PATTERN OF EYE DISEASES IN LEPROSY PATIENTS OF NORTHERN GHANA[1]

S. Chatterjee, M.B.B.S., (Cal.)
Tamale Central Hospital, Tamale

and D. S. Chaudhury, M.B.B.S. (Cal.)
Leprosy Service, Northern & Upper Regions, Ministry of Health
Tamale, Ghana

Reports by different workers in various parts of the world have suggested that ocular lesions are common in leprosy, but that the pattern in which they evolve is not uniform. Each region has seemed to have characteristics of its own. This likelihood is of importance, for it has direct bearing on ocular problems and their management in leprosy patients in particular areas.

These facts led us to investigate the incidence and nature of eye diseases in a sample of 250 cases of leprosy in Northern Ghana, in relation to the disease itself, other locally prevalent diseases, and geographic considerations.

GEOGRAPHIC CHARACTERISTICS OF THE AREA STUDIED

The total area of Northern Ghana is 37,600 square miles. It lies between 8° south and 11° north in latitude and 3° east and 2.4° west in longitude. The northern limits of its Upper Region form its boundary with Upper Volta. Its elevation is for the most part 600 to 1,000 feet above sea level. The region is relatively dry, with an average rainfall of 40 to 50 inches. Vegetation is chiefly that of savannah woodlands. Voltaic rock underlies the soil.

The population of Northern Ghana is approximately one and a half million. The majority of people live in huts in compounds in dispersed settlements, with cattle in closed yards. Agriculture is devoted to raising corn, millet and yams. Tending cattle and raising poultry constitute the major occupations. Transportation in the region is limited to the main roads from the city of Tamale to Belgatanga, Yendi, Wa and Bawku.

GHANA LEPOSY SERVICE

The Leprosy Service of the country started in 1947, with headquarters at Ankaful in Southern Ghana. It now covers the whole country by static clinics at different points and mobile treatment teams ([5]). In Northern Ghana, under the regional headquarters at Tamale, about 48 paramedical workers are engaged in a treatment program, with a fleet of 20 vehicles. During 1962 nearly 14,000 patients attended the mobile treatment units, a thousand attended static

[1]Received for publication August 19, 1963.

clinics, and 300 were institutionalized at one or other of four leprosaria, located at Yendi, Kpandai, Nalerigu and Jirapa. The prevalence rate for leprosy in the area is recorded as 3 per cent, and the majority of cases (90%) are nonlepromatous in type.

MATERIALS AND METHODS

Patients were selected for study at three different places. Outpatient clinics at Tamale, Yendi and Kpandai provided 193 patients. The remaining 57 were inpatients at the Yendi Leprosarium and the Oti River Leprosarium at Kpandai.

Every case was examined independently by an ophthalmologist and leprologist. Each patient was asked to count fingers separately at a distance of four and a half feet. Inability to do so was recorded as "blind," in accordance with criteria laid down by the International Association for the Prevention of Blindness.

Individual patients were examined in daylight for the discovery of skin lesions and cutaneous abnormalities. Total or partial facial palsy was detected by asking each patient to close the eyes and show the teeth. A focusing double battery torch was used for general external examination of the eye and for pupillary reactions. For detailed examinations of the cornea, the conjunctiva, and the iris, a corneal loupe magnifying ten diameters was used, in conjunction with a pointed focusing beam of light from a Hamblin's ophthalmoscope with its head removed. Upper lids were everted to detect conjunctival scarring in all suspected cases of trachoma in which pannus was present. Ocular tension was determined by testing with the fingers. At the end of the examination corneal sensation was tested by a wick of cotton wool. Only 50 cases had ophthalmoscopic examination after dilating the pupils with 2 per cent homatropine and 1 per cent cocaine. All cases were charted for leprosy lesions on the skin, the extent of anesthesia and deformity. They were grouped in two broad categories as lepromatous or nonlepromatous. Borderline cases were recognized as individual cases, and included in the nonlepromatous group.

RESULTS

Although many cases were found to have some type of eye disease, actual leprotic involvement of the eye was found to be relatively infrequent. This was a surprise to the ophthalmologist, who had made an almost complete list of eye lesions in leprosy from the literature and expected to find them in large numbers. Of the total 250 patients, 80 (32.0%) were of the lepromatous and 170 (68.0%) of the nonlepromatous type. One hundred and fifteen patients (46.0%) had eye diseases, of which 33 (13.0%) were due to leprosy and 82 (32.8%) to causes other than leprosy (nonleprotic or extraleprotic). Seventeen (5.8%) were blind; in 6 (2.5%) the lesions found were due to leprosy and in 11 (4.4%) to other causes.

The distribution by sex and type of disease was as follows: lepromatous males, 64; lepromatous females, 16; nonlepromatous males, 83; nonlepromatous females, 87. The majority of the patients were between 35 and 48 years of age.

ANALYSIS OF CHART

Acute and subacute conjunctivitis.—The total number of patients in this group was 44. Conjunctivitis with sticky discharge and con-

CHART OF LESIONS

Total patients: 250 Patients with eye diseases: 115 (46.0%)

Lesions	Total in group	Leprotic		Nonleprotic (extra-leprotic)
		Lepromatous	Nonlepromatous	
Conjunctivitis, acute and subacute	44	–	–	44
Nodule on upper lid	3	–	1	2
Loss of eyebrows	32	14	–	18
Loss of eyelashes	3	3	–	–
Episcleritis	2	2	–	–
TOTAL	84	19	1	64
Iridocyclitis				
Plastic chronic	7	7	–	–
Plastic acute	2	1	–	1
Nodular	–	–	–	–
Miliary or iris pearls	–	–	–	–
TOTAL	9	8	–	1
Corneal opacities				
Leprotic pannus	4	2	2	–
Trachoma pannus	15	–	–	15
Punctate keratitis	5	5	–	–
Onchocerciasis	3	–	–	3
Interstitial keratitis	1	1	–	–
Keratitis, trauma, etc.	5	–	–	5
Keratitis, lagophthalmic	5	1	4	–
Entropion, trichiasis, etc.	8	–	–	8
TOTAL	46	9	6	31
Facial palsy				
Bell's, unilateral	3	–	3	–
Bell's bilateral	4	–	4	–
Orbicularis, unilateral	8	–	8	–
Orbicularis, bilateral	6	1	5	–
TOTAL	21	1	20	–
Fundus changes				
Specific	5	4	1	–
Non-specific	2	–	–	2
Miscellaneous	3	–	–	3
Pinguecula	19	–	–	19
Pterygium	11	–	–	11
TOTAL	40	4	1	35
Blindness				
One eye	12	–	2	10
Both eyes	5	1	3	1
TOTAL	17	1	5	11
GRAND TOTAL	217	42	33	142

Note: More than one lesion was recorded in many individual patients.

gestion is common in Ghana. No definite follicle, nodule or papilla was noted in any of our cases which would have led us to suspect a leprotic lesion. The cause was thought to be the usual mixed bacterial infections arising from poor hygienic and crowded living conditions, aggravated by the extremely dry and dusty weather. Simple Albucid (Sulfacetamide) in drops of 10 per cent strength, if used regularly, would have reduced its incidence.

Nodule on upper lid.—The total number of cases in this group was three (chalazion 2, tuberculoid 1). The cases of chalazion on the upper lid were noted in cases where the skin was typically free from nodules. In one borderline case, a skin nodule was noted on the left upper lid. The patient in this case had also a wide, erythematous and infiltrated plaque on the face.

Loss of eyebrows.—The total number of patients with this defect was 32. Fourteen of them were lepromatous with obvious facial infiltration. Alopecia of the eyebrows is a characteristic lesion caused by edema around the hair follicles resulting from leprotic infiltration. Eight patients had complete loss of eyebrows. The remaining 18 cases were of the nonlepromatous type, showing thinning or incompleteness of eyebrows. There were no facial infiltrations leading us to believe they were nonleprotic abnormalities. As such thin and incomplete eyebrows are common in normal Africans (Fig. 1), the latter cases were considered as of racial origin.

Total loss of eyelashes.—This abnormality was noted in three cases. All were cases of lepromatous leprosy of long duration, but none had any other ocular involvement.

Episcleritis.—Although many cases of pinguecula were found, with

FIG. 1. Incomplete eyebrows in normal African patient.

a variable amount of congestion, true episcleritic nodules with marked congestion and pink coloration were detected in two lepromatous cases only. Involvement was uniocular and in each case the neighboring cornea was infiltrated. In one of them there was lepra reaction with acute plastic iritis.

Iridocyclitis.—Nine cases, eight of them leprotic, were classified in this group. Eight were cases of lepromatous leprosy. Seven of them showed old chronic plastic iridocyclitis, with muddy color of the iris, areas of posterior synechia and rigid pupillary reaction to light. Only one case showed acute iritis with episcleritic nodules and circumcorneal injection. Diagnosis of these cases of acute and chronic iridocyclitis was easy with the torch only.

All seven chronic cases were in a quiescent stage; there was no circumcorneal injection nor punctate keratitis. The remaining case had an old injury to the eye with corneal opacity, old iritis, and resultant blindness. Nodular iritis (granulomatous and miliary leprotic dots on the iris (iris pearls) near the pupillary margin, which are so characteristic of leprotic affection ([2])), was not seen in any of our cases.

Corneal opacities.—The total number of cases in this group was 46, among which there were 15 cases of trachoma with pannus. Only four cases showed leprotic pannus, with superficial greyish infiltration of the cornea and a few invading blood vessels. In all cases the lesion was limited to a small semilunar area of peripheral cornea near the limbus, in most cases above but in some cases on the sides. Two of the cases were of lepromatous disease. One was a tuberculoid case in reaction and the final case was of borderline type. In all cases the pannus was considered so thin and attenuated as to suggest inactivity of the affection. Differentiation of the pannus from trachoma was made on only one reliable ground, i.e., absence of follicles and of scarring of the upper lid conjunctiva.

All five cases with superficial punctate keratitis were of lepromatous leprosy. The lesions appeared as areas characterized by an avascular veil of thin grayish white opacity near the limbus, either above or on the sides or in a band-like cloud in the lower half of the cornea. In one case only characteristic chalky dots were noticed in the veil. They were not vascularized and no circumcorneal injection was noticed, facts suggesting that the lesion was quiescent (Fig. 2). One case of lepromatous leprosy showed interstitial keratitis of a sclerosing type. It was associated with a large episcleritic nodule.

Five cases of superficial keratitis due to long standing lagophthalmos were noted. The lower half of the cornea showed general superficial scarring, irregularity and superficial vascularization. In one of them there was active corneal ulceration and four patients were blind, as a result of long standing exposure-keratitis complicated by per-

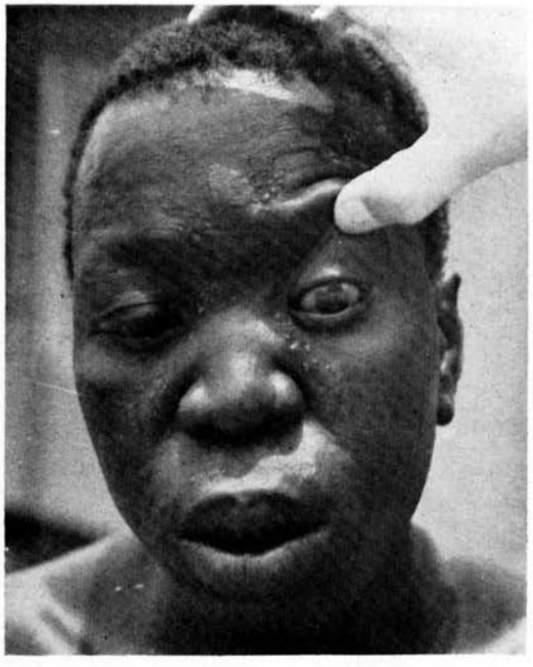

FIG. 2. Corneal pannus in lepromatous leprosy (left eye).

foration of corneal ulcers, adherent leucoma, secondary glaucoma and panophthalmitis. Four were cases of nonlepromatous leprosy and one of lepromatous leprosy of 20 years' duration.

The cornea can be involved in leprosy in two ways. First, a direct spread of bacilli in lepromatous leprosy from the conjunctivae or from an episcleritic nodule, may produce superficial or deep keratitis or pannus. Second, exposure-keratitis can result from lagophthalmos in nonlepromatous leprosy due to facial nerve involvement and from similar nerve involvement, which can also take place in a very late case of lepromatous leprosy.

Fifteen cases of trachomatous pannus were seen. All were bilateral. In eight there was corneal scarring due to entropion and trichiasis. Peculiarly enough, the scar lines under the upper lids and the pannus were very thin and sparse, a fact suggesting arrest of the trachoma. In the light of the only treatment they received, the sulfones, the trachoma appeared to be well controlled. The calculated incidence of trachoma was 6 per cent, which was considered a fairly high figure. It was probably due to the poor and congested living conditions of the leprosy patients. Special attention should be paid to trachoma in early diagnosis and treatment, as it is a severely distressing ailment.

Three patients showed faint nummular opacities of the cornea, which were typical of onchocerciasis. A positive skin snip for *Onchocerca volvulus* confirmed the diagnosis. Five other patients had a

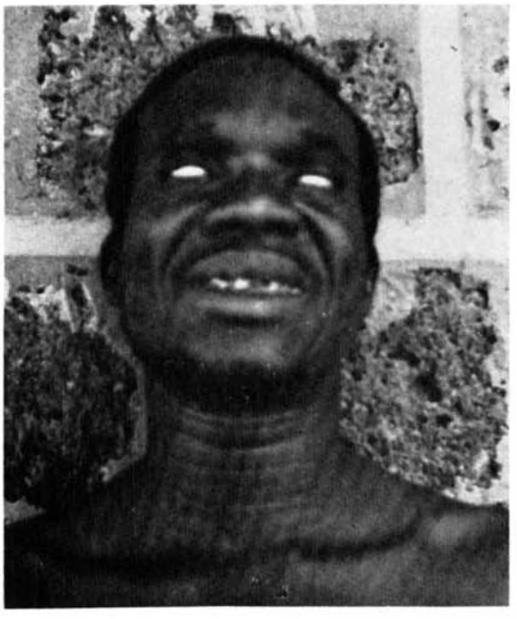

FIG. 3.—Bilateral orbicularis palsy. Other branches of the facial nerve are not involved. (Nonlepromatous leprosy.)

variable number of dense white corneal scars due to different causes, such as smallpox, measles, trauma and keratomalacia.

Facial palsy.—Twenty-one cases (8.0%) exhibited this defect. This constitutes the largest percentage among leprotic involvements of the eye. Twenty of them were nonlepromatous cases, with lesions of variable extent of the facial nerve. In one case lepromatous leprosy had existed for more than 20 years. This case showed bilateral orbicularis palsy. Isolated involvements of other divisions were not evident (Figs. 3 and 4).

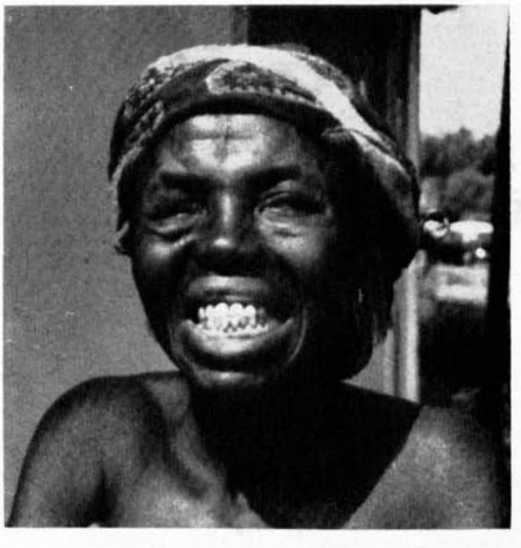

FIG. 4. Bilateral orbicularis palsy. The lesion of the right side is more pronounced than that on the left. Other parts of the face are not affected. (Nonlepromatous leprosy.)

Although 21 cases had lagophthalmos, only five cases developed exposure-keratitis. Many years are required before lagophthalmos could produce exposure severe enough to produce keratitis, for the process is a very slow one unlike acute Bell's palsy. Regular application of a bland ointment in these cases would prevent a bad corneal scar even if surgery were delayed because of circumstances.

Corneal anesthesia.—Variable degrees of tolerance to painful stimulus are found among local people. Also, corneal sensibility varies greatly in different parts of the cornea. Diminished corneal sensation could not be diagnosed, therefore, with any certainty by the crude method we employed. Definitely, however, none of our patients had complete corneal anesthesia. Consequently and fortunately, intractable corneal ulcers due to break-down of an anesthetic cornea, one of the dreadful ocular complications ([7]), did not occur.

Fundus changes.—In seven cases the fundus was abnormal. These cases are under further study.

Miscellaneous.—In three eyes there were other abnormalities, such as essential atrophy, floccule and congenital coloboma of the iris.

Pterygium and pinguecula.—There were 11 cases of pterygium and 19 cases of pinguecula. Although these constitute a large number they do not warrant any serious attention. They can be distinguished easily from inflammatory lesions such as episcleritis. Only a large and fairly advanced pterygium needs surgical interference.

Blindness.—A total of 17 of the cases seen were blind. In six the cause was leprosy. Other causes were responsible for eleven. Of six patients with leprotic blindness, four were blind in both eyes (three with lagophthalmos and one with iridocyclitis). Two were blind in one eye only (one secondary glaucoma and one lagophthalmos). Out of 11 patients with nonleprotic blindness, one was blind in both eyes (senile cataract, one perforating corneal ulcer and one simple glaucoma).

DISCUSSION

Of the cases in this study only 13 per cent had leprotic complications, whereas 32.8 per cent had nonleprotic (extra-leprotic) affections of the eye. The significantly high incidence of extra-leprotic affections called for a closer scrutiny. Trachoma (6.0%), bacterial conjunctivitis (18.0%), and senile cataract (2.5%), constituted a more important group of disease than the rest, including pinguecula (7.5%), pterygium (4.5%) and trauma. The major factor operating behind this large incidence is the endemicity of these diseases, which appears to be determined primarily by geographic relations. This has been described already in the text. The incidence or type rate of leprosy has no bearing on it; yet the high incidence of the above named potentially harmful diseases obviously called for considerable attention from the local leprosy workers ([3]), where an incidence of 6.5

per cent of conjunctivitis was noted, and in Australia ([8]), where trachoma was found in 60 per cent of leprosy patients.

As noted, there was an overall incidence of 13 per cent with eye disease in cases with leprotic complications. This low value has added to the confusion from highly variable statistics of the same nature in different parts of the world. Strictly speaking, a fallacy is involved, for such overall statistics of eye involvement in general groups of leprosy patients do not furnish comparable statistical samples, since ocular complications vary widely in the two different types of leprosy. The incidence of ocular complication is much higher in the lepromatous than in the nonlepromatous type. Therefore, unless separate statistical figures are given for the two types, the figures would tend to vary considerably wherever there was a majority of nonlepromatous over lepromatous patients or vice versa. Thus the figure 13 per cent may convey a false impression.

On the other hand, when we took the two types into account separately, our figures gave reasonable values, as shown by the following facts. When nonlepromatous patients alone were considered, facial palsy occurred in 12.4 per cent of cases as the only serious ocular complication. When compared to the figures from other parts of the world, this incidence was considered fairly high. Lagophthalmos was noted in 1.5 per cent of cases in the Belgian Congo ([3]), 2.2 per cent in Spain ([1]), and 17.2 per cent in the Ryukyus ([4]). Apparently this constitutes the major ocular problem requiring special attention in Northern Ghana, where there is a very high proportion of nonlepromatous patients as compared with lepromatous patients, viz., 9:1 in a total of 15,000 cases. Moreover a nerve palsy resulting from progressive evolution of nerve damage seems very little influenced by sulfone therapy, once the damage has reached a certain degree ([6]). This further accentuates our problem. Fortunately, however, in the nonlepromatous type, direct invasion of leprosy bacilli in the eye does not occur ([10]) and lead to far more serious eye disease, such as episcleritis, keratitis and iritis, as in the lepromatous type.

Statistical figures in the lepromatous type alone gave the following values: episcleritis, 3 per cent; iritis, 10 per cent; keratitis, 12.5 per cent. These are serious complications and unless detected and treated early may progress quickly to eye damage. These incidences are lower than some reported in other countries, e.g., 24.5 per cent for iritis in Spain ([1]), 30 per cent for episcleritis in Japan ([9]), and 22.0 per cent for punctate keratitis in the Belgian Congo ([3]), all among lepromatous patients. Moreover, we noted that all these affections occurred during a quiescent stage, a fact suggesting the influence of past events or the accomplishment of effective control. This sounded a happy note for us, indicating the beneficial results of the extensive, well-managed and regular treatment service now afforded by the

traveling teams of the Ghana Leprosy Service. Antileprosy treatment not only improves the clinical condition of lepromatous patients considerably and controls the disease process, but it also reduces the chance of ocular complication (8). Added to that, to the credit of the patients themselves, was their exceptionally loyal and regular attendance for treatment.

Ocular problems in Northern Ghana, therefore, consisted of (1) treatment of serious endemic eye disease (32.0%), such as trachoma and conjunctivitis, and (2) management of leprotic lagophthalmos (12.5%), which has a calculated total of 1,674 patients in the home area. Keratitis, episcleritis and iritis cases were found well controlled and not numerous. As such, they constituted minor problems here.

CONCLUSIONS

Eye diseases among leprosy patients in Northern Ghana have a distinctive pattern. Endemic eye diseases are most frequent; among them trachoma and bacterial conjunctivitis are most noteworthy. Facial palsy, which occurs in the nonlepromatous type of leprosy, comes next as a major consideration, not only for its high incidence, but also because this particular type of leprosy constitutes approximately 90 per cent of all leprosy in this area. Direct involvement of the eye, which occurs in the lepromatous type, is of minor importance, because the lepromatous type is found in only about 10 per cent of all cases, and complications proved well controlled and minimized as a result of efficient treatment with sulfones. Fundus changes are not so rare as was thought to be the case, but further study is needed.

SUMMARY

Two hundred and fifty leprosy patients were examined and studied in order to determine particular patterns of eye disease in relation to leprosy and local and regional characteristics.

An account of geographic features and endemic diseases is presented. A short history of the Ghana Leprosy Service is included. Materials for study and methods of examination are described. Results of the survey are given in a chart. Findings were analyzed and evaluated separately. The order of importance and significance of the findings have been discussed.

It was concluded that, apart from endemic eye diseases such as trachoma and conjunctivitis, the major complication was leprotic facial palsy. This demanded special attention in this area.

RESUMEN

Doscientos cincuenta pacientes fueron examinados y estudiados con el objeto de determinar tipos particulares de enfermedades oculares en relación con la lepra y las caracteristicas locales y regionales.

Se presenta una estimación de los aspectos geográficos y enfermedades endemicas. Se incluye un relato sucinto del Servicio de Lepra de Ghana. Se describen los materiales de estudio y metodes de examen. Los resultados de la investigación se dan en un gráfico. Los hallazgos fueron analizados y evaluados separadamente. Se discute el orden de importancia y significado de los hallazgos.

Se concluyo que, aparte de las enfermedades endemicas oculares tales como el tracoma y conjunctivitis, la mayor complicación fué la paralisis facial leprotica. Esto demanda especial atención en esta area.

RESUMÉ

Deux cent cinquante malades de la lèpre ont été examinés et étudiés afin de déterminer les modalités des troubles oculaires et d'en chercher la relation avec la lèpre et les caractéristiques locales et régionales.

Un rapport sur les particularités régionales et les maladies endémiques est ici présenté. Une courte notice historique sur le Service de la Lèpre au Ghana est incluse. Le matériel d'études et les méthodes d'examen sont précisés. Les résultats d'une enquête systématique sont fournis sous forme de table. Les observations sont analysées et évaluées séparement. L'ordre d'importance de ces observations, ainsi que leur portée, sont discutés.

Il en est conclu que, abstraction faite des maladies endémiques des yeux telles que le trachome ou les conjonctivites, la complication majeure observée fut la paralysie faciale due à la lèpre. Ceci requiert une attention particulière dans ces régions.

Acknowledgements.—We are grateful to the Chief Administrator, Ministry of Health, for kind permission to publish this article. Thanks are due to Dr. D. S. Hoffman, Principal Officer, Northern Region, and Dr. B. D. Molesworth, Specialist Leprologist-in-Charge, for their encouragement; to Dr. J. Walter, Special Grade Medical Officer, Ghana Leprosy Service, for his keen interest in the problem and valuable suggestions; to Mr. E. G. Boateng, Senior Leprosy Control Officer, Mr. S. E. Y. Addae, Leprosy Control Officer, and Miss Florence Mensah, Staff Nurse, Eye Clinic, Tamale, for their cooperation.

REFERENCES

1. Aparisi, G. T. Lepra ocular. Fontilles **2** (1950) 482-490.
2. Choyce, D. P. Leprosy in Theory and Practice, R. G. Cochrane, Bristol, John Wright & Sons, Ltd., 1959, pp. 160-170.
3. De Laey, A. and Dubois, J. La lépre oculaire au Congo Belge. Ann. Soc. belge Med. Trop. **30** (1950) 1453-1466.
4. Doull, J. A. The need for study of the potentials of surgery and physiotherapy in leprosy. With estimates of frequency of disability based on findings in the Ryukyus. Internat. J. Leprosy **27** (1959) 202-215.
5. Eldon, J. H. Mobile anti-leprosy treatment centres, Ghana. Leprosy Rev. **30** (1959) 168-170.
6. Guinto, R. S. Report on the prevalence of leprosy and the frequency of disability in leprosy. Leprosy Briefs **12** (1960) 21-24; 26; 33-36; 40.
7. James Evans, L. P. Keratitis. Practitioner **190** (1963) 588-595.
8. Mann, I. Ophthalmic impressions of a leprosarium. Leprosy Rev. **29** (1955) 10-14.
9. Uchida, M. A statistical observation of leproma of the eyes. La Lepro **3** (1932) No. 2.
10. Soto, M. C. Consideraciones clinicas sobre las complicaciones oculares de la lepra. Rev. argent. dermatosif. **27** (1943) 412-422.