worm plays an important part in infection and in producing ocular complications.

REFERENCES

- BRYANT, J. (1935).—*Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXVIII, pp. 5, 523.
 DANIELS, C. W. (1918).—*Brit. Jl. Ophthal.*, Vol. II, p. 83, 1918.
 DENNIE and PALULA (1941).—Congenital syphilis. New York.
 DODDS, G. E. (1942).—*Brit. Jl. Ophthal.*, Vol. XXVI, p. 257.
 DUKE-ELDER, SIR S. (1932).—Text-book of Ophthalmology. Vol. I, p. 372.
 FITZGERALD MOORE (1928).—*West Afr. Med. Jl.*, Vol. II, p. 127.
 ——— (1936).—*Trans. Roy. Soc. Trop. Med. and Hyg.*, Vol. XXX, p. 251.
 ——— (1937).—*Lancet*, Vol. I, p. 1225.
 HISSETTE, J. (1932).—*Ann. Soc. Belge de Méd. Trop.*, Vol. XII, pp. 4, 531.
 ——— (1938).—Supplement to *Amer. Jl. Ophthal.*, Vol. XVIII, pp. 1, 58.
 LYLE, T. K., MCCRAE, T. F. and GARDINER, P. A. (1944).—*Lancet*, p. 395.
 LUNA (1918).—*Amer. Jl. Ophthal.*, Vol. I, pp. 2, 122.
 ——— (1919).—*Amer. Jl. Ophthal.*, Vol. II, pp. 11, 793.
 MANN, I. (1944).—*Brit. Jl. Ophthal.*, Vol. XXVIII, p. 37.
 PERGENS (1898).—*Ann. d'Ocul.*, Vol. CXX, p. 42.
 ROBLES (1916).—Quoted by Luna.
 ——— (1919).—*Bull. Soc. Path. Exot.*, Vol. XII, pp. 7, 442.
 SCOTT, J. G. (1944a).—*R.A.M.C. Jl.*, Vol. LXXXII, p. 133.
 ——— (1944b).—*Jl. Trop. Med. and Hyg.*, Vol. XLVII, p. 15.
 ——— (1944c).—*Brit. Med. Jl.*, p. 553.
 WILSON, R. P. (1935).—Tenth Annual Report of Giza Memorial Ophthalmic Laboratory.

EYE DISEASES IN THE EAST*

BY

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I WORKED in Iraq as Ophthalmologist to the Baghdad Military area in 1941 and 1942 when I also had the opportunity to study the eye diseases of the native population. I shall briefly describe these before giving an account of the eye diseases amongst the British and Indian troops then stationed in Iraq.

Epidemics of infective ophthalmias occur regularly every year in Iraq, Palestine and Egypt. They begin in May and last until December. The out-patient departments of the hospitals are then crowded with patients amongst whom infants and children predominate. A small eye hospital in Baghdad had an average daily attendance of over 200 patients. There was only one ophthalmic surgeon to look after them. Male and female nurses assisted him. Infective ophthalmias largely attack children under twelve. They develop a severe mucopurulent conjunctivitis which is usually associated with ulceration of the cornea. This conjunctivitis is caused by a variety of organisms (Koch-Weeks,

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staphylococcus, Morax-Axenfeld, gonococcus and bacillus diphtheriae). From May until August Koch-Weeks and staphylococcal are the most common infections. The more severe epidemics of gonococcal and diphtheritic type begin at the end of September and last until December. Epidemic gonococcal mucopurulent conjunctivitis spreads directly from one patient's eyes to those of another without any associated urogenital infection. This type of infection involves the cornea which sloughs very rapidly. The bulk of the patients were treated with argyrol or protargol drops, silvering of the lids and intra-muscular injections of milk (fever therapy). The results were often most distressing. Every day I encountered in the out-patients' department perforated corneal ulcers with iris prolapse. Only a very small proportion of the patients were treated with M.B. 693 tablets administered internally. The shortage of supplies and the high cost of this drug prevented its widespread use in 1941 and 1942. The results of treatment with M.B. 693 were very good. The sloughing of the cornea was stopped and the cases improved rapidly. One can therefore easily understand why there is such a high incidence of total or partial blindness in Iraq. Investigations by Wilson and others in Egypt on the carriers of infection and on the possible causes of infection are interesting. The highest incidence of cases is recorded in the hottest months of the year when the relative humidity of the air is at its lowest. During those months the flies multiply rapidly. They, with dust and sand, are probably the principal carriers of infection. It has also been suggested that following the winter months children have a lowered local and general resistance to infection due to a lowered concentration of vitamins A and C in the body. However, it must be pointed out that the largest epidemics of infective ophthalmias occur in Egypt, Palestine and Iraq where there is very little evidence of vitamin A deficiency, whilst in India and Ceylon, where vitamin A deficiency is common, epidemic ophthalmias do not affect such high proportions of the population nor do they attain the virulence that is encountered in the Middle East. One has therefore to seek further for causes which lower the local resistance of the conjunctiva to these infections.

Iraq, like Egypt, is full of trachoma. Although there are no reliable statistics 60 per cent. of the population is thought to be trachoma infected. This is again a child's disease and it is at this stage of life that it is most infectious. The bulk of the trachoma cases were treated with the usual silvering of the lids, expression of the follicles and copper stick in the later stages. Treatment of trachoma with sulphonamides has now an established reputation in ophthalmology. In Iraq sulphonamides were rarely used for trachoma in the civilian hospitals in 1941 and 1942.

Again the shortage of supplies and the high cost of the drug prevented its widespread use. I saw it used in selected cases with extremely good results. A good deal of blindness can be prevented by the routine use of sulphonamides in trachoma. My impressions resulting from the study of eye diseases amongst the natives of Iraq are that the country needs a much larger number of trained ophthalmologists to deal with the thousands of cases needing urgent attention. It is to be hoped that in the future the Government of Iraq, with the co-operation of the International Association for the Prevention of Blindness, will organise an efficient ophthalmic service which will prevent the high incidence of blindness in that country.

After this short review of eye diseases in the native population I will go on to the eye diseases amongst the troops stationed in the Baghdad area in 1941 and 1942. The British troops showed a very low incidence of infective eye conditions. There were no epidemics of conjunctivitis amongst them. A number of isolated cases of mucopurulent conjunctivitis occurred. Some were associated with corneal ulceration. There were no cases of trachoma amongst these British troops. The Indian troops had a very much higher incidence of mucopurulent conjunctivitis associated with corneal ulceration of varying degrees of severity. A large number of cases showed signs of old trachoma. It is significant to note the higher incidence of conjunctivitis amongst the Indian troops in comparison with the British. Trachoma, with its lowered resistance to infection, will explain some of these cases but not the large number of Indian soldiers suffering from infection of the conjunctiva and cornea without any signs of trachoma. One is led to wonder why British and Indian soldiers, reaching Iraq in a good state of health, should show such different degrees of resistance to eye infections. The different food may have some relation to the problem. There were no cases of gonococcal or diphtheritic conjunctivitis amongst the British or Indian troops. I will not deal with the other conditions which are to be found amongst the troops in the tropics—glare asthenopia, night blindness, etc. In this paper I have especially confined myself to the infective diseases of the native population and of the troops stationed in the same area.

In the past in many wars in the East epidemics of conjunctivitis and trachoma, known as military ophthalmia have affected the eyes of thousands of soldiers of the British and French armies. In this war our troops, stationed in an area known from time immemorial as a hotbed of infective eye diseases have not suffered from epidemic conjunctivitis or trachoma.

In March 1942 I left Baghdad and proceeded to Karachi. There in the ophthalmic department of the Civil Hospital I saw my

first case of keratomalacia in an infant. Keratomalacia is due to vitamin A deficiency. It occurs in marasmic children. The clinical picture in the eye varies from a mild xerosis of the conjunctiva (lack of lustre, wrinkling of the conjunctiva and Bitôt's spots) to a grave condition in which the cornea is affected. Hypopyon ulcer, corneal necrosis and panophthalmitis are the final grave eye complications which lead to blindness. Night blindness is usually a prominent symptom of the disease. This condition is common amongst the children of the poor Hindus of Karachi and the surrounding country. In India cod liver oil is now unobtainable. Shark liver oil has been shown to contain a high vitamin A and D content and is used with success in the treatment of this condition.

Trachoma is very prevalent in the Karachi district. Epidemics of gonococcal and diphtheritic conjunctivitis are unknown but epidemics of conjunctivitis due to Koch-Weeks and staphylococcal infection occur regularly every summer.

I reached Ceylon in April, 1942, a few days before the Japanese air raid on Colombo. For a short time after the raid the civil hospitals were half empty. The patients were evacuated. After several weeks the Civil General Hospital filled up again. Once more I was able to study the eye diseases amongst the natives.

Trachoma is comparatively rare in Ceylon. An investigation carried out in a Muslim village in the Kandy district in 1939 showed that 2.9 per cent, of the people examined were infected with trachoma. Investigations amongst the Sinhalese showed a very much lower incidence of trachoma infection. Epidemics of conjunctivitis occur with the onset of the Monsoon in April. They are the mild Koch-Weeks infections. Throughout the summer months of May, June, and July there are a large number of cases of infective punctate keratitis which often causes central scarring of the cornea. Keratomalacia due to vitamin A deficiency occurs amongst the very poor. I visited with Dr. Billimoria, a civilian ophthalmologist of Colombo, a large labour corps camp. The labour corps was started after the Japanese air raid on Colombo and its members are recruited from all the communities living on the Island. Amongst the 500 men examined we found only three who showed signs of having had trachoma in childhood. On the other hand we found that about 50 showed old patches of xerosis of the conjunctiva (Bitôt's spots). Evidently at an earlier stage of life they had suffered from vitamin A deficiency which had caused a mild xerosis of the conjunctiva without leading to keratomalacia.

Ceylon has about 3,000 lepers. Several times I visited the leper hospital near Colombo. It has about 700 in-patients. For some years the Ceylon Health Department has conducted a campaign

against leprosy on very efficient lines. Co-operation of the population was essential for the registration of the lepers. This was not forthcoming at first and many families concealed their lepers. Now the population has realised the importance of notifying the disease and it can be assumed that the number of 3,000 lepers given above represents the total on the Island. All infectious cases are isolated in hospitals. Cases which are not considered to be infectious return to their homes. They report to the hospital at regular intervals. At the leper hospital I was able to examine a large number of lepers suffering from eye diseases. Dr. Simon, the present Medical Superintendent of the hospital, very kindly collected cases for me. The chief manifestations of leprosy in the eye are the presence of lepromatous nodules on the conjunctiva. These nodules also spread into the cornea. Most of the cases were complicated with iritis and iridocyclitis. Another group of cases showed no lepromatous nodules on the conjunctiva or cornea but had a superficial and deep keratitis without any lepromatous invasion anywhere near the eye. Blepharitis is an exceedingly common condition amongst the lepers. An ophthalmic surgeon visits the hospital at regular intervals. The lepers live to a very old age. The youngest case seen at the hospital was seven years old. The routine treatment consists of intramuscular injections of chaulmoogra oil. Many cases leave the hospital after a long course of treatment and are considered to be non-infectious.

During my stay in Ceylon, April, 1942, to February, 1943, I looked after British, Indian, Ceylonese and East African troops. In the wards of the British Hospitals I invariably had six or more patients suffering from mucopurulent or catarrhal conjunctivitis often associated with corneal ulceration but there were no epidemics of Koch-Weeks conjunctivitis amongst the British troops. Infective conditions of the skin, impetigo, boils and ringworm were very common amongst the troops. They were often associated with conjunctivitis and blepharitis.

The Indian Hospitals, as in Iraq, had a very much higher number of in-patients suffering from eye diseases. The Indian soldiers suffered from more severe forms of mucopurulent conjunctivitis, in most cases associated with corneal ulceration. A number of these cases showed signs of old trachoma infection. The Indian and Ceylonese troops also suffered from epidemic punctate keratitis which was common amongst the natives in the summer months. It is most significant that no such cases of epidemic punctate keratitis were seen amongst the British troops. The cases seen amongst the Indian troops were often severe, associated with the enlargement of the pre-auricular glands, a good deal of conjunctival oedema and extensive deep punctate deposits in the cornea often leading to serious loss of vision. My only

explanation for the occurrence of epidemic keratitis amongst the Indian troops and its absence from the British would be that the Indian soldier associates much more freely with the native population amongst whom these epidemics occur regularly every summer. These epidemics of punctate keratitis (epidemic kerato-conjunctivitis) occur in the rice eating countries (Malaya, Dutch East Indies, Southern India, Ceylon, etc.). Careful investigations may in the future show that the lowered resistance of the eye to these virus infections may have some relation to the diet of the native population which is in most cases deficient in the vitamin B complex.

A note on the treatment of mucopurulent conjunctivitis may be of interest. In Iraq in 1941 and 1942 I adopted as a routine the internal administration of M.B. 693 tablets for all severe cases of mucopurulent conjunctivitis complicated or uncomplicated with corneal ulceration. Three grm. (6 tablets) were administered daily from 4 to 7 days. This treatment enabled the soldiers to return to duty in a very much shorter time. The Indian soldiers who often suffered from old trachoma complicated with secondary infection (staphylococcus or other organisms) responded to M.B. 693 treatment in a very satisfactory manner. The corneal complications were less frequent and again their stay in hospital was shorter than before the M.B. 693 was adopted. In Ceylon I followed the same course of treatment until July 1942 when I happened to have under my care a British soldier who was suffering from a mucopurulent conjunctivitis of both eyes with extensive marginal corneal ulceration and a "tick bite" ulcer of his leg. "Tick bite ulcers" of the leg were common in Ceylon amongst the British and Indian soldiers. The men were bitten by ticks during exercises in the jungle. Scratching of these bites caused abrasions of the skin which became infected and developed into ulcers. These ulcers of the legs took weeks to heal. The usual treatment consisted in applying a sulphonilamide paste dressing with an elastoplast bandage over it. My patient mentioned above had two large ulcers of one leg and a mucopurulent conjunctivitis with corneal ulceration of both eyes. Swabs taken from the ulcer of the leg and the infected conjunctiva showed staphylococcus aureus to be the cause of the infection of the eyes and the ulcer of the leg. A sulphonilamide paste dressing healed the ulcer of the leg in 14 days but the eyes did not improve appreciably under the usual treatment (silvering of the lids, acriflavine drops, atropine, hot steaming and M.B. 693 internally). I then decided to use the sulphonilamide paste in the treatment of the eyes. This paste was inserted into the conjunctival sac every 4 hours. The results were most gratifying. The patient's eyes improved rapidly. I then used sulphonilamide

paste for all subsequent cases of conjunctivitis amongst the British and Indian troops. The administration of M.B. 693 internally was only reserved for the very severe cases associated with corneal ulceration. The local treatment with sulphonilamide paste was found to be of great value and was adopted in all the military hospitals in Ceylon. No other eye drops were used in the treatment of conjunctivitis. Repeated bacteriological investigations carried out by Major Lucas have shown that the greatest number of cases of conjunctivitis in Ceylon were due to staphylococcus aureus infection. Local treatment with sulphonilamide paste was effective in most cases irrespective of the type of organisms causing the infection. Angular conjunctivitis caused by Morax-Axenfeld bacillus is more often resistant to sulphonilamide treatment but these cases are easily cured with zinc sulphate. Many of our cases had conjunctival swabs taken when they were considered to be clinically cured and were discharged from the hospital. It was then observed that staphylococcus aureus could still be grown in culture from the conjunctiva of the patients who had clinically recovered from a conjunctivitis which was due to staphylococcus aureus infection. Evidently the local action of sulphonilamide is not bactericidal but is bacteriostatic only. Future investigations may show that the sulphonilamide treatment alters the virulence of the infecting organisms although it may not remove them entirely from the conjunctival sac.

Since returning to this country I have used sulphacetamide preparations (drops and ointment) in the local treatment of conjunctivitis. I have found these to give excellent results and slightly less irritating than sulphonilamide paste. Under active service conditions it is often impossible to obtain sulphacetamide powder, drops or ointment. Sulphonilamide is always available and the following paste can be made up in any Army dispensary. The formula of the paste is as follows:—Sulphonilamide powder, 20 per cent., Cod liver oil, 40 per cent. and Paraffin molle, 40 per cent. If sulphacetamide is available this can be used instead of sulphonilamide powder. Medical Officers and ophthalmologists will find this preparation most useful in the treatment of infective eye conditions.

Epidemic punctate keratitis is due to a virus infection. I used sulphonamides in this disease in the form of general treatment or local application but the results were unsatisfactory.

Vitamin B complex (marmite or yeast tablets) or riboflavin administered by mouth or by injection was of great help in the treatment of these conditions.

The natives of Ceylon and India often suffer from vitamin B deficiency as well as vitamin A deficiency. A great deal of disease of the eyes and body will be stamped out in the East when the

authorities embark on the campaign of planned elimination of food deficiency diseases.

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REFERENCES

1. WILSON, R. P.—*Rep. Giza. Ophthal. Lab.*, 1st-11th Reports, Cairo (1927-1937).
2. FEIGENBAUM, A.—"Ophthalmic conditions in Tropical and Subtropical Regions." *Modern Trends in Ophthalmology* by Frederick Ridley and Arnold Sorsby.
3. DE SILVA, K. J. L.—"The Problem of Trachoma in Ceylon." *The Journal of the Ceylon Branch of the B.M.A.* 1942.

OPHTHALMIC WORK IN A BRITISH GENERAL HOSPITAL IN NORTH AFRICA*†

BY

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BEFORE going on to talk about eye cases as such, I should like to say something about the set-up and layout of a Military General Hospital, as that was the type of unit to which I was attached.

First of all, what is meant by the term General Hospital? In this country there are few, if any, functioning as such. Most of the hospitals are what is known as "Static," that is they are fixed in a given place, and do not as a rule move with any alteration in troop dispositions. The General Hospital, on the other hand, can if the situation demands it, pack up and move on. In other words it is mobile—that is the essential difference.

If the venue of your activities is to be in the country, in a foreign country, in a tropical or sub-tropical country, in a none-too-friendly country, then you are going to do more than simply set up a hospital, you are going to set up a distinct and up to a point, a self-supporting community, largely dependent upon itself for the maintenance of its own health and well-being, and exactly in so far as that is carried out efficiently, is your success as a medical centre going to depend. It is not much use having a first-class hospital if the staff are going to go down with malaria because of an inefficient anti-mosquito campaign, or with typhoid because the water has been ineffectively treated or with dysentery because your sanitary arrangements have been faulty.

I would stress that all this work has to be undertaken by the unit itself, that is by the medical staff and orderlies, and that, in addition, the whole setting up of the hospital is done by the unit; the putting up of hospital marquees, of theatre tents, special departments, laboratory, store tents, living tents, ablutions, etc. etc. and all the heaving and hauling connected with it, everything up to the stage where each hospital marquee becomes a fully-equipped ward.

You carry your own generator for power and light, your own X-Ray equipment, your own special department equipment, and each person is responsible for the setting up and the efficient functioning of his own department.

In the event of snags and difficulties, you must just make the best of it as there are no expert technicians upon whom you can call.

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