**Address by Dr. Ralph Vincent on "Production of pure milk and its value as a food for infants" : conference of representatives of public bodies and others interested in the supply of pure milk, held in the Council Chamber of the Bradford Town Hall, on Tuesday, May 21st, 1912. Councillor E.J. Smith, chairman of the Health Committee of the Bradford Corporation in the Chair.**

City of Bradford.

# CONFERENCE

ON

# Production of Pure Milk and its Value as a Food for Infants.

1912.

# CONFERENCE

OF

REPRESENTATIVES OF PUBLIC BODIES AND OTHERS INTERESTED IN THE SUPPLY OF PURE MILK,

HELD IN THE

**Council Chamber of the Bradford Town Hall,**

On TUESDAY, MAY 21st, 1912,

COUNCILLOR E. J. SMITH,

Chairman of the Health Committee of the Bradford Corporation, in the Chair.

---

ADDRESS BY

DR. RALPH VINCENT

ON

**"Production of Pure Milk and its Value as a Food for Infants."**

T.T. 80—750 (44).

# CONFERENCE

## OF

## REPRESENTATIVES OF PUBLIC BODIES

## AND OTHERS INTERESTED IN THE

## SUPPLY OF PURE MILK.

---

THE LORD MAYOR (Alderman J. B. Moorhouse): As Lord Mayor of the City of Bradford, I give you a hearty welcome here to-day to meet Dr. Ralph Vincent. Dr. Vincent is, as some of you know, the Physician of the Infants' Hospital in London, and is a recognised authority on the production of pure milk. The Hospital is an institution devoted to the care of infants suffering from wasting diseases. They are treated with pure milk, produced under the direction of Dr. Vincent, at the farm of Mr. Robert Mond, at Sevenoaks. The treatment has proved in every way satisfactory, and many who on admission have been extremely emaciated, have greatly improved afterwards, increased in weight, and been restored to health. The Health Committee have recently investigated modern methods in use in the production of a pure milk supply, and are convinced that a great improvement in purity can be effected by greater attention to cleanliness on the part of the producer. The Committee believe that the public do not fully appreciate the advantages of pure milk, and are anxious that its advantages shall be thoroughly understood. As you know, it is an asset for England if you can only keep infants from dying off so quickly as they have done during the past few years. I am sure it is one of the best assets England can possess. I know you are all anxious to hear what Dr. Vincent has to say, and to see what he has to show on the screen, so I will ask Mr. E. J. Smith to take the chair and I will take my seat amongst you as a delegate from the Bradford Royal Infirmary.

Mr. E. J. SMITH : My Lord Mayor, Ladies and Gentlemen. The presence here to-day of Dr. Vincent—probably the greatest authority in this country on a pure milk supply—is one of the best possible proofs that in the highest type of citizen there is still a deep mine of public-spirit and disinterested endeavour. He has come to place at our disposal the results of his specialised knowledge and experience, while the Health Committee of this Corporation are already under a considerable debt of gratitude to him in other directions. One outcome of the declining birth rate is to put a new standard of value on infant life and to help us to realise the necessity for its protection. We have reached a period in our history when an increasing proportion of our children are coming from the poorest stock, into the worst conditions, and are being artificially fed ; indeed, slums are becoming the important centres in great cities, and it is to them that public effort must be increasingly directed if the best results are to be secured. In this respect Bradford has already done much through its women inspectors, and hopes to do more by the aid of Dr. Helen Campbell, who is to take charge of our infant consultations. The significant fact which emerges from such work as we have already done is to indicate how much greater the saving of child life might be if we were but willing to spend the necessary money upon it. The great motto of all public health authorities in the future must be " prevention, not cure," and in the meantime, where cure has to undertake the work that prevention ought to have avoided, it should be done as speedily and thoroughly as it would be if it were in your homes or in mine. To sacrifice public good for private gain is to put money before life, and is not only unworthy but fatal to national wellbeing, while those who put obstacles either in the way of the preservation of infant life or a pure milk supply are, however unwittingly, enemies of the most helpless and dependent section of the community. Fortunately the social conscience is becoming increasingly sensitive and alert, and as that progresses we shall cease to begin where we ought to leave off, and decline to put on the roof before we have laid the foundations.

Dr. RALPH VINCENT : My Lord Mayor, Mr. Chairman, Ladies and Gentlemen. The subject that we have to discuss this afternoon is that fundamental question underlying the continued

existence of this country as a first-class power. During a comparatively few years a situation has developed which threatens the health and well-being of the country so severely and so extensively that, unless we can find an adequate remedy for the situation, we must sink to the level of a comparatively inferior power. The secret of what has been happening is to be found in those conditions which are summarised, and only summarised, in the two words, "Infant Mortality." Allow me to ask your consideration, for a few minutes, of the chief factors in relation to this extraordinary mortality amongst infants under twelve months of age. Let us remove from our minds any idea that this extensive mortality has anything whatever to do with the elimination of the unfit. The infant of the strongest and most vigorous constitution has certain absolute requirements in regard to the food it receives, and if those requirements are not met, it must suffer and may die by reason of the absence of those conditions which are essential for the maintenance of health and life. The great tragedy in this country to-day is not that a certain number of weak infants are born in very poor condition; it is that infants who are born in a condition of absolute health and vigour have disappeared before attaining twelve months of age. To summarise these factors very briefly, let me remind you that all the results of congenital disease and defect are more than represented in the deaths occurring within the first few weeks after birth. Of the babies who die within the first three months, you may take it that there are a number not in a fit condition to survive, but a good many are included who ought to survive. If you take the number who die under three months, you will certainly have a full representation, more than a full representation, of the number of deaths that can be attributed to conditions at birth. It is, therefore, of the first importance to consider the deaths over three months, that is, between three months and twelve months. The nature of the problem is well stated by Sir George Newman, in his work on infant mortality:—

> "The first broad fact of importance with regard to this problem—indeed the fact which creates the problem—is that though the general death rate is decreasing, the infant mortality rate is not declining. Indeed, in many places, it appears that infants die in greater numbers and more

> readily than in the past. About a quarter of the total deaths is of infants under the age of twelve months, and this enormous sacrifice of human life is being repeated year by year and is not growing less."

I would concentrate your attention on those words—*not declining —not growing less.* Do we appreciate their full meaning? Within the last century striking progress has been made in regard to general sanitation. Our country is famous the world over for its pioneer work in regard to sanitation as applied to all the great problems of public health. And what are the results? All of you know that there has been throughout the country an enormous improvement Year by year the general death-rate has diminished. Filth diseases which were common less than a hundred years ago are now practically unknown

These great sanitary advances have affected all classes and all sections of the population—babies included. In every other section of the community, save babies, there has been an enormous decrease in the death-rate; there has been none amongst babies. If you consider for a moment what this means, you will come to the explanation. There must have been introduced into the conditions of infant life factors which were not present before, but which are so adverse that they have completely neutralised and more than neutralised all other elements tending to favour and alleviate the conditions of infant life. That, I repeat, is the logical conclusion to which we are forced when we consider the general improvement that has taken place. As a matter of fact, there is no doubt whatever that within the last fifty years the severity of the conditions of infant life has been greatly increased and two diseases have been introduced which, fifty or sixty years ago, did not exist.

About the year 1870 boiled milk, patent foods, condensed foods, and the like, came into being. Before that time they were practically unknown. At about the same time a very strange disease began to be seen in babies, and it puzzled the most accomplished physicians. It baffled the most distinguished surgeons, and the late Sir Thomas Smith operated on quite a number of cases under the impression that he was dealing with a form of malignant disease.

The disease of which I speak—Scorbutus, or Infantile Scurvy—is charactised by a variety of symptoms, the most striking being *hæmorrhage*, occurring in the internal organs, underneath the lining membrane of the bones and in a variety of situations. The late Dr. Cheadle was one of the first to draw attention to the condition, while Dr. Barlow—now Sir Thomas Barlow, President of the Royal College of Physicians—demonstrated the cause and nature of the disease. His researches so completely demonstrated the essential nature of the disease that in Germany it is generally known as "Barlow's disease." The cause of this disease is *cookcd food*. An infant fed on fresh milk never developes scorbutus. This disease—Scurvy—was known all over the world as that from which sailors, who had been deprived for long periods of fresh food, suffered. Naturally, in babies, the manifestations were somewhat different, but in essential characters the disease was absolutely the same. So there is no question whatever that, at least, one disease of a most striking character occurred amongst infants in the middle of the nineteenth century which had not been known before in the history of the world. This is not the only disease which has come into existence amongst infants within the comparatively recent period of which I am speaking. Sir George Newman writes :—

> "Diarrhœa, which formerly caused the death of ten per cent. of dead infants, has increased in half a century to fifteen per cent., respiratory diseases have risen from 16 to 18 per cent., and prematurity from 17 to 19 per cent. Other children's diseases are vanishing, or have vanished. There has been a vast improvement in the general environment surrounding their lives, but the problem of infantile mortality still remains because of the increase of the diseases of prematurity, pneumonia, and diarrhœa."

I think, Mr. Chairman, that with these facts before us, we may pause before we congratulate ourselves on the progress of modern science, or flatter ourselves on the very great advantages of Christian civilisation. There has been no time in the history of this country in which the most helpless have received so little help, for they have been actually deprived of their natural defence against disease. I pass now from considerations of mortality to consider

what happens to those who do not die. It is a strange battle in which you find a large number killed and but few wounded. You know perfectly well that the number of wounded is far greater as a rule than the number killed outright. For the list of the wounded, look around you. The amount of disease in the children of this town, in London, and throughout the country is appalling. It is a national disgrace. It means national decay.

What is it that has caused this condition of infants and children ? Consider the enormous amount of rickets. Consider the prevalence of tuberculosis—a disease which is largely a consequence of rickets. The poor children surrounding us are museums of disease. We may give the diseases from which they suffer many names, but their great cause is malnutrition in infancy and early childhood. They are only expressions of one and the same thing, and of the fact that we have failed utterly to attend to the requirements of the infant population. Let me quote from the investigation made by Dr. Hall, in Leeds, a few years ago. He examined 2,335 Board School children and found more than one-half suffering from rickets. That is the state of affairs we have to face. We have to face more and more the consequences of the neglect of infants, the neglect of their essential requirements, and the hordes of children growing up suffering from all kinds of diseases and defects, a misery to themselves and a standing charge upon the public purse from the time they are born to the time they die.

Now, for all these conditions there is a somewhat plausible and popular explanation at the present time. They are due, we are told, to the ignorance of mothers. Well, I have written a good deal on the subject of infants in the course of the past few years, and I am proud to say that in those writings you will not find a single reference to the "ignorance of mothers." As a matter of fact, there was never such a parrot cry as this talk about the ignorance of mothers. The business of a mother is to feed her baby, if she can, at the breast ; if she cannot, she has to find some sort of substitute food. But I am quite unable to understand how it is to be supposed that because a substitute food is required for the baby, the wife of a labourer should be expected to know the composition of the substitute food.

We have to deal with a large out-patient department at the Infants' Hospital, London. We have babies coming to us from a radius of ten miles. We are dealing with mothers of the poorest class, whose husbands earn very little money. I can only say that we are very well satisfied with them. They spend much time and care in carrying out the instructions; and, considering their income, they spend an amount of money on their babies which is astonishing. When the mothers receive instructions that are something like adequate, my impression is that they are only too pleased to carry them out. Let me tell you what happened in the out-patients' department of the hospital last year, in the hot summer. We are not able to trace all our cases. An out-patient department is a difficult department to deal with, from the point of view of tracing every baby. They are brought sometimes for a slight ailment and we do not see them again. But we took all the babies that we had on our books on June 1st. We took them again on October 1st. And, bear this in mind, all these mothers have to get the milk from the milk shops where they live. All we can give them is advice and instructions. The out-patients' department has nothing to do with the provision of food—the radius we cover puts that out of the question—and notwithstanding the epidemic of diarrhœa that was then raging, the mortality rate among the out-patient babies was four per cent. I think it is quite impossible for me to quote figures like that and at the same time to cast reflections on the mothers. Let me remind you that whatever advice they may have received at the hospital, these mothers only attended once a week. The people who were engaged day by day and week by week in carrying out the instructions were the mothers, and I am perfectly satisfied that the cause of the infantile mortality and the cause of the disease which exists among infants at the present time is not the mothers, but *you* and *me*—that is to say, it is the community generally that has failed, up to the present, to realise the situation and what it means.

The cause of this great infantile mortality is the absence of food for babies adequate for their requirements. The best food for babies in normal circumstances is mothers' milk, but that does not mean mothers' milk in any circumstances whatever.

The first thing we have to recognise to-day is that a large number of mothers cannot possibly provide the milk that is required for their infants. Let me ask your attention to the observations of Dr. Emmett Holt, one of the most distinguished physicians in America, in regard to babies and breast feeding :—

> " In New York, at least three children out of every four born into the homes of the well-to-do class must be fed at some other font than the maternal breast. The percentage of successful maternal nursing is steadily diminishing every year, and even now an educated mother who successfully nurses her own infant for six months is a phenomenon, and one who can continue it for ten months almost a curiosity. It is not, as has been so often asserted, that the modern mother will not nurse. Nearly all in my own experience would be glad to do so if they could ; but they simply cannot."

The causes underlying the failure of breast feeding is too large a question for me to discuss this afternoon, but I must remind you, at least, of one thing—that anything which tends to disturb or harass the nervous system at once threatens the function of lactation. And the stress of modern life, the whole conditions of modern life are so adverse to maternal nursing that there is no reason why we should regard this lack of mothers' milk as anything very mysterious. In the lower animals it is a common occurrence to find diminution of the milk supply if the animal is worried or upset. In cows, any kind of nervous disturbance—frightening them or getting them excited—will immediately have the result of disturbing the milk and causing changes in its quality.

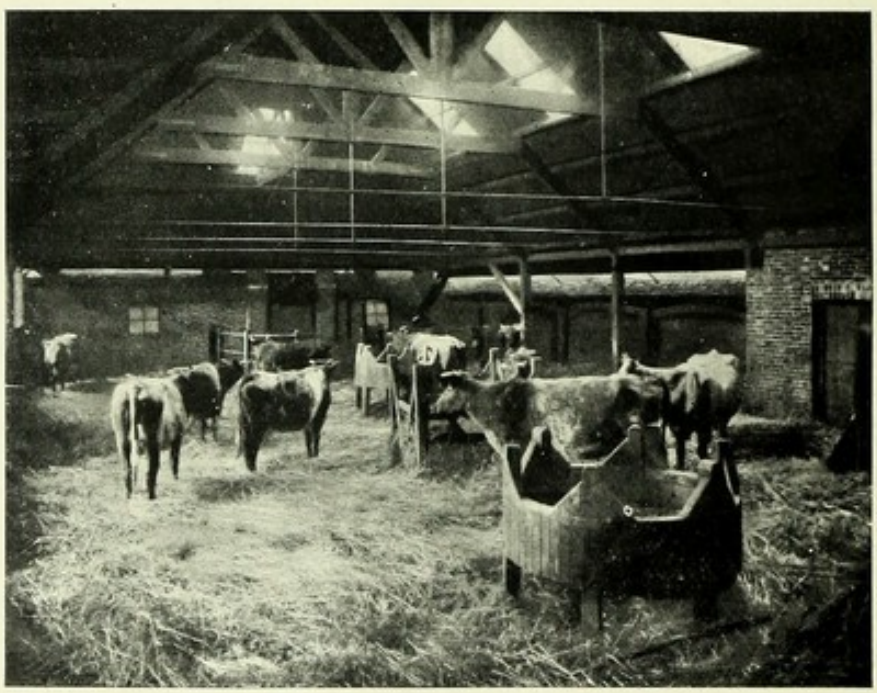
We have to face the fact that there are a large number of infants who must be fed by some other method than the natural method, and it is here that the whole of our arrangements have completely broken down. Before we can get on to good paths, we must, at least, abandon the wrong ones. Consider, for instance, the number of leaflets that are being published as to how to feed the baby in the first three months, and how to feed the baby in the second three months. There is one convenient place for all of them—the waste-paper basket—and the quicker they get there the better.

Consider for a moment the absurdity of the situation. We spend our time explaining that there is no food like mothers' milk. Mothers' milk is the best food for infants. But when we have to find a substitute for it, anything will do—boiled milk, sterilised milk, cows' milk—two of water and one of milk, or two of milk and one of water. No consideration of the infants' individual requirements, no consideration of any of the essential factors; and then when those ridiculous instructions prove to be anything but successful, we carefully explain that it is due to the ignorance of the mothers. Think for a moment of the various developments in various parts of this country. One of the favourite statements is that no artificial food can compare with mothers' milk. Then why call it a food? Why tell the mothers to give it to the babies? Why publish leaflets and do everything possible to encourage mothers to give that which does not compare with the only standard we know of as a food for infants? Fix firmly in your minds one fundamental thing. The substitute food *must* compare with mothers' milk. It is the standard we work to. We will listen to no other. In one town in this country—I dare say there are others—great success has been achieved by supplying the mothers with dry milk in envelopes. You put a little powder in an envelope and if the baby is three months old, you say "Give so much water," and if it is four months, "A little less water"; and it is a great success. The most astonishing thing about all these methods of infant feeding that I have come across is that you do not find any method that is not a success. There is an enormous mortality, an appalling amount of disease, but whatever the food may be so long as you get it inside a tin, inside an envelope, inside a bottle with a label outside—and the label is much more important than what is inside—(laughter)—it will be a great success. That, as a matter of fact, is the state of affairs throughout this country. They are not all dead yet; there are still some survivors at the end of a few months, and the results are eminently satisfactory—results upon which we congratulate ourselves.

I propose, now, to consider some of the factors which are really essential if we are to meet the requirements of infants. We may begin by discussing the arrangements at The Infants' Hospital Farm—Combe Bank Farm—established by my friend and colleague, Mr. Robert Mond, Treasurer of The Infants' Hospital.

The cows are carefully selected and the herd is systematically inspected so as to secure that every animal providing milk is thoroughly healthy. The diet of the cows receives very special attention. Some articles of diet, such as oilcake, give rise to products in the milk, which are liable to upset infants and, in consequence, the diet is carefully adjusted so as to provide the cows with good food making good milk. At the present time the cows spend all their time in the open, save when they are brought in to be milked. But at other times of the year when it is too cold for them to be out of doors, they are kept in *winter quarters* which have been specially constructed, so as to provide a plenitude of fresh air while protecting the animals from the inclemency of the elements (Fig. I).

FIG. I.—WINTER QUARTERS.



The *Milking Sheds* (Figs. II. and III.) are used only at the time of milking; the cows never being allowed in them at any other time. These sheds are ordinary cowsheds remodelled. Mr. Mond was anxious to avoid anything in the way of unnecessary elaboration, as he wished to shew what could be done by simple measures. The alteration of the sheds chiefly consisted in putting on a false roof to provide for efficient ventilation, and in putting windows into the roof to provide light. The floor is of concrete and the fittings

are of sherardised iron. Immediately prior to milking the sheds are thoroughly flushed down with the hose so as to prevent the cows raising dust as they enter the shed. The milkers wear white coats and caps, which are sterilised before use. The pails used are smaller than the ordinary milking pails, as a separate one is used for each cow. Immediately each cow is milked the cover is put on the pail. The weight of the milk is taken and the milk is immediately transferred to the refrigerating room.

FIG. II. ONE OF THE MILKING SHEDS.

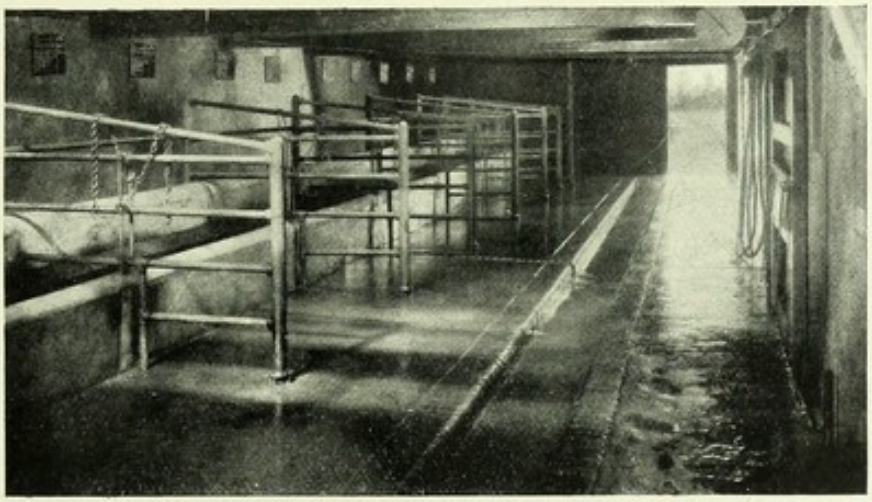
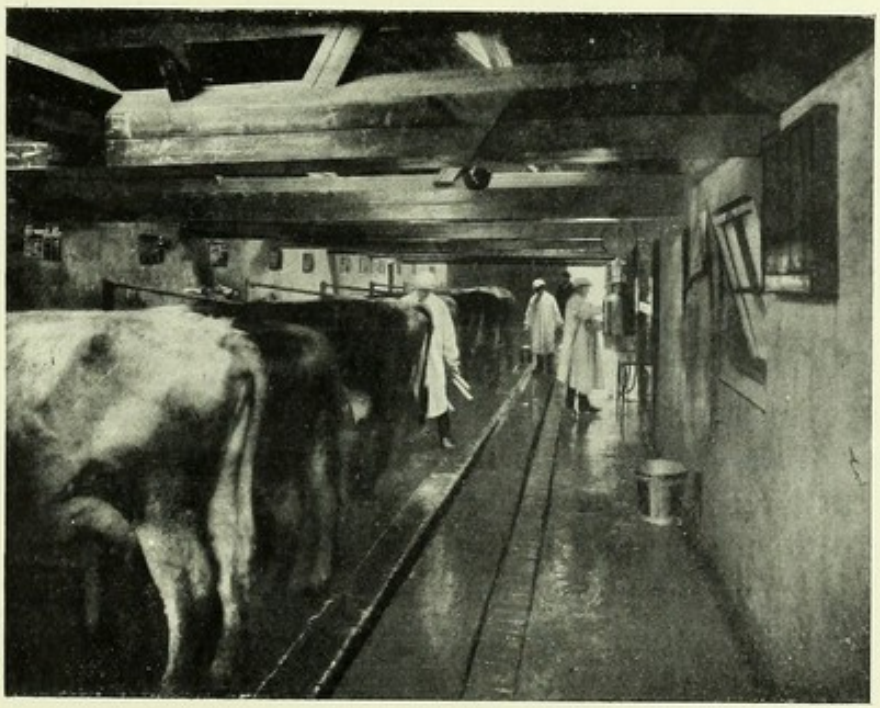


FIG. III.
ONE OF THE MILKING SHEDS AT THE TIME OF MILKING.



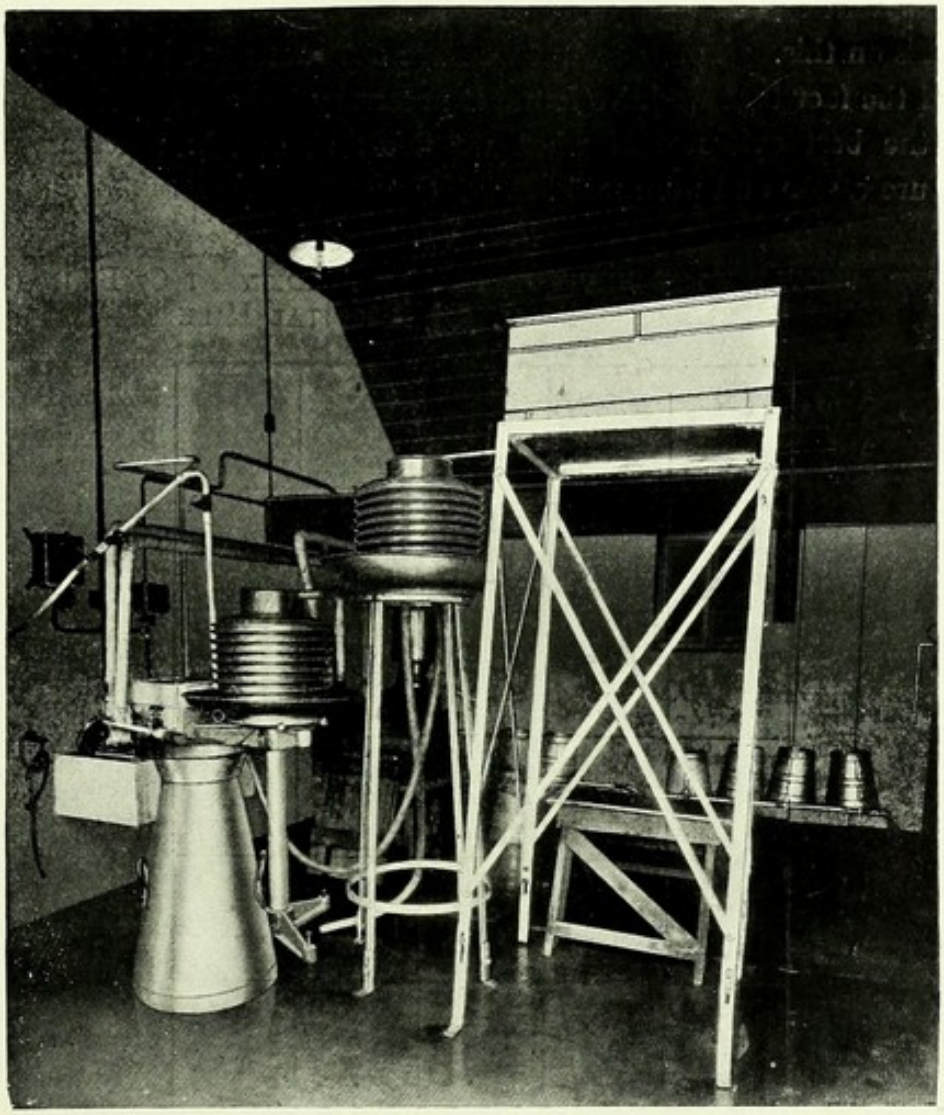
Milk was intended by Nature to be transferred directly from the mother to the offspring. It was never intended to be handled or stored in any way, and consequently it is necessary to take steps to preserve the milk in the condition in which it comes from the cow. At ordinary temperatures bacteria grow rapidly in milk, and the prevention of this bacterial growth is essential. The milk is therefore reduced to a temperature of 40 deg. F. At this temperature no bacterial development can take place. The bacteria are not destroyed, but they are quiescent. This question of refrigeration of milk immediately after milking is of vital importance. It is impossible to keep milk in its pure, natural condition, if bacterial growth in the milk is permitted to occur in the interval that elapses between the time it comes from the cow and the time it reaches the infant.

FIG. IV. THE MILK BEING TRANSFERRED FROM THE MILKING SHED TO THE REFRIGERATING APPARATUS.

As each cow is milked, her milk is immediately taken to the Refrigerating Room (Fig. IV.). The photograph (Fig. V.) shews the apparatus. The milk is placed in the tank at the top. It then falls over the first cooler, where it is reduced in temperature by water circulating in the interior of the cooling vessel. It then passes over the refrigerating cooler. Brine at a temperature of about 15 deg. F. is continually pumped through the interior of this vessel by the refrigerating machinery, and the milk is thus reduced to a temperature just above freezing point. We require that the temperature of the milk shall not exceed 40 deg. F. As a rule the temperature of the milk on reaching the churn is between 33° and 35° F. The churn is of especial construction, being fitted

with an insulating "air wall" to protect the milk from rise of temperature during its transit to London. At the back of the Refrigerating Room is a large sterilizing room, where all the apparatus employed is sterilized prior to use.

FIG. V. THE REFRIGERATING APPARATUS.



The Farm has recently been inspected by the Health Committee, and this afternoon I have briefly described the chief features of its work. I understand that in Bradford you are contemplating taking upon yourselves the absolute management and control of a farm with the view of obtaining a supply of really pure milk. I believe, Mr. Chairman, that it is the one essential thing which must be done if you are to really grapple with the problem of infancy and childhood. Year after year we go on recording the

disgraceful condition of the general milk supply. Year after year are published the reports of chemists, bacteriologists and physicians all over the country. And what has been the result ? We are just where we were. But get your own farm at work. Bring the production and handling of the milk, from start to finish, under your own direct and immediate control, and you will soon have a different tale to tell. It is scarcely necessary for me to lay much stress on this. You see what we have determined to be necessary, and the fact that we have found it necessary to have our own farm is the best evidence of what we think absolutely necessary to secure a safe and pure milk.

FIG. VI.

CURVE SHOWING THE DEVELOPMENT OF ACIDITY AT 67°F. IN (A) COMMERCIAL MILK, (B) HOSPITAL MILK.

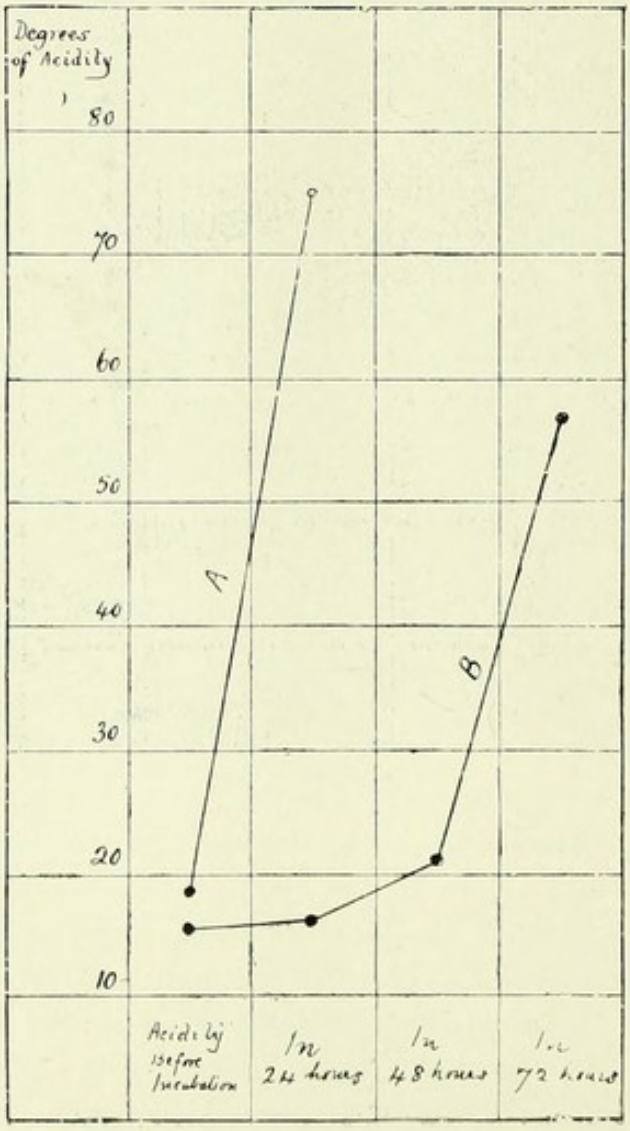
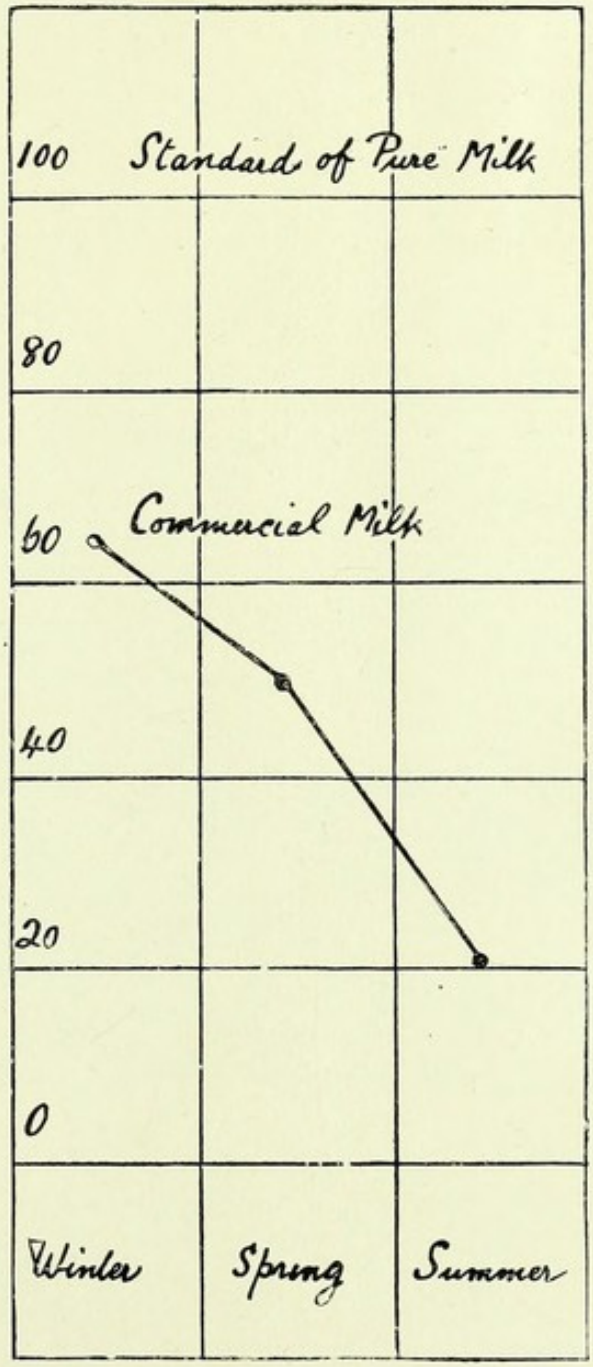


FIG. VII.

CURVE ILLUSTRATING THE QUALITY OF COMMERCIAL MILK IN REGARD TO FRESHNESS AND ITS EXTREME DETERIORATION IN THE SUMMER SEASON.




Immediately the milk arrives at the hospital it is systematically examined and tested in the Research Laboratory, and before discussing the work of the hospital I may shew you two charts which will illustrate the difference between really pure milk and

the commercial milk that is generally available to the public. The charts are taken from my paper "On the Development of Acidity in Cows' Milk and its Relation to Time and Temperature," read before the Glasgow Obstetrical and Gynæcological Society on November 8th, 1911, and published in the "Glasgow Medical Journal," December, 1911.

All milk is acid at the time of milking. This acidity is due to the chemical composition of the fluid. The *development* of acidity after milking is due to the action of organisms. Without bacterial growth there is no development of acidity. The first chart (Fig. VI.) shews you the contrast between the development of acidity in (A) Commercial Milk, (B) the Hospital Milk when incubated at a constant temperature (67°F.). Note the acid development in the hospital milk (B). In the first 24 hours the development is so slight that it is less than one degree of acidity (one degree equals 0.009 per cent lactic acid). In the next 24 hours there is a rise of some five degrees, and in the third 24 hours the active production occurs. Contrast this with the development of acidity in the Commercial Milk (A). At the time the milk is obtained from the milk shop the development of acidity is in active progress. In 24 hours there is a much greater per cent. of acidity in the commercial milk than there is in the hospital milk in 72 hours. This shows you graphically what the neglect of all precautions means, and its results on the milk supplied to the public.

The next chart (Fig. VII.) shews the influence of temperature on milk. In the coldest weather, water cooling is comparatively effective. In the spring it is already failing. In the summer it is hopelessly ineffective. The milks are marked according to the time they take to curdle at 67°F. On the top of the chart is the standard of pure milk, a standard easily achieved by the hospital milk, winter and summer alike. In the winter the commercial milk gets 64 marks. In the spring it gets 46 marks. In the summer it gets 21 marks; so that *judged by its own standard in the winter* the milk has lost two-thirds of its marks by the time summer has arrived. This impresses upon us the paramount influence of *temperature* and the urgent necessity of *refrigeration* immediately after milking. The milk producer and the milk vendors fail to

take the most elementary precautions in regard to the protection of the article in which they deal. The fishmonger and the butcher understand the requirements, and, as a rule, provide for them. The milk producers neglect them.

And now let me take you to The Infants' Hospital, which owes its existence to its Treasurer, Mr. Robert Mond, for the hospital was built and equipped entirely at his expense. At the hospital we deal solely with infants under twelve months of age, suffering from diseases of nutrition. There are two wards, each containing twenty-five cots.

FIG. VIII. ONE OF THE WARDS.

The hospital is elaborately fitted throughout so as to deal most efficiently and most thoroughly with its special work. The Lecture Theatre (Fig. IX.) is elaborately fitted with optical apparatus for demonstration purposes, while the Research Laboratory (Fig. X.) is fully equipped for the bacteriological and bio-chemical investigations that are carried out there day by day. The Research Laboratory plays an important and essential part in the diagnosis and treatment of every case admitted to the wards, for our treatment is based upon the investigations carried out in the laboratory. We come now to the milk laboratory.

FIG. IX. THE LECTURE THEATRE.

FIG. X. THE RESEARCH LABORATORY.

FIG. XI. THE MILK LABORATORY.

The table shews you the composition of human milk and that of cows' milk.

| | Human Milk. | Cows' Milk. |
|---|---|---|
| FAT .. | .. 4.00 .. | 4.00 |
| LACTOSE .. | .. 7.00 .. | 4.50 |
| WHEY-PROTEINS | .. 1.00 .. | 1.00 |
| CASEINOGEN .. | .. 0.50 .. | 2.75 |
| WATER .. | .. 87.25 .. | 87.00 |

We may briefly note the essential difference in the constitution of the two milks. The fat is present in about the same proportion. Milk-sugar (lactose) is present in much higher proportion in human milk than in cows' milk. The whey-proteins are present in about the same amount; but the caseinogen—the "curd" forming protein—is in great excess in cow's milk. You will at once perceive that mere dilutions with water can do nothing to adjust these differences. In order to meet the requirements we separate the milk by simple and natural means, without the use of chemicals, into its several constituents, so that we can recombine them according to the indications and thus supply the infant with the milk of the exact

composition it requires. Each baby is prescribed for individually. The prescription is taken to the milk laboratory and the milk mixture is prepared. Here, for example, is a sample prescription.

WARD II.—INFANT NO. 18.

| | Per cent. |
|---|---|
| FAT .. .. .. .. | 1.50 |
| LACTOSE .. .. .. | 5.50 |
| WHEY-PROTEINS .. .. | 0.50 |
| CASEINOGEN .. .. .. | 0.25 |
| ALKALINITY .. .. .. | 5.00 |

Ten tubes each of four ounces.

In the milk laboratory the prescription is translated into actual amounts. Thus, the translation of the above prescription is as follows :—

| | Cubic Centimetres. |
|---|---|
| CREAM (32 per cent.) .. .. | 56 |
| FAT-FREE MILK .. .. | 71 |
| LIME WATER .. .. .. | 60 |
| LACTOSE (20 per cent. Solution) | 152 |
| WHEY .. .. .. | 536 |
| WATER .. .. .. | 325 |

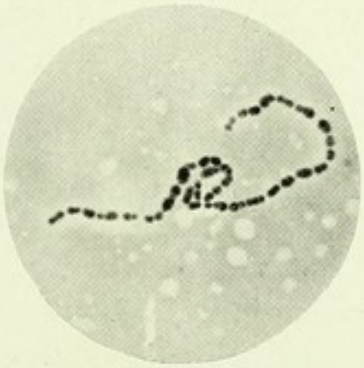
We have to deal with infants who are very ill, and consequently great refinements are required in the adjustment of their diet. The tables in use in the milk laboratory provide for some 57,000 different combinations.

Dr. Evans has been kind enough to provide me with two bottles of milk. They are both taken from the same milk sample, but in one bottle the milk is in its natural condition, in the other bottle the milk has been boiled. I take the specimen of boiled milk. To it I add one cubic-centimetre of a solution of orthomethylamino-phenol sulphate and then a drop of hydrogen peroxide. You observe that the milk has undergone no change. Let us observe what happens in the case of the milk that has *not* been boiled. We add the reagents as before and you see that immediately a striking change has occurred. The raw milk is now of a deep red colour. Milk is a delicate and subtle fluid. Only boil it and a

characteristic reaction of milk in its natural condition is entirely lost. And, to convince you that it is the raw milk which is responsible for this reaction, I will add some raw milk to the boiled specimen containing the added reagents. You see that at once the red colour appears. Milk as a food for babies must be milk in its natural condition. Boiled milk is not milk, for the properties that characterise milk and place it in a class by itself have been utterly destroyed.

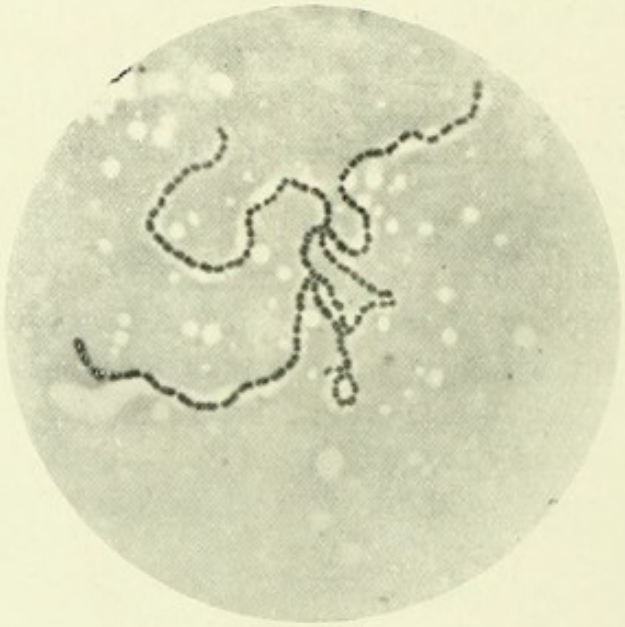
Let us consider for a moment some of the chief points in regard to the bacteriology of raw milk and of boiled milk. The first photo-micrograph I shew you is one of the *streptococcus lacticus* (Fig. XII.). This is the typical organism of pure milk. It is present in the udder of the cow, and the purer the milk the more freely the streptoccus grows when the milk is incubated at blood temperature.

FIG. XII. STREPTOCOCCUS LACTICUS (×1,000).



The next photograph is the Streptococcus lacticus as it is found after the milk has been incubated for about eight hours (Fig. XIII.).

FIG. XIII. STREPTOCOCCUS LACTICUS (×1,000). Growth in pure milk incubated for eight hours at blood temperature.



It never grows in this form unless the milk is extremely pure; for it is a delicate organism and when the milk is contaminated it fails to grow in chains. Consequently in our examination of the milk at the laboratory we are constantly and systematically observing the milk to see exactly how the Streptococcus grows. If it is interfered with we know that the milk is not as clean as it should be.

This organism is present in the alimentary canal of every infant. The infant depends upon it for the lactic acid which is essential to its health and life. For it protects the infant from the possibility of putrefactive changes occurring in the intestine and permits of the digestive processes being carried out in their natural order and sequence.

The next organism I shew you is never found growing in raw milk. The hospital milk was heated at 170°F. for ten minutes. It was then incubated for 48 hours and this bacillus—the *bacillus putrificus*—was found (Fig. XIV.). It may be said "That is all very well, but we don't incubate Pasteurised milk before giving it to our infant." That may be the case. The baby is quite capable, however, of providing both the temperature and the time of incubation.

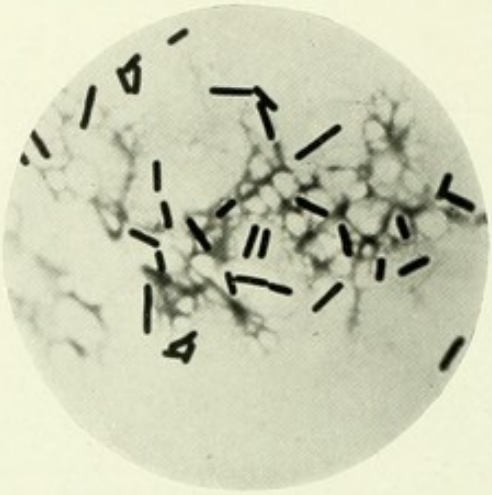
Give this milk to a baby on Tuesday, and the incubation period will be reached on Thursday. It is quite true that the Bacillus Putrificus will not develop inside a healthy infant; its growth will be prevented, because the lactic organisms will not permit it to grow. But if the infant has been systematically fed on pasteurised milk and has been deprived of the lactic organisms, then this organism is very likely to develop. If it does it will speedily kill the infant, or gravely threaten its life.

FIG. XIV.—THE BACILLUS PUTRIFICUS (×1,000).

This experiment with milk you can readily carry out for yourselves. Take half-a-pint of fresh milk. Put it into a bottle. Raise the milk to 170°F. and keep it at that temperature for ten minutes. Cork the bottle and incubate it at 100°F. for 48 hours. You will not require a microscope. At the end of the 48 hours remove the cork and smell the milk; I think you will be quite satisfied with the success of your experiment. At any rate, two of my assistants in the research laboratory were quite satisfied when they carried out the experiment in the manner I have described. They smelt the milk, and they immediately went off duty for the rest of the day (laughter).

The next bacillus I have to shew you is the Bacillus Enteriditis Sporogenes (Fig. XV.). This organism never grows in fresh milk, but it can readily be obtained by heating milk at a certain temperature for a certain time. Please note the precise temperature and the precise time of exposure, for these apparently minute details are essential. To obtain a growth of the Bacillus Enteriditis Sporogenes raise the milk to 190°F. for one minute. Incubate

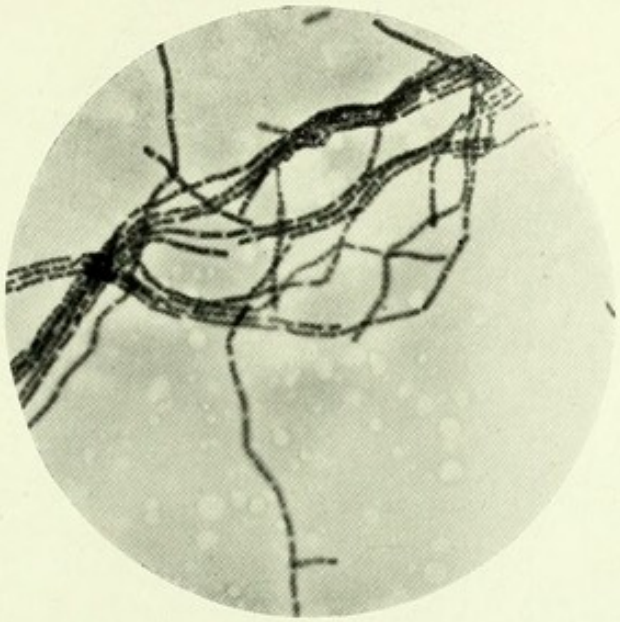
FIG. XV. BACILLUS ENTERIDITIS SPOROGENES (×1,000).



the milk for 48 hours at 100°F. and if the bottle is tightly corked it will probably be blown into pieces, for the Bacillus Enteriditis Sporogenes is a powerful gas producer. The bacillus also produces butyric acid, which is an intense irritant. Ten days ago I saw a young child who had been fed for some time on a carefully pasteurised milk. She was very dangerously ill, and I found that it was this organism which was the cause. It was three days before I would say that I thought her life could be saved. Bear this in mind—that this organism will never attack an infant fed on fresh milk.

Now I pass to the organisms growing in boiled milk—that is, milk that has been raised to 212°F.., and in this list I may include sterilised milks for, practically speaking, none of these milks are sterile. The hospital milk was boiled and then incubated. Eight hours afterwards a film was examined under the microscope and the photograph shews you a type of the organisms growing in milk after it has been boiled. It is one of the putrefactive organisms (Fig. XVI.).

FIG. XVI. PUTREFACTIVE BACTERIA GROWING IN MILK AFTER IT HAS BEEN BOILED (× 1,000).



These organisms at the time of their active growth produce the most powerful poisons that we know of—the alkaloids—and when they attack an infant or a child they generally cause death in about forty-eight hours.

The next photograph shews the same milk a little later. You see in this specimen, the spores (Fig. XVII.) which have developed from the bacilli. It is the *spores* which are responsible for the growth of bacteria in milk that has been boiled; for boiling destroys all bacteria, but it does not destroy the spores. These putrefactive bacteria are highly motile organisms, and they move so rapidly that they can cover 500 times their own length in one second. The photograph (Fig. XVIII.) shews you the Bacillus Subtilis, with its "flagella" which render it capable of this active movement. These "flagella" are not seen when the organism is observed under the microscope in ordinary circumstances, as they require special staining to enable them to be seen.

FIG. XVII.—SPORES OF PUTREFACTIVE BACTERIA DEVELOPING IN MILK AFTER IT HAS BEEN BOILED (× 1,000).

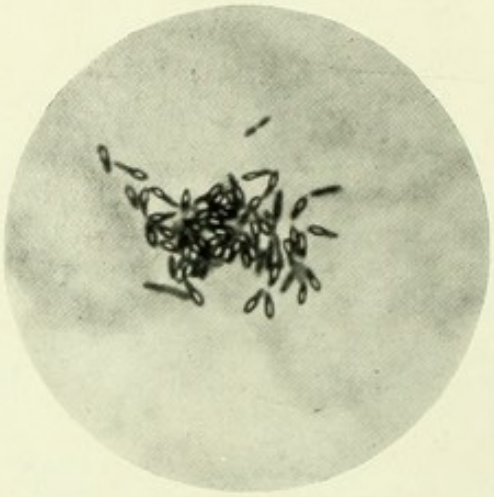
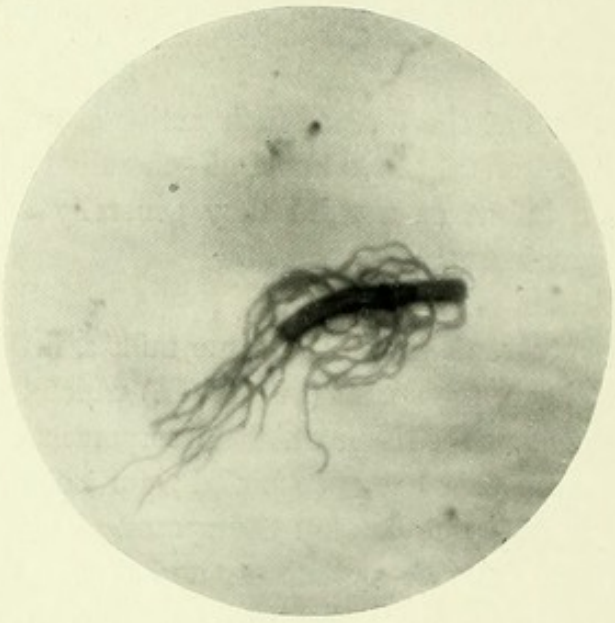


FIG. XVIII.—THE BACILLUS SUBTILIS WITH ITS FLAGELLA (× 2,000)

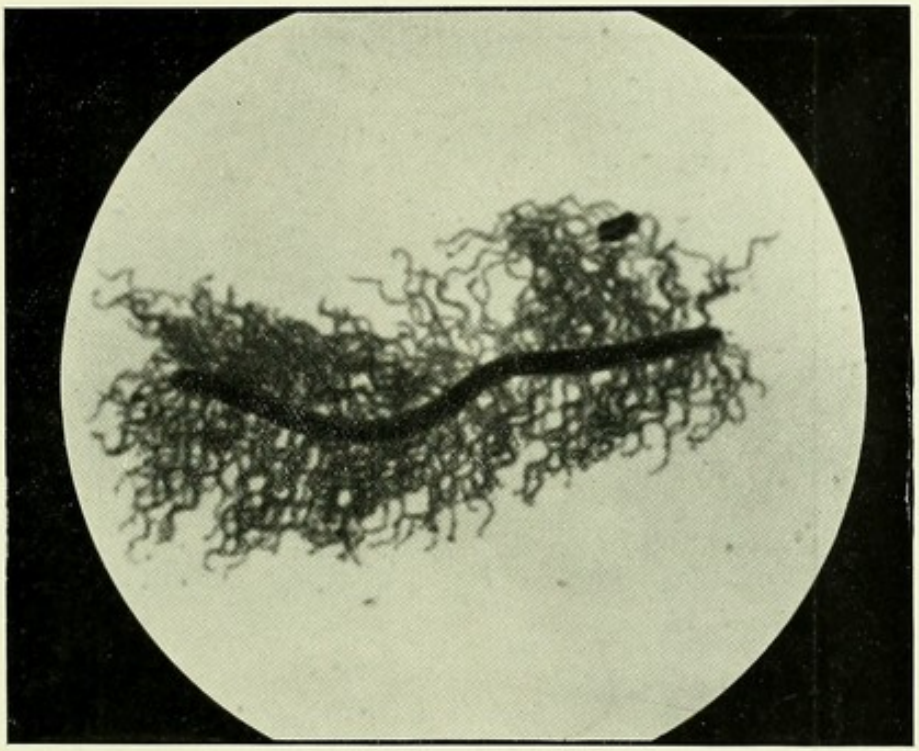


The motility of these organisms is not merely of academic interest. The fact that these organisms are so highly motile means great metabolic activity, and they consequently produce rapid chemical changes in the fluid in which they live.

The last photo-micrograph I shew you is that of the *Bacillus Proteus Vulgaris* with its flagella—one of the most powerful putre-

factive organisms (Fig. XIX.). This organism, however, does not grow in milk after it has been boiled, provided the milk is sufficiently protected from contamination, because the *Proteus Vulgaris* does not possess spores. But if the boiled milk is not so protected, then this organism can reach the milk.

FIG. XIX.—BACILLUS PROTEUS VULGARIS WITH ITS FLAGELLA. (× 2,000).



All the putrefactive organisms grow with great rapidity. No other organisms produce such luxuriant growth as do these organisms in a comparatively few hours. When this piece of potato was inoculated you would not have been able to see that it had been touched. Twenty-four hours later it was covered with the luxuriant growth you see. It is a typical potato-culture of our "No. 7" bacillus (Fig. XX.).

And now I shew you a very simple photograph of some beans growing in pots (Fig. XXI.). You may wonder what that has to do with our subject.

FIG. XX.—POTATO-CULTURE OF BACILLUS "No. 7."

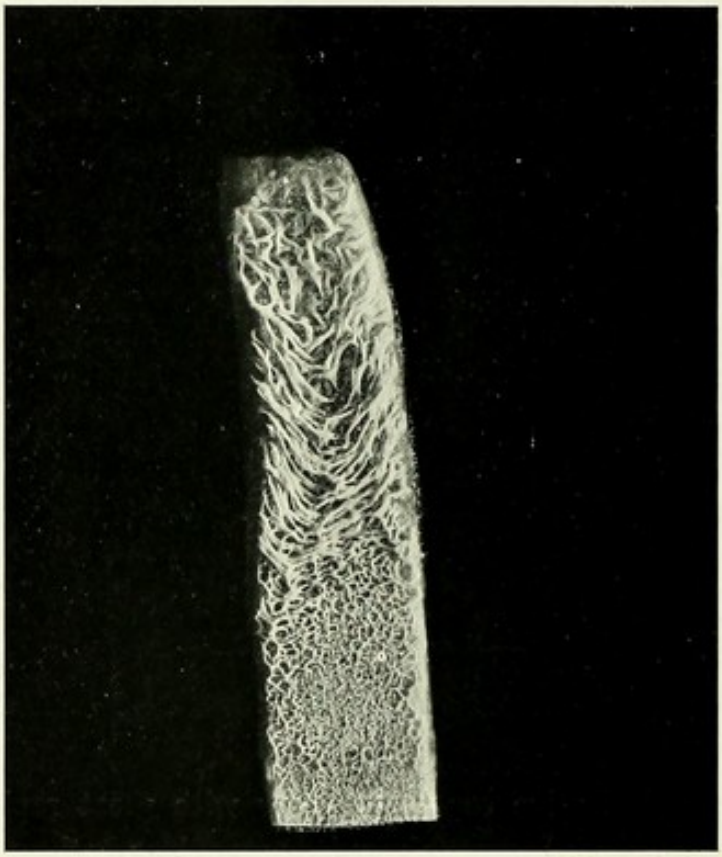
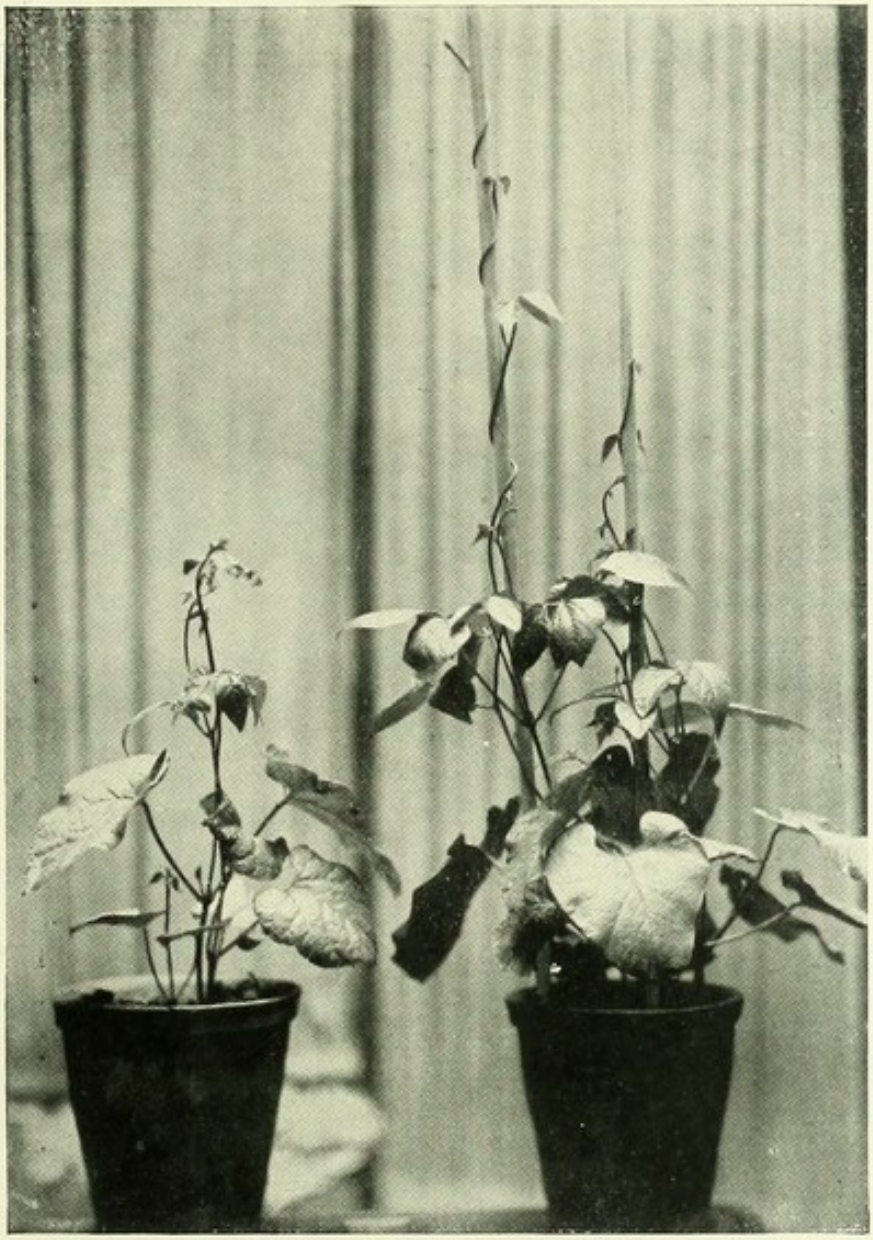


FIG. XXI.—BEANS GROWING IN NON-PASTEURISED AND IN PASTEURISED SOIL. THE MORE LUXURIANT GROWTH IS IN THE SOIL WHICH HAS BEEN PASTEURISED.



Nature is concerned with many things. If she cares for babies she has to deal with many other problems. All the organisms I have been speaking of are of the greatest value. They are all beneficial organisms—in their right place. These putrefactive organisms are wanted in the soil to break up dead organic matter and to render it available for the vegetable kingdom. The acid organisms which the infant requires are precisely the organisms

which the soil does not want, for they interfere with the putrefactive organisms.

A sample of ordinary soil was taken. It was placed in two pots. One of these pots with the soil inside it was pasteurised by steam. The other was allowed to remain in its original condition. Beans were then planted in both pots. In the pasteurised soil the beans have grown much more luxuriantly than in that which was not pasteurised. For the acid organisms in the non-pasteurised soil have interfered with the action of the putrefactive organisms. Every farmer will tell you the same thing in his own words. He will tell you that he can do nothing with a "sour," that is to say, an acid soil, and he puts lime on the land to neutralise the acid and thus permit the putrefactive organisms to carry out their work. Putrefaction is a very good thing in the soil; it is a very bad thing inside babies. Raw milk is the great natural protection of the infant. The more you study the question, the more closely you investigate the biological and chemical problems involved in the present condition of infant life, the more you will realise how fundamental is this question of milk—milk in its pure, natural condition (applause).

The CHAIRMAN: Dr. Vincent has spoken with very great patience and deliberation. This is a thoroughly representative conference, and includes the whole of the charitable organisations of the city, medical profession, farmers, and members of the City Council. There is, quite naturally, divergence of opinion, and I have been in public life long enough to know that it is never difficult to destroy all that a speaker has said if you wait until he has got away before undertaking the task. I therefore recommend that such time as is left at our disposal should be wisely used, and I propose to invite questions dealing with any part of Dr. Vincent's address, but not outside of it.

Mr. R. DAWSON: I should like to know if Dr. Hall, who enquired into Jewish children at Leeds, has got any statistics in regard to infantile mortality among them?

Dr. VINCENT: Yes, sir, but I did not quote them. Dr. Hall enquired into the condition of Jewish children in the Board Schools,

and whereas he found that in the ordinary Board Schools there were fifty per cent. suffering from rickets there were only seven per cent. among the Jewish children, although the Jewish children were certainly of quite as poor parents, if not poorer.

Mr. R. DAWSON : Are there any statistics as to infant mortality among the Kaffirs in South Africa ?

Dr. VINCENT : I am not acquainted with those.

A member of the audience asked if he could tell them the air space of the shippons at the farm.

Dr. VINCENT : I cannot tell you definitely in figures, but they are thoroughly ventilated.

A member of the audience : Can you tell us the cost per gallon produced from your farm ?

Dr. VINCENT : It is less than threepence a quart delivered at the hospital.

A member of the audience : Have the medical fraternity generally condemned sterilised milk ?

Dr. VINCENT : I am afraid it is impossible to answer for the medical fraternity generally. There are too many of them to give them credit for any opinion as a body.

Alderman ARTHUR PRIESTMAN : Is it possible to produce milk pure and at the same time at such a price that it can compete in the general market ? The great difficulty with all of us is that there must be a large amount of money spent in these model farms, and that in consequence the price of milk is made almost prohibitive. A gentleman who farms near Bingley with a large number of cows told us that he could not compete with the ordinary milk producer, simply because he took greater care with his cows and the cost was too great.

Dr. VINCENT : Our experience is not that, but there is something to be said for the contention. Very few people have really tackled the question. I quite agree that if a farmer producing milk is dependent upon the ordinary milk vendor and puts it forward in

the helpless way he does, without taking any steps to find a market for it, then he will not be able to compete with very cheap milk. But our own experience shows that we can put milk in London on a small and limited scale, at less than threepence a quart. There are the refrigeration and other costs, but our estimate of the added costs is only ten per cent. On the other hand, we do not lose any milk by its going bad, as we have our cold stores to keep it. Providing you take milk from the farm to the consumer there is scope for ample profit, but if you divide the profit among a number of people then I do not see how it can be done.

A member of the audience : Dr. Vincent referred to the out-patient department of his hospital. Do they take notice of the effect on out-patients, and if it is the same as inside the hospital ?

Dr. VINCENT : We do not supply milk to the out-patients. They come from such an enormous area. The parents get the milk from the milk shops in the neighbourhood in which they live.

A member of the audience : May I take it that in the hospital you practically prescribe for each case ?

Dr. VINCENT : Quite so.

Mr. W. LEACH : Can you give us any statistics in regard to the actual death rate at the hospital ?

Dr. VINCENT : The death rate varies according to the season and the condition of the infants on admission, but I may say that the death rate taken over a period of five years, notwithstanding the desperate condition of the infants, has never been so high as the death rate of infants under twelve months in any of the large towns of the United Kingdom.

Mr. LEACH : That is extremely important. Am I to understand that the patients in Dr. Vincent's hospital are ailing everyone of them more or less seriously, and yet that the death rate in these circumstances is actually less than it is for normal children in the large cities of the kingdom ?

Dr. VINCENT : Yes. I must explain the work of the hospital. We have a large out-patient department, and the babies are brought there because they are not well. If they are only trivial cases

such as can be put right outside the hospital then they are not admitted, so that all cases of slight illness are dealt with in the out-patient department. We have a great demand on our wards, and no case gets into the wards of the hospital unless it can be described as a grave case in which the life of the infant is in danger, and the question to be considered is whether it will survive or not. Notwithstanding these conditions, we are able, by nursing care and the study of the bacteria which are poisoning the baby, to show that our death rate is lower than the average death rate of infants in the large towns.

The CHAIRMAN : It may possibly throw some light on the matter, if I remind you that Dr. Vincent said the infantile death rate in the out-patients' department of his hospital, from 1st June to 1st October, during the exceedingly hot summer, was only four per cent., while the corresponding figure for the whole of Bradford was over 20 per cent.

Dr. D. WALKER : Can Dr. Vincent explain how it is that even with his searching condemnation of artificial foods, with which I agree, you often find children fed on such foods thrive, and thrive exceedingly ? You have told a mother that in giving these foods she is practically killing her child, and a few months afterwards she comes and shows you the child, and how well it looks.

Dr. VINCENT : For the same reason that some infants thrive on boiled milk. The mothers do not carry out the instructions. The fact is, that if you take a baby fed on boiled milk, in which the mother manages to achieve what boiling is meant to achieve, that child would be dead inside of six weeks. But it is nearly impossible for her to absolutely get rid of lactic organisms. In all my experience when I have found these foods really fed, and can get evidence under strict conditions, then I do find exactly what I expect to find. It is quite a common experience for me to report that a baby has been fed on a certain specified food owing to my bacteriological enquiries. This method of feeding is not to be found in the notes of the case. The Sister of the Ward asks the mother specifically about this food, when the mother replies, "Oh, yes. I gave that, but I did not think to mention it."

A LADY MEMBER of the Conference : Is tinned milk a bad thing

for children, because I know children who were brought up on it and were healthy ?

Dr. VINCENT : There are many children fed on tinned milk. Tinned milk contains all the constituents of milk and some sugar, and it is a very good food compared with some other things. But the point is that children have had such antidotes as orange juice and cabbage. Those much-abused things, cabbage and pickles, have sometimes been the means of saving a child's life.

Dr. MARGARET SHARP : Will Dr. Vincent give us a sample of the kind of advice given to mothers ? How would he direct them to get the correct strength of the milk at home ?

Dr. VINCENT : That is a very interesting question. The preparation known as " Fat-whey " is the basis of the method employed in the out-patient department. We worked it out in the Research Laboratory. " Fat-Whey " is distinguished from ordinary whey in that it contains nearly all the fat present in the original milk. You will appreciate the importance of that. Dr. Helen Campbell has worked at the Infants' Hospital and will be able to explain to you the details in regard to its preparation. This fluid contains nearly all the fat, all the lactose, and all the whey-proteins. The mother adds to it the proportion of milk—or of milk and water —that is ordered, and the food is ready. The method permits of numerous modifications, and is very elastic. It is not, of course, as accurate as the milk laboratory method ; but it is near enough for most of the cases in the out-patient department.

A MEMBER OF THE CONFERENCE : Can Dr. Vincent tell us how to put milk on the market commercially, in the condition he has described ?

Dr. VINCENT : The ordinary milk, so far as I can see, is a question of mangels. If a farmer has a certain quantity of mangels he gets a certain number of cows to eat them, and he thinks that that produces milk. The farmer is not even a milk producer from our point of view. If he takes up milk production as a business in itself there is no reason why he should not carry out all the measures we carry out, but as a sort of addendum, a bye-product, as it is to-day, milk production on

our methods is hopeless for the average farmer. The average farmer is not attempting to tackle the problem, is not producing milk on any scale, or doing anything in the way of real milk production. On sound lines on a sufficient scale, he could do it quite easily.

Alderman ARTHUR PRIESTMAN: Is there no safeguard for us whatever in boiling the milk? If your milk supply, you know as a fact, comes from a dirty farm, can there be no protection in raising the temperature?

Dr. VINCENT: I sympathise with the question you put to me. You say, in effect, "It is all very well for you to speak of unboiled milk, but you have a model farm and your milk is produced under ideal conditions—what are we to do with the manure-laden stuff that we have to deal with?" My answer is, do not boil it. If boiling killed the organisms of contamination, then that, at least, would constitute an argument for boiling. But boiling does not kill these. On the contrary it kills the very organisms that prevent the growth of the contamination organisms. Boiling does not destroy all germs; it selects them and it leaves unharmed those that are most dangerous. I may be allowed to quote from my Glasgow address (1910): "In the out-patient department of the Infants' Hospital we deal with the infants who have been discharged from the wards, and we see them at intervals of a week or a fortnight. We deal there also with infants who have not been in the hospital, but who have been brought for advice and treatment. None of these infants receive milk supplied from the hospital. Their mothers obtain it in the various districts within a ten-mile radius of the hospital. We recommend the precise milk mixture for each infant, and the mother prepares the mixture in accordance with the written directions which she receives. Every mother also receives a printed leaflet, giving certain general instructions, and one of these instructions is: 'The milk *must* be fresh. It must *not* be boiled, or pasteurised, or sterilised.'

"We are not unaware of the dirty condition of the milk these infants are receiving, nor unmindful of the neglect of all proper sanitary precautions which is the outstanding feature of the

production and the handling of milk in this country. It is precisely because we know these things only too well that we desire to keep the milk raw. If it contains much that it ought not to contain, it at least contains also a powerful antiseptic—the *streptococcus lacticus*. We take much care to preserve that."

Mr. A. COWLING : Would Dr. Vincent favour milking cows by machinery or by hand ; and would he say that Bradford, with its municipal milk supply, has been—of course, unconsciously—murdering infants ? (laughter).

Dr. VINCENT : With regard to the latter question, I think it is impossible, according to legal standards, unconsciously to murder a person (laughter). As regards milking by hand or by machine, I strongly favour milking by hand. Milking by machinery requires a great deal of manual labour ; it does not empty the milk glands properly, and the cows have to be attended later and milked.

The CHAIRMAN : If there are no other questions I will ask Dr. Goyder to move a vote of thanks to Dr. Vincent, and Mr. Thornton Pullan to second it.

Dr. GOYDER : I am very much interested indeed in the statement of the lecturer. There can be no doubt of this fact, that if you get pure milk sterilisation is unnecessary. But at present we do not succeed in getting that ; and the great difficulty of the public at present is to guard themselves from the occurrence of tuberculosis and typhoid. We have had an epidemic of typhoid in Bradford, and have traced it to the milk. The public want to know how they are to protect themselves, and I question whether the sterilisation and examination of the milk in a proper place would not very far answer that purpose. But still the dictum which you laid down is one which every man of common sense, whether of the general public or of the medical profession, will at once accept. Let us have the pure milk if it can be got, and if it is got by your method why should it not be done elsewhere ? It has been excellently done, and I think in pointing the public to that fact alone we are greatly indebted to Dr. Vincent for his lecture to-day. I beg to move a hearty vote of thanks to him. We can learn the lesson which he has given us, and I hope we shall carry it into effect. We have a good Chairman, and he has done

good work. We had the tuberculosis exhibition in Bradford; now we are about to have a dispensary, and shortly we are to have a place for the care of tuberculous children, and the Education Authority is moving in the same direction. So I think we are on the up-grade in this matter. We are very much indebted to Dr. Vincent for his lecture, and we accept the principles which he lays down.

Mr. H. Thornton Pullan: I have very great pleasure in seconding the resolution which Dr. Goyder has proposed, that our best thanks be given to Dr. Vincent for his able and interesting lecture. He has taught us one thing, and that is that we have a good deal to unlearn as well as a good deal to learn. So far as we in Bradford are concerned, I think it may be taken for granted that we are anxious to do the best we can in dealing with the problems of infant life and milk supply, and we have been struggling with it for several years past. Apparently we have been following a course not altogether helpful to the needs. Therefore I say we have a good deal to unlearn. At the same time we are faced with certain limitations and difficulties which all Corporation Committees have to face; we have to convince a great number of people of the propriety and advisability of the course which is going to be pursued, and orders cannot be given, as they have been given in Dr. Vincent's case by Mr. Robert Mond, for the best that was requisite for the purpose of obtaining what they had in view. Most of you here know that, in Bradford, the milk has been sterilised, and it has been generally accepted that the sterilising of milk prevented a good many of the troubles incident to the use of milk. I believe that principle has been almost universally held, and it is the investigations of Dr. Vincent in particular, with a few co-workers in the same field, which have proved conclusively, I think, at all events so far as infant life is concerned, that the system of sterilisation is entirely wrong. What I appreciate is this, that when you have milk in the raw state there is present a certain acid element which is in accord with Nature's provision, and in consequence that is a form in which it ought to be administered to children, and being so administered the presence of that particular germ, whatever it may be, counteracts the things that otherwise would be adverse to child life. Now, if that milk be

boiled, or carried up to a certain temperature, you destroy this particular germ and bring into being some others which are harmful. If you carry it far enough they are putrefactive, and if you feed a child on boiled milk you are giving it a food calculated to bring about its death at a very early date unless there be some agency creeping in in a miscellaneous diet. The difficulty, however, with regard to the whole problem seems to be this, that we have no certainty that we can get a pure milk supply——

A VOICE : Excuse me !

Mr. PULLAN : It seems to me our difficulty is that we cannot get a pure milk supply. Dr. Vincent, of course, through Mr. Mond's farm, has had the necessary precautions taken which enable him to obtain such a supply for the purposes of the hospital. When I use the term " pure milk supply," I refer to two or three features. First of all, with regard to the health of the cattle, Mr. Mond, of course, sees that his cattle are all healthy. He gets good, healthy cattle to begin with. We know that in Bradford—and Bradford is indicative of what exists throughout the country—the cattle are not all of that description. A great number of them are suffering from tuberculosis in one form or another. We know that in the course of twelve months on the farms in Bradford there have been over a hundred cattle discovered suffering from tuberculosis of the udder. That, of course, brings it into immediate contact with the milk (" Question "). We have direct evidence of it and our reports are based on the examination of the cattle. You cannot get healthy cattle to begin with. The next point is that you cannot get cleanly milk unless the conditions are such as tend to that end. In Mr. Mond's farm the cattle are well groomed, the milk is taken directly from the shed into the dairy, where it is at once refrigerated or goes through a process of cooling and is put into the cans. I was a member representing Bradford on the committee of enquiry for the whole of the West and East Ridings of Yorkshire, including several of the large towns, and we had a bacteriologist, Dr. Orr, employed for twelve months for the purpose of examining the milk supply of the whole county from the point of view of cleanliness, and the evidence he got quite justified all that I am saying, and a good deal more, with regard to it. The evidence we got showed how easy it was for the supply

to be unclean and for diseases to get into it. With all these elements generally present, it has seemed to me to be incumbent upon any authority tackling the problem with the desire to have a pure milk supply to take some steps to ensure the obtaining of such a supply. Apparently if all other methods failed, the public must do what Mr. Mond had done for Dr. Vincent's hospital. The authority must get their own source of supply, where the necessary conditions for the procuring of a cleanly and healthy milk supply can be obtained. That seems to me to render it necessary for the municipality to get a farm of their own and a herd of cattle of their own in order to get the necessary quantity of milk for the purpose of dealing with the children of the slum districts, who have fallen into a state of life similar to that of the children treated at Dr. Vincent's hospital. For the children under one year old it does seem to me that we must have a cleanly milk supply, and the only method of obtaining it is through the municipality having a farm of their own. It seems to me that all this follows from what Dr. Vincent has said. And because he has focussed the whole of the general knowledge on this subject so completely, and makes it so perfectly clear what the course is which ought to be pursued, and that it can be done successfully and commercially, I think we in Bradford are deeply indebted to him for all he has said. I have, therefore, great pleasure in seconding the vote of thanks.

The CHAIRMAN: May I say how heartily I endorse all that Dr. Goyder and my good friend, Mr. Pullan, have said. The reason why Dr. Vincent's lecture is unanswerable is this——

Mr. PHILIP WRIGHT (interrupting): May I support the motion?

The CHAIRMAN: I do not think you intend to support it (hear, hear). The reason why Dr. Vincent's arguments are unanswerable is because all he asks us to do is to get back to Nature (hear, hear). I am very pleased to carry my friends, the farmers, with me.

Mr. WRIGHT: Just say that we can have a pure milk supply and do have it.

The CHAIRMAN: I was just going to say that if we were to have

a pure milk supply—and if we can carry the Council with us we will have it—we can demonstrate to the farmers that although they may be doing what they regard as their best, they still have a great distance to travel. I say Dr. Vincent's position is unanswerable for the reason that he has tried to get back to nature. Cowsheds devoid of light and air and full of manure are not likely to get us back to nature ; dirty cattle don't get us back to nature.

Mr. WRIGHT : To groom them is contrary to nature.

The CHAIRMAN : Pardon me, you had ample opportunity to put questions, and I was amazed at the way our farmer friends sat still and said nothing when they had the chance, at question time, of showing our ignorance and demonstrating their knowledge. Ungroomed cattle with unwashed udders don't help us to get back to pure milk. These conditions obtain generally in every area from which the milk supply of Bradford is drawn, and it is that that we are anxious to avoid. If there is anything at all to be said in support of the contention that the present price of milk is not adequate for such a pure supply as Dr. Vincent has referred to, then it ought to be made so, because an article that is not pure can never be cheap, and what we need is a pure article at a reasonable price. We are anxious to help the farmers, by demonstrating in their midst how it can be done, and I do not think we shall have long to live before we have achieved that purpose. We are deeply indebted to Dr. Vincent in many ways. He has helped us over and over again, as members of the Health Committee can testify, and we appreciate highly all the service he has rendered. We are also deeply indebted to Mr. Robert Mond, to whom reference has been made. His farm is not an expensive one ; no money is wasted in needless elaborations ; though it is conducted on the lines Dr. Vincent has indicated. With exemplary public spirit Mr. Mond has most willingly placed at our disposal the vast amount of information he has gathered through actual experience, so that while we are used to one public authority helping another, in this instance we are indebted to a private individual for unqualified and generous help. We are grateful to Dr. Vincent for what has been an exceedingly interesting, instructive, and profitable address, and for the courteous way

in which he has met questions and criticism. I am certain we have not heard the last of this subject, and all that our friends, Dr. Goyder and Mr. Pullan, have said I heartily endorse.

The vote of thanks having been carried with applause,

Dr. VINCENT said: Mr. Chairman, Ladies and Gentlemen. I thank you all for the kind and indulgent way in which you have received me this afternoon. It is a great pleasure to me to come to Bradford and find so much interest in the subject which I have been working upon for so many years. One thing I know, and that is, that you have an extraordinarily active Health Committee. Not long ago they were in London, and after I had made a short speech they asked me if I would mind answering questions. In the course of my early professional career I had to undergo many examinations, but all the examiners were not equal to the Health Committee of Bradford, for they managed in an hour and a half to cover the ground, and they put their questions with a detailed thoroughness that showed they had studied the subject, and compelled my admiration. If I can be of any help to Bradford in the providing of a pure milk supply I shall be pleased to do anything I can. One word to my friends, the farmers. I need hardly say I have no feelings against any farmer, but I think they would make a great mistake in obstructing anything in the nature of a farm producing really pure milk. The people who ought to know more about this subject are the farmers, and the sooner they can have an opportunity of seeing what are the conditions attending the production of really pure milk the better for themselves and for everybody concerned.

The meeting then terminated.