some liquorice powder eliminating these as causes of pain, and a note, which I need not add, setting forth the mother's account of the symptoms corroborating the above details.

The patient was treated in the ordinary way. All her pains left her soon, and her recovery was satisfactory.

CASE III.

N. H. was a girl of 12, whom I saw first of all on February 5th as an out-patient at St. George's Hospital. The symptoms complained of were recurring "fainting fits," and recurring paroxysms of abdominal pain. There was no family history of rheumatism, but a fortnight before the patient had had sore throat and pain all over. She was a well-nourished, well-developed, intelligent child. The abdomen was normal. Temperature 100.2°. Heart's impulse diffuse, action rapid, and distinct left-side dilatation. There were no vacant beds in the hospital that day, so she was given some sodium salicylate and sent home; but her symptoms were not relieved, and on February 19th a vacancy was found for her and she was admitted into the hospital under the care of Dr. Rolleston. Her condition then was much the same as upon February 5th, the temperature being 100°, and the pulse 120, low tension, rather irritable and jerky. The left heart was dilated, the area of cardiac dullness extending to just outside the left nipple. At the apex, the sounds were embryocardial and rather abrupt in character, and the rhythm tended to alter on movement. There was a haemic *bruit*, best heard in the third left space, and the pulmonary second sound was a little accentuated.

A few days after her admission I wrote the following note about her abdominal pain: "Nearly two years ago she saw a doctor in the country on account of recurrent sharp pains about the upper abdomen. In other respects her health was good. She was told that it was colic, and prescribing was probably in accordance with this diagnosis. But she was not relieved, for from time to time since then attacks of this pain have recurred. They have sometimes been associated with growing pains in the legs, but these have not been sufficient to make her limp. The pain in the upper abdomen has occurred in short paroxysms lasting but a few minutes, but recurring frequently throughout the day. They come on especially when she runs or walks fast, and when they come on she stays still, and doubles herself up somewhat; she does not rub her stomach, nor sit down. The pain comes in the right hypochondrium and runs across the epigastrium just above the umbilicus. 'It is inside.' It is not associated with tenderness or soreness of the abdomen. It has nothing at all to do with the ingestion of food; it is not accompanied by vomiting or nausea. She distinguishes it absolutely from a 'stitch in the side,' which she has had on one or two occasions on running, and from colicky pain, such as that she has had since admission to the hospital, probably due to the administration of an aperient. Though these pains may occur in exactly the same situation as the kind first described, they are both 'quite different.' She is unable, however, to explain in what way they are different. She says that they are worse than the colicky pain she has had since admission, but not so bad as a stitch in the side. The pain does not go through to the back. Since admission none of the peculiar attacks of abdominal pain have occurred."

CASE IV.

E. T., aged 16, was admitted into St. George's Hospital on February 25th, 1904, under the care of Sir Isambard Owen. She was complaining of joint pains and swellings, with sweating and headache.

Family History.—Negative.

Past Personal History.—Scarlet fever several years ago. Since the age of 14 occasional slight growing pain in the legs; never bad enough to make her limp.

Present Illness.—Began on February 18th with pain in the left ankle and right knee. She tried to do her work, that of a general servant, up to February 23rd. About this time joint pains and headache got worse, and in addition some shooting pains occurred about the upper abdomen. They were not associated with nausea or vomiting nor with the taking of any medicine, for none had been given her. The bowels were regular. The pain came on independently of food. It seemed to be inside and went across the epigastrium, but seemed to have started in the hypochondriac region, more commonly on the right side than on the left. It did not go round or through to the back at all. Though constantly recurring it did not last very long at a time. The paroxysms came on during the night, waking her out of sleep, as well as during the day. They occurred five or six times during the night and three or four times during the day. She appeared never to have had a "stitch in the side," and so cannot compare them to this pain. She had never experienced pains like them before.

Course.—Under the usual treatment the pains as well as the other symptoms of acute rheumatism subsided satisfactorily. The patient is still in the hospital, however, for on March 21st she had to be readmitted, three days after being discharged, on account of a relapse. The abdominal pain did not return during the relapse. She is now feeling well again and will soon be able to leave the hospital, for it seems that her heart has not been permanently damaged.

CASE V.

A. S. was a boy of 16, who was admitted into St. George's Hospital on March 4th under the care of Dr. Penrose. He was complaining of joint pains flying about. These, slight at first, affected chiefly the ankles and knees, and had come on originally three weeks before his admission. Shortly before admission they were associated with pain in the neck and across the shoulders, and on February 29th he got "pains in the stomach." These were not associated with anorexia, or vomiting, nor with the taking of food. Action of the bowels did not influence them,

they were not connected with the taking of a purgative, and they were unlike the pains that may occur after the administration of an aperient, though they were occasionally associated with gurgling sensations of the bowels, and once with slight nausea. The bowels had been regular. They came on in short attacks lasting a minute or two, situated in the epigastrium, not sufficiently severe to double him up, but quite sharp. They were not below the level of the umbilicus, and were not associated with soreness of the abdominal wall, but seemed to be inside. They were in the hypochondrium sometimes, more commonly on the left than on the right side. They occurred chiefly in the night while he was warm in bed. They woke him up, recurring four or five times during the night.

On admission the patient's temperature was 101°, he had a moist skin and smelt rheumatic. There was arthritis of both knees. The first sound of the heart was muffled, but the heart was not dilated. Under full doses of salicylate and the other usual remedies his pain went away. An eruption of exudative erythema on the trunk occurred on March 8th to 11th. On March 30th he was able to go home, somewhat anaemic, but fairly well.

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ON THE BACTERIOLOGY OF SO-CALLED
"STERILIZED MILK,"

WITH SPECIAL REFERENCE TO THE MUNICIPAL SUPPLY OF
MILK FOR THE FEEDING OF INFANTS.

BY

WM. ROBERTSON, and WM. MAIR, M.B.,
M.D.Glas., D.P.H., Ch.B., B.Sc.Ed., D.P.H.Camb.,
Medical Officer of Health, Lecturer on Bacteriology, Queen's
Leith. College, Belfast.

It is now nearly ten years since Professor Flügge, of Breslau, called attention to the dangers of imperfectly sterilized milk in the feeding of infants. The subject does not appear, in this country at least, to have attracted the attention which its importance deserves. And in view of the activity of many municipalities in the direction of establishing infant milk dépôts, the present appears an opportune time to rediscuss the question. The chief results of a bacteriological examination of the milk supplied by the Leith Corporation's infant milk dépôt, given below, form the basis of the present article.

It is now, we suppose, universally admitted that the great majority of intestinal disorders of infancy occur in artificially-fed babies, the large proportion of these affections being caused by the bacterial contamination of cows' milk used as a substitute for mothers' milk. We are unfortunately still in the dark as to which group or groups of the infinite variety of bacteria occurring in milk are to be regarded as the chief offenders. Our ignorance on this point would matter less if by any convenient method we could kill all the bacteria in milk. But, as will be presently shown, this is almost, if not actually impossible, as long as we continue to adopt our present methods.

The bacteria in milk may be roughly divided into three classes, according to their powers of resisting heat.

1. Non-spore-bearing bacteria. These include the cocci, the lactic acid, coli and proteus groups. The members of this group are very easily killed by exposure to temperatures of 100° C., or as an alternative by heating for a short time at a temperature ranging between 90° C. and 95° C. This latter temperature is reached when in domestic parlance, articles of food are "brought to the boil." Pasteurization—subjecting the milk to a temperature of 70° C. for half-an-hour—will also kill these bacteria. The bacteria which are the normal inhabitants of the mammary ducts of the cow, and which cannot be avoided even with attention to the utmost care and cleanliness, belong to this group.

2. The butyric acid bacilli. These are strictly anaerobic spore-bearing bacilli. They rapidly decompose milk when stored in closely-stoppered bottles, with strongly acid reaction, coagulation and butyric acid and gas formation. Their spores are killed by an exposure of one to one hour and a-half at a temperature of 100° C. To this group belongs Klein's bacillus enteritidis sporogenes.

3. The bacillus subtilis group. These are aerobic spore-bearing bacilli, but are capable of growing under anaerobic conditions. They decompose milk with faintly acid or unchanged reaction, coagulation of the casein and subsequent liquefaction of the coagulum.

From the latter fact Flügge has called them the "peptonizing" bacilli. They are characterized by an extraordinarily rapid rate of growth at high temperatures (25° C. and up-

wards), comparatively little growth taking place below 22° C. Their spores are more resistant than those of Group 2, most of them requiring an exposure of at least two hours at 100° C. to effect their destruction. It is to the importance of this third group of "peptonizing" bacilli in the causation of summer diarrhoea in infants that Flügge has called attention. Infantile diarrhoea, as measured by statistics of mortality, only occurs to any marked extent in countries where the mean summer temperature rises above 60° F. In these countries more than three-quarters of the deaths occur during the hottest quarter of the year—June to August. Also every rise of temperature is closely followed by a rise in infantile mortality. The mortality is practically confined to infants fed upon cows' milk, and occurs, according to Flügge, despite the fact that the majority are fed upon cows' milk which has been boiled. Suspicion is thus immediately cast upon the "peptonizing" bacilli, since these grow very rapidly at the temperatures in question and without producing much obvious change in the milk. The anaërobes, Group 2, are less likely to do harm, as they speedily curdle milk and render it obviously unfit for human food.

Flügge isolated twelve distinct species of "peptonizing" bacilli from samples of market milk. These are fully described (distinguished by numbers) in his article.¹ On account of their power to produce albumoses and peptones in milk all of these must come under grave suspicion. But three of them Flügge found to be definitely pathogenic to mice, guinea-pigs, and rabbits, when injected subcutaneously or intraperitoneally. When milk cultures of these bacilli were given by the mouth to young dogs the animals drank the milk readily, and immediately suffered from diarrhoea, which was followed by fatal results when the feeding was continued; recovery taking place when other milk was given. Similar experiments with the acid-forming anaërobes failed, because the dogs refused to drink the milk.

Flügge's investigations led him to the conclusion that most of the so-called "sterilized" milk on the market was quite unreliable and likely to cause harm. The labels attached to the bottles usually stated that the milk was "Sterilized" (*Sterilisirte Milch* or *Keimfreie Dauermilch*). In fact Flügge suggests, and we think the force of his suggestion is very strong, that it should be made compulsory to change the wording of the label to read "Heated Milk, not Sterile" (*Erhitzte Milch, nicht Keimfrei*). "Must be kept at a temperature below 18° C., or used within 12 hours."

The following diagram, taken from Flügge's article, shows the relative rapidity of growth at various temperatures of two of his "peptonizing" bacilli, and the *bacillus acidilactici*.

Lubbart² made a closer investigation of the pathogenic properties of Flügge's bacillus No. 1. He confirmed Flügge's results, and came to the conclusion that the toxin is contained within the body of the bacillus and that only in its vegetative form, the spores being harmless. He found that by boiling the milk culture before use it was no longer pathogenic, either when injected or given by the mouth. This is very important from a practical standpoint. He also made the very interesting observation that while the milk culture

caused fatal diarrhoea in young puppies when given by the mouth, it was harmless to older dogs even in large quantities (1½ litre per day for five days).

Weber³ examined 150 samples of "sterilized" milk from Berlin shops, finding only 54 per cent. sterile. He isolated and described 13 species of "peptonizing" bacilli, and investigated their pathogenic powers. In only three of the bottles did he find pathogenic bacilli corresponding to those described by Flügge. With these he was able to confirm the results of Flügge and Lubbart, with the exception of the feeding experiments. He considers that these bacilli (like all other members of this group) are only harmful in that they are capable of setting up fermentative changes in the milk, and not in virtue of the toxins contained in the bacilli. Whether these bacilli are only harmful when a weakened state of the body permits them to grow in the intestines to an abnormal extent and set up fermentation there (as Escherich and his pupils hold), or whether, when given in large quantities, they can set up intestinal disturbances even in normal circumstances, must at present be left an open question.

If Flügge be right in thinking that the bacilli of Group 3 play the most important part in the causation of summer diarrhoea among infants the reproach against partially sterilized milk is a very serious one. It means that the comparatively harmless bacilli of Group 1 are killed, while the spores of the putrefactive bacilli are left to flourish undisturbed by competition. It is a well-known fact that milk ordinarily turns sour without putrefying. In fact, the lactic acid bacilli may, from this point of view, be regarded as actually beneficial, since they inhibit the growth of the "peptonizing" or putrefactive bacilli.

At the same time, we think it will be agreed by most practising physicians—in this country, at least—that many of the intestinal disorders of infancy may be prevented by boiling the milk, an indication that the bacilli of Group 1 are the real culprits. In any case, it behoves municipal authorities who supply milk which is called "sterilized," and which is believed by the public, and perhaps by not a few of the medical profession, to be sterile, to control the quality of that milk by frequent bacteriological examinations. Also to give their customers the necessary directions for its proper keeping.

Bacteriological Examination of the Milk Supplied to Infants by the Leith Corporation from the Infants' Milk Dépôt.

At this dépôt the bottles, fitted with ordinary spring stoppers, are placed, after being filled, in a sterilizer which is supplied with steam under a pressure of between 12 and 15 lb. The registering thermometer passes through the lid of the sterilizer into a conical vessel filled with milk. After this thermometer registers 212° F. the bottles are subjected to that temperature for half an hour.

It may be objected that from what we know of the powers of resistance to heat of the various organisms, nothing is gained by leaving the bottles in the sterilizer so long; that an exposure of from five to ten minutes would serve the same purpose. But preliminary experiments showed distinctly better results with an exposure of twenty minutes than with only five or ten minutes. It has therefore been considered advisable to give half an hour, that being the limit allowable without causing an alteration in the taste and colour (caramelization) of the milk.

All the bottles examined contained between 5 and 6 oz. of a mixture of three parts of milk to one of water, with the addition of some cream, sugar, and salt.

It was desired in the first place to ascertain how many of the bottles were actually sterile. On receiving the bottles from the dépôt they were placed in the incubator at 98° F. for two days. Those bottles which showed coagulation were tested for gas formation and reaction. Loopfuls from the remainder were taken with a sterile platinum needle and spread upon agar plates. The reaction was tested with litmus and the following tests made:

1. *Boiling Test*.—A little of the milk was put in a test tube and boiled. In some cases coagulation of the casein occurred.

2. *Alcohol Test*.—A little of the milk was put in a test tube, and an equal amount of alcohol (68 per cent. by volume) added. In most cases where the milk was not sterile a fine flocculent precipitate resulted. In no case was the reaction obtained with sterile milk. This test, originally used for fresh milk, has been shown by Weter to be equally applicable to "sterilized" milk, and to be much more sensitive than the boiling test. Our results confirm this observation.

It may be said that the agar plates were examined after incubation at 98° F. for twenty-four hours.

The subjoined table shows the results of the experiments:

Bottles Examined after Incubation at 98° F. for Two Days.

Date.	No. of Bottles.	Spontaneous coagulation.	Of remainder.			Not sterile.	Sterile.
			Boiling test.	Alcohol test.	Tests negative but not sterile.		
Nov. 2	8	2	?	?	?	7	1
" 17	4	?	?	?	?	3	1
Dec. 5	9	9	—	—	—	9	0
" 6	7	6	0	0	—	6	1
" 7	9	2	1	2	1	5	4
" 8	7	7	—	—	—	7	0
" 10	7	2	0	1	1	4	3
" 14	7	6	1	1	0	7	0
" 15	7	5	0	1	1	7	0
" 19	4	1	0	1	0	2	2
" 24	7	7	—	—	—	7	0
" 26	5	3	0	0	0	3	2
Jan. 7	9	8	0	0	1	9	0
Total ...	90	58				76	14
Percent. ...	100					84.4	15.5

Thus it will be seen that only 15 per cent. of the bottles were sterile, and it is also to be noted that the percentage of sterile bottles varied largely from day to day. This can only be due to variation in bacterial contamination of the original milk. The majority of the bottles which coagulated showed strongly acid reaction, gas formation, and characteristic smell of butyric acid. The remainder gave a faintly acid reaction and uniform coagulum.

It was next desired to ascertain the number of bacteria present after two days at various temperatures. Various dilutions were made, and for the lower temperatures at least two agar plates were poured, each with 1 c.cm. of a 1 in 10 dilution of the milk. For the bottles exposed at the higher temperatures much greater dilutions were necessary. The plates were incubated at 98° F., and were counted from eighteen to twenty-four hours afterwards. The numbers must be regarded as only of approximate and relative value, since it was frequently impossible to make satisfactory estimations on account of the very rapid growth over the surface of the agar, even when only a small number of colonies were present. No attempt was made to count the anaerobes present.

The series of bottles were exposed for two days at room temperatures varying between 50° F. and 70° F.

Date.	No. of Bottles.	Not Sterile.	Sterile in 2 c.cm.	Average number of Bacteria per c.cm. of those not Sterile.
September 16th ...	6	1	5	10
December 21st ...	7	2	5	5
" 23rd ...	7	5	2	3.400
" 25th ...	7	1	6	16,000

The following bottles were incubated for two days at 70° F., and the results may be considered along with those just given.

Date.	No. of Bottles.	Not Sterile.	Sterile in 2 c.cm.	Average number of Bacteria per c.cm. of those not Sterile.
December 29th ...	7	2	5	30
" 31st ...	7	—	7	
January 2nd ...	6	2	4	12,000
Totals ...	47	13	34	Average number of bacteria in those not sterile 4,400.
Per cent. ...	100	27.7	72.3	

These results must be held to be quite satisfactory. There is evidently very little growth of the organisms concerned at temperatures below 70° F. Seventy-two per cent. of the bottles were sterile in 2 c.cm.; in the remaining 28 per cent. the bacteria did not average more than 5,000 per c.cm. None of the bottles gave the alcohol reaction. We conclude from the above results that the milk is safe and reliable when kept even for two days at temperatures below 70° F.

It is very different, however, with the next series of bottles examined, which were incubated for two days at 80° F.

Bottles Incubated at 80° F. for Two Days.

Date.	No. of Bottles.	Not Sterile.	Sterile in 1 c.cm.	Average number of Bacteria per c.cm. in those not Sterile.
January 4th ...	6	4	2	50,000
" 5th ...	6	5	1	180,000
" 6th ...	6	3	3	38,000
Totals ...	18	12	6	
Per cent. ...	100	66.6	33.3	100,000

Here, evidently, there has been very active growth, and the proportion of sterile to non-sterile bottles is almost reversed, while the average number of bacteria in those not sterile is no less than 100,000 per c.cm. Three of the bottles gave the alcohol reaction, all gave a faintly acid or amphoteric reaction to litmus. None were altered in appearance or taste.

Bottles Incubated at 90° F. for Two Days.

Date.	No. of Bottles.	Not Sterile.	Sterile.	Average number of Bacteria per c.cm.
January 8th ...	6	6	0	4,000,000

One of these bottles showed a clear zone below the cream, indicating a separation of the casein. On shaking the bottle this abnormal appearance at once disappeared. The taste was only slightly bitter, and the smell unaltered. All showed faintly-acid reaction. The remaining bottles were unaltered in taste and smell. One of them coagulated on boiling, and two gave the alcohol reaction.

It will be observed that these results correspond closely with the curves shown in Flügge's diagram.

It would be very desirable to conduct similar experiments during the summer months, when milk is, for various reasons, much more liable to contamination with spore-bearing bacilli.

Conclusions.

The first and obvious conclusion arrived at is that the designation "sterilized" milk, as applied to that sold from corporation dépôts, is wrong and misleading, and we would suggest the substitution of the term "Milk Prepared for Infants." In this way there will be no sailing under false colours, nor will undue confidence be placed in the keeping qualities of infants' milk. From Weber's results it is obvious that the remark as to designation also applies to commercial "sterilized" milk.

Secondly, every customer should be carefully instructed as to the necessity for keeping the milk in as cool a condition as possible. This instruction will especially be necessary in summer, when the temperature often exceeds 70° F.

Thirdly, faith in the powers of our steam sterilizers should not be too implicit. Accordingly, in hot weather each day's supply ought to be sold as it is prepared.

Fourthly, as an additional precaution, all bottles, after being taken from the sterilizer, should be placed in warm water gradually cooled. To place the still hot bottles in cold water would lead to their bursting.

From the writings of Flügge, Lubbert, and Weber it is not difficult to understand why imperfectly sterilized milk may be the cause of diarrhoea and intestinal troubles. If imperfectly sterilized milk is allowed to stand in warm rooms it will soon become a source of danger to the consumer, and it behoves us to avoid this possibility by insisting that all "prepared" milk be stored in cool places.

There are those who, after reading what we have written, will come to the conclusion that the establishment by corporations of infant milk dépôts should neither be persevered with nor advocated. If our article leads one astray in that direction, we take the early opportunity to say that our faith in providing milk for infant feeding is in no way weakened; but our attention has been forcibly drawn to one or two points the emphasis of which will, we trust, be a help to those corporations whose enterprise and forethought have led them to come to the aid of those infants who were being martyred at the shrine of ignorance.

The Commissioner who wrote in the JOURNAL about the Milk Supply of Large Towns is one of those who scoffs at the principle of corporation efforts to supply bottles charged with carefully regulated meals for infants. He would—and we are thoroughly at one with him—prefer to have pure milk reach

the house from the cow. That is to say, there must be clean hands to milk the cows, whose teats, udders, and flanks must also be purified. In addition all milk after coming from the cow must be filtered and cooled, and if possible sold from sealed cans or bottles. That we admit to be the ideal which we must all seek to achieve in our respective districts. But by way of corollary to his able articles there appeared the replies received from many medical officers of health regarding the enforcing of regulations under the Dairies, Cowsheds, and Milkshops Orders. The sad tale need not be retold, but these replies showed that in many districts regulations were not even framed, and that where they were in existence they were frequently not enforced. It is a knowledge of these facts, unfortunate as they are, that has urged some medical officers of health to advise their local authorities to adopt the principle of supplying milk in such a way that it will be safer to drink than most of the filthy stuff coming in from badly kept cowsheds and dirty cows.

Two years ago we instituted a crusade against these cow-feeders who did not keep their premises in conformity with the existing regulations. The cow-feeders in the district promptly formed themselves into an association, engaged a solicitor, and held an indignation meeting at which we were denounced as "hounds of officials" who were seeking to ruin an arduous and honest calling. Much was achieved despite the meeting and the declamations, but it had to be done at the point of the bayonet.

In some districts the cow-feeders are alive to the necessity for keeping everything clean, but that appears to be the exception to the rule. The cow is a machine which is depleted three times daily, and fed to give plenty of milk. There is no time to waste over the cleansing of hands or anything else. Moreover, the general public looks upon cold milk with suspicion. It requires much education on this point, for if milk be warm, though it be heated with the addition of hot water or skimmed milk, the consumer believes it must be fresh from the cow. Filters and milk coolers are slow in action, and the cow-feeder starting operations at 4 or 5 every morning, declares that he has no time to waste over details which he is pleased to call the "fads of health officials." The average cow-feeder refuses to be taught. He will not leave the path trodden by his predecessors. Force alone will compel him to adopt more modern and cleaner methods. That force must be applied from two directions. First, the general practitioner must take a keener and more active interest in the subject of pure milk supplies. If the family physician only knew it, many a patient of his drinks milk which in the language of the Public Health Acts is "unfit for human food." Were the doctor to teach his patients why milk, artificially cooled, is safer to use by reason of its better keeping qualities, the urgent demands from consumers would soon goad the milk seller to supply the want. Secondly, the power must be placed in the hands of the medical officer of health to say to a cow-feeder when his traffic is not being conducted on satisfactory lines. Analogous power is granted under the Factory and Workshop Act when dealing with bakehouses. The fact that the local authority comes in as a buffer between the health official and the cow-feeder makes the supervision of the milk traffic often extremely difficult, and in some places well-nigh impossible. That this anomaly should be remedied appears to us to be absolutely necessary.

While the foregoing remarks have taken us beyond the province of our paper, they go to prove that the medical officer of health is perfectly justified in advocating the establishment of infant milk dépôts, and we speak from experience. It has been our constant aim to persuade and teach cow-feeders in our district the value and importance of cleanliness. We have made some progress, and have earned for ourselves a notoriety for hard heartedness and severity which few men possess, and all because we have tried to rouse the Rip Van Winkle cow-feeder out of his sleep. With that experience to guide us we had no hesitation in recommending the adoption of the principle of supplying infants with milk which had been filtered, mixed with cream, sugar, and water in definite proportions, put up in bottles which had been scrupulously washed, and finally subjected to a temperature sufficient to kill most of the micro-organisms present. We have been gratified beyond measure to see the good results, not the least valuable of which has been the education of the people. Many, indeed most, of those who come to our dépôt are drawn from that class which has been in the habit of feeding infants upon the rule of thumb principle. Dirty bottles, rancid teats and tubes, and extraordinary varieties

of food have been supplanted by consistently good and wholesome nourishment at a very low cost. Already many mothers have come to appreciate the difference between the old and new method, and when we can say we have educated them to value the importance of sound infant feeding we have achieved much.

When the ideal milk supply of our large towns is universal the people may have no need of corporations to assist in the mixing up of food for the young. We cannot, however, wait for the mountain to come to us, so we must go to it by taking an immediate step in the direction of preparing milk for infants, thousands of whom, despite the purest milk supply in the world, would be fed upon mixtures of wonderful concoction.

[NOTE.—Since the above was written it has been decided to pasteurize the milk by subjecting it to steam at 170° F. for twenty minutes, and subsequently cooling the bottles.]

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"GOUTTES DE LAIT ET CONSULTATIONS DE NOURRISSONS."

By G. VARIOT, M.D.,

Médecin de l'Hôpital des Enfants Malades, Paris.

IN France rapid progress has been made in the scientific rearing of infants under a system of medical supervision. Midwifery doctors conceived the idea of having infants born in maternities brought back periodically to be weighed and inspected, and if need be that milk might be supplied for their nurture. Professor Hergott, of Nancy, founded in 1890 a charity in the maternity to encourage breast-feeding for infants. Mothers who suckled their children and who brought them back one month after birth in a satisfactory state received a monetary donation. Thus Dr. Hergott succeeded in materially stimulating the suckling of infants for the first few months of their lives, the most important period. In 1892 Professor Budin organized at La Charité in Paris a *consultation de nourrissons* for children born in his wards. He submitted the mothers to a weekly inspection during the whole period of nursing, and he also distributed sterilized milk to those who had an insufficient natural supply. Only 5 or 6 per cent. of the children were fed entirely from the bottle, 60 per cent. were breast-fed, and 35 per cent. received their nourishment partly from the breast and partly from the bottle. These are the most recent figures, and relate to cases which were attended to at the *consultation de nourrissons* at the Clinique Tarnier during 1903.

We physicians have adopted the method of watching our infants inaugurated by the accoucheurs, and have introduced it into a different sphere, into dispensaries for sick children situated in the poor quarters of Paris. In 1892 I established at the Dispensaire de Belleville, in one of the poorest districts of the French capital, a *goutte de lait*, and shall briefly describe the field in which it works and its methods. Children of the lowest and poorest classes are brought to us who are almost invariably fed artificially and rarely if ever breast-fed by their mothers, who are compelled to work hard to be able to rear their children. Most of the children are atrophic after illnesses such as gastro enteritis. They are not always brought by their mothers, but often by a grandmother, an elder sister, or an *élevreuse* (baby farmer). Bad rearing and the injudicious use of the feeding bottle are consequents of misery and pauperism. Such is the infant population of our *gouttes de lait* both in the poor quarters of Paris and in the manufacturing centres, where women are obliged to work in the manufactories or in the workshops. It is utterly impossible to resort to suckling to combat infantile mortality in such centres. The mothers have no longer any milk. We have therefore organized the scheme of distributing good sterilized milk, which we give gratuitously or at a reduced price according to the funds of the charity. This distribution of milk is of great value where the great majority of children have to be nursed artificially. For this reason we have adopted the apt title of *goutte de lait*, which was originated by Dr. Dufour in 1894 to designate the most interesting work he had organized at Fécamp.