed by Ung.H.O.F.; 4 months later, cornea showed 50% improvement. Vision. R-6/30. L-.3/60 After 7 months.Pn.healed e.e. H.and N. now only xx. e.e. Vision. R.- 6/30. L.- 6/20.	(a) 6 weeks. (b) 11 months. (R) Great improvement Disease Arrested.
Case 61. 1932. (a) 25.(b) 5.	(a) Lachrymation and defective vision.Duration 6 months. (b) Vision. R.- 6/18. L.- 6/12. Lids. T. xxxx. S.x. Tarsi. Pt.xxx. e.e. Corn. Pn. x. Ft.x. e.e. Conj. P. xx. U. xxx.	Tr.III. e.e. with gross Ptosis,and Corneal Involvement.	T Tarsectomy e.e. T After 3 months vision. R.- 6/9. I.- 6/12. Ptosis gone. Cornea, R.-Clear. L.-Healed Pn.	(a) 1 month. (b) 3 months. (R) Great Improvement. Disease Arrested.

A.	B.	C.	D.	E.
Case. 62. 1932. (a) 18. (b) Nil.	(a) Nil.Found on Recruiting. Vision. 6/10. R. 6/8. L. Lids. T.xxx. e.e. Tarsi. Conj. Pxx. F.xx. U.xxx. e.e. Corn. Pn. h. Ft.x. e.e.	Tr.III. e.e. (Active) (Florid)	Tarsectomy e.e. on enlistment. After 3 weeks reaction systems subsided. After 2 months Tr. healed. Vision. 6/6. e.e. Lids. T.x. e.e.	(a) 3 weeks. (b) 2 months. (R) Disease arrested.
Case. 63. 1931.	(a) Ac:Conjitis L.e. After having been hit with animal's tail 3 days previously. (b) Typical.Animal -tail. Conjitis. L.E. Vision. L. 3/30.- R. 6/18. Lids. T.xx. e.e. Tarsi. R.- S.x. L.-Sx. Tx. Conj. R.- U. x. L.-U.x. F.x. I.xxx. Corn, Pn.(h) L.-Pn(a) xx. L.xx. I.xxxx.Cu.x.	Tr.III. L.E. Animal tail traumatic Conjitis complicating.	Atropine 1% and Acriflavine. 1% proved very refractory. After 2 months responded to Ung. H.O.F.2% but gradually degenerated with Hazy Cornea.	(a) 3 months. (b) 8 months. (R) Secondary. Degenerative Corneal Changes.

A.	B.	C.	D.	E.
Case .64. 1932. (a)28.(b) 12.	(a) Acute Conjitis R.e. caused by road dust in R.e. 5 days previously. Vision. R.-6/30. L.-6/6. Lids. R.T.xx. Pt. xxx. L. NIL. Tarsi. R.- T.x. L.-Nil. Conj. R. F.xxx. P.xx. L. NIL. Corn. R.-Cu.x. H.x. N.x.Tr.x. L.-Nil.	Tr.II.Rt.E.with acute secondary infection after definite injury history.	Scraping Rt.upper Lid resulting in smooth Lid-Surface, and complete relief from symptoms. Other than Ptosis which is only slightly less. 2 weeks alter treated with 01.Chaulmoogra Alt:Dys. for 10 days before transfer from Quetta when again R.Conjunctiva F.x.P. x.	(a) 6 weeks. (b) 6 " (R) Indefinite.
Case. 65. 1931. (a) 36.(b) 16.	(a)Mild Ac:Conjitis. e.e. Duration 4 days. (b)Vision. 6/6. e.e. Conj. R.-F.xx. I.xx. P.xx. L.-F.xx. I.xx. P.xx.	Tr.II. e.e. Doubtful Suspicious with mild secondary infection.	Inflammatory symptoms cleared with Acriflavine 1% in 7 days. Tr.signs.without severe symptoms Remained over 8 months when still showed F.xx. P.xx. e.e. Had no other treatment.	(a) 1 week. (b) 8 months. (R) still doubtful
Case. 66. 1931. (a)34. (b) 14.	(a)Found during routine inspection (b)Vision. 6/6. e.e. Conj. Rt. F. xxx. P.xxx. Lt. T.xxx. P.xxx.	Doubtful Tr.II.	Rt.Eye no treatment, Lt.eye scraped.Rt.continued to have F.xxx. P.xxx.for 4 months, After 7 months clear, except for F.x. Rt.lower lid.	(a) 4 days. (b) 12 months. (R) Considered simple Folliculitis.

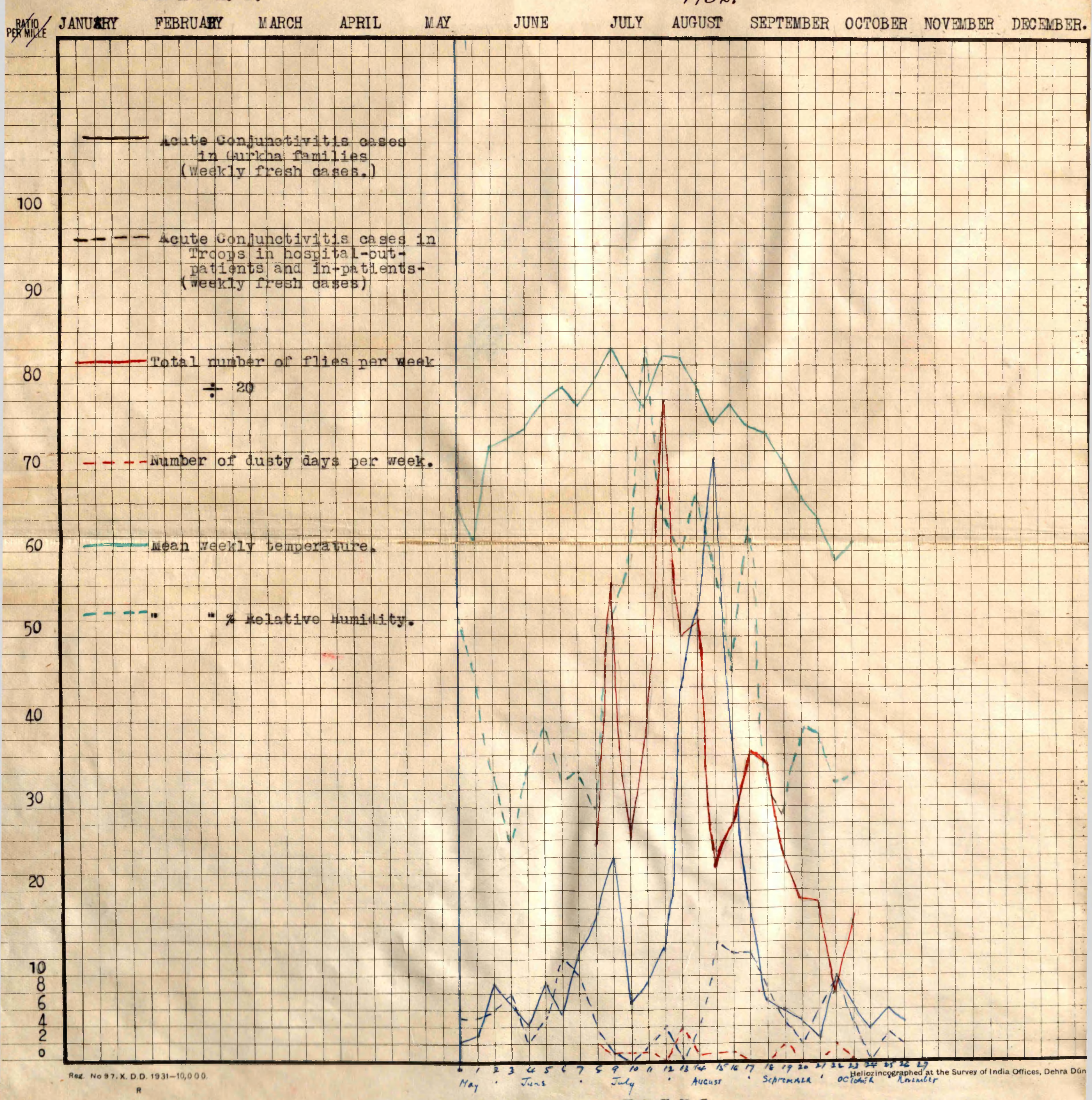
A.	B.	C.	D.	E.
Case. 67. 1931. (a) 18.(b) 2.	(a) Acute Conjitis R.e. Duration 6 days. (b) Vision. 6/8. e.e. Lids. T.x. e.e. Tarsi. T.-. e.e. Conj. R-F.xxx. I.xx. e.e.	Doubtful Tr.II. e.e.	No treatment.condition unchanged after 9 months.	(a) NIL. (b) 9 months. (R) Regarded simple Folliculitis e.e.
Case. 68. 1931. (a) 38.(b) 17½.	(a) Acute Conjitis R.e. Duration 1 day. (b) Vision. 6/6. e.e. Conj. R.I.xxx. F.x. L.I.-. F.x.	Tr. I.e.e. Doubtful.	Hydrarg.Perchlor 1-5000,and Acriflavine 1%. 1 month Conjitis subsided.Tr.signs unchanged. No Foliculitis present when seen,14 months later.	(a) Nil. (b) 14 months. (R) Doubtful,Mild. Tr.signs remaining.
Case. 69. 1931. (a) 32.(b) 15.	(a) Ac:Conjitis .R.e. Duration 3 days. (b) Vision. 6/6. e.e. Lids. T.x. e.e. Tarsi. T.-. e.e. Conj. R. F.xx. I.x. L. F.xx. I.x.	Tr.II e.e.	Zinc Sulph.2% 1 month,Tr,signs increased. Condition unchanged when transferred from Quetta 2 months later.	(a) 1 month. (b) 2 " (R) No improvement in Tr. signs.
Case. 70. 1931. (a) 22.(b) 4.	(a) Ac:Conjitis L.e. since injury 1 month previously. (b) Vision. 6/6. e.e. Lids. T.x. Rt. Tarsi. T.-. e.e. Conj. F.xx. P.xx. I.x. e.e.	Tr.II. e.e.	Treated at home with Zinc & Ung.H.O.F.2% for 2 months.Tr. signs unchanged.Observed for 12 months,when there were no definite Tr,signs other than doubtful P.x. e.e.	(a) 2 months. (b) 12 " R. Apparent clinical cure.

A.	B.	C.	D.	E.
Case 71. 1931. (a) 38. (b) 23.	(a) Ac:Conjitis.e.e.Duration 3 days. (b) Vision. 6/10.e.e. Lids. T.x. e.e. Tarsi. e.e. Conj. R. Pxx. F.xx I. x. e.e.	Tr.II with Papille Predominating.	Zinc 1 month 4 months later only doubtful Papillae. Observed for 8 months when regarded as free of Tr.signs.	(a) 1 month. (b) 8 " (R) Simple Follicu-litis.
Case.72. 1931. (a) 3. (b) 23.	(a) Sub.Ac:Conjitis e.e. Duration 1 week. (b) Vision. 6/12. e.e. Lids. T.x. e.e. Tarsi. T.x. e.e. Conj. R. P.xx.I.xx.F.x. L. P.xx.I.xx.F.x.	Tr.II.e.e. with secondary infection.	Zinc & Ung.H.O.F.at home 4 months Examination after 8 months showed doubtful mild Tr.IV. e.e.	(a) 4 months. (b) 7 " (R) Resulted in Mild Tr.IV.
Case.73. 1931. (a) Not mentioned. (b)	(a) Sub.Ac:Conjitis.e.e. Duration 7 days. (b) Vision. R. 6/12. L. 6/6. Lids. T.x.e.e. Tarsi. T.T.e.e.	Tr.II.e.e. with secondary infection.	Zinc 1 month then observed for 11 months when conjunctivae was normal.	(a) 1 month. (b) 12 months. (R) Apparent clinical cure.
Case. 74. 1932. (a) 35. (b) 14¾ .	(a) Sub.Ac: Conjitis L.e. Vision. R. 6/30. L. 6/60. Lids. R. T.xx. L. T.xxx. Tarsi. R. T.xx. S. L. T.xx. S.xx. Conj. R. F. x. P.x. L.F.xx. P.xx. Corn. R.Ft.x.H.x. L.Cu.xx.	Tr.III.e.e. with Corneal complication.	Atropine 1% intended for Tarsectomy.Not seen until after 10 months,when condition found to be unchanged.	(a) - (b) 10 months. (R) No change.

A.	B.	C.	D.	E.
Case. 75. 1932. (a) 24.(b) 7.	(a) Ac: Conjitis. e.e. Duration 1 month. (b) Vision. 6/6. e.e. Conj. P.x. F.xx. e.e.	Tr.I. e.e.	Acriflavine 1% for conjitis only observation after 4 months showed Conjunctivae normal.	(a) 1 month. (b) 14 " (R) Cleared withou treatment.

BRITISH OTHER RANKS.. Shown thus :—
INDIAN OTHER RANKS... Shown thus :—
FOLLOWERS............ Shown this;-
1932.

GRAPH. I.



RATIO PER MILLE
JANUARY FEBRUARY MARCH APRIL MAY JUNE JULY AUGUST SEPTEMBER OCTOBER NOVEMBER DECEMBER.
100
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Acute Conjunctivitis cases in Gurkha families (Weekly fresh cases.)
Acute Conjunctivitis cases in Troops in hospital-out-patients and in-patients- (Weekly fresh cases)
Total number of flies per week ÷ 20
Number of dusty days per week.
Mean Weekly temperature.
" % Relative Humidity.
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
May . June . July . August . September . October November
WEEKS.

Reg. No 97. X. D.D. 1931—10,000.
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Heliozincographed at the Survey of India Offices, Dehra Dūn

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