human food and 14 were condemned as being unfit. It may be noted that in several of these cases the animals were so far advanced with disease that the owners recognised the futility of trying to fatten them for the butcher, otherwise they would doubtless have been less easily advised to accede to immediate slaughter.

The post-mortem conditions that have been met with in the carcasses of those cows which have been slaughtered have been almost as variable as the symptoms and conditions exhibited during life. Whereas nine out of the 26 slaughtered have been fit for human food, 17 have been totally unfit. In most of the latter carcasses the diseased conditions found have been very extensive, involving in addition to the udder and the mammary lymphatic glands most of the viscera and lymphatic glands, and in many cases tuberculous lesions, varying in age and extent, have been found on the serous membranes. In a few cases large patches of tuberculous ulceration have been found on the mucous membrane of the intestines. In other carcasses which were unfit for food the disease was not so extensive, but in these cases the carcasses were thin and wasted, so much so that the owners did not have the carcasses prepared for sale, but before slaughter decided either to bury them or to send them to the knacker's yard.

In two or three of the carcasses which were fit for human food, not only were they well-nourished but, excepting the udder and its lymphatic glands, very little tuberculous lesion was present, the carcasses being sold for from eight to 12 pounds. In all these cases, however, caseous deposits could be found in the mesenteric glands, although in one or two instances it required a careful examination of several of the glands in order to demonstrate the presence of the disease to the naked eye. In all cases of tuberculous udder the mammary lymphatic glands are found hypertrophied, but in many of the cases no tuberculous deposits are visible by microscopical examination, and it is only in animals that are thin, and where these glands are much enlarged, that the condition can be detected during life.

Regarding the disposal of the remaining 26 cows matters have not been at all satisfactory. Seven of the owners elected to isolate their cows with tuberculous udders, to stop selling their milk, gradually to dry off and to fatten them for slaughter. When the animals are not far advanced with disease this can, no doubt, be done to advantage; but in the interests of the public health these cows should not be sold except for slaughter and under adequate veterinary inspection. Where the carcass fulfils the conditions suggested by the Royal Commission on Tuberculosis and recommended by the Local Government Board there is no reason why such a carcass should be condemned, although it must be borne in mind that a cow with a tuberculous udder is in the majority of cases rather far advanced with disease, and the longer she is kept for feeding purposes the more advanced the disease will become, and the less likely that the carcass will be fit for human food. In all of these seven instances the owners were asked by the medical officer of health to inform him when they disposed of their diseased cows for slaughter, so that the killing of the animals could be verified and the carcasses inspected, but in no instance was this information given, although several gave a promise to do so. In 11 instances the diseased cows were removed from the farms by their respective owners and could not be traced. Several of these cows were removed soon after my visit to the farms and after the diseased or suspicious condition of the cows' udders had been pointed out. In other cases the cows were removed as soon as the owners received the letter from the medical officer of health advising that the diseased cows should be slaughtered. In several of these cases no information regarding the disposal of the cow could be obtained; in others the owners wrote stating that the cows were sold for slaughter. In not one of such instances could the actual slaughter of the cow be verified, and in some of them it was afterwards ascertained that the buyers had sold the cows again in open market. It will thus be seen that 18 of these cows with tuberculous udders have been lost sight of, and as some of them were in calf it is quite probable that they may be giving diseased milk somewhere, possibly to be consumed in Manchester. Eight of the 26 cows are still in the possession of their owners; two of these are city cows and six belong to farmers in the country. The owners of all these have given either written or verbal promises to notify the medical officer of health as to the time when they dispose of these cows, so that their slaughter can be witnessed and the carcasses inspected.

THE RELATION OF ALCOHOLISM TO TUBERCULOSIS.¹

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ALCOHOLISM and tuberculosis stand foremost amongst the causes hampering human progress and limiting man's happiness. Through them the evolution of the race has been impeded, and, unfortunately, in spite of numerous restraining and restricting agencies, their baneful influence is still accountable for a high degree of mortality and an immense amount of sickness and suffering. The stay of such calamitous agencies has long afforded problems which have appealed to all sorts and conditions of men, and their solution even now is to a great extent shrouded in mystery and surrounded by difficulty. With two such morbid influences barring human advance it was but natural that eager minds studying the one should have been compelled to recognise the presence and action of the other. Hence the question as to the relationship of alcoholism to tuberculosis is one of old standing. But since the answers have been hitherto by no means uniform it is particularly desirable that some approximation to the truth should be arrived at, and if possible generally accepted. The position has been well expressed by Dr. J. F. Payne,² who says: "With regard to the influence of alcohol on the production of tubercle, the utmost divergence and, indeed, contradictory opposition of opinion prevails. Huss found tuberculous phthisis to be rare in drunkards; and that has been the general conclusion drawn from post-mortem observations. It has even been thought that drinking freely checks the progress of phthisis, but of this I can find little evidence. On the other hand, the more general impression is that alcoholism is a frequent cause of consumption." And Dr. Payne goes on to say: "On this disputed point we must appeal to the methodised experience of those who have special opportunities of observation."

The subject, however, is one full of peculiar and unavoidable difficulties. And not the least arises from prejudices, which, however repugnant to scientific research, have only too frequently warped the minds of those who attempted an investigation of the matter. Efforts to elucidate the question by an appeal to what has been termed clinical statistics is necessarily permeated with fallacy. Purely experimental inquiry, however suggestive in the presence of modifying influences concerning which we have but little knowledge and but limited control, can afford but unreliable results. Mortality returns, although rendering material for interesting, and it may be useful, analysis, afford data too gross for anything but rough generalisations. A study by the pathological examination of a large number of cases would seem to afford the most hopeful method of research, and when combined with a discriminating clinical investigation is likely to accomplish as near an approach to the truth as we are likely to obtain under present circumstances. But before indicating the manner and results of such a method of inquiry it will be well to refer briefly to opinions and conclusions of certain authorities which, as the outcome of exceptional experience or special inquiry, may be deemed worthy of consideration; and it will be desirable that special reference be accorded to those expressions which are based on a knowledge of alcoholism and tuberculosis as they are met with more particularly in this country. Three views are possible: (1) that alcoholism is antagonistic to tuberculosis; (2) that alcoholism bears no special relationship to tuberculosis; and (3) that alcoholism definitely predisposes to tuberculosis. Let us briefly consider them.

1. *The view that alcoholism is antagonistic to tuberculosis.*—Before the true nature of tuberculosis became apparent the opinion was somewhat widely held that habits of alcoholic excess were antagonistic to tuberculosis and even preventive. This impression still exists among a large section of the public and is apparently in part due to opinions expressed by many of the earlier writers on pulmonary tuberculosis. Indeed, in some medical quarters such a view is still held. This view

¹ Précis of a paper communicated to the British Congress on Tuberculosis. Section II., Medical, including Climatology and Sanatoria.

² Transactions of the Pathological Society of London, 1889, vol. xl., p. 332.

was clearly expressed by Dr. R. Payne Cotton³ many years since in his Fothergillian Essay: "It is worthy of remark that the habitual drunkard—he who is always in his cups—is not very often the subject of phthisis; such, at least, is the result of my own observations."

The idea that alcoholism was antagonistic to tuberculosis may, perhaps, in part account for the advocacy of its persistent and even excessive use in phthisis. Bennet,⁴ writing some 30 years since, says: "Of late years in America alcohol, especially whisky, has been much lauded as a remedy in consumption"; but he adds: "I have seen a certain number of cases in which it had been long taken, but I cannot say with benefit. The daily ingestion of large quantities of nerve-stimulating, carbon-producing spirit certainly does not come under my ideas of hygienic treatment." Flint⁵ used alcohol freely, that is from six ounces to a pint of spirit daily, and appears to have considered it beneficial, "but not in the sense of exerting a special influence upon the disease." Charteris, writing in 1877 concerning the administration of whisky to phthisical patients, says: "In private practice I order it to be taken *ad libitum*." Dr. Hermann Weber⁶ in 1885 was convinced of the great usefulness of alcohol in the treatment of phthisis. Dr. Thomas Harris⁷ tried the effects of whisky containing 53 per cent. of alcohol during a period of nine months. 26 cases were so treated, the doses commencing with two drachms of pure whisky gradually increased up to one and a half ounces of whisky every four hours, day and night. Dr. A. Ransome, who saw many of the cases, expresses the opinion that "at certain times of the day the dose of alcohol was unnecessarily large—for some of the patients at times were distinctly flushed and slept heavily even in the daytime." Dr. Harris states: "No case left the hospital in a worse state than that in which he entered it. As regards the physical signs, very little difference could be detected between those at the date of admission and the date of the discharge of the individual." Manifestly in no instance did "cure" occur.

Reference has frequently been made to Stokes's account of a gentleman who recovered from pulmonary tuberculosis after regularly drinking "seven tumblers of punch every night," but it is sometimes forgotten that at the same time he was duck-shooting every day that he could go out, and according to his own account "had to stand up to my hips in the Shannon for four and five hours of a winter's day following the birds."⁸

It is interesting to note that Bell of New York as far back as 1859 opposed the current view, for he then stated: "The opinion so largely prevailing as to the effects of the uses of alcoholic liquors—viz., that they have a marked influence in preventing the deposition of tubercle—is destitute of any solid foundation. On the contrary, their use appears rather to predispose to tubercular deposition. When tubercle already exists alcohol has no obvious effect in modifying the usual course it takes. Neither does it mitigate in any considerable degree the morbid effects of tubercle upon the system in any stage of the disease."⁹ The abolition of alcohol from many modern sanatoria seems to indicate that, as Dr. Ransome well expresses it, "owing to the terrible consequences of excess and to the proclivity of mankind to its excessive employment it [alcohol] can only be recommended in selected cases with many cautions."¹⁰

2. *The view that alcoholism bears no special relationship to tuberculosis.*—Many hold that alcoholism bears no special relationship to tuberculosis and only exerts an indirect influence in so far as it leads to lowering of general vitality and places the individual under conditions particularly favourable to the infection of tubercle. And certainly the circumstances attending the life of the chronic alcoholic are generally such as to specially expose him to the risks of tuberculosis. His habits lead in great measure to an indoor existence, the maintenance of an insanitary environment, insufficiency of suitable food, oftentimes to the influence of depressing emotions, and not infrequently his indulgence necessitates

his following an occupation under conditions which are peculiarly inimical to health. Thus, while the overcrowding, neglect, uncleanness, malnutrition, and nerve influences cannot be overlooked, considerable difficulty attends any attempt to estimate the effect of alcohol *per se* in rendering the tissues peculiarly vulnerable to the tubercle bacillus.

3. *The view that alcoholism definitely predisposes to tuberculosis.*—The view that alcoholism definitely predisposes to tuberculosis has of recent years received much support. Indeed, the tendency of modern opinion is to recognise alcohol as an agent which renders the tissues specially prone to tuberculous infection. This is well exemplified by such recent expressions as the following: Dr. Hector Mackenzie in a recent article on Tuberculosis¹¹ declares that "alcoholism must be regarded as a powerful predisposing cause of tuberculosis. ... It is almost invariable to find tubercle present in the lungs in patients dying in the course of alcoholic paralysis. ... Tubercle of the peritoneum or pleura frequently complicates cirrhosis of the liver. ... Alcohol in excess undermines the strongest constitutions and renders the body less resistant to diseases of all kinds. This is especially true when the individual leads a sedentary town life. Considerable amounts of alcohol may be taken without obvious deterioration of health by persons who lead an out-of-door life and eat heartily. ... Alcoholic subjects appear to be specially liable to acute military tuberculosis."

One of the most recent and definite pronouncements is that of Professor Thomas Oliver,¹² who says: "Nor is there any truth in the opinion held by the laity that the use of alcohol protects the individual against tuberculous disease. I do not refer to such a restrictive employment of alcohol as a glass of beer or stout or a little wine at dinner-time; that may be helpful to the individual. It is to the mistaken opinion that where there is a family predisposition to the disease it is necessary to be somewhat more indulgent. In my experience of young men with a hereditary tendency to phthisis alcohol has, by the late hours which it encourages and the careless and irregular habits that it fosters, frequently precipitated the individual into active tuberculous disease, which abstinence and more careful living would have assuredly prevented. It indirectly favours the development of tuberculous disease." Pulmonary tuberculosis was found by Dickinson to be more frequent in drinkers than in ordinary people in the proportion of three to one. Dr. H. D. Rolleston, quoting Dr. H. Mackenzie, states that in 67 cases of pulmonary tuberculosis occurring in drinkers a family history of tubercle was only found in 10, whereas it is found in about 30 per cent. of the ordinary cases. The frequent association of pulmonary tuberculosis with alcoholic peripheral neuritis and its presence, too, in nearly one-third of the cases of cirrhosis of the liver are circumstances which show that under the debilitating influences of alcohol resistance is reduced, ordinary pulmonary catarrhs are not so quickly thrown off, and thus the bacillus of tubercle gains an easier entrance. Some have held that there is a tendency for phthisis in alcoholics to assume the fibroid form, but this is not in accordance with the best modern experience. Dr. G. V. Poore and Dr. W. H. Allchin in a recent article¹³ speak of the association of tuberculous phthisis with alcoholic cirrhosis of the liver as "well established, the course of the disease being usually one of rapid caseation and excavation with broncho-pneumonia and rarely towards fibrosis." But the close association of tuberculosis and alcoholism has now been widely recognised not only by British physicians but also particularly by Americans and French observers.

Various suggestions have been made in explaining the liability of alcoholics to tuberculosis. There can be no doubt but that the non-hygienic surroundings and nutritional impairment and lowered vitality of the drunkard greatly predispose him to tuberculous invasion. But it is contended by some that even besides these factors there are special influences arising from the action of the alcohol and its associates. Professor Sims Woodhead has recently shown that alcohol has a marked influence in altering, or determining alteration of, the cells of animals subjected to the action of certain pathogenic organisms. Professor Abbott of Pennsylvania and also Dr. Deléarde working in the Institut Pasteur at Lille have recently shown that alcoholised animals

³ On Consumption, its Nature, Symptoms, and Treatment, 1858.

⁴ On the Treatment of Pulmonary Consumption, second edition, 1871.

⁵ Austin Flint: Phthisis, 1875.

⁶ THE LANCET, April 4th, 1885, p. 604.

⁷ Dr. Arthur Ransome: The Treatment of Phthisis, 1896, p. 95.

⁸ Clinical Lectures on Fever, Medical Times and Gazette, 1854, vol. xxx., p. 487.

⁹ Medical Times and Gazette, vol. i., 1859, p. 587.

¹⁰ Dr. Arthur Ransome: The Treatment of Phthisis, 1896, p. 94.

¹¹ Text-book of Medicine, edited by G. A. Gibson, 1901, vol. i., pp. 352-371.

¹² Ibid., p. 603.

¹³ Diseases Determined by Poisons: a Manual of Medicine, edited by W. H. Allchin, London, 1900, vol. ii., p. 52.

are more readily infected by many organisms than non-alcoholised animals and other investigators have also shown that alcohol produces a marked negative chemiotaxis. It has also been found that animals brought into a state of chronic alcoholism are much less readily rendered experimentally immune to microbial infection. Attempts have also been made to show that alcohol through its influence on nervous structures renders the tissues and especially the lungs prone to invasion by tubercle.¹⁴

In order to compare some of our Manchester experience with the views and opinions above indicated I have endeavoured to analyse and to express the results of observation of hospital cases for a number of years. A reference to pathological data probably affords the most reliable basis for the formation of sound views as to the relationship of alcoholism and tuberculosis.

1. *Alcoholic neuritis and phthisis*.—Some time since I analysed a number of fatal cases of peripheral neuritis occurring in chronic alcoholics. Eight cases were subjected to pathological examination during a period of three years. They formed 1.6 per cent. of all the medical cases examined during that period. Pulmonary tuberculosis was met with in seven. This gives a percentage of over 87. All the cases were females. In only one subject were there distinct tuberculous lesions elsewhere than in the lungs, and then the intestines were also affected. In one subject there was an old tuberculous focus at the apex of the lung, but it seemed probable that the active phthisis was rather due to a fresh infection than from this latent patch. In five cases both lungs were more or less involved. In two the left was the only one showing any distinct tuberculous process. In three of the cases the course seemed to have been rapid. In four it seemed to have lasted for several months. One subject, it was stated, had "spat blood" six months before her death. In one case one lung only was studded with small tubercles, the injection having been recent. In two there was more or less extensive caseation. Four presented evidences of softening and cavitation, and in two of these there was some fibrosis. Since collecting the above¹⁵ I have gone over my more recent pathological notes. Two further cases of alcoholic multiple neuritis have come to necropsy. In one, a male, aged 35 years, who was also the subject of hepatic cirrhosis, both lungs were studded with recent tubercles. There was no softening, but caseous foci at the apices were apparently of older formation than the tubercles elsewhere. In the other case, a female, aged 32 years, in whom there was also a fatty and cirrhotic liver, the lungs, although congested, œdematous, and presenting patches of broncho-pneumonia, showed no distinct evidences of tubercle. Thus, out of ten fatal cases of alcoholic neuritis, nine females and one male, eight, or 80 per cent., were the subjects of pulmonary tuberculosis.

In connexion with the recent remarkable outbreak of arsenical neuritis in Manchester and district, and occurring principally in alcoholics among the poorer classes, it is interesting to note that in a considerable number of the fatal cases active pulmonary tuberculosis was present and in some undoubtedly it had hastened the end.

2. *Tuberculosis is also of frequent occurrence in the subjects of alcoholic cirrhosis of the liver*.—In many cases it is manifestly of the nature of a terminal infection. In order to throw light on this matter the records of 3053 medical cases examined in the pathological department of the Manchester Royal Infirmary have been analysed. I have collected 121 examples of common cirrhosis of the liver. All doubtful and complicated cases were omitted. Cases associated with cardiac or such chronic affection as seemed to have led to secondary changes in the liver were excluded. All examples of "biliary" cirrhosis and those in any way connected with syphilis have been passed over. After omitting several doubtful cases, in 28 tuberculosis, either active, latent, or obsolete, was present. Thus, over 25 per cent. presented evidences of tuberculosis, active phthisis was present in 14 (12 males and two females), and active peritoneal tuberculosis in 12 (nine males and three females). Of these, six males and one female had involvement of both lungs and peritoneum. In five males and one female the lungs alone were affected, and in two males and two females the peritoneum alone. No less than 12, or nearly 10 per cent. of the 121

cases, appeared to die directly from tuberculosis. The average age of those in which active tuberculosis was limited to the peritoneum was nearly 47 years. The average age of those in which active tuberculosis was limited to the lungs was just over 44 years.¹⁶

LEGISLATION SUGGESTED FOR CONTROLLING AND ERADICATING TUBERCULOSIS IN ANIMALS.¹

BY PROFESSOR DUNCAN McEACHRAN.

DELEGATE TO THE CONGRESS OF THE CANADIAN GOVERNMENT.

THE subject for discussion which I have the privilege of introducing must be carefully considered in all its various bearings, lest by proposing impracticable enactments we nullify our good intentions and give rise (as has already been the case in some countries and states) to bitter opposition by the owners of infected herds. Our efforts must be to educate the people so that they themselves will voluntarily adopt our suggestions, and, with the assistance of the State, to bring about a gradual diminution in the numbers of tuberculous animals in our herds, and the adoption by every stock-owner in the land of thorough preventive measures by which its re-introduction will be rendered impossible. The first step, therefore, which I would recommend is the publication and distribution among the masses—the agricultural population in particular—of information on the subject of tuberculosis. Much good work has already been done in this direction, but more must be done. If we look back for 35 years, when Villimin, Viseur, Chauveau, Gerlach, and others were engaged in demonstrating the contagious character and transmissibility of this disease, and compare our scanty knowledge then with the vast amount of information, which, thanks to Koch, Bang, Nocard, and many others, we now possess, it will be easily understood why we who have been in the field of active work in the practical sense, as practitioners and advisers of our Governments, have in early days hesitated to advise active measures of control or eradication, and why the Governments have been slow to pass enactments bearing on the subject.

It was in 1882 that Koch first communicated the results of his investigations of the etiology of tuberculosis before the Physiological Society of Berlin, followed by further communications later. The knowledge of its transmissibility being due to a specific bacillus led to much investigation and experimentation. The reports and contributions to the literature of tuberculosis have for many years filled our journals and bookshelves to such an extent that no excuse is left for ignorance concerning the subject on the part of those interested in it. In citing evidence in support of any suggestions one may make as to legislation necessary to enable the people, assisted by the Governments, to control and subsequently to eradicate tuberculosis from the lower animals, we necessarily must consider the measures tried by those countries, especially in Europe and America, which have dealt with it. It is to be hoped that in the course of the discussion some new practical suggestions will be adduced which this Congress can recommend for adoption. Until Koch demonstrated that tuberculosis was due to the invasion of an organism, the tubercle bacillus, communicated either directly from an infected person or animal or by intermediate sources of infection, especially by buildings, pathologists were content to attribute its existence and extension to heredity; when, however, its real nature and its pronounced contagious character came to be known, both medical and veterinary practitioners stood aghast in contemplation of the thousand-and-one blunders which crowded their memories consequent on want of this knowledge. I remember well when, 30 years ago, I had temerity enough to read a paper based on the continental investigations referred to, before the Medico-Chirurgical Society of Montreal, in which I ventured to say: "The experiments of continental

¹⁴ See Pulmonary Consumption, Pneumonia, and Allied Diseases of the Lungs, by Thos. J. Mays, New York, 1901, p. 61.

¹⁵ Kelynaek: On the Occurrence of Pulmonary Tuberculosis in the Subjects of Alcoholic Neuritis, Medical Chronicle, 1895-96, vol. iv., p. 180.

¹⁶ See Kelynaek: "On the Occurrence of Tuberculosis in the subjects of Common Hepatic Cirrhosis," Medical Chronicle, 1896-97, vol. vi., p. 262.

¹ A paper communicated to the British Congress on Tuberculosis, Section IV., Veterinary Tuberculosis in Animals.