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COMMUNICATIONS

TRACHOMA IN THE BRITISH COLONIAL EMPIRE.—
ITS RELATION TO BLINDNESS;
THE EXISTING MEANS OF RELIEF;
MEANS OF PROPHYLAXIS*

BY

A. F. MACCALLAN, C.B.E.

I PROPOSE to deal with this subject, "Trachoma in the British Colonial Empire," geographically, beginning with the self-governing Dominions, Newfoundland, Canada, Australia, New Zealand, and the Union of South Africa. Then the Indian Empire will be considered, and finally the Imperial Crown Colonies situated in Europe, Asia, Africa, America and Oceania.

Canada

Carefully thought out regulations are in force to prevent the entrance into the country of persons who are suffering from active trachoma.

All intending emigrants starting from the British Isles, Paris, Hamburg, Antwerp and Rotterdam are required to be medically examined prior to embarkation to satisfy the Canadian Government that they are not physically or mentally defective.

* A Report by A. F. MacCallan, Vice-President of the International Organization against Trachoma, read on May 14, 1934, in Paris, at the Joint Meeting of the International Organization against Trachoma, and of the International Association for the Prevention of Blindness.

Emigrants coming direct from countries where there are no Canadian immigration agencies, such as Denmark, etc., are subjected at the Canadian port of arrival to a medical examination of the same standard as that required prior to embarkation.

Persons suffering from a contagious disease such as trachoma are neither allowed to settle in Canada nor to pass through Canada in transit to other countries unless a cure is likely to be effected by treatment in a period not exceeding four or five weeks.

The published instructions to medical officers on the subject of the diagnosis of trachoma are of interest:—"Medical officers will

DOMINIONS

Name	Area in square miles	Population	Remarks
CANADA	3,684,463	10,376,786	Account given
NEWFOUNDLAND	162,750	263,000	No report
AUSTRALIA	2,974,581	6,623,754	Account given
NEW ZEALAND	105,155	1,602,414	Account given
UNION OF SOUTH AFRICA—			
Cape of Good Hope ...	276,966	2,782,719	Account given
Natal	35,284	1,429,398	Account given
Transvaal	110,450	2,087,636	Account given
Orange Free State ...	49,647	628,827	Account given
South-West Protectorate ...	322,393	227,739	Account given
Basutoland	11,800	500,000	No trachoma. 898 cases of conjunctivitis treated
Bechuanaland	275,000	153,000	44 cases of trachoma
Swaziland	6,700	113,000	No report

regard as trachoma any case wherein the conjunctiva presents firm, well-marked granulations which do not have a tendency to disappear when placed for some days under hygienic surroundings, or do not rapidly yield to ordinary treatment, even though there be no evidence of active inflammation, appreciable discharge, or degenerative or destructive processes, at the time of the examination. They will also regard as possible trachoma any case which presents an active inflammatory condition of the conjunctiva accompanied by a discharge or thickened infiltrated condition of the lids, and hold such a case until by treatment or otherwise the examination may be concluded satisfactorily. Cases presenting an acute inflammation with a granular appearance should be held as suspicious, and kept under observation for a period necessary to arrive at a definite diagnosis."

"Any condition in which granulation and discharge are present, but which readily disappear on treatment, shall not be regarded as trachoma."

"The formation of scar tissue distinguishes trachoma from all other diseases of the conjunctiva, not dependent on traumatism. In all other inflammations the conjunctiva returns to normal, leaving no traces behind it. In trachoma the presence of cicatricial tissue is evidence of nature's process of cure in those areas at least."

"When an emigrant has been certified for trachoma and is found on re-examination to be 'apparently cured' after all treatment has ceased, such emigrant shall be deferred for six months and then re-examined, and if still 'apparently cured' be passed."

"No case having suffered from trachoma shall be shown as 'apparently cured' until all evidence of the disease has been completely eradicated. The diseased conjunctiva must be replaced by white scar tissue, the lids having regained their elasticity and the infiltration causing thickening having disappeared."

"In persons of advanced years there is sometimes a condition of amyloid or hyaline degeneration following trachoma or other chronic infection leaving a thickened lid which of itself is not certifiable. This must not be confused with trachomatous or infectious infiltration."

"In the case of continental emigrants the port medical officer in Canada shall examine the eyes in order to assure himself that there is no trachoma present, since it is known from experience that old cases of this disease which may have been passed as cured, sometimes revive during an ocean voyage."

The above regulations, made by the Canadian medical authorities for the use of their medical officers who are not oculists, appear to be admirable.

Foci of trachoma in Canada.—There are a few unimportant foci of trachoma existing among Hebrew and Eastern European immigrants. The Indians, however, 122,911 in number, who have increased by 10 per cent. during the last 10 years, maintain an approximate trachomatous incidence of about 10 per cent. according to Gordon Byers, the distinguished ophthalmic surgeon. It is probable that this estimate is a highly conservative one. The last mentioned author states that the incidence of trachoma among the white population of Manitoba and Saskatchewan is serious.

At the Indian Residential Schools a definite treatment procedure has been adopted. This is not intended to take the place of the professional directions of an eye specialist, but is for use where the services of a specialist are not available. It is as follows:—

Diagnosis.—Trachoma is a chronic, communicable disease of the eye, beginning with a slight general inflammation and going on to the formation of small red granular growths on the inside

of the lids. The continued inflammation leads to the formation of scars, by which the lids are distorted. Ulcers sometimes form over the sight, leaving cloudy patches. By these means the sight is obscured. The disease is very persistent. Some cases recover in time, even without treatment, but many go on for years, and a certain number become blind. Trachoma spreads from person to person by means of towel, soap, fingers, or anything which may convey the tears or discharges from affected eyes to well ones. It does not spread without contact of some kind.

Principals should ask the Medical Attendant to advise them as to the presence of trachoma among the pupils of the school. Any case of persistent inflammation of the eye should be looked upon as trachoma unless the doctor is sure it is not. Every pupil must have and be trained to use his own towel and soap and no other, and to avoid putting the fingers up to his own eyes or to the eyes of other pupils.

A supply of antiseptic lotion (made up from tablets) is to be kept on hand. The solution is to be used in the following manner: The pupil, seated on a chair or at his school desk, is to lean backward and hold his own eye open with one finger of each hand. The teacher or nurse, using a ball-pointed dropper, is to drop two drops in each eye. The pupil is then to close the eyes while he may count 20, and move the eyeball about so as to distribute the solution thoroughly. This treatment is designed to prevent the spread of trachoma, and is to be given to the pupil every night and morning, subject to instructions contained in the ensuing paragraph. It is also recommended for the school staff. If any pupil is considered to be suffering from established trachoma the drops are not to be used, and the following treatment is to be used instead:—Small tubes of copper citrate ointment will be supplied by the Department in Ottawa. A separate tube is to be used for each pupil. The treatment is to be given just before the pupils go to bed for the night. The pupil stands in front of the teacher or nurse who will pull down the lower eyelid and squeeze on the inside of the lid a portion of the ointment as large as half a grain of wheat. The pupil then passes to bed, closes the eyes and moves the eyeballs about while he counts 20. No other treatment is authorized unless ordered by an eye specialist.

When the above mentioned treatment is carried out the nurse or teacher is to have at hand a basin of solution made by adding one teaspoonful of lysol to one quart of water. After handling the eyes of one pupil and before touching the next the fingers are to be rinsed and wiped on a towel.

Admissions to hospital.—Trachoma in itself is not considered a cause for admission to hospital. This does not forbid hospital treatment of acutely diseased eyes, whether the cause be trachoma

or otherwise, but the Department at present has not the facilities to provide the hospital treatment of trachoma as such.

These instructions have been very carefully prepared by the Director of Medical Services after consultation with a competent adviser on trachoma. *They are neither to be varied nor neglected.*

While this procedure is intended primarily for Indian Residential Schools it is also suitable for use in any other place where it can be applied.

Authorized supplies for each 100 pupils :—

Antiseptic eye lotion tablets ...	...	500
Copper citrate ointment tubes ...	...	50
Lysol, gallon ...	...	1
Eye droppers, ball pointed ...	...	24

Australia

In certain parts trachoma is prevalent. A number of trachoma cases were found among the Australian troops during the War. I have had patients in London who have come from Australia for operation on complications of trachoma. The disease is treated rather lightly in Australia where it is called "sandy blight."

Trachoma has been present in Australia to some extent since the early days of colonization, and has been observed as a condition of decreasing importance since then in all the larger centres of population and their neighbourhood.

Within the broad coastal areas devoted to agriculture and closer settlement, the disease has now practically ceased to exist. On the other hand, the history of Australia is curiously consistent in respect to the frequency of trachoma in each State during its first establishment, that is to say, when housing and living conditions were primitive, and diet was often poor in quality and irregular in supply.

Specific references occur in respect to Sydney (New South Wales), Melbourne (Victoria), Hobart (Tasmania), Adelaide (South Australia), Fremantle (Western Australia), and Brisbane and Rockhampton (Queensland).

As settlement became more permanent and the amenities of civilization developed, the disease showed definite limitation to the fringes of established settlement, and to such extent as it still does exist, this remains a generalization.

It is particularly found in the dry and dusty areas of Western and North-Western Queensland, Western New South Wales, North-West of Victoria, Northern South Australia, and the Eastern and North-Eastern parts of Western Australia, but the incidence of the disease is not high in any of these localities.

In these areas it appears to have little relation to housing and living conditions other than those affecting diet, but the areas of

incidence are usually those in which milk, greens and fruits are relatively scanty.

In no State, except Victoria (from October, 1933, only), is the disease notifiable, though as a problem of public health it is perhaps more important in Queensland and New South Wales.

In infected areas inspections of school children are made at short intervals by school medical staffs and travelling units. Public education in regard to prophylaxis proceeds along with this activity.

Facilities for change of environment to the coast exist in Queensland and elsewhere for affected children.

Compulsory notification by regulation has not been considered necessary for such areas as have been recorded.

Persons affected, on attempting to enter Australia, are prohibited under Section 3 (e) of the Immigration Restriction Act, 1901-1925.

New Zealand

Trachoma is a notifiable disease in New Zealand. Only four cases were notified in 1932. However, it is probable that owing to lack of knowledge of the disease many cases occurred which were not notified.

No adult or child suffering from trachoma would be allowed to land until a certificate from an ophthalmic surgeon had been produced, certifying that the disease had been absolutely cured.

South Africa

I have received information from the Secretary of Public Health, Pretoria, that trachoma was proclaimed a notifiable disease in the Union of South Africa in October, 1925.

Cases of the disease are not very common, the numbers that have been notified during the past eight years being as follows :—

Year ending June 30	Number notified	
	Europeans	Non-Europeans
1926	10	25
1927	13	15
1928	9	23
1929	11	32
1930	22	61
1931	6	19
1932	16	15
1933	9	27
	Total 96	Total 217

Indian Empire

Area, 1,900,000 square miles. Population, 352,000,000

Consideration of conditions in the Native States is omitted.

The Provinces of British India are :—

Name	Area	Population	Remarks
Ajmer-Merwara	2,711	495,271	No report
Andamans and Nicobar ...	3,143	27,086	No report
Assam	55,014	7,459,128	75 per cent. of all eye cases seen at Rangoon General Hospital trachomatous
Baluchistan	54,228	420,648	Trachoma universal
Bengal	77,521	46,702,307	Account given
Bihar and Orissa	83,054	33,995,418	No report
Bombay	123,679	19,348,219	14.5 per cent. of all eye cases at Bombay Ophthalmic Hospital trachomatous
Burma	233,492	13,212,192	75 per cent. trachomatous
Central Provinces and Berar	99,920	13,912,760	No report
Coorg	1,593	163,838	No report
Delhi	573	488,452	Majority trachomatous
Madras	142,277	46,740,107	At Madras Gov. Ophthal. Hospital 1149 cases of trachoma healed in 1933
North-West Frontier ...	13,518	2,425,076	Trachoma universal
Punjab	99,265	23,560,852	Universal
Agra and Oudh	106,248	48,408,763	60 per cent. trachomatous

India

The Indian Empire consists of the Provinces of British India which are governed by the Governor-General, and the Indian States which are governed by princes under the suzerainty of the King-Emperor. The area and population of the Provinces is roughly about half that of the Indian States. The Provinces alone are considered in the present paper.

Trachoma is widely spread throughout India. In the Annual Report of the Public Health Commissioner with the Government of India, 1931, Vol. II, p. 36, there are some interesting paragraphs which also appear in War Office Report of the Health of the Army, 1931, Vol. LXVII, p. 121 :—

“The most important work in this department has been the controlled enlistment of trachomatous recruits into the Indian Army. This has developed into an investigation into the nature and extent of the disease as met with in Northern India. The

results are :—(1) The disease is wide spread among certain classes, particularly Sikhs, among whom well over 90 per cent. are infected. (2) Infection starts in childhood, and in the majority progresses to reach a quiescent stage which produces little disability. (3) In the past large numbers have been enlisted and served as efficient soldiers throughout their colour service. (4) No evidence has been found to show that the disease is so infectious as to render the enlistment of these men a danger to their fellows or to the British troops serving with them.

During the year 621 trachoma recruits have been enlisted, and of these 65 have been discharged as incurable. A large proportion of these incurable cases was enlisted during the early stages of the experiment, when the type of case suitable for enlistment was not so clearly defined. With increased experience the later results have been more satisfactory."

However, two men of the British Army were admitted to hospital with trachoma according to the Annual Report of the Public Health Commissioner with the Government of India for 1932, Vol. II, p. 172.

In the Annual Report of the Public Health Commissioner with the Government of India, 1932, Vol. II, p. 62, with regard to recruiting for the Indian Army it is stated that out of 22,156 men presenting themselves for enrolment during the year ending March 31, 1932, 2,838 or 12.80 per cent. were rejected on account of trachoma. The Report continues as follows :—"The experiment referred to in last year's report in relation to the enlistment of recruits suffering from trachoma gave encouraging results, and was further extended. The evidence and experience acquired made clear the fact that little or no danger was likely to result from the recruitment of mild cases of trachoma; further the majority of these cases when placed under appropriate treatment responded readily. Instructions have since been issued permitting the enlistment in all recruiting centres of the following types of case :—

- (a) Early cases in the "papillary" or "follicular" stage.
- (b) Slightly more advanced cases where the tarsal glands are beginning to be involved.

Advanced cases are rejected as heretofore. The fact that such recruits suffer from trachoma on enlistment is noted on their medical sheets, and they are required to sign a certificate that they are willing to undergo a minor operation on their eyes if necessary. A strict watch is kept on the results of this measure and to date it clearly seems that no ill effects are occurring, and that many valuable recruits are secured who otherwise would not have been available."

In the War Office Report on the Health of the Army, 1932, Vol. LXVIII, p. 116, it is stated with regard to the Indian Army :

"The enlistment of recruits suffering from mild trachoma continues to give satisfactory results. The opinions of recruiting medical officers are in conformity with that of a distinguished ophthalmologist in civil practice, who writes:—'I can speak from 33 years' Indian experience and I am quite convinced that there are many mild cases of trachoma which are not only amenable to treatment, but which will eventually clear up without treatment. One sees hundreds of these cases each year. Regarding the contention that these are not cases of trachoma at all, but forms of chronic conjunctivitis, it is not possible to be dogmatic—for only experience can enable one to diagnose between early cases of trachoma, angular conjunctivitis and follicular conjunctivitis. But in my opinion it is perfectly safe to accept recruits with mild trachoma; in fact in some parts of India, especially in Sind, there are few eyes that do not show some signs of trachoma and yet give rise to no symptoms at all; and these signs are only found in apparently healthy eyes on everting the upper lid. If all recruits are rejected because they have some signs of mild trachoma, the field for recruiting will be enormously curtailed. Furthermore, in mild cases of trachoma at the age at which recruits are taken, the risk of infection is so small as to be almost negligible.' "

At Kohat in the North-West Frontier Province a school of 186 boys was examined where every boy below the age of 12 years was found to be infected. Whereas at Simla, on the heights of the Lower Himalayas, at a school of 1,300 boys only 3.1 per cent. were found to be infected.

In the Report of the Public Health Commissioner with the Government of India, 1929, p. 99, it is stated that in Burma in some of the schools 20 per cent. of the pupils suffer from trachoma and defective vision.

According to the Report of the Public Health Administration in the Punjab for 1932, p. 33, trachoma is so rife that "a pamphlet on the disease in English was printed and copies were freely distributed in schools through the Director of Public Instruction. An Urdu edition of the pamphlet is also under preparation and will also be distributed shortly through the same agency."

In India no clinics exist solely for the treatment of trachoma. The disease is treated gratuitously at ophthalmic hospitals and at all government hospitals and dispensaries. Compulsory treatment is an impossibility. Voluntary treatment is not very popular, since the usual treatment is painful and requires many attendances.

The course of the disease is said to be comparatively mild, and not to be subject to explosive outbreaks due to superadded infection, as is common in Egypt and Palestine.

Conditions of housing and living favour the spread of trachoma.

Over-crowding is universal among the poorer classes. The houses are insanitary and are insufficiently ventilated. Flies, smoke and dust abound in the peasant's dwelling, the disease in its earliest stage is always neglected, and the more advanced cases do not persist in treatment once comparative relief is obtained.

As one of the British military ophthalmic surgeons has written, "I cannot imagine how an anti-trachoma campaign could be carried out in this district (Lahore) which is full of communal troubles. There is no want of facilities for treatment, rather the reverse. What is needed is general sanitary education rather than any special anti-trachoma campaign."

An Indian medical officer writing from Lucknow says: "Looking into hospital records, a little over 60 per cent. are cases of trachoma. The special conditions prevailing here are the dusty nature of the streets, roads and villages, the extreme insanitary condition of our towns resulting in excessive breeding of flies, the economic cause, poverty, and above all the baneful social custom, the purdah."

While the Public Health Department of the Government of India have to expend annually so much energy and treasure in reducing the ill-effects of cholera, plague and malaria, all of which are constantly present, it is impossible to devote money—and thousands of laks of rupees would be required—to improve the ocular condition of the peoples of India, with their scores of religions, and their caste prejudices.

Medical inspection is provided in many of the Government and private schools. In many of them as many as 30 per cent. of the pupils are obviously under-nourished. Infant welfare centres are maintained in some of the large towns.

The Indian Red Cross Society is a flourishing institution carried on under the highest possible British Official and Indian patronage and management. Besides a monthly journal of 100 pages in English, the language in which communication is commonly established between the speakers of the 225 different languages (exclusive of dialects) of India, excellent illustrated brochures are published for the Junior Red Cross Section of the parent Society. Also illustrated posters in various vernacular languages are used to teach the elements of ocular hygiene.

Imperial Crown Colonies and Protectorates

Name	Area in square miles	Population	Report on eye diseases
EUROPE			
Malta	120	225,000	Account given
Gibraltar	2	22,000	Trachoma absent

Malta

Great care and interest in trachoma are observed by the Government Medical Department of Malta. There is no doubt that the disease was at one time practically universal among the poorer classes of the Maltese. Owing to the treatment adopted during the last 10 years ophthalmic conditions in the schools have greatly improved. In 1923, 1,282 marked cases were reported in the Government Schools, while in 1933 only 553 were signalized. Treatment is carried out at the Government Dispensaries, and also by District Nurses. It is important to note that during the long summer holidays treatment is still carried out for those who need it and can be persuaded to attend the Dispensaries. I should like to congratulate the Medical and Nursing Staff on their devotion to their work.

At the Ophthalmic Division of the Civil Hospital during 1933 200 cases of trachoma were treated as in-patients, and 632 cases as out-patients.

Asia

Name	Area in square miles	Population	Report on eye diseases
ASIA			
Ceylon	25,500	5,313,000	Government Health Report does not mention trachoma
Malaya—			
Straits Settlements ...	1,531	1,076,564	} Trachoma common: degree of incidence uncertain
Fed. Malay States ...	27,648	1,713,096	
Johore	7,678	505,309	
Kedah	3,150	443,021	
Perlis	316	49,300	
Kelantan	5,713	362,517	} Uncertain: 46 immigrants refused admission on account of trachoma according to current report
Trengganu	5,000	179,664	
Hong Kong	391	900,796	
North Borneo	31,000	270,223	No report
Brunei	2,500	30,000	} No mention of eye diseases in Public Health Reports
Sarawak	50,000	606,000	
Cyprus	3,600	311,000	Account given
Palestine	9,000	800,000	Account given

Straits Settlements

At the Government Schools 54 cases of trachoma were detected and submitted to treatment at the general hospital and out-patient dispensary of Singapore. This is an apparent improvement on the condition of affairs in 1930 when 207 operations for trachoma were carried out.

It is probable that under expert examination the schools and the whole native population would be found to be heavily infected.

At Singapore there are five Government Health Sisters who visit native women. There is a Child Welfare Society, two children's clinics and a crèche.

Federated Malay States

There are five clinics for eye diseases where 8,823 patients were treated in 1933. It is said that 129 cases of trachoma were diagnosed. It is extremely improbable that the small number of cases diagnosed is any reliable measure of the degree of trachomatization of the general population. A serious attempt is made to teach social hygiene by means of lectures, etc.

Johore

No trachoma statistics available. Eye diseases, especially conjunctivitis, are treated by travelling motor dispensaries, 529 cases being treated in 1933. There are also a hospital and infant welfare centres.

Cyprus

Eye clinics are in existence at the principal towns, Nicosia, Larnaca, Limassol, and Famagusta. Also two travelling oculists are employed who treated 8,629 cases; while 2,312 cases were treated by honorary oculists. Practically the whole of the poorer population is trachomatous. Social hygiene work is carried on by a lady welfare officer. A health propaganda is carried on by means of cinematograph exhibitions.

Palestine

Palestine has the distinction of having a greater percentage of blind persons among her general population than any other country in the world. This is seen in the following list :—

Number of blind persons per 100,000 of population.

Palestine	...	...	...	843
(Blind in one eye	...	...	1,968)	
Egypt	...	...	...	776
Latvia	...	...	...	225
Turkey	...	...	...	197
British India	...	...	...	150
Italy	...	...	...	111
England	...	...	...	73
France	...	...	...	71
Germany	...	...	...	59
Holland	...	...	...	56

The question of this devastating amount of blindness in Palestine requires some consideration in relation to the country, its climate and its population.

The area of the country is about 9,000 square miles or 64,000 square kilometres, and may be divided into the district about Jerusalem, and the districts north and south of the Holy City. In the southern district there is practically no rainfall.

The population consists of about 70 per cent. Moslems, 20 per cent. Jews, and 10 per cent. Christians.

According to Shimkin there is now little or no trachoma among the children who frequent the better class Jewish schools in Jerusalem.

In the southern district with a population of 304,532 it was found that 28 per cent. were blind in one eye, and 11.3 per cent. were blind in both eyes. This very high percentage is related to the scarcity of water in the southern district, since for the whole of Palestine the percentage of blindness in one eye is 19.68 and for blindness in both eyes 8.43.

Of great importance in the determination of the cause of this appalling degree of blindness is the age of onset of the deterioration of vision.

There is a close association between age and the incidence of blindness; this is marked up to the age of 10 to 15 years both in boys and girls. Thereafter the incidence falls abruptly in boys, but in girls, at this, the marriageable age, it remains high until about 30 years.

The explanation of this is that up to the age of 10 to 15 years they are associating with other children who have acute conjunctivitis which infects them, and owing to the inflammation of the eyelids ulceration of the cornea occurs, resulting in blindness in a large proportion of cases.

In girls over 15 years marriage and child-birth is the usual lot. They associate with infected children to a greater extent than do the opposite sex and partake of the ocular dangers of the children.

In former days small-pox was a very frequent cause of blindness, but now, owing to the compulsory vaccination under British administration, this disease has ceased to exist in Palestine.

As in Egypt ophthalmia neonatorum in Palestine is an almost negligible cause of blindness.

Again, as in Egypt, the prime cause of the blindness is acute conjunctivitis. This is the result of the action of well-known bacterial organisms the most important of which are the gonococcus, the Koch-Weeks bacillus, the Morax-Axenfeld bacillus, the pneumococcus, and the staphylococcus.

It is important to supply an answer to the question "Is trachoma a cause of blindness?" Uncomplicated trachoma is a mild hyperaemic state of the lining membrane of the eyelids, that is of the conjunctiva and subconjunctival tissue. It may cause very little discomfort. In a trachomatous country it is necessary to evert the upper eyelid of every person whom it is desired to state to be free from trachoma. Trachomatous infiltration of the superficial layers of the cornea occurs very shortly after, or simultaneously with the earliest infection. This manifests itself by a vascularization which in its earliest stage can only be detected by biomicroscopical methods. Such increased vascularity will militate against the development of corneal ulceration when, by chance or by accident, some of the superficial cells of the cornea are rubbed off. (Report of the Ophthalmic Section, Department of Public Health, Cairo, 1919, p. 6.)

However, when trachoma has reached a florid stage of prominent gelatinous follicles (Stage Tr. IIa), or of papillary hypertrophy (Stage Tr. IIb) the purulent discharge caused by conjunctivitis-producing bacteria remains in the interstices between the follicles and papillae and exerts a deleterious influence on the subjacent cornea.

So it may be stated that uncomplicated trachoma of Stage Tr. I is not a cause of blindness, but that trachoma complicated by superadded bacterial infections is a cause of blindness, the corneal-disintegrating factor being mainly the bacterial infection.

Not infrequently trachomatous eyes are seen which have survived a long-continued inflammatory process caused by bacteria, but are practically blind due to dense pannus. It is not improbable that without the vascularization due to the trachoma such eyes would have been completely destroyed.

Means of ophthalmic relief in Palestine.—Palestine is richly provided with means for the amelioration of ocular disease as compared with other countries, though still insufficiently to cope with the vast amount which exists.

First and foremost is the Ophthalmic Hospital of St. John of Jerusalem which is maintained by the Grand Priory in the British

Realm of the Venerable Order of the Hospital of St. John of Jerusalem. This Order was founded in Jerusalem in 1099 as an Order of Hospitallers. It was converted into a Military Order, and on the loss of Jerusalem it migrated to Acre, and thence to Rhodes and Malta, where it formed one of the most important bulwarks against the naval power of the Moslems in the Mediterranean. The Knights were expelled by Napoleon in 1798. The present headquarters of the Order are in an ancient building in London.

The Warden of the Hospital in Jerusalem is Dr. Strathearn to whom a great part of the success of the Hospital is due, and from whose writings much of the present information is obtained.

The Scottish Hospital also does important work. The Government provides seven hospitals in various places and also a travelling unit.

Treatment has been adopted in many of the schools. A training school for girls of marriageable age is about to be established so that they may learn how to look after the health of a family.

The Hadassah Medical Organization was created by American women and maintains five hospitals with ophthalmic departments; it also carries on ophthalmic treatment in Jewish schools, and is making an effort to bring home to dwellers in distant country places the importance of ocular hygiene and treatment, by means of clinics.

In the ancient Hebrew books there are several mentions of blindness supervening on groups of men (Genesis XIX, 11; II Kings VI, 18; and in the New Testament, also (Acts of the Apostles IX, 8; also XIII, 11) as well as several well-known miraculous cures of blindness. It is, therefore, incorrect for Dr. Jassky of Tel-Aviv, Palestine, to suggest that there was not much eye disease in Palestine in ancient days. It is true that he mentions the word trachoma, but in the East uncomplicated trachoma is a mild disease, though fulminating blindness may occur when it is combined with acute bacterial, especially gonococcal, infection. No doubt Saul of Tarsus was only lightly infected just before he got to Damascus, so that some slight treatment exhibited by Ananias soon put him right.

It is quite possible that all the Prophets, and later the Martyrs, had trachoma. Just as practically all indigenous inhabitants of Palestine have it now. There is no doubt that trachoma was rife in Egypt during the period of the Israelitish bondage in that country. It is almost inconceivable that they should not have brought it away with them, as one of their less desirable forms of plunder. In ancient days Palestine was a well-wooded country, and therefore, the rainfall was abundant. Since there was no fuel except trees a grand deforestation resulted, with a consequent diminution of rainfall. With an insufficient water supply trachoma and acute ophthalmias ran rife.

Trans-Jordania

This mandated country is bounded on the west by Palestine, on the north by Syria, on the east by Iraq, and on the south by Hejaz and Nejd. The total population is about 300,000, of whom about half are nomadic.

In the schools 24.9 per cent. of the pupils are stated to be trachomatous. Ophthalmic treatment is carried out in the schools; in 1931 the attendances for school treatment were 263,580.

At the government hospitals in 1931 the number of cases treated was 7,877, and at other clinics 1,198.

Eye drops are supplied to the heads of the religious organizations (which are predominately Moslem) for distribution.

It is probable that trachoma is practically universal.

Imperial Crown Colonies and Protectorates

Name	Area in square miles	Population	Report on eye diseases
AFRICA			
Southern Rhodesia ...	149,000	900,000	No information
Northern Rhodesia ...	288,000	1,270,000	No trachoma noted
Gambia ...	4,000	210,000	No trachoma noted
Gold Coast ...	79,000	2,030,000	No trachoma noted
Sierra Leone ...	34,000	1,541,000	Much conjunctivitis
Nigeria and Cameroon	336,000	19,000,000	No report
Somaliland ...	68,000	300,000	Much conjunctivitis, some trachoma
Kenya ...	200,000	2,530,000	Trachoma increasing, see account given
Uganda ...	223,500	3,145,500	Trachoma common
Tanganyika ...	365,000	4,122,000	Trachoma present
Zanzibar ...	1,020	200,000	See account
Nyassaland ...	38,000	1,200,000	See account
Sudan ...	1,015,000	6,000,000	See account
Mauritius ...	720	384,000	No report
Seychelles ...	150	25,000	No conjunctivitis
St. Helena and Ascension Islands	85	3,950	No report

Kenya

It is reported that trachoma is spreading fast among the natives of the colony. Formerly it was rare or non-existent, but it has been brought into the country by new-comers—Indians and Arabs—and unfortunately is still being introduced.

According to the last General Report, that of 1932, the number

of cases of conjunctivitis treated was 8,540 (some of which were probably trichomatous) as well as 184 cases of trachoma.

The equator bisects the country, which occupies a very elevated plateau.

Uganda

There were 26,980 cases of conjunctivitis and trachoma treated at the eye clinic at Mulago.

Tanganyika

In 1931, 735 cases of trachoma were treated in hospitals and 106 cases in dispensaries.

Although 8,713 cases of gonorrhoea were treated there were no cases of gonorrhoeal ophthalmia.

Zanzibar

External eye diseases are very common. From 2 to 4 per cent. of the pupils in the schools are more or less incapacitated by some form of conjunctivitis.

There are European, Asiatic and Native hospitals. There has been a special eye clinic established recently.

Nyassaland

There is a Native hospital and rural dispensary in each district. According to the last report, 19,316 cases of conjunctivitis were treated, and 22 cases of trachoma. It is probable that many of the cases conservatively diagnosed as conjunctivitis were really trachoma.

Sudan

The examination of 2,197 pupils in Government Schools at Khartum and other places showed that 972 were trichomatous. This information appeared in the last Government Report on the Public Health of the Sudan.

This finally disposes of the suggestion that trachoma is practically unknown in the Sudan. When I was in Egypt the belief was current that there was very little, if any, trachoma south of Asswan, but during a visit I paid to Nubia I found that all the pupils in a school on the side of the Nile opposite to Abu-Simbel were trichomatous; this is not very far north of Wadi Halfa.

The district of Nubia is where practically all the excellent servants and cooks employed in Egypt come from. As they are all trichomatous it is important that they should not be allowed to come into intimate contact with uninfected European children.

In all schools in the Sudan, which begins about 200 miles south of Asswan, along the banks of the Nile, arrangements for the treatment of trachoma have been instituted; in the majority of cases the masters have been trained to apply simple remedies under the supervision of the Medical Officers of Health and of the Eye Specialist.

On a report that a number of cases of blindness had occurred among certain tribes of the Bahr-el-Ghazal, about 1,000 miles or 1,600 kilometres south of Asswan, a British Medical Officer was sent to investigate. He found that there were actually 47 such cases and reported as follows :—

“The disease appears to be a gross form of choroido-retinitis, the onset of which is characterized by lacrimation and swelling of the lids, followed by night-blindness and progressing to complete blindness in from five months to two years. The choroido-retinitis is followed by optic atrophy and in many cases the disease is associated with a generalized uveitis with exudate and synechiae, and also cataractous changes in the lenses.

In a boy, aged 12 years, there was no trachoma, there was an eosinophilia of 10 per cent. (probably the result of intestinal parasites), lenses clear, disseminated retino-choroiditis, some pallor of the optic discs, no irido-cyclitis.

There is usually a strong family history of blindness. It has been suggested that the ocular condition is the result of eating fish, which are obtained by poisoning the water in which they live with a peculiar seed from a tall leguminous plant, the seed being of the appearance of a lentil and of a blackish-green colour. The leaves of the plant are rather fleshy with the under surface covered with silvery hair.”

Imperial Crown Colonies

Name	Area in square miles	Population	Report on eye diseases
AMERICA			
Jamaica	4,200	863,000	No trachoma noted in Government Health Reports
Bahamas	4,400	60,000	
Leeward Islands ...	750	140,000	
Windward Islands ...		162,000	
Barbados... ..	170	156,000	
Trinidad and Tobago ...	1,860	366,000	
British Guiana	90,000	301,000	
British Honduras ...	8,600	46,000	
Bermuda	20	24,000	
Falkland Islands ...	4,618	3,000	

British Guiana

Although no trachoma is reported there is a considerable frequency of hypopyon ulcer.

Keratomalacia is frequent, due to defective diet. Night-blindness is not uncommon.

Toxic amblyopias are common during parturition and may result in optic atrophy.

Name	Area in square miles	Population	Report on eye diseases
OCEANIA			
Fiji Islands	7,500	157,000	Trachoma prevalent
Pacific Islands	12,500	200,000	Trachoma present

Fiji Islands

I have been in communication with one of the Government Medical Officers in Fiji with reference to the nature of a form of conjunctivitis prevalent in the Islands.

It is suggested in the last Colonial Office Report that this is not really trachoma, but "chronic granular follicular conjunctivitis." There is, of course, no such disease apart from trachoma. I have little doubt that the condition is trachoma. It is said to be rare to find a blind Fijian. As trachoma is not in itself a common cause of blindness, but only by its complications or sequelae there is nothing surprising in this.

There are 15 hospitals in various islands where eye treatment, of a kind, can be obtained.

Trachoma is a notifiable disease in the Islands.

At the welfare centres "Argyrol" is used for the treatment of conjunctivitis among children. This may account for the lack of success in treatment.

British Solomon Islands Protectorate

Eight cases of trachoma were treated in the hospitals as in-patients. This looks as if trachoma were definitely prevalent.

Summary

In the foregoing paper an account has been given of the incidence of trachoma and acute conjunctivitis in the various parts of the British Empire.

One or two points stand out as important. First in some of the distant possessions the claims of lethal diseases, such as plague, cholera, malaria and the anaemia of ankylostomiasis engage the whole attention and financial resources of the Public Health Administrations. Second a specialist knowledge of eye diseases cannot be expected of the ordinary competent Colonial Medical Officer, so that in some places the incidence of trachoma is grossly underestimated or indeed neglected.

In the absence of fulminating epidemics of acute conjunctivitis superadded to trachomatous conjunctivitis a population may be universally infected with trachoma without any insistent demand for treatment or prophylaxis. For instance, in some parts of India trachoma runs an uncomplicated course the affection being accepted as an ordinary or natural occurrence, while in Palestine hideous epidemics more than decimate the eyes of the natives.

No universal scheme of prophylaxis for all countries can be recommended. Each country may require a different method. But at least it can be said that the one method which can and should be applied to all countries is treatment in the schools. Even here great personal influence and tact may be required to bring into being a useful scheme of treatment. When I first attempted to introduce school treatment in Egypt I was met with decided opposition, both by the school-masters and the parents. Other official distrust, both administrative and medical, had to be overcome. Now all the Government Schools in Egypt have a most rigorous system of treatment carried out with the full support of both masters and parents.

I think that before any school treatment can be successfully attempted it is important to have in being a hospital or clinic where parents and relations can themselves experience the benefit of treatment.

While a rigorous school treatment by a specialist is desirable, a valuable, though second-rate, effect can be produced by the instillation of drops by the school-master or his deputy, always provided that this can be insisted upon, and not merely be a neglected order.

While the diagnosis of doubtful cases of trachoma may embarrass even the super-specialist, the recognition of the ordinary cases is not a difficult matter. However, to appreciate the life-history of the disease it is, in my opinion, essential to recognize its four phases or stages, the first stage of initial trachoma with tiny pinshead follicles (Tr. I), the second stage of gelatinous follicles or papillary development (Tr. II), the third stage of commencing cicatrization (Tr. III), and the fourth stage of cicatrized trachoma (Tr. IV).

The first two stages are those from which contagion commonly

occurs; the third stage is much less infective; while the fourth stage is non-infective.

Deterioration of visual acuity in cases of uncomplicated trachoma may result from trachomatous infiltration of the cornea manifested by vascularization or pannus, or by the friction produced by trichiasis-entropion causing corneal ulceration.

Blindness is a common sequela of trachoma which is complicated by acute bacterial conjunctivitis. This is especially frequent in Palestine. Severe ulceration of the cornea occurs in a high proportion of cases, and often leads to shrinking of the eyeball.

As I have shown elsewhere, a census of trachoma, expressed as a percentage of the population may be very misleading (*Brit. Jl. of Ophthal.*, July, 1931, p. 378 *et seq.*). Early stages of trachoma can be recognized in some cases only by observation of trachomatous infiltration of the cornea by means of the slit-lamp. Such a means of diagnosis is obviously impossible when a large number of suspected cases have to be examined.

The cure of trachoma occurs by the laying down of cicatricial tissue in place of the trachomatous granulation tissue. This may occur spontaneously, or as the result of the daily application of caustics over a prolonged period. Our means of induction of cicatricial tissue is no better now than it was 30 years ago.

The interest taken in the disease by ophthalmic surgeons who practise in trachomatous countries has been greatly stimulated by the publication of the "Revue Internationale du Trachome" by "La Ligue contre le Trachome" of which Morax is the main-spring, and by the Amsterdam offspring of the International Congress of Ophthalmology, "The International Organization against Trachoma." The twin sister of the latter society, the "International Association for the Prevention of Blindness," has a great part to perform in teaching the laity the principles of prophylaxis not only of disease, but of the accidents in factories.

My grateful acknowledgements for valuable information are due to the High Commissioners of Canada, Australia, New Zealand and the Union of South Africa; also to the Chief Medical Adviser of the Colonial Office and the Director-General of the Indian Medical Service. At the library of the London School of Tropical Medicine I received essential assistance.