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**WORLD HEALTH ORGANIZATION
TECHNICAL REPORT SERIES**

No. 87

**EXPERT COMMITTEE ON
ONCHOCERCIASIS**

First Report

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**WORLD HEALTH ORGANIZATION
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GENEVA**

DECEMBER 1954

EXPERT COMMITTEE ON ONCHOCERCIASIS

First Session

Mexico City, 23 November - 1 December 1953

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Secretariat :

- Dr. W. M. Bonne, Director, Division of Communicable Disease Services, WHO
- Professor M. Giaquinto, Section of Endemo-epidemic Diseases, WHO (*Secretary*)

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The report on the first session of this committee was originally issued in mimeographed form as document WHO/Onchocerciasis/22, 30 January 1954.

EXPERT COMMITTEE ON ONCHOCERCIASIS

First Report*

The Expert Committee on Onchocerciasis met for its first session in Mexico City from 23 to 26 November 1953, moved to the onchocerciasis area of Tapachula district on 27 November, and returned on 29 November to Mexico City, where sessions continued until 1 December 1953.

Dr. Ignacio Morones Prieto, Minister of Public Health of Mexico, welcomed the members of the committee.

Dr. W. M. Bonne, Director, Division of Communicable Disease Services, as representative of the Director-General of the World Health Organization, thanked the Mexican authorities for their invitation to hold the first session of the Expert Committee on Onchocerciasis in Mexico City, and opened the meeting in the name of the Director-General.

The committee elected Professor M. Wanson as Chairman, Professor L. Mazzotti as Vice-Chairman, and Professor P. C. C. Garnham as Rapporteur.

The agenda presented by the Director-General of WHO was approved and adopted.

1. SYMPTOMATOLOGY AND PATHOLOGY

The symptoms of the disease differ to a greater or lesser extent in the various regions; the committee noted the differences between African and American conditions.

* The Executive Board, at its fourteenth session, adopted the following resolution:

The Executive Board

1. NOTES the first report of the Expert Committee on Onchocerciasis;
2. THANKS the members of the committee for their work; and
3. AUTHORIZES publication of the report.

(Resolution EB14.R2, *Off. Rec. Wld Hlth Org.* 57, 1)

1.1 Definitions of Various Alterations

Commonly Attributed to the Disease and Possibly due to a Different Aetiology

1.1.1 *Elephantiasis*

In some places in Africa where *Wuchereria bancrofti* is rare or absent, onchocerciasis is unaccompanied by elephantiasis. Moreover, elephantiasis is not seen in onchocerciasis areas in America and for this reason it is reasonable to suppose that it is unlikely to be a symptom of the latter disease.

On the other hand, microfilariae have been demonstrated in as high a percentage as 67 in lymphatic glands, in the course of some investigations carried out in Africa. Some authors believe that involvement of the glands, either alone or complicated by some other affection, might give rise to the elephantiasis syndrome.

1.1.2 Adenolymphocele

Adenolymphocele of onchocercal origin is never found in America; when present in African patients it is probably an extension of a lymphatic involvement.

1.1.3 “*Craw-craw*”

The so-called “craw-craw” or “gale filarienne” characterized by lichenification of the skin and pruritus is probably due to causes other than onchocerciasis.

1.2 Differences between African and American Onchocerciasis

Important differences between onchocerciasis in Africa and that in America are as follows:

— Present evidence indicates that the nodules are more frequent on the head and trunk in Guatemala and Mexico, while they are more commonly located on the pelvic girdle and on the lower limbs in Africa.

— Pruritus is found very exceptionally in America; in Africa it is probably the commonest symptom of the disease.

— The number of microfilariae found in lymphatic glands in African patients seems to be greater than that found in American patients.

— The skin lesion described as “erisipela de la costa” (coast erysipelas) in American patients seems to be absent in Africa.

These differences do not appear to be due to varying intensities of infection. There is, however, some evidence that the severity of the symptoms may be due to intensity of infection. For instance, in Liberia symptoms are comparatively slight, possibly because the infection is of a relatively low order.

— Choroidoretinitis and primary optic atrophy have recently been described in Africa, but have not been seen in America by many ophthalmologists with experience in onchocerciasis, although some have diagnosed a few cases of such lesions.

None of these differences have been explained and they require further investigation.

1.3 Ocular Symptomatology : its Evolution and Frequency

Onchocerciasis may attack all portions of the eye, with the exception of the lens. Principal lesions are :

— Conjunctivitis and limbitis (frequent).

— Superficial subepithelial punctate keratitis, which is the lesion most frequently encountered ; it is very slow in its evolution. Interstitial keratitis is less common and important.

— A characteristic iridocyclitis, which is often seen and is the chief cause of blindness.

— Choroidoretinitis and optic atrophy ; these seem, at present, much more frequent in Africa than in America, and are among the most serious onchocercal affections of the eye.

Lesions tend to progress slowly, and the sight of untreated patients gradually deteriorates in the course of years.

1.4 Causation of Symptoms : Allergic and Nutritional Factors

The causation of the symptoms depends essentially on repeated heavy infections with the worm : thus, symptoms will be commonest and most severe in places where infection is heaviest. It was thought that allergy was one of the principal causes of certain symptoms of the disease, e.g., pruritus and eosinophilia. These allergic symptoms occur in untreated cases and to an even greater extent after drug treatment when the microfilariae are killed in large numbers and allergens are set free. Severe allergic symptoms include oedema, pruritus, and fever.

2. EPIDEMIOLOGY

2.1 General Review of Present Knowledge on Epidemiology

The committee, after a general discussion on present knowledge on epidemiology, examined with special attention the following points :

2.1.1 *Social importance of the disease*

A review of epidemiological surveys carried out in different countries of Africa and America showed that *Onchocerca* infections are present in high percentages of the populations of these regions. Infection rates up to 80%-100% have been recorded in both continents.

The disease may cover wide areas, as in large parts of West and Central Africa, or, in other cases, may be comparatively localized, as in parts of East Africa and America.

Detailed surveys carried out in limited areas have also proved that the disease is of great social importance, in view of the high rate of ocular complications which may reach total or "economic" blindness,¹ or produce such a loss of visual acuity as to affect the working capacity of patients. In very limited endemic areas ocular complications may affect 50% of the population in America and 75% in Africa.

In America it has been demonstrated that, in some places, blindness may reach proportions varying between 0.45% and 3.3% of the total population, and, exceptionally, even 15.6% in heavily affected areas. Even higher proportions have been reported for some African districts.

For many regions where the infection is known to exist, however, data are not yet sufficient to evaluate the real social importance of the disease, and more detailed surveys are necessary.

Damaged eyesight may thus be a heavy burden on the economy of the affected areas.

Rural areas are the more frequently affected, because few towns are located near breeding-places. Highly fertile zones valuable for agriculture are among the worst affected places.

¹ "Economic" blindness is defined as reduction in visual acuity of such a degree as to incapacitate the individual from any work, industrial or otherwise, for which eyesight may be essential. In general, visual acuity of less than 1/10 of standard vision (i.e., 6/6 Snellen) has been classified as economic blindness. This means that, in so far as distant vision is concerned, objects are only identifiable when brought to a distance one-tenth of what normal vision would require. Such a reduced vision in the better eye, when it has been corrected with the best lens possible, would be registered as "less than 1/10 or 6/60 or 20/200". In such cases, it follows that near vision will be correspondingly reduced. Gross defects in the visual field may cause equally serious disability.

Desertion of land and villages has been reported in different areas of Africa (Mayo-Kebbi, in Chad, and Busoga district, in Uganda). Exploitation of some forest areas has been prevented or made difficult by the existence of the disease, or by the abundance of the *Simulium* vectors.

Onchocerciasis may affect plans for economic development, such as the construction of power stations or dams, irrigation schemes, and coffee-growing or other cultivation. Coffee plantations in certain districts of Guatemala and Mexico have been obliged to give special attention and often to allocate considerable funds to combatting the disease.

2.1.2 *Economic and social factors*

All activities carried on outdoors, exposing man to the bites of vectors, especially near breeding-places, are factors influencing both diffusion and intensity of parasitism and consequently of the disease. Such activities include cultivation of land, especially if it involves long exposure of workers in endemic areas, fishing, hunting, etc.

Movement of population through endemic areas may be an important factor in the epidemiology of the disease.

Low social and economic conditions are usually associated with high infection rates.

2.1.3 *Vectors in different areas and their bionomics*

2.1.3.1 *American vectors.* In Mexico and Guatemala the principal vector is believed to be *Simulium ochraceum*. Other species that may have a secondary role in the transmission are *S. metallicum*, *S. callidum*, *S. exiguum*, *S. haematopotum*, and *S. veracruzianum*. The vector species in Venezuela is unknown.

The above-mentioned species are more abundant during the dry season, the number of flies increasing after the last rains and decreasing considerably at the beginning of the rainy season.

The origins of the smallest streams, cool places well covered by vegetation, are the preferential habitat of *S. ochraceum*; other species breed at lower reaches, but never in the geologically old sections of the rivers.

The time that elapses from the egg-laying to the hatching of the larvae may be up to five days. The larval stage is more variable and may extend to 30 days, the pupal stage to six days. This means an aquatic stage of about 41 days. Some data recorded for *S. ochraceum* in Guatemala point to a more rapid development that can be completed in from 12 to 31 days. Estimations of the length of life of the adults are not very precise, but can be calculated to be around two months and in some cases up to 85 days or longer. If the transmission period is considered to be about

six months, it will not cover more than three or four generations of simuliids each season.

Several observations have been made on flight ranges, but the data refer more to maximum distances than to the more important factor of the density of the vector necessary to maintain transmission in relation to distances from the breeding-places. In two experiments, marked *S. ochraceum* and *S. metallicum* were recovered at distances varying between 1.6 and 15.5 km (1-10 miles) from the release point.

The night-time resting-places of the adults are usually found close to the breeding-places, either on the lower vegetation or on the ground. Daytime resting-places have been found in trees at various heights from the ground.

S. ochraceum is more predominantly anthropophilic in its alimentary preferences than the other species, so it has more chance of becoming infected with *Onchocerca volvulus* and of transmitting the disease than other only partially anthropophilic species. The former species seems to require an average of a little over five minutes in order to become fully engorged and is not so easily disturbed.

As *S. ochraceum* feeds mostly on human beings, fewer fallacies of interpretation of infectivity rates occur if a large number of specimens are studied. With the other species, that commonly bite animals, confusion may exist, but these species do not, in most cases, have much importance as vectors. No vectors other than species of simuliids have been demonstrated. Experimental work rules out certain species of *Culicoides*.

2.1.3.2 *Simulium damnosum*. This species is an important vector over large areas of Africa. Its seasonal incidence varies from one area to another according to the time when the rivers flow and to the amount of silt they carry. In some of the drier parts of Africa, *S. damnosum* is more numerous and spreads farther from rivers during the rainy season than in the dry season, and there is some evidence that it has a higher infection rate, possibly owing to the effect of humidity on the longevity of the fly.

S. damnosum breeds largely in the rapids of rivers of considerable size, but its larvae are also found in many small waterfalls and sometimes in unbroken water flowing as slowly as 2 km (approximately 1 mile) per hour. At Leopoldville water flowing at more than 4.5 km (approximately 3 miles) per hour is not favoured.

The egg usually hatches soon after deposition, but it has been suggested that, in areas where rivers cease to flow, the egg can survive the dry season. The larval stage lasts five days at Leopoldville and the period doubtless varies elsewhere according to temperature. The pupal stage lasts about four days. In Uganda an adult population of *S. damnosum* dropped