Shaded area indicates the extent of local hyperidrosis.

REMARKS.

The original destruction of brain tissue was more particularly confined to the anterior two-thirds of the scar region, and I do not think the injury extended much deeper than the grey matter. It is very difficult to account for the great

Areas for muscular movements of opposite upper limb.

" " " " " lower "

Fig. 610 (after Ecker), from Landois and Stirling's *Human Physiology*.—c, Sulcus of Rolando. (1) Advance of the opposite hind limb; (2), (3), (4), complex movements of the opposite leg and arm, and of the trunk as in swimming; (12) eyes open widely, pupils dilate, and the head and eyes turned towards the opposite side; (13), (13'), the eyes move towards the opposite side and upwards and downwards centre-of vision.

pain in the right shoulder complained of on admission and subsequently, except on the hypothesis that it was referred pain due to the cortical lesion.

Figure 610 from Landois and Stirling's *Physiology* was copied to serve as a key-reminder to the physiology of the region involved in this case, and the numbers on the outer surface of the brain are those well-known ones transferred by Ferrier from the motor areas in the monkey's brain to corresponding convolutions in man. The area marked (5)—I mean, of course, that on the left side—could not have been injured in this case, but it is just possible that its motor path was; if that be so, we must grant that the injury selected the No. (5) path and left undisturbed the paths of Nos. (12), (7), (2), (3), (4), which would be most improbable. In other words, I think this is an instance against the existence of No. (5) in man for the same purpose as it serves in the monkey.

Immediate and permanent disturbance to a part of the "sensory areas" for the right upper limb followed the injury, namely, those for common sensation, tactile sensation, heat and cold, and trophic changes. Nor is he conscious of the exact locality of his hand when searching for objects without his sense of sight. There could not be any injury to the gyrus fornicatus and hippocampal region, for the reason that such an injury would to a certainty cause some paralysis in the lower limb, and besides, the extreme improbability of such injury selecting only the "sensory areas" for the limb that was motorially paralysed.

The man is still conscious of his right arm feeling heavy when at work. This peculiarity may be due to the extra task thrust upon the motor areas which have so successfully taken up the function of the destroyed cortex.

The evidence of this case, taken altogether, is, I think, strongly in favour of Gowers's, Munk's, and Starr's contention that the "motor areas" are not exclusively motorial in their functions.

Cases of grave destructive lesions of the brain, unaccompanied by serious concussion and septic troubles, are of such paramount importance to the elucidation of the physiology of localised areas in man, and are also of such infrequent occurrence that I ventured to give as fully as possible details of the patient's consciousness of his injury, as well as those of my own observation.

THE MILROY LECTURES

ON

DARWINISM AND RACE PROGRESS.

Delivered before the Royal College of Physicians.

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[ABSTRACT.]

LECTURE II.—DISEASE AND NATURAL SELECTION.

WE have as the result of the actions upon mankind of such diseases as measles or small-pox a constitutional disturbance which leaves behind as its sole relic individual and race immunity. It was at one time held that this race immunity was the result of hereditary transmission, that the parents were rendered immune, and that they transmitted this immunity to their children. It is conceivable that this may be so, for the blood is affected in these diseases, and therefore the germinal cell may be affected too. There is, however, no reason to believe that this is the case, for a community will, in several generations, undergo at the hands of the microbe a process of selection, and only those strains will be found alive who are able in some measure to resist its inroads.

There are other microbes which, in addition to the production of blood changes, have a profound and lasting effect upon many of the tissues of the body; such are the microbes of leprosy and syphilis. Strange to say, the germ cells seem not to be reached in leprosy, and this loathsome disease is not transmitted from parent to child. Hideous as are its aspects, it must be looked upon as a friend to humanity, for while the microbe of typhoid will attack a man who is healthy, the microbe of leprosy feeds upon those who are debilitated, and from conditions under which healthy and strong racial development is impossible. It is a depopulator

Report of Leprosy Commission in India, 1890-91.

of starved ill-nourished districts, and the race recruits to its advantage from those more favourably placed.

In the case of syphilis, serious and often permanent tissue change is produced as a result of the action of the microbe; and in this case to an absolute certainty an effect may be produced upon the offspring. Many suppose that this is due to the transmission of the specific microbe itself from the body of one or both of the parents to the developing egg. That such a thing is not impossible is shown in the case of the silkworm disease "pebrine," where a fungus affects the grub, and the spores of this fungus are to be found within the egg of the silkworm moth. These spores subsequently develop and attack the tissues of the grub of the next generation. In syphilis the same sort of thing no doubt occurs, for a syphilitic child may subsequently infect the mother or nurse during the period of suckling. But there are other cases which appear hardly to be explained so easily, and we have to assume that the germinal cells are themselves changed in some way during their sojourn in the parental body. After a certain time the disease is no longer capable of transmission by the parent, and the children born after this period are likewise incapable of infecting those who tend them. We have every reason to believe, therefore, that there are no specific germs or microbes left in the body of the parent, and that we have to do solely with the tissue change more or less permanent produced by the microbes during this residence. The children born during this period are frequently ill nourished, possess recognisable indications of disease, and are subject to nervous and other affections. We have here, therefore, for the first time distinct evidence that an obviously acquired constitutional disease is transmitted, and that that transmission is in some cases due to a direct effect of the action of the microbe upon the germinal cells. The microbe of syphilis, unlike the microbe of leprosy and like that of measles, feeds on healthy blood and tissue. It attacks the strong as well as the weak, and if the weak more readily succumb, the strong and vigorous are more apt to acquire it. It is not, therefore, selective like leprosy, and its capacity of transmission ranks it as a disease distinctly inimical to race progress.

The tubercle bacillus cannot gain access to or multiply in the tissues of a healthy, vigorous man or woman. A consumptive type of person is one who comes of a family liable to fall a prey to this microbe, and he is recognisable by many distinctive characteristics. Consumptives are prone to other diseases, such as bronchitis and other diseases of lungs, etc., so that, over and above their vulnerability to this one form of microbe, they are to be looked upon as unsuited not only for the battle of life, but especially unsuited for parentage and for the multiplication of the conditions from which they themselves suffer. It is evident that those people with the tuberculous variation, who, even under the present circumstances, manage to contribute their quota to the population, would, were the bacillus tuberculosis altogether exterminated, contribute more than their share and the type would become more common. This type, apart from the action of the bacillus, is delicate and fragile. The bacillus tuberculosis is a friend of the race, for it attacks no healthy, vigorous man or woman, but only the feeble. It is like the bacillus of leprosy in this respect.

Some of the microbes that cause disease, such as the bacillus of tubercle, only feed on unhealthy human tissue, while the greater number of microbes kill, if anything, the weak rather than the strong. They are, on the whole, our race friends rather than our foes, and if we attempt seriously to do away with their selective influence—namely, the elimination of the weak and the preservation of the strong—we must supply this selective influence by something else or the race will tend to deteriorate.

A large number of diseases due, probably, to some innate family predisposition are known to us. Of these diabetes, hæmophilia, and some others are of comparative rarity, and may be left on one side in this necessarily curtailed sketch. Others, such as cancer and constitutional weakness of respiratory and other organs and insanity, are frequent enough to merit our close attention. Of cancer we at present know too little, and I propose to leave it on one side. Of inherited weakness of special systems we have many examples, such as delicate respiratory or digestive mucous membrane, inherited

variations in the mechanism of assimilation, also gout and obesity; in fact, innate delicacy of all kinds. These render their possessor less able to cope with his natural surroundings, let them be what they may. It is evident, indeed, that the conditions of our daily life, even if we were to establish a perfectly uniform system of State communism, with self-heating houses, meat dinners, and flannel underclothing all round, would not be the same for all.

INSANITY.

Brain affections are markedly hereditary. An overplus of work, anxiety, or depressing surroundings are truly exciting factors, but act with alarming ease in the case of certain types, while in others their action is relatively inoperative. This type—an organic variation—is transmitted; it is not destroyed. It would seem, then, that the neurotic individual is an innate variation, and that any racial change in respect to the prevalence of insanity must, therefore, be brought about by selective means.

ALCOHOLISM.

The evidence in favour of there being any hereditary predisposition to alcoholism is very slight, but certain type variations occurring no doubt in families are especially liable to drink and other forms of vice. Drink may be looked upon as a selective agency, one constantly thinning the ranks of those who are weak enough by nature to give way to it. It appears probable, however, that the children of drunken parents suffer not only from the transmitted organisation of the fathers or mothers, but also from the direct action on the germinal cells of the alcohol carried in the parental veins.

This leads us to the question as to whether or not legislation, with a view to prevent the sale of alcohol, will further or retard race progress. The case against preventive interference would be quite clear were it not for the fact that the offspring are debilitated by the drunken habits of their parents. Dilke informs us² that the convict element may now be disregarded in Australian Society. In the case of some crime was an accident, and would not be transmitted to the children they left behind them. On the other hand, the genuine criminal, and also the drunken ne'er-do-wells, left no children.

Here the selective agency came in alone, for the facilities for marriage were slight, but the case would no doubt be altered had the drunkards before their death married and produced children, who would not only have inherited the parent's innate weaknesses of moral constitution, but would have been directly debilitated by the effects of his drunken habits while they still formed a part of him. May it not be said that a clear case is to be made out for the introduction of preventive measures in districts where drunkenness has become a matter of universal habit or fashion; where, therefore, the selective action of alcohol is reduced to a minimum, and where from its general consumption in injurious quantity the transmitted debility may be considered as reaching towards a maximum? On the other hand, from our point of view—that of racial progress—the case is not so clear, for its introduction into a district where the population have in the mass learnt to lead sober lives, where drunkenness is looked upon as vice, and where only those naturally without self-respect and proper self-control fall victims to it, takes away a selective agency of considerable potency.

In the United States there is and has been a strong feeling against the liquor traffic, not only on the part of those who hold that drinking is in itself wrong and leads to crime and misery, but on political grounds as well. In Maine a prohibitory law was enforced in 1851, lapsed for two years (1856 and 1857), but continued since that time up to the present date.³ We have, therefore, an experiment on liquor prohibition lasting forty years. In Maine the manufacture and sale of alcohol in any form is illegal and punished by imprisonment and fine. The law is enforced, and, we are told, has so influenced manners that whatever share in the result ought to be assigned to the effect of prohibition, it is a fact that the demand for liquor, or the desire for it in large

² *Problems of Greater Britain*, vol. i, chap. 2.

³ *Liquor Legislation in the United States and Canada*, Rathbone and Fanshawe.

quantities or small proceeds only from a limited section of the population. If now we turn to the statistics of crime, pauperism, and insanity, we shall find a result which may appear startling.

The statistics of the insane hospital show a great and progressive increase of patients from 75 in 1850-51 to 685 in 1891-92. In regard to indoor paupers the ratio is slightly lower than that of the neighbouring States:

Ratio of paupers per million of population :	1880.	1890.
Maine	2,319	1,756
Other States non-prohibitive	2,339	1,790

In regard to outdoor paupers, the census attaches to Maine a number very considerably in excess of the average. As regards prison population, Maine has a low but decidedly increasing ratio, which comes out especially clearly in the case of the juvenile offenders in reform schools:

Ratio per million of population in reform school :	1880.	1890.
Maine	176	256
Average in other nine North-Eastern States	469	425

In Kansas—another State in which prohibition dates from 1881—the United States census tells us that there were more prisoners in its penitentiary and county gaols in proportion to its population in 1890 than it had in 1880, and that, of all the neighbouring States, Kansas had in 1890 absolutely the largest ratio of prisoners to population.

In Iowa, the third State in which prohibition has been most effectually carried out, we are told¹ that opium dens are found as the alleged result of prohibition, and that "in one small town where prohibition was so effectually enforced that, when the bishop of the diocese visited it, an intended celebration of the Sacrament had to be abandoned because no wine could be obtained. My informant, whose testimony was unimpeachable, was told by a physician practising here that the use of opium in the place was a positive curse; he had twenty or thirty cases on his hands of persons suffering from the habit, both men and women."

The above data strongly suggest that any lasting prohibition, other than the dictates of a man's own conscience and sense of self-respect, may do more harm than good, for when not a fashion, excessive drinking can only be looked upon as a symptom of a debilitated or depraved nature, which, without access to drink, will show itself in other ways, and, if artificially kept sober, will tend to perpetuate and widen the circle of its depravity.

On putting before ourselves the broad question, How can we improve the health of the race? many may reply that the health of the race is being improved, as is shown by the fact that the individual living now has, on the average, a longer life than one living twenty years ago. This increased longevity does not necessarily imply increased innate healthiness, but may, and in point of fact does, imply increased amelioration of surroundings alone. Freedom from disease does not imply robustness of constitution. We have no foundation, therefore, for assuming that because the average longevity of the race has increased during the last half century we are more robust than we were. The evidence is quite the other way.

In the Registrar-General's reports we have ample data for drawing at any rate rough general conclusions as to the progress of disease amongst us. In Report 54, Table XVII, are the annual death-rates, from various causes, given per million of population, and arranged in groups of five years from 1858 to 1890. We have there a history of thirty years, and even in that time a notable change in this history is to be observed. In the first group of diseases are those due to micro-organisms, and in all cases, except that of puerperal fever, a diminution of disease to a very marked extent is to be observed. Consumption and scrofula share in this decrease.

In the second group are deaths that may, to a great extent, be classed as the results of carelessness, want of management, neglect, and ignorance, such as convulsions, diseases of dentition, parturition, and registered accidents. These, too, as one would expect, diminish yearly in a country where surrounding comforts and a sense of responsibility are on the increase.

When we turn to the third group, that of constitutional disease where the hereditary tendency comes in, we find an in-

crease in almost all the hereditary diseases. A tendency to an increase of neurotic affections is shown by an increase in the deaths from nervous diseases, suicide, and intemperance. A large increase is to be observed in the diseases of the respiratory system, due in part to the increasing number of tuberculous patients, who, kept from inroads of microbes, nevertheless, readily fall a prey to other affections. There is, too, an increase in diseases of the circulatory system, in cancer, diabetes, and other constitutional diseases. It is evident, therefore, that, while preventive medicine and modern civilisation are removing the microbe and diminishing the dangers of childbearing and child-rearing, those who are spared fall a prey to some one or another form of constitutional disease.

In the chart from the Registrar-General's report we find that deaths from old age are less and less frequent, indicating that we are permeated by less healthy constitutional strains, and in a table compiled by Longstaff² we find that this is conclusively borne out. In this table we get the deaths from all causes in 1876-80 as compared with 1861-70. We find (in table) that while the death-rate is being lowered for all ages up to 40 (in women up to 45), after this the death-rate is increased.

The tendency of events is, therefore, to remove selective agencies whereby people escape death, and live in greater numbers through the child-bearing period, but this has gone quite far enough, and it may be modified to produce a different result. Why should the microbe select? Why not public humanity and public reason, since selection there must be? War may be waged with the microbes, provided at the same time that other selective agencies are used to replace them. Is it not our duty, by boldly facing facts, and publicly stating them, to endeavour to bring about such strong public opinion as will force people to look upon the production of children of feeble or depraved strains as an injury not only to the person of the child, but to the welfare of the State.

(To be continued.)

THE FUNGUS KINGDOM.

Abstracts of Three Lectures delivered in the Theatre of the Royal College of Surgeons.

By CHARLES B. PLOWRIGHT, M.D., F.R.C.S.

PHYCOMYCETES; ASCOMYCETES; BASIDIOMYCETES; HYMENOMYCETES.

THE increased attention given to the study of fungi especially from a biological point of view is one of the features of a scientific education in the present day. One of the difficulties which the novice encounters is the cumbersome terminology with which the science of botany in general and mycology in particular is overloaded. While anatomical facts and physiological phenomena must necessarily have distinctive names, it is most desirable that these should not be unnecessarily multiplied. It is a great mistake to imagine that because a man has learned the meaning of some few dozen technical terms, he has therefore become a botanist. Science is apt to be hindered rather than helped by a too prolific nomenclature. One of the most important groups of fungi is the phycmycetes, or moulds. They are characterised by their minute size, and to the ordinary observers are apparently unimportant. They are, however, an exceedingly interesting family in many ways. Moulds multiply themselves in many ways, and afford some of the best marked instances of sexual reproduction. Moulds are both saphrophytic and parasitic. Amongst the latter the salmon disease and the potato disease are only too well known. Horticulturists are familiar with another pest—"the damping-off of seedlings;" while the young medical man who has to cure a case of ringworm in a fortnight, in order that "the child may go back to school," will have his work cut out. All these conditions owe their existence to moulds. The various fungi causing these diseases were described, and it was pointed out with regard to the ringworm

¹ *Op. cit.*, p. 170.

² *Studies in Statistics*, p. 256 and 257.