have never had a single unkind word from those with whom I have had so much to do, and considering that sometimes one had to be rather strict, it is something to be able to say that they have treated me so handsomely. I look upon my position in the Chair here to-day as a reward, though I must add I am greatly overpaid for the little I have done.

The Frequency, Causation, Prevention, and Treatment of Phthisis Pulmonalis in Asylums for the Insane; Essay for which was awarded the Bronze Medal of the Medico-Psychological Association, 1899. By F. G. CROOKSHANK, M.D.Lond., lately Assistant Medical Officer, Northampton County Asylum.

I. THE FREQUENCY OF PHTHISIS AS A CAUSE OF DEATH AMONGST THE INMATES OF ASYLUMS.

WE are, for obvious reasons, forced to gauge the prevalence of phthisis in asylums by its mortality. Several questions at once present themselves:

What is the mortality from phthisis at the present time in the British Islands? What is the mortality from phthisis in the asylums of the British Islands?

Are these mortalities diminishing or increasing? And what relation do they bear to one another?

It is easy to propound these questions; it is extremely difficult to properly appraise the available data. For, first, if it be desired to compare the mortality from phthisis of asylum inmates with that of the general population, the comparison must be made on the basis of the ratio, in each case, of the annual deaths from phthisis to the average populations involved. In other words, the phthisis death-rate, and not the percentage of deaths assigned to phthisis, must be estimated.

Unfortunately most asylum statistics prior to 1870 were based on the percentage of total deaths due to phthisis. It is obvious that, owing to the relatively high mortality from all causes in asylums, the phthisis mortality indicated by such

statistics is very much less than the real phthisis mortality. But, unless the death-rate from all causes is known to vary considerably in the asylums concerned, it is not unfair to compare the phthisis mortality of different asylums, and of the same asylums at different periods, on the basis of the calculated percentage of deaths due to phthisis.

If, however, any just arithmetical comparison is to be made between the phthisis death-rate of the asylum community and that of the general population, correction must be made for age and sex distribution. If not, the comparison presses unduly on the asylums, for the population of asylums is practically a population between the ages of fifteen and seventy-five, the age of phthisis incidence.

Again, in asylums there is an enormous incidence, as a cause of death, of disease of the nervous system. Such incidence obviously masks the true incidence of other causes of death. On this point some cogent remarks were made by the Scottish Commissioners in their Report for 1873. Again, in the asylums of England and Wales there occurred, during 1897, 7298 deaths; of these, 1064 were assigned to phthisis, 76 to tuberculosis, and 6 to scrofula (*sic*); 1385 deaths—19 per cent. of the whole—were assigned to general paralysis. Since, on an average, 1457 general paralytics are admitted annually to these asylums, it seems likely that this number 1385 includes almost all the general paralytics dying in them during 1897.

Now Clouston found that of 97 general paralytics who died 27 were phthisical, and Mickle has stated that of general paralytics examined after death, 26 per cent. exhibited caseation or cavities, 12 per cent. "cured" phthisis, and 65 per cent. pleuritic adhesions. So of these 1385 general paralytics dying in 1897 many must have been far gone in phthisis.

It is misleading, then, to say that of 7298 deaths 1064 only were due to phthisis. Deducting, as is only fair, deaths assigned to general paralysis from total deaths, we find that of 5913 deaths 1064 at least were due to phthisis. By a parity of reasoning, allowance should be made for, at any rate, some of the 267 deaths assigned to "exhaustion," and the 512 to "organic brain disease," having been due to or accelerated by phthisis.

Whatever allowances might thus be made in calculating the percentage of deaths due to phthisis, it is obviously difficult to

ascertain the true—as distinguished from the "official"—phthisis death-rate; for, owing to the relatively short duration of their asylum life, it would not be sufficient to deduct from the average resident population the average number of general paralytics resident.

Owing to the system of classification adopted by the Commissioners in their tables and the necessity imposed upon superintendents of stating only one cause of death on the certificates, many more deaths from phthisis are, for statistical purposes, lost. No mention, for instance, is made at all in the Commissioners' tables of tubercular meningitis, peritonitis, nephritis, or enteritis. Since in 1897 alone 94 deaths were assigned to "congestion of the lungs"—a meaningless phrase, 34 to peritonitis—a disease never idiopathic, and 57 to meningitis—a disease rarely, if ever so, there seems little doubt that certain cases in which the fatal issue is due to a complication of phthisis, are as we have said, for statistical purposes, lost under various headings.

It would be difficult from these data alone to estimate the degree by which the official returns under-estimate the true phthisis mortality in asylums, but, by an examination of post-mortem records of various asylums, some help may be gained. It is well known that phthisis is, in the insane, often latent, or at any rate unrecognised. It is equally well known that—be the reason what it may—phthisis does not appear on the death certificates so often as it is found post mortem in so advanced a stage as to cause death. Death is assigned instead to general paralysis; "brain disease," "enteritis," and so forth. According to Clouston, phthisis is found post mortem at least twice as often as would appear from the certificates.

At one county asylum in which the reported proportion of deaths due to phthisis has been for years about 11 per cent., advanced phthisis has been found in 20 per cent. of the complete autopsies made since 1888.

There is good reason to suppose, then, that the true phthisis death-rate of asylums, is something not much less than twice the "official" rate. It is certainly half as high again.

It is clear that we can hardly hope to institute a just arithmetical comparison between the phthisis mortalities of the asylum and general populations; nor shall we be able to until some return is issued, from the Board in Whitehall, of the total

number of deaths of which phthisis is either the immediate cause or the pathological antecedent of the immediate cause.

Since official returns so grossly under-estimate the phthisis mortality of asylums, it is not easy to answer the questions we have proposed. However, from the very valuable report made by Dr. Tatham to the Commissioners appointed to inquire into the relation of tuberculosis to the food supply, it appears that during the quinquennium 1891–5 the phthisis mortality in England and Wales was, per million living at all ages, 1463 (Table VI, Appendix A). The age period of greatest mortality during this quinquennium was that of males between thirty-five and forty-five. In this group the mortality was per million 3268 living.

Table I, Appendix A (compiled from official sources), shows that the phthisis mortality in the asylums of England and Wales was in 1894, 14·1 per thousand of the average resident population. In the years 1895, 1896, and 1897, the rates were 15·7, 13·7, and 14·7 respectively. Figures (also extracted from the official returns) show that in the same years the phthisis death-rate was in Irish district asylums considerably greater, and in the Scottish and London county asylums distinctly less (Tables II, III, and IV, Appendix A).

Dr. Tatham has kindly informed me that the "number living" of his tables is strictly analogous to the average resident population of an asylum. It will be convenient then to present in tabular form these two series of facts.

I.—*Phthisis death-rate* (*per 1000 of the Average Resident Population*).

	1893.	1894.	1895.	1896.	1897.
All Asylums, England and Wales . . .	—	14·1	15·7	13·7	14·7
Irish District Asylums	24·8	25·7	19·6	18·5	23·9
All Scottish Asylums	11·0	10·5	11·2	11·6	10·4
London County Asylums	12·6	9·5	12·1	8·5	9·8

The "official" death-rate from phthisis is, it would appear, on an average 14·6 per 1000 of the average resident population (in English asylums). This is ten times that for the general population of England and Wales (1891 to 1895).

II.—*Phthisis death-rate (per 1000 living) for England and Wales.*

	All ages. Both sexes.	35—45 (Female)	35—45 (Male)
Quinquennium, 1891—1895. . .	1·463	2·305	3·268

We have already mentioned the difficulties attending attempts to institute arithmetical comparison.

No secondary considerations, however, can impair the force of the fact that the "official" death-rate from phthisis in the asylums of England and Wales is 4·5 *times as great as that of the age group of the general population most liable to phthisis. Males between the ages of thirty-five to forty-five.* And we have shown reason to believe that this rate is too low by a third if not by a half.

It will not escape notice that the phthisis mortality in Irish district asylums is, on official showing, more than half as great again as that in English asylums. Without attempting to deny that phthisis is extraordinarily prevalent in Irish asylums, it may be pointed out that in Ireland only 4 per cent. of the deaths in asylums are assigned to general paralysis; while in England and Wales general paralysis accounts for 19 per cent. of such deaths. Since at least 25 per cent. of general paralytics die with advanced phthisis, it is obvious that the official returns, as at present made, press unduly on the Irish asylums in this matter.

It is not easy at first sight to account for the relatively low phthisis mortality in the London county asylums. These asylums receive a debilitated class of patients, and cannot be said to be free from over-crowding. But it appears that large numbers of the London insane—and certainly not those most robust—are accommodated in provincial asylums. On January 1st, 1898, 1284 such persons (11 per cent.) were so boarded out, and it has been hinted that the principles of selection of such patients tend to encourage the boarding out of phthisical cases. The low death-rate of Scottish asylums is to be otherwise accounted for. But it may here be pointed out that the mortality from tubercular disease in Scotland is relatively greater than in England (Table IV).

It is well known that phthisis, as a cause of death, is in the British Isles, steadily lessening in importance. The tables furnished by Dr. Tatham formed the basis of some remarks in the Report of the Royal Commission on Tuberculosis (1898). The Commissioners stated, "that these figures—after every allowance has been made—show that the mortality from tubercular disease (in all its forms) has steadily fallen since 1851 to 1860, and that every age period for which statistics are available shows a decrease often considerable." Dr. Tatham finds that "comparing 1891 to 1895 with 1851 to 1860 . . . . phthisis mortality in males of all ages has been reduced by about one third, and in females by more than one half."

The subjoined table is extracted from Dr. Tatham's elaborate returns.

III.—*Mortality per 1,000,000 living, all ages (England and Wales).*

	Phthisis.	All tubercular diseases.
1851-60	2679	3483
1861-70	2475	3240
1871-80	2116	2863
1881-85	1830	2540
1886-90	1635	2322
1891-95	1463	2122

Dr. Arthur Ransome, on statistical grounds, concludes that a decline in the phthisis death-rate of England and Wales has existed since 1838 at least; that this decline is a slightly increasing one, and that, if phthisis as a cause of death continue to diminish at the same rate for another thirty years, it will, at the end of that period, have entirely disappeared.

Mr. Malcolm Morris has pointed out that from Dr. Ransome's charts it appears as if the first great drop in the phthisis death-rate occurred in the decade 1840-50—the period in which serious attention was first given to sanitary reform.

It may also be observed that the decline has been particularly marked since 1867, a fact to which we will presently refer. From some data that have been put forward by Dr. Chalmers, it appears that the death-rate from tubercular disease in Scotland has diminished in the last forty years by about a third—to

be precise, by 35 per cent.—a rate of reduction greater by about 4 per cent. than that obtaining in England and Wales during the same period.

IV.—*All Tubercular Disease: Mortality per 1,000,000 living.*

	England and Wales (Dr. Tatham).	Scotland (Dr. Chalmers).
1861–70	3240	3814
1871–80	2863	3552
1881–85	2540	2936
1886–90	2322	2578
1890-95	2122	2446

It appears from Dr Chalmers' investigations that this reduction has been particularly marked in the case of phthisis, which disease, in Glasgow at any rate, accounts for 72 per cent. of the deaths from tuberculosis. The results of Dr. Tatham's investigations are then in close agreement with those of Dr. Chalmers.

It remains for us to ascertain, if possible, whether the phthisis mortality in asylums has decreased during the periods investigated for the general population by Drs. Tatham, Ransome, and Chalmers. We are, at the outset, confronted with the grave disadvantage that only since 1894 have the causes of death in English asylums been officially tabulated. Vague statements are met with in medical literature to the effect that in the early part of the century, and, indeed, as late as 1850, the deaths from phthisis in asylums amounted to nearly one half the total deaths. Since the death-rate in asylums from all causes was formerly far higher than at present, we are justified in assuming that since 1850 a considerable decline in the phthisis mortality of asylums has occurred.

Dr. Clouston, for instance, has stated that in the Royal Edinburgh Asylum, between 1842 and 1863, 29 per cent. of the deaths were due to phthisis. Since 1879 the percentage has been much lower; from 1879 to 1888 it averaged 13·6. This percentage is indeed lower than that of English asylums at the present time (Table I, Appendix A). It must, however, be pointed out that in the early records of individual asylums the tendency to statistical loss, so marked a feature of the Commissioners' returns, did not then obtain to the

extent it does now. General paralysis as a cause of death excited less attention fifty years ago than it does now. Certainly no motive existed to depreciate the phthisis mortality. But, after all, what we chiefly require is evidence of the decline, if any, of phthisis mortality in asylums since 1865–70, the time at which bacteriological opinions first became current and from which the decline in phthisis mortality for the whole population has become so notable. Happily much valuable information can be obtained from the Scottish Blue Books. This information is summarised in Table V, Appendix A. The figures given in this table, as indications of the absolute phthisis mortality, can only be received with the reservations we have already declared; but they do afford us evidence of the "official" mortality in successive quinquennia.

It appears that, while on official returns, the phthisis mortality for males in Scotch asylums from 1870–74 averaged 11·2 per 1000, in 1890–94 it averaged 10·9—a reduction of 2·7 per cent. In the case of females a greater reduction is apparent, the rates being 15·9 and 11·1 respectively. But if we compare the years 1875–79 with those of 1890–94 we find the reduction has been in the case of males 1·78 per cent., and for females 6·7 per cent. Since 1871–80 the reduction in mortality from tubercular disease for the whole of Scotland has been 31 per cent.

In England the reduction of mortality from phthisis alone has been since 1861–70 over 40 per cent., and since 1871–80 about 31 per cent.

Moreover, from Table III, Appendix A, it seems clear that the later tendency of the phthisis death-rate in Scottish asylums has been, till 1897, to rise.

It is difficult, in default of such returns as those issued by the Scottish Commission, to find any trustworthy data from which to draw conclusions as to the phthisis mortality in English asylums during the last forty years. Statistics of individual asylums abound, but are necessarily of little value, even when, as is too seldom the case, they are calculated on the basis of the average resident population. It is perhaps worth mentioning that at Garlands, from 1864 to 1894, "tubercular diseases" accounted for but 15·3 per cent. of the total deaths; in 1897 phthisis alone accounted for at least 15·6 per cent. of the deaths in English asylums (Table I, Appendix A). No

doubt if the individual reports of the various asylums of England and Wales were collected, some facts would be obtained, but the difficulties of such a task would be great. As before 1880 many asylums reports were inadequate and the causes of death very crudely classified, the results would be disappointing. But between 1870 and 1880, the Commissioners published —in their reports on individual asylums—tables of the causes of death "since last visit." These reports have been collected and the results summarised in the accompanying table. Only those reports have been utilised in which phthisis (or "consumption") is classed alone as a cause of death. (In many instances deaths were grouped as due to "pulmonary disorders," etc.) The "years" given refer to the years in which the reports were made; of course many of the deaths "since last visit" occurred in preceding years. In some years very few deaths were classified. In the right hand columns are given the official death-rates (from all causes) in the asylums of England and Wales during the year of the visits, and an "approximate" phthisis death-rate; but the possible error in this last must necessarily be large. Below are placed for comparative purposes, some recent statistics:

V.—*Phthisis Mortality in various English Asylums*, 1870—1880.

Year.	Deaths classified.	Deaths from phthisis.	Percentage of deaths due to phthisis.	Death-rate in all asylums (all causes).	Approximate phthisis death-rate.
1871	1051	180	17·2	102·1	17·5
1873	1288	231	17·9	101·6	18·1
1876	2324	316	13·1	100	13·1
1877	2563	319	12·7	99	12·5
1878	1119	160	14·3	100	14·3
1879	1290	175	13·5	100·4	13·5
1880	805	85	10·5	91·09	9·5
1895	7182	1135	15·8	99·9	15·1
1897	7298	1140	15·6	94·5	14·7

It would appear from this table, imperfect though it be, that in the early seventies the phthisis mortality was distinctly higher than in later years. It also seems that of late years,

although the death-rate from all causes has sensibly declined, the percentage of deaths due to phthisis has increased in rather greater proportion. In other words there appears to be an arrest of the decline in the phthisis death-rate, if not an actual tendency to increase (cf. Table I, Appendix A). These conclusions are in substantial harmony with those arrived at from the study of the Scottish Blue Books (Tables III and V, Appendix A). Moreover, Table II certainly shows no settled tendency to decline in the phthisis death-rate of the London county asylums. Without exaggerating the value of these various tables, it is thought that they afford basis for several conclusions which may be briefly stated :—

The "official" death-rate from phthisis in English (and Welsh) asylums is 4·5 times as high as the phthisis death-rate for males between the ages of thirty-five and forty-five. Males between thirty-five and forty-five constitute the age group of the general population most liable to death from phthisis.

This "official" death-rate under-estimates by a third at least the true phthisis mortality in asylums. The death-rate from phthisis in Irish district asylums is, in part from circumstances already dwelt on, 50 per cent. higher than that in English asylums.

The phthisis death-rate in Scottish asylums is about 20 per cent. lower than that of English asylums, notwithstanding the fact that tubercular disease is in Scotland more prevalent than in England.

The mortality from phthisis of the general population of England and Wales is being reduced annually at a rate which tends to increase. This reduction has, since 1871–80 (Table VI, Appendix A) amounted to over 30 per cent.

A similar reduction appears to be occurring in the phthisis mortality of the general population of Scotland.

There appears no ground for assuming that in the last twenty years there has been, on the whole, any fall in the phthisis death-rate of English asylums; but a certain fall did probably occur in the early seventies.

The phthisis death-rate in Scotch asylums, which also fell in the early seventies, has only slightly declined during the last twenty years (1·5 to 6·7 per cent.).

Perhaps in Scotland, certainly in England, some tendency exists at present for the phthisis death-rate of asylums to rise.

It does not appear that the relatively low phthisis mortality of the London county asylums tends to further decrease.

II.—The Causes of the Excessive Mortality from Phthisis amongst the Inmates of Asylums.

The high phthisis death-rate that prevails in asylums admits of two explanations. One is that the insane are, as insane persons, peculiarly liable to phthisis. The other is that the insane become phthisical because the conditions of asylum life favour the development of phthisis.

Unfortunately, we are unable to compare the phthisis mortality of lunatics under care as single patients with that of lunatics confined in institutions. It certainly is the case that, of admissions into asylums, a relatively large number are already phthisical, and a still larger number possess hereditary tendencies to become so. But Dr. Clouston found that of 140 instances in which phthisis was the cause of death, in only 21·5 per cent. was the disease diagnosed within twelve months after admission. In other words, four fifths *at least* of these cases contracted phthisis after admission to the asylum.

I have been at some pains to examine the records of a county asylum in which very careful physical examination and note-taking have always been practised. Of the last 1000 cases admitted only 85 warranted, on admission, even suspicion of phthisis. In not a few instances the sequel has shown these suspicions to be unfounded. But during the period covered by these 1000 admissions advanced and active phthisis was noted in 20 per cent. of the autopsies made; old phthisis and apical adhesions in a much greater number. Since the discharge rate of cases suspected on admission of phthisis was practically that of non-tubercular cases, it is quite clear that, even with a generous allowance for oversight, a very large number of cases acquired phthisis after admission. The exact number, however, for the asylum world at large will not be determined until the Commissioners require notification of all cases admitted with phthisis. The addition of one or two words to the certificates now sent to Whitehall on admission of a new case would suffice.

It is exceedingly difficult to estimate the number of cases

admitted in which an hereditary tendency to phthisis exists. The inaccuracy of statements made by relatives is well known, and it is not easy to say what is evidence of hereditary predisposition. From my own observations it would seem that not *more* than 7·5 per cent. of cases admitted are phthisical, and that in about 10 per cent. a family tendency exists. These conclusions do not disagree with those of others who have paid attention to the subject.

We have seen that in English asylums about 15·5 per cent. of deaths are officially assigned to phthisis, and that in at least 20 per cent. of fatal cases advanced phthisis exists, while in from 30 to 40 per cent. some signs of tubercular deposit in the lungs may be traced. It is hard, then, to avoid the conclusion that in the majority of instances phthisis is contracted after admission to the asylum.

The question of hereditary predisposition tends rather to obscure the point at issue. If a patient admitted free from disease contract phthisis in an asylum the fault lies with the institution harbouring the germs. It is no excuse that the person infected has "family tendencies." The responsibility is great of those who, assuming charge of predisposed persons, place them in directly disadvantageous circumstances. It is difficult to substantiate the theory put forward by apologists for the asylums that in an insane person there is, *quâ* his insanity, some subtle tendency to phthisis. If it were so Dr. Chapman could not have written in 1874: "No death has occurred from phthisis (in Hereford Asylum) except one case of tubercular disease in a man dying of general paralysis two months after admission. Phthisis so commonly originates in asylums that there is good ground for supposing this immunity may be ascribed to the original capacity of the building and to the care bestowed on hygienic measures." And in 1875: "My experience leads me to think that phthisis is a preventable disease in asylums. I attribute its absence at Hereford to ventilation, freedom from over-crowding, dietary, and exercise."

There is, however, one peculiarity of the insane or of certain classes of the insane, which directly predisposes them to phthisis —the shallowness and infrequency of respiration in depressed and demented cases. No doubt the vitality of the insane—especially the pauper class—is low, but the proscription to them

of fresh air is a detail of asylum management; no doubt their nutrition is poor, but it is childish to assert that half-a-crown or less per week is enough to spend on food.

How far do the conditions of asylum life determine the spread of phthisis amongst the insane? The chief cause of phthisis is the *Bacillus tuberculosis* in force sufficient to overcome the defensive resistance of the bioplasm of the individual attacked. And this organism must gain access to the body by inoculation, ingestion, or inspiration. Tuberculosis in the human subject is very rarely the result of inoculation. Tuberculosis from ingestion of tuberculous meat and milk is unfortunately more common. But, as the Royal Commissioners pointed out, it is the tuberculosis of childhood—abdominal tuberculosis—that is so brought about. *Phthisis* from food is rarely met with. When it is the case usually runs a rapid course, affection of the lungs being secondary to infection of mesenteric and retroperitoneal glands. There is no reason to suppose that such cases occur more often in asylums than amongst the general population. But chronic pulmonary tuberculosis is nearly always due to infection by the respiratory tract.

It is hardly necessary to give authority for a statement, the truth of which is generally admitted, that the judicial utterances of the Royal Commission may once more be alluded to (Report, Part I). This statement does not, of course, mean that phthisis is communicated by *direct* infection. It means that the *materies morbi* is disseminated by the drying of promiscuously voided sputa, and is respired with dust.

Sir William Broadbent has put the matter clearly in a few sentences:—"Consumption is a contagious disease; it is communicated from person to person and . . . it arises in no other way." "The principal way in which they (germs) are conveyed . . . is by means of the expectoration which contains them in enormous numbers, and which, when dried, is suspended in the atmosphere . . . . in the form of dust and inhaled."

Surely it would be difficult to find institutions which afford such opportunities for the dissemination of phthisis germs as do our asylums. Consider a community existing under conditions that preclude, for many, adequate exercise in the open air; spending long hours in over-crowded day-rooms and dormitories; a community of filthy and careless habits, and already

phthisical in the proportion of from 15 to 25 per cent. Such a community is formed by the inmates of every county asylum.

Over-crowding may exist in workhouses, in infirmaries, in Whitechapel sweating dens, and in the slums of Somers Town; but nowhere, save in asylums, are there such aggregations of tubercular persons whose malady is complicated by persistently uncleanly habits. Chemical disinfectants cannot be generally employed; and the drying of sputa is hardly to be prevented. Small wonder surely that farm labourers, taken from the plough and placed in a crowded ward, so often die of phthisis in a year or two.

What are the causes which weaken the defensive powers of the body against these organisms? Certain conditions of soil dampness and inefficient drainage, certain conditions of life in valleys and deficient sunlight, all these have an evil influence. But though asylums, no less than other institutions, have profited by the work of the sanitary engineers, during the last twenty years the phthisis mortality of asylums has been only slightly reduced. Why, then, has the phthisis mortality of asylums remained so high?

In great part we have answered this question by pointing to the opportunity afforded for the dissemination of spores under asylum conditions, and there are three other factors which directly tend to lower the resistance of the insane to the *Bacillus tuberculosis*, over-crowding, lack of exercise in the fresh air, and a certain quality of diet.

There is no doubt that *over-crowding*, besides directly increasing the possibility of infection, brings about a condition of low vitality strongly predisposing to phthisis. To quote the words of Dr. Theodore Williams: "It has been demonstrated over and over again that impure (rebreathed) air is the principal debilitating cause which renders the individual vulnerable to the attack of the tubercle bacillus." "Immunity from phthisis is almost invariably associated with more or less open-air life."

To what extent does over-crowding prevail in the asylums of the United Kingdom? Parkes laid it down—and the accuracy of his calculations is still unshaken—that an average healthy adult needs per hour 3000 cubic feet of air. In our country it is difficult to change the air of living or sleeping rooms more than three times an hour without risk of chill, and

so the least space allotted to each person should be 1000 cubic feet. For hygienic purposes, it is agreed, a room of this space should not be more than 12 feet in height. A ventilated room of 40 square feet in area and 20 feet in height is not, in hygienic value, the equivalent of one 10 feet in height and 80 square feet in area. Every adult then should be allotted, in sleeping and living rooms, 83 square feet of floor space at least. Parkes also laid it down that, to infirmary patients, 1000 to 1300 cubic feet (83 to 108 square feet of floor space) should be allotted. Dr. Acland showed, many years ago, that for nursing purposes the *minimum* floor space ought to be 72 square feet per bed.

It may be said that these are counsels of perfection. No doubt ; our standard should be that which ought to be, not that which is.

How far does the provision for lunatics in England and Wales fall short of this standard of Parkes'?

The Commissioners in Lunacy for England in their tables assume that in ordinary dormitories 50 square feet, and in sick dormitories 66 square feet, is sufficient floor space per bed. That is to say, if every dormitory be supposed to be 12 feet high and the air changed thrice hourly, 1800 cubic feet of air per hour is allowed to ordinary and 2376 cubic feet for infirmary patients.

It is true that in the tables of the Commissioners only dormitory space is *calculated*. It is "assumed" that in each "single room" only one patient sleeps and that the cubic space is adequate. But in how many single rooms is the supply of air per hour actually as much as 1800 cubic feet, the amount the Commissioners deem adequate? Under the most favourable circumstances, the floor space allowed by the Commissioners corresponds to only 1800 cubic feet of air per hour for ordinary patients (instead of 3000), and for sick patients to only 2376 instead of the needed 3000 to 4000. On their own estimate over-crowding existed, on January 1st, 1898, in 36 out of the 77 county and county borough asylums. In these 36 asylums there was, on the estimated dormitory and single room accommodation, over-crowding to the extent of 1486 persons.

It must be insisted that this allowance of the Commissioners, meagre as it would be for healthy persons, is actually supposed to be adequate for a community confined to institutional life

and of which from 15 to 25 per cent. at least are tuberculous! And of which it is said that a still greater number are predisposed to phthisis!

So much for the dormitory accommodation. Is the day room accommodation any better? Absolutely no official figures are provided.

It may be again pointed out that the tendency during the last few years of the phthisis mortality in English asylums has not been to fall (Table I, Appendix A). The average resident population of asylums in England and Wales has risen from 71,682 in 1895 to 77,217 in 1897. The accommodation has not increased in the same ratio. On the Commissioners' calculations there was on January 1st, 1896, sleeping room in the county and county borough asylums for 1932 more patients than were actually resident. On the 1st of January, 1898, there was room for but 715 more. On January 1st, 1896, 31 of these asylums were over-crowded, on January 1st, 1898, 36.

We have some explanation of the relatively low phthisis mortality in London county asylums in the fact that in them, owing to an extended system of boarding out, over-crowding is not increasing so rapidly as the number of patients. Unfortunately it is impossible, in the absence of official statistics, to gauge the over-crowding of Scottish and Irish asylums; but it may be pointed out that in Ireland, where the asylum population is increasing more rapidly than in England, the phthisis rate is high; and that in Scottish asylums, where the reverse is the case, the phthisis rate is relatively low.

It does appear, then, that the phthisis death-rate of asylum groups may be definitely correlated with the density of asylum populations.

There is little need to insist on the advantages, for those confined in asylums, of *exercise in the open air*. Necessarily many, by reason of infirmity, or the form of their disease, are precluded from participating in the "walks" now so generally arranged by asylum superintendents.

But it should be remembered, when allotting day-room and dormitory space, that of asylum patients in England and Wales (County and County Boroughs) 19·6 per cent. are restricted to airing courts for exercise and only 39 per cent. pass daily beyond them (Blue Book 1898).

The food in these institutions is no doubt wholesome, and for robust individuals sufficient. But, by a study of diet tables, one is driven to the conclusion that, for persons many of whom are drifting into dementia and struggling with the tubercle bacillus, it is in certain asylums inadequate, and deficient in fat.

No doubt in many ways the diet of the asylums is as good, if not better, than that of many agricultural labourers. But we insist that too often it is not calculated to strengthen the defensive powers of the bioplasm of a melancholiac living under the greatest restrictions, restrictions imposed by his malady and by social necessities.

It appears then, that though many persons are admitted to asylums in various stages of phthisis, yet in the majority of cases in which phthisis leads to a fatal issue the disease is acquired in the asylum.

By reason of hereditary tendencies, or peculiarities of respiration, many insane persons are vulnerable to the tubercle bacillus. But the immediate cause is, in all but a few instances, that inhalation of spores which is a necessary consequence of the usual unenlightened practice of allowing phthisical cases to mingle with non-phthisical persons. Further, since overcrowding is a recognised factor in producing states of low vitality, undoubted responsibility attaches to those who allot insufficient fever-space for a feeble and infected group of person.

It is obvious that restricted opportunities for open air exercise render necessary sleeping and living room space above the proper standard, and the provision of a dietary relatively rich in fats.

III.—The Prevention and Cure of Phthisis amongst the Inmates of Asylums.

Two questions seem to be suggested by the conclusions already arrived at. (1) What can be done to prevent the infection of sound patients? (2) What can be done to arrest the progress of disease in those already infected?

Apart from the ethical motive, there are reasons of economy. A lessened phthisis mortality means—though no doubt in a lesser proportion—a higher recovery rate, at least among the

patients free from phthisis on admission. But it also means a reduction of the number of sick patients and some check on the present waste of patients capable of profitable labour. Of course every measure that tends to prolong the lives of the insane adds to the aggregate burden on the public. But every measure reducing the mortality and sickness of the insane tends in the long run to economy of asylum management.

Three plans may be suggested in the interests of the uninfected patients.

The first, based on a recognition of the advantages of ample air, space, and generous dietary, would practically result in the conversion of asylums into institutions of the type of our hospitals for consumption, institutions such as that at Brompton. It has been demonstrated, time and again, that in these institutions, if proper measures of disinfection be enforced, no risk of infection is incurred by the non-tubercular inmates. It is obvious that this plan would necessitate the doubling of our asylums in size. Only one person could live where two or three do now. It is not the most economical plan, and is not that suggested by our latest knowledge.

The second plan—advocated some few years ago by Sir J. Crichton Browne—involves the provision of a block to be used as a consumption hospital in connection with each asylum. This plan, embodying as it does the principle of isolation, is a distinct advance on the first one. But it seems inadequate. It makes no provision for recently admitted cases of mental disease complicated by phthisis. And in practice, for it has been tried, the hospital degenerates into an infirmary for such consumptives as keep their bed and are quiet.

The third plan enjoins the segregation of every case of tubercular disease, whatever the mental condition of the patient. The application of this plan must, with certainty, result in a decline of the number of cases acquiring phthisis in asylums. It should lead to the attainment of what we must recognise as our ideal—the disappearance of phthisis as a cause of death amongst patients free from the disease on admission.

It may be urged that in practice this plan would break down; that early cases would be overlooked; that sources of infection would still persist in the general wards. It is true that phthisis is, in the insane, frequently latent. It is also overlooked although these patients may not complain in them, as in the sane,

with febrile processes the pulse beats faster and the thermometer rises. Although physical examination is often difficult, insanity will not abolish the flattening of a cavernous apex or a the dulness of a consolidated base, and an impaired percussion note is the earliest and most trustworthy physical sign of phthisis.

If every patient were weighed once or twice a quarter, and if every patient losing weight were carefully examined, very few cases would be overlooked.

Thus far, then, in the interests of the uninfected :—

(i) Every patient exhibiting signs of tuberculosis in any form should be, whatever the mental condition, at once removed from all communication with uninfected patients.

(ii) At the same time every effort should be made to narrow the possible margin of error, by approximating the conditions of asylum life to those generally recognised as defensive against phthisis, and by enforcing modern practices of disinfection and sterilisation.

What provision should be made for the segregated (infected) cases? The answer is bound up with that to our second question :—What can be done to arrest the progress of disease in those already infected? A few years ago it would have been said that some modification of the Brompton Hospital plan afforded the greatest hope of relief to phthisical persons unable to leave this country. But if the principle of separation is to be rigorously applied, it is obvious that this plan must be greatly modified. The persons for whom provision must be made are not only quiet cases but persons exhibiting every phase of mental disorder requiring asylum treatment. Of late the general opinion is that the most hopeful plan of dealing with phthisical persons is that indicated by the term "sanatorium treatment." Dr. Rufenacht Walters has well said: "To write on the sanatorium treatment of consumption is to preach to the converted; it is the logical outcome of facts which cannot be disputed, and of principles which are universally accepted by the medical profession."

Inasmuch as the population of a "sanatorium" consists of persons of almost every grade of bodily activity, it would seem that the conditions of asylum life could be more easily reconciled with those of a sanatorium than those of a hospital. Most modern authorities—notably Dr. A. Ransome and Léon Petit—have declared that the advantages of the so-called cli-

matic treatment of phthisis are those of residence in the open air simply. And Sir Samuel Wilks has said, "The remedy for consumption is air, air, fresh air."

Lastly the results that have already been obtained by Dr. Burton Fanning and others sufficiently demonstrate the potentialities of sanatorium treatment in the British Isles. The necessary conditions, according to Petit, Walters, and others, are:—Pure air; not in close proximity to large towns. Sandy soil without damp, or fog after sunset. Free exposure to the sun; adequate shelter from north winds. An environment suitable for outdoor life in fine weather, and providing shelter in cold and wet seasons. Facility of access.

Such conditions exist in few places in the British Isles more admirably than at the sites which, of late years, have been selected for our large asylums. The position of the Northampton County Asylum, for instance, fulfils all these conditions admirably; an elevation of 400 feet, the highest in the county; distant from the town three miles of good road; a thick wood to the north; an uninterrupted horizon to the south and west; a fine soil; a good water supply; and an estate of some 240 acres available for exercise and occupation; and also from the relative elevation, dryness and freedom from dust, combined with a generous rainfall.

The question of site, then, for these asylum-sanatoria would offer little difficulty. The buildings themselves might be either single, as at Falkenstein, or arranged in villas, as at Nordrach and the Adirondacks. With the general adoption of the "villa" system of asylum construction the whole question of phthisis prevention would be solved, were the principle of isolation rigorously enforced.

Buildings on the Falkenstein plan are, as a rule, two stories in height, and constructed so that a long frontage to the south is secured. Wings are thrown out from each end of the main building at an obtuse angle, so that exposure to the south is combined with protection from east and west winds. Such a building is well adapted to asylum necessities, especially if broken into pavilions. Separation of the sexes can be conveniently effected by the usual central administrative block running northwards to the mortuaries, disinfecting furnaces, &c., in rear of the main building. In most Continental sanatoria verandahs, shaded by glass or other material, run the whole

length of the south side, and paved walks are provided. Sanatorium managers require an allowance of not less than 1000 cubic feet of space per head in dormitories, which should all be well lighted from the south and freely ventilated. Recent literature on this subject is so voluminous that further reference to construction is unnecessary here.

We have now to consider such modifications as asylum physicians would demand in the plan of these sanatoria.

First, as to size; Continental sanatoria variously provide accommodation for from 20 to 200 patients. But, since such asylum-sanatoria as we are proposing would necessarily be independent administrative units in respect of kitchens, &c., economic considerations would suggest provision for not less than 200 patients and the necessary staff.

Provision for 200 patients would not at first, at any rate, be in excess of the needs of an asylum with 1000 inmates. With a greater number treatment would be less beneficial, with a less number administration would be expensive. It would probably be to the advantage of the smaller asylums to board out their phthisical patients. And it would certainly be to the financial advantage of asylums of medium size—those accommodating from 600 to 1000 patients—to provide sanatorium accommodation in excess of their own necessities.

London, Lancashire, or Yorkshire might establish in suitable localities groups of asylum sanatoria to which cases of phthisis might be drafted. Such groups, composed, let us say, of five units, each accommodating 200 patients, could be conveniently administered and would lend themselves admirably to a system of classification in the interests of the inmates.

Let us assume, then, that the best size, on the whole, for a sanatorium is such as would hold 200 patients. For such an institution the plan followed at Falkenstein—the plan of a long building facing south with short east and west wings—seems most convenient. Necessarily the equipment and organisation must closely approximate that of an asylum for ordinary mixed cases of insanity; but in an asylum sanatorium for 200 patients at least 40 or 50 would need sick room accommodation, and such dormitories should be placed on the ground floor so that beds and couches could be wheeled out to the verandahs. On the upper story of each wing well lighted and ventilated single bedrooms could be arranged for the use of

quiet patients, at right angles to a central corridor. In the main building and wings day-rooms, with annexed dining-rooms, might conveniently occupy the ground floor.

This brief sketch is not put forward as a definite plan but as an outline to be modified and filled in; and these tentative proposals would be yet more imperfect were no suggestions made for the daily life of the inmates. The aim of the medical officer should be to secure for his patients the maximum of sunlight and fresh air. It is so generally recognised that out-of-door employment is one of the most potent weapons in the hand of the alienist physician that there is little need now to insist on its value. But for persons who besides being insane are phthisical, gentle labour in the field and the garden is of far more value than simple out-of-door sauntering. The muscles are toned, the bowels and skin stimulated, and, above all, the mental currents are diverted by it. In my own experience phthisical patients have proved by no means the most incompetent gardeners and farm labourers. For the rest, every patient that could should be taken daily walks; and everyone should spend hours in open courts, gardens, and verandahs. Even the sick and infirm should be wheeled on couches or in chairs into the direct sunlight.

The most scrupulous attention should, in the interests of patients and nurses alike, be paid to the disinfection and sterilisation of clothing, bedding, knives, forks, spittoons, &c. The provision of a special laundry is, of course, imperative. No doubt the free use of chemical disinfectants is a matter of anxiety, yet sanitas can do but little harm; handkerchiefs should be destructible; and enamelled iron spittoons and utensils can be frequently sterilised by heat.

Food should be rich in fat. Bacon should be a staple article of diet; pure cocoa should supplant tea; butter and milk should be good and abundant.

Lastly, it should be remembered that at the present day the tendency is to make too little of the medical treatment of tuberculosis. But if phthisis is to be conquered not a single symptom should pass without an effort to subdue it.

It will be urged against any such scheme as this that the expense would, in the case of paupers, be prohibitive, but the initial expense of erecting these asylum sanatoria for individual or grouped asylums would be little more than the cost of

provision for the inevitable increase in the number of lunatics that in any case has to be faced.

This is our rough scheme. The principles are simple: complete separation of tuberculous from non-tuberculous patients; for the tuberculous patients the modern, approved sanatorium treatment.

APPENDIX A.

Statistical Tables.

As the annexed tables have been prepared from official returns, the form they have taken is that prescribed by the limitations of those in the various Blue Books. A few words of explanation appear therefore necessary. Tables I to V refer solely to lunatics living in institutions; they do *not* incorporate statistics of those in private houses. But while Tables II and IV refer to the pauper asylums *only*, Tables I, III, and V embody statistics of other institutions.

Table I includes statistics of all county, borough, idiot, and other asylums, registered hospitals and licensed houses in England and Wales.

Tables III and V include returns from every Scottish institution for the insane, and from the lunatic wards of poor-houses with restricted licenses.

That these tables deal with different classes of asylums is to be regretted, but is unavoidable; for the Scottish Blue Books alone give information of the causes of death in the various classes of asylums. Still the licensed houses in England and Scotland accommodate relatively so small a number that the tables are only nominally affected by their inclusion with the institutions to which this paper more particularly refers.

One word more is necessary. In Scottish and Irish asylums no tubercular disease other than "phthisis" or "consumption" appears to be recognised as a cause of death. But in the returns from English (and London) asylums the vague term "tuberculosis" appears.

The deaths assigned to this cause are relatively so very few that it has been thought fair to add them to the deaths ascribed to "phthisis" or "consumption."

TABLE I.—*Showing the Mortality from Phthisis and the Death-rate from all causes in the Asylums, Registered Hospitals, &c., of England and Wales since 1893.*

	1894.	1895.	1896.	1897.
Average Resident Population . . .	61,072	71,682	74,784	77,217
Total number of Deaths	5,926	7,182	6,783	7,298
Death-rate (per 1000 Average Resident Population)	97	99·9	90·7	94·5
Deaths assigned to Phthisis . . .	920	1,135	1,029	1,140
"Official" Phthisis Death-rate (per 1000 Average Resident Population)	14·1	15·7	13·7	14·7
Percentage of total Deaths assigned to Phthisis	15·5	15·8	15·0	15·6

The figures for 1894 do *not* include returns from registered hospitals and licensed houses.

TABLE II.—*Showing the Mortality from Phthisis and the Death-rate from all causes in the Asylums of the London County Council since 1892.*

	1893.	1894.	1895.	1896.	1897.
Average Resident Population . . .	9,015	10,192	10,591	11,309	11,764
Total number of Deaths	836	963	1,052	1,016	1,036
Death-rate (per 1000 of Average Resident Population)	92·7	94·5	99·3	89·8	88·1
Deaths assigned to Phthisis	114	97	129	97	116
"Official" Phthisis Death-rate (per 1000 Average Resident Population)	12·6	9·5	12·1	8·5	9·86
Percentage of total Deaths assigned to Phthisis	13·6	10·08	12·2	9·54	11·1

TABLE III.—*Showing the Mortality from Phthisis and the Death-rate from all causes in Scottish Institutions for the Insane since 1892.*

	1893.	1894.	1895.	1896.	1897.
Average Resident Population . . .	10,191	10,487	10,916	11,145	11,526
Total number of Deaths	867	818	939	852	955
Death-rate (per 1000 of Average Resident Population)	85·6	77·9	86·0	76·4	82·8
Deaths assigned to Phthisis	113	111	123	130	120
"Official" Phthisis Death-rate (per 1000 Average Resident Population)	11·0	10·5	11·2	11·6	10·4
Percentage of total Deaths due to Phthisis .	13·01	13·5	12·69	15·2	12·5

TABLE IV.—*Showing the Mortality from Phthisis and the Death-rate from all causes in the District Asylums of Ireland since 1892.*

	1893.	1894.	1895.	1896.	1897.
Average Resident Population	12,307	12,605	13,082	13,735	14,340
Total number of Deaths	1,076	1,108	933	926	1,091
Death-rate (per 1000 of Average Resident Population)	87·5	87·9	71·3	67·4	76·0
Deaths assigned to Phthisis	306	324	257	255	343
"Official" Phthisis Death-rate (per 1000 Average Resident Population)	24·8	25·7	19·6	18·5	23·9
Percentage of Deaths assigned to Phthisis	28·4	29·2	27·5	28·5	31·4

TABLE V.—*Showing the Absolute Annual Average Mortality from Phthisis in Scottish Institutions for the Insane during five consecutive quinquennia.*

	1870–74.	1875–79.	1880–84.	1885–89.	1890–94.
Average Resident Population—					
Male	2928·8	3434·0	3999·7	4324·1	4800·0
Female	3268·7	3831·5	4359·2	4616·0	5202·7
Total number of Deaths—					
Male	264·6	302·6	330·6	351·2	445·8
Female	270·4	278·2	329·2	340·4	405·6
Death-rate per 1000 (Average Resident Population)—					
Male	90·3	88·09	83·2	81·2	92·8
Female	82·7	72·6	75·5	73·7	77·9
Deaths assigned to Phthisis—					
Male	33·8	38·2	37·2	40·6	52·6
Female	52·0	45·2	52·4	48·6	57·8
"Official" Death-rate from Phthisis—					
Male	11·2	11·1	9·3	9·3	10·9
Female	15·9	11·9	12·0	10·39	11·1
Percentage of Deaths assigned to Phthisis—					
Male	12·8	12·6	11·2	11·6	11·8
Female	19·2	16·2	15·9	14·3	14·3

TABLE VI.—*Showing for different age periods the Phthisis Mortality in England and Wales during various terms of years since 1850 per 1,000,000 living* (*Dr. Tatham*).

Period.	All ages.	-5	5-	10-	15-	20-	25-	35-	45-	55-	65-	75-
1851-60	2679	1305	572	1025	2961	4181	4317	4091	3466	2840	1983	808
1861-70	2475	968	454	825	2651	3928	4243	4026	3340	2656	1603	539
1871-80	2116	767	358	664	2036	3117	3619	3745	3132	2449	1476	492
1881-85	1830	569	312	560	1695	2535	3154	3312	2849	2197	1362	490
1886-90	1635	502	271	488	1420	2144	2691	2985	2656	2150	1363	555
1891-95	1463	444	228	410	1253	1875	2342	2771	2440	1941	1147	440

APPENDIX B.

LIST OF WORKS, &c., CONSULTED OR REFERRED TO.

(*a*) *Statistical Reports, &c.*

Reports of the Commissioners in Lunacy (England), 1870-98; Scotland, 1872, 1888, 1894-98.
Reports of the Inspectors of Lunatics (Ireland), 1884-98.
Report of the Royal Commission on the Relation of Tuberculosis to Food Supply—Parts I and II. 1898.
Reports of the Asylums Committee of the London County Council, 1894-98.
Reports of the Hereford Asylum, 1874-75.
Reports of the Northampton County Asylum, 1880-98.
American Journal of Insanity, 1894, pp. 182-195.
Medical News of Philadelphia, 1895, pp. 357-359.
Journal of Mental Science, January, 1873, p. 554 ('Note on Reports of Scottish Commissioners').
Ibid., April, 1895 ('Insanity and Phthisis in Ireland').

CHALMERS, Dr. A. K.—*Practitioner*, June, 1898.
CLOUSTON, Dr.—*Journal of Mental Science*, 1863, and April, 1874, p. 16 *et seq.*; *Dict. of Psych. Med.* (article on 'Phthisis').
FARQUHARSON, Dr. —*Journal of Mental Science*, July, 1898.
RANSOME, Dr. A.—*Researches in Tuberculosis*, 1897.

(*b*) *Ætiology and Treatment of Phthisis.*

CRICHTON BROWNE, Sir J.—*Brain*, 1892.
BREHMER.—*Die Therapie der Chronischen Lungenschronidsucht.*

Brit. Med. Journ.—'Reports on Sanatorium Treatment,' 1898.

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BURTON-FANNING, Dr.—'Sanatorium Treatment in England,' *Lancet*, March, 1898; *Practitioner*, June, 1898.

MACCORMAC, W.—*Consumption and the Air Re-breathed.*'

MACKENZIE, Dr. H.—'Treatment of Phthisis,' *Practitioner*, June, 1898.

PETIT, LÉON.—*Le Phthisique et son Traitement Hygiénique.*

POLLOCK, Dr.—'The Hospital Treatment of Consumption,' *Practitioner*, June, 1898.

RANSOME, Dr. A.—'Sanatorium Treatment,' *Brit. Med. Journ.*, July, 1898.

WALTERS, Dr. R.—'Sanatoria for Consumptives,' *Practitioner*, June, 1898.

WEBER, Dr. HERMANN.—*Practitioner*, June, 1898.

WILLIAMS, Dr. T.—'Sanatorium Treatment of Tuberculosis,' *Brit. Med. Journ.*, July, 1898; *Pulmonary Consumption.*

CROOKSHANK, F. GRAHAM.—'Treatment of Phthisis,' *Clin. Journ.*, December, 1897.

Relation of Syphilis to Insanity. A Discussion opened by F. W. MOTT, M.D., F.R.S., Pathologist to the Asylums of the London County Council.

Dr. MOTT.—Before I was intimately associated with lunacy I was astonished to find in my hospital experience that nervous diseases were so frequently due to syphilis. I therefore adopted the treatment of giving mercury and iodide in all doubtful cases. In regard to general paralysis, I agree at first with those authorities which believe that syphilis had little to do with it; but careful examination of the patients and post-mortem investigations convinced me that syphilis plays an important *rôle* in this disease.

In studying the relation of syphilis to mental diseases one has to consider the various ways in which the syphilitic poison may act, also to arrive at some conclusion as to what proportion of the male adult population is infected. This is, however, a difficult matter in England, but not so in those countries where everybody who suffers with this disease comes into one general State hospital; for example, in Scandinavian countries a record of all cases is kept, and when a patient comes again