PULMONARY TUBERCULOSIS IN CHILDREN.*

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I HOLD the view that phthisis is one of the most common diseases of childhood, and that among those who die of it at the ages when it causes the highest mortality, the majority have contracted and suffered from the disease in childhood—that is, during the first fifteen years of life.

I am aware that eminent men have frequently and recently expressed opposite views. I know that to venture to express my views is to be called an alarmist; but I consider that in order to abolish the high phthisis death-rate in early adult life it is absolutely essential to admit that the disease has existed in a recognizable condition for years, and, during these years, has been in the highest degree amenable to treatment.

Death and Morbidity Statistics.

Various figures are given as to the number of persons found at autopsies to have tuberculous lesions in the lungs.¹

Death Statistics, London, 1905.

Estimates vary from 27 to 75 per cent. Let nearly the lowest—30 per cent.—be taken.² In 1905 the phthisis death-rate in London was 0.142 per cent. of persons living.

- Therefore for every 0.142 persons dying of phthisis, 30 suffer from it. This ratio probably holds also for children, and if not, it is too low. The number of children dying of phthisis in London in 1905 at ages 5 to 15 was 176.³
- Therefore the estimated number of children dying of phthisis in London in 1905 at ages 5 to 13 was 92.
- From (a) and (b) we find that the number suffering from phthisis corresponding to the 142 dying of it = $30 \times \frac{142}{0.142} = 30,000$.
- Number of children aged 5 to 13 in London = 694,774. From (c) and (d) we find that among 694,774 children the number suffering from phthisis = 30,000.

Results of Medical Inspection, London, 1905.

- The number of children on the rolls in the London schools examined was 165,915. Therefore the probable number suffering from phthisis among these was $\frac{30,000}{694,774} \times 165,915 = [\log. 30,000 + \log. 165,915 - \log. 694,774] = 7.164$ —that is, it is probable there were, roughly, 7,164 children suffering from phthisis in the schools examined, and from (b) and (c) the number of deaths from phthisis = $\frac{142}{694,774} \times 165,915 = 34$ (approximately).

In the report of this year, 1905, there is no record of the finding of any cases of phthisis, though we have seen that it is probable some 7,000 children were suffering from it in the schools examined.

Death Statistics, London, 1906.

The alteration in percentage death-rate from phthisis in London between 1905 and 1906 was 0.002.⁴ The number of deaths from phthisis between 5 and 15 was (74 + 82) 156, instead of 176 in 1905.⁵ Considering the ages 5 to 13, this number would be 123. Hence there was no material alteration in the number of deaths.

Results of Medical Inspection, London, 1906.

In the schools examined this year there were on the rolls 208,874 children, and there was again no record of cases of phthisis.⁶

In an examination undertaken in a few schools with special reference to phthisis, a few cases were recorded, reaching the percentage of 0.5.⁷

But if 123, according to the Medical Officer of Health for London's returns for 1906, died of phthisis among the 694,774 children in London, there must have been, roughly, 36 school children who died of it, and some 7,605 children suffering from it, among the schools examined.

These calculations are based on nearly the lowest set of figures obtainable. We can only suppose that these 7,000 children were all suffering from it in a so-called latent stage; or, in plain language, in a stage not sufficiently advanced for those particular observers to detect it.

We are thus met at the outset with a startling fact. Some 200,000 children were on the rolls in the schools examined, and were inspected by certain members of the staff of twenty-five doctors. It is true that the examinations were not as systematic as is demanded now, but a fair number were cases of delicate children picked out by the teacher, or the doctor, for ill health,

* Read in part before the Worcestershire and Herefordshire Branch of the British Medical Association, and in part before the Association of Registered Medical Women, London.

and hence were more likely to have been suffering from phthisis than if the work had been purely routine—that is, only among non-selected cases. It has been contended that there were no cases of phthisis in those schools because they had been drafted into the "invalid schools." There is no record in 1905 of such a drafting in the report of those invalid schools; and if they had been so drafted there would have been some mention of the examinations in the ordinary schools, when the fact that they suffered from phthisis was detected. According to the figures I have just given it is obvious that there *must* have been children examined in every stage of phthisis, except the late stages, and that the examining doctors failed to detect the disease. What happened in London is sure to have happened elsewhere.

In a leader on the subject in the BRITISH MEDICAL JOURNAL of February 9th, 1907, is the following passage:

It is a curious fact that no cases of pulmonary tuberculosis, or of predisposition to pulmonary tuberculosis, are noted in the London elementary schools. In France a large number of children, ranging from 2 years to the end of school age, are received into sanatoriums for children, either predisposed to or suffering acutely from tuberculosis. How is it, then, that in England, where such a large number of deaths occur from phthisis, no notice is taken of the disease until after school age? It is in the highest degree improbable that the true condition here differs so essentially from that existing in France, and a careful inquiry into the matter would be of the very greatest interest.

In 1906⁸ the presence of sixteen phthisical children is reported in the invalid schools.⁹

Dr. Newsholme quotes the following figures as obtained by various observers to indicate the amount of phthisis in our school children.¹⁰

	Number of Children Examined.	Percentage with Phthisis.
Drs. Lecky and Horton (Brighton)	806	0.37
Dr. Mackenzie (Edinburgh)	600	2.3
C. O. S. (Edinburgh)	1,318	1.4
Professor Hay (Aberdeen)	600	0.5

Dr. Greenwood, in Blackburn, among 1,028 children, gives 6.7 per cent.¹¹

The late Dr. Grancher, of Paris, in a most careful paper on the subject, found the percentage among 4,226 children to be 15.¹²

Dr. Hyslop Thomson reports from Glasgow that among 779 patients seen for chest complaints in hospital there were 43 children under 16 with phthisis.

Proportion of Tuberculosis Found Post Mortem in Children Dying of Various Diseases.

With tuberculous lesions in any organ, Harbitz¹³ of Christiania, among children under 15, found 42.5 per cent.

Comby,¹⁴ of Paris, gives for children aged 2 to 10, the percentage 67, and for the ages 10 to 16 the percentage 64.

Nägeli,¹⁵ of Zurich, has furnished a series of figures, which are frequently quoted. For children under 18 his series gives a percentage of 17. But he explains that this figure is much too low, as for various administrative reasons children with tuberculosis are commonly refused admission to the hospital at which the necropsies were made.

The most complete table I have been able to obtain is that drawn up by Hamburger and Sluka,¹⁶ who give their own results and also the figures obtained by other observers. A most careful bibliography is given at the end of the paper.

Author.	Age of Children.	Number of Necropsies	Number of Tuberculous.	Tuberculous per cent.
Müller	0-15	500	209	46
Baginsky	?	806	144	18
Orth	0-15	418	47	11
Nägeli	0-15	88	15	17
Burchhardt	0-15	190	72	40
Ancell	0-15	154	42	28
Hamburger and Sluka ...	0-14	401	160	40

Further information is given for special ages (1) by Müller,¹⁷ (2) by the authors:

Age.	Number found Tuberculous.	
	1. Per cent.	2. Per cent.
5-6	50	60
7-10	40	64
11-14	75	77

Hamburger and Sluka¹⁸ also state that among 100 children dying in a hospital in Vienna, of various diseases, 40 had tuberculosis, recognizable by macroscopic examination. This number would, of course, be much higher if microscopic examination had been made. These Austrian figures probably fairly represent English ones—for it has been shown that the death-rate in London was 142 per million, while for Austria in 1901 it was 144.¹⁹

Ganghofner²⁰ has given figures for 1,800 autopsies on children who during life had not been recognized as suffering from tuberculosis:

271 deaths, ages 4-6, percentage with tubercle = 26.9.
123 deaths, ages 6-8, percentage with tubercle = 26.8.

It is very difficult to obtain figures as to the numbers in whom tubercle was found in the lungs, and we can only consider approximate figures.

Hamburger²¹ gives 63 cases of pulmonary tuberculosis in 160 cases of tuberculosis. Nägeli states that of his cases nine-fifteenths showed lesions in the lungs.

Dr. Newsholme²² estimates that among deaths due to tuberculosis the proportion due to phthisis is 69.5 per cent. Professor Osler²³ quotes Müller to the effect that, in children, the lungs are involved in 92 per cent. of tuberculous infection. This was the percentage at autopsies at the Munich Pathological Institute.

We may note here that Baginsky, in 933 autopsies in children with tuberculosis, could find no case in which the lungs only were infected, indicating that primary lung tuberculosis is rare in children.²⁴

We thus see that statistics from autopsies support the contention that tuberculosis of the lungs is a common disease in children.

There is a serious discrepancy between the figures for tubercle of the lungs in the dead, and the highest figure we have been able to find for recorded English observations in the living, that given by Dr. Greenwood, 6.7 per cent. Apparently observers class the undiscovered cases as "latent," but I can hardly believe we are willing to admit we cannot do something better at diagnosis than this.

Probable Age of Infection.

Professor Behring has said: "The bacilli which gain access to the alimentary tract in infancy constitute the important etiological factor in the production of the tuberculous infection which leads to consumption."²⁵ With this statement I agree, and I believe that the great majority of the cases of consumption, especially those who die between 15 and 35, were infected in early childhood, and have had tuberculous lesions in the lungs for periods varying from five to twenty years.

In a recent most able paper read by Dr. Newsholme before the Epidemiological Society, he altogether differs from Professor Behring, and in support of his view he adduces statistics relating to the ratio between deaths from phthisis and the infantile mortality in various countries.

His argument is that tuberculous infection from cow's milk must take place mainly in those districts or countries where the greatest amount of artificial feeding takes place. This appears reasonable, except in so far as we need not limit the period of probable infection to the first year of life; I would extend it in a lessening rate through the years of childhood. The best gauge of the amount of artificial feeding is admittedly the infantile mortality-rate. So far, in the main, I agree. But then, Dr. Newsholme continues, if the liability to the infection and the infant mortality are both greatest under the same circumstances—that is, when there is much artificial feeding—then the infant mortality-rate and the phthisis-

rate should show a definite correspondence in the various towns and countries. But he states "there is an utter absence of correspondence," and in support of this statement he gives statistics. Hence he deduces that Professor Behring's theory of the frequency of infantile tuberculous infection is in the highest degree improbable.

I disagree entirely with this deduction. If the infantile mortality is high, that means that a large number of the children infected with tuberculosis by cow's milk die in early infancy. Probably the majority of those seriously infected die. These deaths will be certified as due to every disease of which babies may die, and will not materially raise the phthisis-rate.

Surely it is obvious that, according to this view, there will be left, in such areas, a much smaller proportion of children than usual with tuberculous infection, and hence a high infantile mortality will produce a low phthisis death-rate. And this view is confirmed by the actual statistics given by Dr. Newsholme.²⁶

	Phthisis-Rate.	Infantile Mortality-Rate.
England and Wales ...	1.23	139
Belgium	1.25	147
Scotland	1.53	123
Ireland	2.15	99
Norway	2.02	86
Sweden	2.92	96

Dr. Newsholme also argues against this view (that of frequent tubercle of the lungs in childhood), because the phthisis death-rate has declined greatly in the last forty years, and he states there has been no corresponding improvement in the condition of the dairies. This is not a very convincing argument; many of us think there is a very appreciable increase in the trouble taken to obtain germ-free milk. We still use milk which is a disgrace to civilization—but we used to use milk which was a disgrace to barbarism. We take a certain amount of care now in regard to the milk after it has left the hands of the milkers, and we sometimes endeavour to destroy the tubercle bacilli, though we still do little to prevent their obtaining entrance to the milk.

Now let us see whether my view finds support, or the reverse, from other statistics given by Dr. Newsholme²⁷—namely, the varying death-rates from phthisis for the two sexes at different age periods.

Ratio of Male to Female Death-rate at each Age Period. That of Females at each Age Period = 100.

Age Period.	Urban Counties.	Rural Counties.
0	117	117
5	58	46
15	107	92
25	134	121
35	160	131
45	224	166
55	241	163
65	223	164
All ages	150	116

The main fact is that in childhood, from 5 years to 15 in the towns and somewhat longer in the country, there is some factor which keeps the male phthisis death-rate below the female; and conversely, as the boy reaches manhood, there is some factor which causes the male phthisis death-rate to be higher than the female.

In early childhood, as babies, boys and girls are treated very much alike. As children there is a distinct difference. From 5 to 15 is the boy's "good time." His comfort is considered before his sister's, and he himself succeeds in assisting to maintain this desirable state of things. He is regarded as needing the best food, and out of school hours he is out of doors playing. The girl is all too frequently

indoors nursing the baby or helping in the house. If the boy and girl are both infected with pulmonary tuberculosis, which has the best chance of keeping in good health? The boy undoubtedly. Hence during boyhood the male phthisis death-rate will be lower than the female.

In the country this state of things will probably continue in the boy's favour longer than in the town, for, if the boy begin work at 12 or 13, in the country it will probably be out-of-door work. In the towns circumstances will be less in his favour, and this fact is borne out by the phthisis death-rate.

As the children reach adult life the factors in favour of the boy cease to operate; the male is the breadwinner, and the stress of work falls on him. Suppose, again, both the boy and girl infected; throughout his boyhood circumstances have been favourable to the boy, he has held his own in the fight against the bacilli. But once let such a boy be exposed to the stress of work, with the many influences so aptly described by Dr. Newsholme as "urbanization," and the apparently latent infection will take effect; the young man will succumb. No such immense change in circumstances takes place as a girl reaches womanhood, and hence the phthisis death-rate among the young women is then less than among the males.

The second factor operating to maintain this inequality is the larger number among the girls who have succumbed to tuberculous infection in childhood. A smaller number of infected are left alive in early adult life among the females than among the males.

Urbanization.

The discrepancy between the phthisis death-rate of men and women is much higher in the towns, and this is what one would expect, for the urbanization would have more effect on the men than women. But as the effects of urbanization would take some considerable time to act detrimentally, it is reasonable to consider that the effect would be greatest in later years, and hence would produce its chief effect on the death-rates at a period when our two previous factors have nearly ceased to act.

Methods of Tuberculous Infection.

A few years ago we believed that in infancy infection was by the alimentary tract, and that inhalation infection was unimportant. We believed that children suffered from tuberculosis mainly in the alimentary, glandular, and osseous symptoms. In regard to adults, the idea was that infection was mainly by inhalation, and that the phthisis, which causes the appalling death-rates from 15 onwards, was a disease originating in the lungs. So far as experimental evidence in animals went, there was nothing directly to contradict these views.

The most important points in recent work on this subject were very clearly recorded, with most careful references, by Sir William Whitla in the *BRITISH MEDICAL JOURNAL* of July 11th, 1908. He considers that the following points are proved:

1. That the bovine type of bacilli is found in human tubercle, the great majority occurring in intestinal or mesenteric disease.
2. That the bacilli can pass through the mesenteric glands without leaving any trace, thus disproving the widely accepted belief that, if no abdominal lesions are found in cases of phthisis, it is proof that infection was not via the alimentary tract.

Hence we cannot accept figures, such as Dr. Still's, based on the older theory.

3. "That in the immense majority of cases tuberculosis is not contracted by inhalation, but by the ingestion of bacilli or bacilliferous products by way of the intestinal mucosa." (Calmette.)

No one who has read the paper alluded to can doubt that, very shortly, this last contention will be an axiom.

The common route of infection appears to be the intestinal mucosa—not the stomach—by way of the lacteals or lymphatics to the mesenteric glands, thence (either free or in phagocytes) into the thoracic duct, to the venous circulation, and thence to the lungs. The deep cervical glands share in this infection, and this is of importance as explaining some of the cases of cervical adenitis in which no local lesion can be detected, and as suggesting that in many cases, when there are tuberculous glands in the neck, their infection is a later event than that of the lungs, and has occurred by the same route.

As bearing on this question as to when the disease is acquired, I may quote the opinion of the Royal Commission of 1894, that: "No doubt the largest part of the tuberculosis which man obtains through his food is by means of milk containing tuberculous matter." And Dr. S. Martin says "that the milk of cows with tubercle of the udder preserves a virulence which can only be described as extraordinary."

The work reported by Sir William Whitla indicates that the chief track of tubercle infection is by the alimentary system. The commissioners insist that milk is the most common article of infected food. Undoubtedly milk is more used as a food by children than by adults, and hence this line of reasoning leads back to my original contention—that the greater part of the phthisis existing in adults starts in young children. Further, von Behring, and also more recent observers, have shown that the greatest permeability of the intestinal mucosa exists in early childhood, and, hence, that it is at this period that tuberculous infection of the lung is most liable to take place.

It is no doubt probable that a certain amount of infective material is first inhaled into the mouth and pharynx and then swallowed. This source of infection is open to children and adults alike, with again, however, a reservation in favour of its more common action in childhood, for the reason that it is in childhood that we find the greatest amount of mouth breathing, and in early childhood that we find the greatest tendency to place in the mouth articles other than food which may have become infected with tuberculous dust.

Dr. Newsholme puts forward the view that segregation of consumptives, particularly of the advanced cases, has been the most important item in the various changes which have brought about a decrease in the death-rate from phthisis.

I venture to suggest another change which has worked in the same direction—namely, since the beginning of compulsory education, the taking of the children out of their homes, for five hours a day, into the schools. The homes are the places where the most infection must exist for they are the places where the last stages of a consumptive's life are passed. In school there are rarely cases of advanced consumption.

But, though the present conditions are an improvement much may still be done in the same direction. There are phthisical children in school and phthisical teachers, and whenever these have coughs they may be a source of danger. Dr. Tatham has found a specially high phthisis-rate among teachers. Heyman²⁸ has shown that in coughing tubercle bacilli are given off, and were collected by him on Petri dishes in 70 per cent. of the experiments. Cadéac²⁹ has shown that the bacilli contained in these "droplets" of phthisis sputum are highly virulent. And, though we may not consider there is much danger of their being inhaled directly into the lungs, yet it is undoubtedly possible that the other method of infection mentioned may occur. Hence it is important that all phthisical children who cough in the day time should be excluded from school. In Denmark no teacher is admitted to the elementary schools without a thorough examination to exclude phthisis, and this is an excellent example for us.

Dr. Bulstrode, in his *Report on Sanatoria*, states that there is one subject on which opinion and evidence are alike—namely, the overwhelming importance of the early diagnosis of the disease, and he quotes Dr. Latham, "That the early diagnosis of pulmonary consumption is a question of supreme importance, perhaps the most important which the physician has to face." Again and again the point is urged that the patients in the sanatoriums die because they are sent too late. Hence we are brought back to the importance of the question as to what extent phthisis exists in children.

I am aware that there is a certain number of physicians who say that they will not admit any case to be phthisis until and unless they find bacilli. I have so little sympathy with such a death-dealing view that I can only quote the words of a man whose authority most will acknowledge. Professor Grancher said:

To wait for the presence of tubercle bacilli—that is to say, to wait for the presence of cavities in the lung—is to do an immense injury to the patient, to render incurable or very difficult of cure a tuberculous infection which would have been curable in an earlier stage.

I well remember the two cases, both of close personal friends, which impressed this view upon myself. In the one case we hunted twenty-one times for the bacilli, over a period of two years, before we found them, and then the disease had advanced so far it required years to arrest it; and in the other case we examined twenty-seven specimens, and only demonstrated the disease to an unbelieving family doctor at a stage when it had become hopeless.

There is a widespread belief concerning phthisis which is extremely mischievous—that it is a disease which tends to a fatal termination in a period of less than five years. It is an extremely chronic disease, frequently starting and recognizable in childhood, and tending in the majority of cases to recovery.

Dr. Newsholme, to a certain extent, admits this view, for he says that “in notified cases of phthisis the infection very commonly dates back ten to twenty or even more years.” If this statement only applies to the elderly among his phthisis cases, it has no bearing on my point. But if he admits the same statement for cases which are notified at ages of 20 to 30, then it would point to the infection having occurred in childhood.

So far I have tried to consider how far evidence, from widely different sources, supports the view I have put before you. Now, only shortly, I venture to lay before you my own experience on the subject. I started examining school children with two ideas on this subject:

1. That most authorities reported that phthisis is very rare among school children, but did not produce any statistics by men whom I could ascertain to have had special experience in diagnosing the disease in adults.

2. That over and over again while living abroad at phthisis stations, patients used to come to me, too late for cure, stating that they had been under their own doctor for years, and that they had started abroad directly he admitted that they had phthisis.

Gradually it began to dawn on me that there was some connexion between these two ideas. Then came the London statistics, a record of work in London among children, which contained no mention of cases of early phthisis, while the mortality returns showed that they must exist in large numbers. I began to consider whether the statements as to the infrequency of phthisis among school children was due, not to its rarity, but to the rarity of doctors who diagnose it.

When we want an opinion on a case of eye disease we consult an oculist. So with various other specialities, and I believe that the diagnosis of early phthisis is just as specialized a work. The cases of early phthisis do not commonly attend the hospitals complaining of lung symptoms, but of a hundred other trivial ailments. The temporary weakness is treated and the lungs are not examined. Hence students leave hospital with an idea of phthisis gathered from the advanced cases in the wards. Naturally we fail to detect cases early, and say we are not sure until we find bacilli.

The figures I have obtained from the children I have examined are, I believe, still too low (see table).

The most valuable figure I consider to be the percentage for the routine cases, town and country—namely, 14.3. The figure for all cases is somewhat higher, namely, 15.4 per cent., and for the selected cases is naturally still higher, namely, 17.9 per cent. In many cases the numbers dealt with are so low as to render the results almost valueless. My figure for all cases, 15.4 per cent., is almost the same as that given by Dr. Grancher.

I am told that some of my cases of phthisis are chronic bronchitis. Professor Osler says: “The frequency of bronchitis prior to recognized lung tubercle cannot be regarded as causative, rather it is symptomatic of existing tuberculosis.”⁸⁰ I think one difficulty has arisen from the fact that, so commonly, bronchitis is a symptom, and yet our textbooks classify it as a disease. I have studied four textbooks on this subject recently, and so far as the point is alluded to at all, it is evident that bronchitis is used to indicate the pathological condition, quite apart from the etiology; the result is that the bronchitis, which is a mere symptom of phthisis, is spoken of as if it were the main disease.

I believe that a chronic non-tuberculous bronchitis is rare between the ages of 5 and 50, unless due to heart disease, Bright's disease, or some other definite pathological entity, and is extremely rare in comparison with phthisis. Dr. Sutherland, in his recent book on *Treatment*

Table showing Results of Examination of Children in Town and Country Schools.

Routine means that the children were taken as they chanced to occur at the given age. *Selected* means that they were those picked out for some sign of ill-health, either by the teacher or myself. This group included many cases picked out only for defective eyesight, vermin, etc.

Routine or Selected.	Sex.	Age Period.	Number Examined.	Number with Phthisis.	Percentage with Phthisis.	Town or Country.
Routine ...	Male	3-6	41	3	7.3	Country.
"	"	12-14	97	17	17.5	
Selected ...	"	6-12	56	9	16.1	
Routine ...	Female	3-6	55	7	12.7	
"	"	12-14	244	28	11.5	Town.
Selected ...	"	6-12	139	21	15.1	
Routine ...	Male	3-6	55	4	7.3	
"	"	12-14	44	6	13.6	
Selected ...	"	6-12	29	5	17.2	Country.
Routine ...	Female	3-6	79	5	6.3	
"	"	12-14	315	63	20.0	
Selected ...	"	6-12	155	33	21.3	
All cases...	Male	All ages	194	29	14.9	Town.
"	"	"	128	15	11.7	Country.
"	Female	"	438	56	12.8	Town.
"	"	"	549	101	18.4	Country.
All cases...	Both sexes	All ages	632	85	13.4	Town.
"	"	"	677	116	17.1	Country.
All cases...	Both sexes	All ages	1,309	201	15.4	Town and country.
Routine ...	Both sexes	{ 3-6 } { 12-14 }	437	55	12.6	Town.
"	"	"	493	78	15.8	Country.
Routine ...	Both sexes	{ 3-6 } { 12-14 }	930	133	14.3	Town and country.
Selected ...	Both sexes	6-12	195	30	15.4	Town.
"	"	"	184	38	20.7	Country.
Selected ...	Both sexes	6-12	379	68	17.9	Town and country.

of Diseases in Children, does not give a chapter to “chronic bronchitis”; apparently he agrees that it is a disease of the aged. He regards an intermittent bronchitis as a common complication of fibroid phthisis; he speaks of the chronic bronchitis of young children due to rickets, but the usual chapter on chronic non-tuberculous bronchitis is absent.

A child with tuberculous infection in the lungs is by no means necessarily what people mean by “consumptive.” In the majority of cases I believe the disease tends naturally to cure, and that, when this is not so, it is on account of one of the following reasons:

1. That the child started life with a hereditary predisposition to the disease, which must be counteracted by special treatment.
2. That the child has been subjected, or is continually being subjected, to so severe an infection that its vital forces are beaten at the outset.
3. That the circumstances of its life are unfavourable.

These three possibilities render it imperative that we should find out which children are already infected, in order that we may counteract any hereditary tendency and alter any adverse circumstances.

Phthisis is not a disease which requires combating chiefly on account of its fatal tendencies, but because it is a disease creating our army of “ineffectives,” the people

who are prevented by chronic ill-health from doing effective work. Again, it is a disease to be fought because so many of our children with the best brains are attacked by it. If ever a teacher says to me that such and such a boy is the sharpest in the school, I always notice the lungs with extra care.

Early Symptoms and Signs.

The following remarks do not refer to cases in an advanced stage, children definitely ill, nor need I allude to the classical types of the tuberculous.

Night sweating is a symptom concerning which one of my colleagues has no faith. He says that they all say they sweat. That seems to me only saying that "all men are liars," and needs qualification. There are certain distinctions to be made:

1. If the sweating has existed all the child's life, it is probable the original cause was rickets. If it has started recently, or has existed in infancy, stopped, and started again, it has weight.
2. If the sweating is not constant, but occurs from time to time, whenever the child catches cold (of course excluding the results of hot drinks at night).
3. The sweating must be on the forehead or round the neck. It may be elsewhere as well, but, if the forehead is always dry, I am sceptical.
4. The sweating must be worse in cold weather.
5. Must not be due to heavy bedclothes.

If these five conditions are present, sweating at night in children over 5 is mainly due to tuberculosis.

Morning Anorexia.—The second symptom of importance is eating no breakfast. You doubtless remember the eminent man (was it Sir A. Clark?) who said that if a man over 40 ate a good breakfast he would pass him for life insurance. There are few children with active phthisis who willingly and regularly eat a good breakfast.

Fatigue.—The third symptom is that they tire easily. They may forget the tiredness in excitement, but, if so, they collapse afterwards. Many of my cases of phthisis reach home from school so tired they promptly go to sleep.

Other Symptoms.—Other symptoms are legion. Children with early phthisis are constantly catching cold, have headaches, etc. Cough is a matter of chance, the majority of early cases do not cough in the daytime, hence are not dangerous to others. One symptom, which can only be discovered in a fairly intelligent patient, is pain, pain quite apart from pleurisy, occurring early, over a small lung area. It is a feeling of soreness or dull ache, and appears to indicate inflammation commencing in a new focus.

Loss of weight is most important. We are having our children suspected of phthisis weighed monthly.

Temperature.—I often find a rise even in the morning; but rarely in the fibroid cases.

Auscultatory.—In examining the chest, most of us have some special sign on which we lay weight. Professor Grancher laid great stress on any change in the character of the inspiration as indicating a tuberculous focus. I confess that I have tried, in vain, to feel any certainty in regard to this point. The chief point that I generally try to make out is whether there is any area which sounds unlike the rest; the place of difficulty to me is the right apex, as it is not easy to determine variations from the normal at this spot. Two of the doctors who carried out part of the special work in the London schools speak of certain changes they find as indicating an atelectatic condition of lung. These changes are patchy dullness, tubular breathing, and crepitations. I do not believe such a condition exists beyond infancy, except as a pathological curiosity, and in this view I have the support of Professor Osler.²¹ It is common to hear that such and such a sign, such as crepitations at one apex, have no significance, because on the next examination they have cleared up. If there is one thing certain about crepitations due to early phthisis, it is that they may be present one day and not a week later.

THE NATIONAL BALANCE SHEET.

Dr. Newsholme, in his *Prevention of Consumption*, gives most valuable figures. He states that there are 60,000 deaths annually, as well as a heavy financial loss to the country, from phthisis. From the male deaths he estimates that the loss to England and Wales is not far from ten million pounds annually, and that the loss from sickness, or what I have spoken of as the non-efficient workers,

comes to one-fifth of the total loss from sickness, and costs one friendly society alone at least half a million sterling in a year.

It is also stated that one-eleventh of the total cost of pauperism in England and Wales is caused by consumption.

This year the country has a unique opportunity to initiate steps to end this fearful loss of lives and money. Whether or no we consider it is easy to diagnose phthisis in children, every one agrees it is important to do it, and also that it is particularly difficult to diagnose in what Dr. Newsholme calls the "latent stage." But in all the demands made by the various education authorities in regard to the qualifications of their medical officers, I have not seen one which has demanded special skill in this branch of work.

And yet this is the disease which takes infinitely the heaviest toll in men and money; and if we are to stamp it out the cheapest time to do it is in childhood, before the sufferer becomes a bread-winner, and while the disease is in an early stage. Dr. Newsholme urges various steps to improve the present appalling state of affairs. First and foremost, I would suggest that the utmost care should be taken to ensure careful examination of the lungs by competent doctors, under the new scheme of medical inspection of children—and that any idea that it is possible to decide by looking at a child whether he needs "inspection" or examination (which is the present idea of the Board of Education) should be absolutely negated. And then, so soon as we know roughly the number of cases of early phthisis we have to cure, let these children be drafted into open-air schools and cured while cure is easy and inexpensive.

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IODINE IN SURGICAL TUBERCULOUS DISEASE.

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ONE of the most common diseases with which we are confronted in China (as probably also in other countries) is tuberculous disease of joints, bones, glands and skin.

Last summer we had a special number of tuberculous joint cases which either occupied our beds or attended the out-patient department for change of dressing, and it occurred to us to try iodine liniment.

The first case which we seriously undertook to treat by this method was that of a lad with tuberculous disease of the right elbow. As usual, a native doctor had acupuncture the swollen member. Having a poisoned hand myself, I asked my colleague to operate. He excised the joint and removed every vestige of disease. Every possible care and precaution was exercised to secure a good result. After a few weeks, with the usual treatment of iodoform dressings, the condition of the elbow was, as the experience of similar cases had proved us to expect it would be, that it was healed to a certain degree, but with several sinuses persisting. We again put the lad under chloroform and thoroughly scraped the sinuses from which pus was freely discharging. Then we thoroughly swabbed the sinuses with iodine liniment, we did not put in any drainage, but dressed with gauze and wool, replacing the arm upon an angular splint. Two days afterwards we removed the dressings and to our surprise there was not a particle of discharge. Every day after we swabbed the sinuses with iodine liniment, and they healed as though they had been