prescribed as such. To call the condition accommodative asthenopia is really inaccurate as more often than not there is some associated heterophoria which helps to produce the symptoms.

Analogy is a dangerous form of argument and it is not desired to labour the point but it requires little thought to find examples of acute, subacute and chronic decompensation in the intra- or extra-ocular neuro-muscular systems.

This terminology will increase the ease with which the student will be able to acquire a rational viewpoint of the defects of the visual apparatus. Asthenopia of various types and muscle imbalance are terms out of current use in medicine and mean nothing to the average student. The analogy with the heart is sufficiently accurate, is easily understood and would help to bring ocular problems in line with general ideas.

He would realise that the prescription of glasses is the last and by no means the most important detail in dealing with a case of ocular decompensation. Attention must first be directed to the conditions of the man's work, his ocular hygiene and his general health. The correction of these factors may be of more ultimate importance than the prescription of a suitable lens. This is probably the most important indictment of the optician; not his inability to diagnose ocular disease but his inability to refuse glasses to anyone who comes for them.

The large number of people who wear glasses unnecessarily make a happy hunting ground for the quack who professes to cure their eyesight and to relieve them of their spectacles by means of exercises. It would appear as if he had a better appreciation of the dynamic nature of ocular dysfunction than those who prescribe the glasses.

NOTES ON ONCOCERCIASIS IN GUATEMALA*

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ONCOCERCIASIS, or Oncoceircosis, also known as Robles' Disease, or Blinding Disease of Guatemala, is a new nosological entity, caused by a parasite which profoundly affects the visual organ in a great number of cases.

It was discovered in Guatemala in 1915, by Dr. Rodolfo Robles, a Guatemalan physician, prematurely dead, who entrusted the writer

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with the early study of the resulting ocular disturbances. The first paper on this subject was published by the author in the *Amer. Jl. of Ophthal.*, February, 1918.

The disease is endemic in limited regions sharply separated by areas entirely free from it. These regions are, as a rule, devoted to the production of coffee, and are situated at altitudes of 300 to 1,200 metres, on the steep slopes of the Sierra Madre (which is a continuation of the Rocky Mountains) on the Pacific side. In 1926 the existence of the disease was verified in Mexico, but it was not until 1932 that the ocular symptoms of the African oncocerciasis were described in the Belgian Congo. It appears possible that it was imported many years ago to America by African slaves brought by the Spanish monks to work the land.

This comparatively new disease is caused by a filaria, the Onchocerca Volvulus, Leukart, 1893. The fact that the ocular symptoms had not been mentioned in connection with African patients, led at first to the belief that a new American species had been discovered, and it was named Onchocerca Caecutiens, Brumpt, 1919, or the Blinding Filaria of Guatemala. But when visual disturbances were also noted at a later date in the Belgian Congo, doubts as to the identity of the parasites from the two continents were dissipated.

The male filaria measure 0·03 cm. in length and some females as much as 0·50 cm. The filaria, as a rule, live together, one male and several females, forming fibrous tumours which may grow to the size of a pigeon's egg. They develop superficially underneath the skin, showing preference for the subcutaneous cellular tissues of the head, where as many as 21 tumours have been found on a patient.

Microfilaria measure about 300 microns. They emigrate from the tumours and are found at a distance from them. They may be observed in fresh skin, in conjunctival biopsies, and in histological slides of the ocular tissues. With the bio-microscope the microfilarias can easily be seen, alive or dead, between the corneal laminae or swimming with rapid movements in the aqueous, in the vitreous, and on the surface of the iris, at the exact moment of leaving or penetrating its tissues.

Transmission is accomplished through flies of the Simulium species, which act as intermediate hosts. In Guatemala, these species are:—Simulium Ochraceum, S. Maoseri, and S. Avidum. They are nourished on human blood, to obtain which, they sting man during the day. In this act they also suck the microfilarias which are found in the dermis. The microfilarias then develop, and after a period of about 10 days, they reach the stage of maturity to leave the fly. They are then deposited on the surface of the skin, when the fly stings another human being. These future filarias

have the power to perforate and penetrate the skin of their definite host, and are transformed into adult filarias. Up to the present time no other insects have been found to act as carriers.

It is estimated that 20,000 persons in Guatemala are infected with oncocerciasis. Ocular manifestations are observed in 30 per cent. of these, and 2 per cent. are blind. It should be noted, therefore, that a certain proportion of persons infested do not suffer from ocular disturbances.

The symptoms of oncocerciasis may be classified under three heads:—the tumours, mentioned before; the characteristic ocular symptoms which sometimes end in blindness; and some rare cutaneous manifestations which do not interest the ophthalmologist.

The ocular changes are due to a chronic, slow, and insidious process of sclerosis, which takes years to develop. It is caused by the presence of the microfilarias, alive or dead, in the tissues of the eye, and by the secretions and excretions of both microfilarias and filarias. These act both locally and also at a distance, possibly by means of toxic products of protein disintegration.

The early symptoms of oncocercosis are severe photophobia associated with extreme blepharospasm and a distressing sensation as of a foreign body in the eye. At first only a slight ciliary injection is visible, but with the aid of the corneal microscope and the slit-lamp a tenuous superficial punctate keratitis is noted consisting of avascular punctiform infiltrations which are grouped with marked regularity at the ends of the horizontal diameter, leaving the centre of the cornea free.

Other patients come for consultation only when the punctate keratitis has developed further and may be seen with the naked eye, being then composed of infiltrations, dirty white in colour, of a diameter varying from 0·50 to 1 mm. Bio-microscopic examination of this stage shows a deep invasion by elements identical with those on the surface which do not invade the centre. For this reason such patients show only slight decrease in visual acuteness.

In some cases, while the keratitis is in progress, but others independently, a plastic iritis develops which seriously compromises vision. At first the pupil is contracted, reacting poorly to light and accommodation. Synechiae and pseudo-membranes develop which obstruct the pupil and force it downwards giving it a pear-shape. Later, the iris becomes a thin, smooth layer, and vessels, folds, and crypts disappear from its surface. The process usually extends to the uveal tract, and degenerated pigmentary lesions of the choroid and retina with no relation to the vessels have been observed. Their examination is difficult due to the clouding of the vitreous. In advanced cases the ocular tension is low and the process ends by phthisis of the eye. The globe is reduced to a stump which takes the shape of the head of a champagne bottle cork

Unfortunately, up to the present, no therapeutic agent has been found which acts with good results upon the parasites. Simple extirpation of the tumours has been the treatment from the beginning and continues to be used, but it has no effect upon the microfilarias. These continue to live undisturbed for an undetermined period of time.

Early surgery of the tumours seems to have a favourable influence on the photophobia, the symptom most distressing to the patient. The latter are quite satisfied after the operation because of the relief they experience. The objective lesions persist, however, and do not improve, as the author has observed in an old case 25 years after his first examination.

The sanitary authorities of Guatemala are doing their best to exterminate oncocerciasis. With this end in view, for some years now, groups of health workers have been organized. These visit periodically the infested regions to operate on all the tumours that come to their notice. Under the auspices of the Pan-American Sanitary Bureau, Washington, D.C., Guatemalan delegates recently met with the health authorities of Mexico to make further study upon oncocercosis conditions and to organise a large scale campaign of prophylaxis in both countries. As a result it is hoped that in the near future this serious disease that endangers sight may disappear from the American Continent.

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