the submucosa and muscularis sharing the same fate. The whole process makes a complete picture of progressive atrophy. The disease involves also the lower end of the small intestine, and extends into the large intestine. At times we find the large intestine also studded with round cells and with thickened interstitial layers and proliferation of glands and epithelial cells. The proliferation spreads superficially, and also deep, so that the appearances are those which I indicate in the works I have mentioned as characteristics of chronic catarrh.

The chief characteristic in the pathological anatomy of the marasmus of children, then, is that, in addition to the catarrhal lesions and evidently as a result of these, there is a more or less well-marked and extensive atrophy of the intestinal

Fig. 3.—Atrophy of the mucosa.

walls. All the layers of the intestine are affected, and the consequence and quintessence of the whole process is the evident incapacity of the subjects to assimilate and absorb the nutritive material ingested. As a consequence of this loss of the nitrogenous substances of the body muscles, etc., there is persistent thirst and hunger, so that the clinical picture so often seen of children with their fists stuck into their mouths as far as they will go, and persistently going through sucking movements, receives an obvious explanation.

Objections have been raised to this observation from various sides. My friend Fr. Fede, of Naples, has insisted that he has seen cases what he calls "primary atrophy" in which there was extreme emaciation and fatal termination, and yet in which the intestine was in an absolutely normal condition. I have had the chance of making necropsies of two such cases which had been but a short time under observation. As a matter of fact, the intestinal wall was in almost its whole extent perfectly normal, certainly not atrophic, though here and there the signs of a catarrhal and inflammatory process were evident.

In these two cases, however, all the external appearances pointed to the fact that they had actually died of starvation. Not that they had failed to absorb nutriment supplied to them, but that they had in all probability ingested an insufficient amount. Such children may of course have absolutely normal intestinal mucous membranes, especially if unsuitable food has only been given for a short time. It is possible, then, if the necropsy is done soon enough, to distinguish by a microscopical examination "angel-making" by starvation from marasmus due to atrophy of the intestines. This may be of importance from a medico-legal point of view. There should be no question, to my mind, of talking, in the cases of really starved children, of death from "primary atrophy," as if this were a disease; on the contrary, we should call it very simply, in contradistinction to the sharply defined clinical and pathological picture that marasmic atrophy of the intestines gives us, death by starvation.

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TRACHOMA AND RACE.

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OF the many problems connected with trachoma—a disease which as a scourge of the human race may fitly rank with leprosy, tubercle, and syphilis—perhaps the most interesting is the influence of race on its genesis and spread. The literature of the subject is scanty, and many points require further elucidation, but already one great fact stands out sufficiently clearly—namely, that the dominating influence in the etiology of trachoma is race. The labours of Swan Burnett, Chibret, and others show that the races composing the population of the world vary to a most extraordinary extent as regards receptivity of the trachoma virus, and that this variation cannot be explained by differences of civilisation and sanitary surroundings, or even, except in a limited sense, by differences of climate. Hence any attempt to study the distribution of the disease from a purely geographical standpoint—to construct a "trachoma map" of the world, so to speak—is foredoomed to failure; the trachoma problem is one of race, not place. No one can deny the influence of want, overcrowding, filth, and insanitary surroundings on the spread of what is, to a certain extent at all events, a contagious disease, but these influences are entirely subordinate to two great factors—first, race, and, secondly, but *longo intervallo*, climate.

RACE.

It can be shown that one race at least seems to be incapable of contracting trachoma; that other races enjoy a relative immunity; that others, again, are receptive to an extraordinary degree; and that between the two latter classes come races which are neither immune nor exceptionally receptive.

1. Absolute Immunity.

It appears to be certain that the Canadian indigenous tribes, including the Esquimaux, are entirely immune; both the specialists and the general practitioners of the Dominion are unanimous in their belief in this *absolute* immunity. Dr. Foucher, the well-known ophthalmic surgeon of Montreal, has never seen a case of trachoma amongst the savage tribes. An inquiry addressed by him to Desjardins of Montreal, Simard (Quebec), Orsey (Ottawa), Dudge (Halifax), Agnew (Winnipeg), and Benoit (Edmonton), all oculists of note, elicited a similar experience from his *confrères*; and confirmatory evidence from the general body of the profession was obtained in response to a circular note sent through the Medical Union of Canada.¹

This immunity is the more extraordinary, inasmuch as these savages live under all the conditions usually considered most favourable to the development and spread of trachoma. They herd together in tiny hovels, their habits are filthy, and their food insufficient; tubercle and syphilis are rife, and epidemic diseases, such as scarlet fever and small-pox, ravage them to an extent unknown amongst civilised peoples. Dr. Foucher gives two striking examples in tribes with which he is personally familiar. The Cauglinawaga tribe, the nearest to Montreal, live on a reservation situated in a low-lying, damp, marshy country; their huts are overcrowded to an unheard of extent; cleanliness is unknown; a large proportion are syphilitic, tuberculous, or both; epidemic diseases are common; eye affections, too, are common, with one exception—trachoma—which is never seen. A still more remarkable instance, showing the powerlessness of contagion to affect racial immunity, is that of the Cris and Santeux of Manitoba, who live side by side with the Russian Mennonites under precisely the same conditions of defective hygiene. The Mennonites suffer greatly from trachoma, blindness from this cause being very common to their neighbours, the savages, are never attacked.

The Indians of the United States, who do not belong to the same race as the Canadian Indians, are by no means free from trachoma. Indians from the Canadian tribes are found in Pennsylvania, and are presumable immune, but unfortunately we have no information.

2. Relative Immunity.

Pure-blooded negroes, such as those from Senegambia, Guinea, and adjacent parts of the West Coast of Africa, enjoy

a relative immunity as compared with whites; in the United States this immunity appears to be almost absolute. Swan M. Burnett, of Washington,² first drew attention to this curious fact as far back as 1876, in a paper read at the International Congress of Ophthalmology in New York. The most remarkable instance of immunity adduced in this communication was that of the negroes employed in railway construction in Tennessee, who, living side by side with white workmen (chiefly Irish), under the same sanitary conditions, remained quite free from trachoma, although the whites suffered very severely.

Since 1876 Burnett has seen two or three cases of trachoma in mulattoes, none in negroes. In his latest report he produces evidence on the subject from the ophthalmic surgeons practising in parts of the States where negro populations are large. Callan of New York has only seen one case in a negro. Savage of Nashville, in a population one-third of which is composed of negroes, has never seen a case amongst them, though it is common enough amongst the whites. Ray of Louisville sees 800 to 1,200 cases of eye disease annually amongst negroes, but never trachoma, although many of his white patients are trachomatous. Phillips of Savannah, White of Richmond, Ayres of Cincinnati, have each seen one case. Bruns of New Orleans believes he has seen eight, but is doubtful as to some of them. Burnett himself has seen six doubtful cases in twenty years, but has never yet seen entropion.

The experience of practitioners in Cuba is very interesting, as there we have the population made up of three distinct races, namely, whites (Spaniards), negroes (not pure-blooded—many mulattoes), and Chinese. Santos Fernandez, the well-known oculist of Havana,³ gives some curious statistics of the incidence of trachoma on the three races in Cuba:

Population.	Race.	Trachoma Cases.	Percentage.
460,000	Black	78	0.016
1,100,000	White	742	0.067
30,000	Yellow	33	0.111

It will be seen that for one negro attacked there are four whites and seven Chinese, a striking object lesson of the influence of race.

Van Millingen, of Constantinople,⁴ disputes the racial immunity of the negro on the grounds: First, that he has seen cases of trachoma amongst negroes in Constantinople; and, secondly, that the indisputable immunity seen in other countries is due, not to race but to improved sanitation. Chibret, however, in his admirable paper on the Geographical Distribution of Trachoma,⁵ shows that from the standpoint of ethnology the negroes of Constantinople are derived from a highly impure race, that of North-Eastern Africa, which for a lengthened period has intermixed with a (highly receptive) Semitic element; so that the occurrence of cases amongst the people of this mixed race is not only possible but probable. Van Millingen's second objection does not fit in with facts; doubtless, since the abolition of slavery, a small minority of the American negroes have made sanitary progress, but the great majority have still much to learn from their white neighbours in this respect.

Precise information from our *confrères* in West Africa is badly wanted, but I have reason to hope it will soon be forthcoming.

Chibret believes that the modified immunity of the inhabitants of the central plateaus of Auvergne and Bavaria is due to race⁶; I am inclined to think, however, that the immunity in this case is mainly due to climate. (See below.)

The Cingalese are stated to be relatively immune (Hirschberg); here, again, more precise information is needed.

3. Receptivity.

The evidence of the receptivity of the white races is too well known to need recapitulation here. Among whites the Jews, Poles, Italians, and Irish suffer most; and here, undoubtedly, poverty, defective sanitation, and overcrowding are the main causes of the increased prevalence of trachoma

amongst these races as compared with other white races. Egypt, Persia, and India have been ravaged by trachoma for centuries; here, also, defective sanitation plays a certain part, but meteorological conditions are probably the main factors in reinforcing racial predisposition. (See below.)

Some of Van Millingen's statistics are worth quoting, as showing the relative proportion of trachoma to other eye diseases in certain countries⁷:

Percentage of Trachoma to other Eye Diseases.

England ...	0.07	Turkey ...	18.00
Scotland ...	0.70	Bulgaria ...	20.00
Ireland ...	3.00	Russia ...	25.00
America ...	3.00	Greece ...	25.00
France ...	4.00	Italy ...	25.00
Belgium ...	4.00	Portugal ...	25.00
Holland ...	7.05	Central Asia ...	45.00
Spain ...	11.09	Africa ...	50.00
Hungary ...	12.00	Roumania ...	52.00

To the Chinese and Japanese belongs the unenviable distinction of being the most susceptible to trachoma of all the races of the world. Hirschberg found that trachoma accounted for no less than 78 per cent. of ocular affections in Southern China; Mujashita of Tokio places the percentage in Japan as high as 75. American observers note the same prevalence in the Chinese quarters of their cities. In Java and the Malay Peninsula the Chinese suffer to a much greater extent than the Malays. In the course of a recent conversation with me on the subject, Dr. Manson expressed the belief that the peculiar shape of the Mongolian eye had much to do with the extreme susceptibility of the race to conjunctival troubles; my own experience of four years in China inclines me to the same belief.

CLIMATE AND SUBSIDIARY INFLUENCES.

Meteorological conditions, while they appear incapable of affecting immunity or partial immunity, have an important influence in reducing or increasing the spread of trachoma amongst the susceptible races.

It has long been recognised that, as a rule, the climate of high altitudes is unfavourable to the development and spread of the disease; for instance, trachoma is almost unknown amongst the races composing the permanent population of Switzerland, and cases brought into the country by travellers ameliorate rapidly. The rule, however, has numerous and important exceptions. Treacher Collins, in travelling through Persia, was particularly struck with the enormous amount of trachoma amongst the inhabitants of the mountain chains between Shiraz and Ispahan. River of Colorado (quoted by Swan Burnett) has seen cases in Leadville at an altitude of 10,000 feet. Viger⁸ found it very prevalent at high altitudes in Algeria. Many other instances could be given. These facts have led Van Millingen and Swan Burnett to believe that altitude has little or no influence—almost the only point on which these observers agree. I believe, however, with Chibret, that altitude has an important influence on the disease, but not altitude *per se*. Where extreme heat, dryness, and dust coexist with high altitudes—as in Persia, Algeria, and Colorado—these conditions overpower the immunising influence of diminished atmospheric pressure; but on the other hand, when the air is cold, moist, and dust-free, as in the Alps, trachoma becomes rare or unknown.

Strong sunlight, by producing inflammatory conditions of the conjunctiva, is undoubtedly a predisposing cause; add to this dryness, dust, and national headgear affording insufficient protection to the eyes, and we have all the essentials for the development of trachoma in a receptive race.

Filth, overcrowding, starvation, and all the conditions aptly summed up by Chibret in one word—misery—are also factors in increasing racial receptivity; they probably act mainly by lowering the powers antagonising disease, but partly no doubt by favouring contagion. Whether trachoma is contagious at all in the strict sense of the word—whether trachoma can communicate trachoma—is doubtful, but the problem is too wide to admit of discussion here.

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