

diarrhea essentially a summer diarrhea. Moreover, it is a common observation that the diarrheas of the exclusively breast-fed are usually tractable, regardless of season, in otherwise healthy infants, by the application of the well-known principles of hygiene.

The startling mortality from digestive disorders is confined almost entirely to bottle-fed babies. This fact is so generally established that when pronounced diarrheal symptoms appear in an infant at the breast the first interrogations are directed towards the possibility of the ingestion of other material than breast milk. A careful study of the infant's hygiene, with examination of the dejecta after colonic flushings, frequently disproves the statement that the child's diet included nothing but breast milk. Statistics show that in the fatal cases of summer diarrhea less than 3 per cent. were exclusively breast fed. No clinical phase of this subject begins to rival in importance this one fact, that summer diarrhea, with rare exceptions, means practically summer artificial feeding.

In view of our knowledge of summer diarrhea the question of feeding, then, is of paramount importance. A neglect to use every means to secure for the infant natural food can not be atoned for by the most energetic therapy yet devised. Many of the obstacles to natural feeding are insuperable or even formidable only so long as the lay mind is asleep to the fact that his physician knows how to prevent fatal digestive disorders in the infant. When the responsibility for the consigning of a baby to a method of feeding that diminishes his chances of living two-fold more than inoculation with smallpox virus is fully brought home to the physician the difficulties of breast feeding will become proportionately insignificant. The fact that some governments and municipalities now require on the infant's death certificate a statement as to the method of feeding shows an awakening to the importance of this matter. How long before the same line of inquiry shall require an explanation as to why the infant was subjected to the manifold dangers of artificial feeding?

It has long been claimed, partly from inference and latterly as a result of milk examinations, that breast milk is not constant in its composition, but varies normally, not only in the total amount of solids, but also in their relative percentages. The admirable work of many milk analysts, especially that of the Adriances, shows some of these variations in solids during the entire period of lactation in quite a large number of recorded cases. So far as I can learn, however, no extensive record has been kept as to the influences of season on the various constituents of the mammary secretion. From my own observation I am confident that careful work will show diminution in the solids of high caloric value during the hottest weather.

A fact which admits of no discussion is this, that dietetic changes to meet the varying thermic conditions of climate and season are essential to normal metabolism in older children. Under what age this physiologic law is inoperative the most exacting artificial percentage feeders have neglected to state. Beginning with as low solids in their synthetic imitation of mother's milk as will sustain life, the rule is to increase gradually all the solids until an approximation of breast milk percentage is attained—the advancing age of the infant requiring a daily increase in the total quantity ingested. Whether from May to September or from October to January, whether in Florida or in Manitoba, the artificial emulsion must be pushed with increasing age. The sweltering infant's cry of thirst is inexorably met

with the bottled emulsion of higher proteids and hydrocarbons until the overtaxed digestion suddenly fails. Fermentation and putrefaction follow with acute intoxication and much speculation as to the etiologic rôle played by the organism of Shiga.

Under such dietary regimen of unnatural foods, unnaturally administered, we cease to wonder at the high death rate of bottle-fed babies in hot weather.

When a tithe of the work that has been expended to cheat the babe and mother out of their mutual rights by the substitution of artificial methods of feeding, shall have been devoted to the problem of lactation, its physiology and its pathology, then will the morbidity and mortality of the suckling cease to be the opprobrium of the medical profession and the Shiga bacillus, with its pathogenic congeners, may be relegated to the background.

#### SUGGESTIONS FOR REDUCING THE PREVALENCE OF SUMMER DIARRHEA IN INFANTS.\*

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Summer diarrhea is caused by the entrance into the system, usually through some food medium, of a virulent poison, which is the product of micro-organisms.

The symptoms in a given number of cases of summer diarrhea will vary enough to enable one to recognize, aside from degrees, several forms of the disorder.

The nature of the infection—whether it was poisonous products already formed outside the body or whether it was bacteria as such that entered the gastro-intestinal tract—has been offered in explanation of this variation in symptoms. But since, thus far, there has been no single form of bacteria separated as being specifically responsible, it is possible that the nature of the organism itself has something to do with shaping symptoms.

However, what uncertainty exists as to the cause of the several forms of the disease does not make less absolute the conviction in the minds of bacteriologists that summer diarrhea is the result of bacterial infection and that whatever other factors are concerned are not causes *per se*, but are only conditions most favorable to the development of the bacteria and to the production of their poisons.

It was by accepting this view that Kerley<sup>1</sup> was able to prove so brilliantly the curable nature of the disease.

But summer diarrhea is better than curable—it is preventable. If a child is fed on a food containing neither poison nor organisms capable of producing poison that child will not be poisoned!

We witness, however, an annual recurrence of this disorder and in such prevalence as to show that we have thus far accomplished but little in the way of prevention. This unsatisfactory result is easily accountable.

First, because there is a large percentage of practitioners still believing that heat and humidity alone and without the presence of a single bacterium are capable of producing the disease.<sup>2</sup> This view precludes any acceptance of its preventable nature. Consequently, a large

\* Read at the Fifty-fourth Annual Session of the American Medical Association, in the Section on Diseases of Children, and approved for publication by the Executive Committee: Drs. H. M. McClanahan, A. C. Cotton and H. E. Tuley.

1. Kerley: "Treatment of Summer Diarrhea in Infants." *New York Medical News*, Aug. 4, 1900.

2. Editorial: "Summer Diarrheas in Children." *THE JOURNAL A. M. A.*, July 4, 1902.

percentage of the medical body has shown no inclination to co-operate with those especially interested in carrying out prophylactic measures.

Beside, there is involved in the subject of prophylaxis itself a complexity and a multiplicity of questions that have been discouraging to the accomplishment of appreciable results. Once we undertake to force the right of every child to receive nothing but a clean unpoisoned food we find ourselves entangled "in embarrassing questions of home sanitation and of personal hygiene and in graver questions of state medicine and of public charities."

Another factor, which has offset any results in the way of general prophylaxis, is found in the increase in the number of children being artificially fed. The artificial foods are the ones most likely to be contaminated and the artificially-fed infant offers the least resistance to bacterial poisoning.

Realizing, then, the main difficulties confronting us, can we overcome them?

Since the whole question, complex as it may seem, resolves itself into one of education, it seems to the writer that these disorders ought no longer to be accepted as inevitable.

The persistent pushing of the infectious nature of summer diarrhea at every available opportunity by every member of the profession who believes in it, and especially by every member of this Section who believes in it, will soon have the profession at large educated up to the point of acceptance. Let the bacterial origin of the disease be taught in our schools, stressed in our societies and our journals, and there will soon be found as few retaining the old ideas relative to the cause of summer diarrhea as there are now still holding to the old ideas of the cause of puerperal septicemia.

#### MODE OF ENTRANCE OF BACTERIA.

The food of the ordinary infant is milk. Unfortunately milk is one of the happiest of media for bacteria. Breast milk is not infrequently contaminated through careless and uncleanly habits of the mother. Therefore, we find that summer diarrheas are not confined entirely to bottle-fed babies. But owing to carelessness in dairy methods, in its transportation and in its handling, cow's milk is much more apt to be contaminated with enough of adventitious matter to make it swarm with micro-organisms. Notwithstanding, I meet doctors prescribing milk formulæ who do not even take the trouble to ascertain the name of the dairy furnishing the milk from which their formulæ are to be made. In a community above the average in the intelligence of its medical men, I find the utmost indifference as regards the milk supply. To a large body of the profession milk is milk. Our duty here is clear, namely, to teach these men that some milk is milk and that some milk is—poison!

#### PERSONAL INSPECTIONS OF DAIRIES.

The result of this teaching will be more general inspections and investigations of dairies by physicians. The physician, who possesses any degree of progressiveness or any regard for the welfare of his patients, will come to appreciate the advantage of being able to recommend dairies which are reasonably certain to supply clean milk. This is a commercial age, and dairymen, without being necessarily dishonest, are governed by commercial motives. There can be no greater stimulus for getting dairymen to exercise care and thought in an endeavor to supply an uncontaminated milk of good quality than the knowledge that what they give will be known and

that their prices and patronage will be governed somewhat by the quality of milk furnished.

#### MILK COMMISSIONS.

Even should there exist among medical men a widespread desire to raise the milk standard, except for those physicians living in towns where the milk is furnished directly to the consumer by the dairyman, the visiting of dairies and the inspection of conditions thereon would be found to be impossible. In large cities milk is furnished by dealers after it has been collected from many farms and from varying distances. For the individual physician to inspect the source of such a supply is clearly impractical. This difficulty has already been partly met in some few cities by the establishment of what are known as milk commissions.

The objects, methods and personnel of such a commission, briefly stated, are about as follows:

The commission assumes the responsibility of ascertaining and of recommending dairies and dealers which can be depended on to furnish clean milk. On request, any dairyman or dealer is furnished with explicit instructions as to how he may bring his dairy or depot and its product up to the requirements of the standard set by the commission. Should he become a candidate for the certificate of recommendation furnished by the commission, his farm in the one case or his milk depot with its source of supply in the other, is inspected and the certificate granted or refused, according to the findings. Any certified dairy is open to as many inspections and without previous notice, as the commission may see fit to make. The commission withholds the right to withdraw any certificate issued.

Beside members, whose duties are purely executive or clerical, the commission is usually composed of four experts: (1) A veterinarian, who examines the cattle and all matters pertaining to their health, care and management; (2) a physician, who examines all persons connected with the dairy in relation to their habits of cleanliness as well as for transmissible diseases; (3) a bacteriologist, who examines the milk to test the efficiency of the measures in force for excluding bacteria, and (4) a chemist, who examines the milk as to its composition and for adulteration.<sup>3</sup>

#### WHERE MILK COMMISSIONS HAVE FAILED.

These commissions have accomplished enough to prove their practicability and to encourage those interested to further endeavor, but their results have not been in proportion to the unselfish efforts that have been expended. This disappointing feature is due to a lack of appreciation and of co-operation on the part of the general profession. The men interested in such commissions are too often regarded as enthusiastic cranks possessed of a hobby! They even fail to gain the undivided support of those directly concerned with the question of infant feeding. A partial canvass by the writer of the nurseries and babies' hospitals in one of the cities having a milk commission, resulted in the finding that not a few of these institutions were employing milk other than that recommended by the commission.

I believe this failure of the profession at large to take early advantage of the benefits offered by the milk commission to be due in part to the sectional workings of the medical societies of large cities. It is only the most energetic and progressive man in such societies who is

3. For fuller description of milk commissions see reprint from seventeenth annual report of Bureau of Animal Industry (1900), entitled "Market Milk: A Plan for Its Improvement," by R. A. Pearson, M.S. I have made free use of Mr. Pearson's description in this article.

acquainted with the advances being made in sections other than the one in which he finds himself peculiarly interested. I would suggest, then, to the pediatric sections of these societies that in order to gain a fuller appreciation of what they have done toward solving the milk problem they must not only invite an acceptance, but they must force it. Send men capable of presenting the subject clearly into the other sections to beg for co-operation. Let the milk commission itself send to every physician in its radius a statement of its methods and objects, and let this be accompanied by a circular letter asking the physician addressed to further its purposes by his encouragement.

If the commissions already existing can gain the co-operation to which they are entitled they will be able to prove such signal service to their communities that they will be emulated over the entire country and springing up around such commissions will be found the coveted model dairies.

#### STERILIZATION AND PASTEURIZATION.

Several methods of killing the bacteria in milk have been suggested. But aside from any objectionable features resulting from the continued use of a milk that has undergone sterilization or pasteurization, such processes are uncertain and have the additional objection of being compromises with filth. A milk coming from the dairy free of disgusting and poisonous contamination ought to be as much more acceptable to the mind of the physician as it is to the digestive apparatus of the infant.

#### CONTAMINATION IN THE HOME.

Foul milk does not always denote an illy conducted dairy. From my opportunities of observation I have come to believe that milk is subjected to almost as many contaminating influences after delivery as it might have been in its source. In the homes of the well-to-do this happens by giving the care of the milk into the hands of ignorant servants. The physician should guard against this by advising the mother of the necessity for her personal supervision. But this condition is more applicable to the homes of the poor, and more especially to the homes of the city poor.

#### SUMMER DIARRHEA IN THE TENEMENTS.

The habitat by choice of summer diarrhea is the tenement house. It is here that every condition is favorable, and it is here that we are forced to compromise with conditions as they exist. But, than what has been done, can we do nothing more energetic, more practical and more benevolent to save the child of the tenement? We can not reach into such places from behind our desks in the dispensaries. We can not reach into such places by taking the mothers and their sick babies for a day's excursion on the river or into the country. These have been tried, and each year brings back the same anxious train of dirty mothers with their sick and dirtier babies. The dispensaries and hospital boats are worthy institutions deserving of support, but they are not enough.

#### PAMPHLET EDUCATION OF THE POOR.

I know of no better way to carry the light of hygiene and sanitation into the tenements than to carry it there.

If the boards of health were to compile a set of practical, explicitly worded and easily intelligible rules for the care of infants during the hot season; if these were to be printed in the four common languages of tenement, Yiddish, French, German and English, and published in pamphlet form; if a pamphlet of this kind were to be given a wide distribution in the homes of the poor, I be-

lieve much could be accomplished in the way of hygienic education and of prophylaxis.

As the poor possesses an inquisitive mind, so far as it is practical, reasons should accompany the rules embodied in such a pamphlet.

The question of distribution may offer some perplexity. Last year an admirable set of rules for the management of infants in summer was published by the board of health in one of our cities.<sup>4</sup> I was not made acquainted with the plan of distribution here, but from an announcement in the secular press I judged that those who did not apply for them were not furnished with these printed rules. If this was its extent the distribution could not have been very successful, either in its breadth or in its results. The idea may have been to enhance the value of the pamphlet by putting its owner to some slight inconvenience in securing it. But I believe the same effect may be obtained in a better way.

If such pamphlets were carried into the homes of the poor, and if each mother into whose hand a pamphlet is placed were given to understand that at a subsequent time a physician would visit her home to see if the measures advised were being observed, I believe more appreciable results would follow.

From the medical schools in these cities on which the tenement evil has engrafted itself a corps of students from the upper classes might be organized to carry on this work. Many of the students would be glad to accept an opportunity of thus profitably employing the summer months and of an early identification with their profession. As a further inducement, such students as would enlist should be given credit and mention by their schools for any written observations on their work. If the ranks are still unfilled the post-graduate schools could supply enough men to make up the deficiency.

Such a corps of workers should be under the direction of the hospital dispensaries and clinics. To make the project a success there should be an agreement and an understanding as to the division of the work.

After the distribution of the printed rules the corps of outdoor workers should be allowed the privilege of treating cases of summer diarrhea among the children of the poor of which they may become advised. The first treatment might be given at the dispensary and the case then followed into its home by the assistant on the corps of outdoor workers to see if the measures advised at the dispensary are being carried out and to give any additional treatment that seems necessary.

I realize that this is but an illy defined and roughly outlined plan, but it is only offered as a suggestion in the hope that it may be given further thought and consideration.

#### BOTTLE FEEDING.

Among the conditions hindering the reduction in the number of victims to summer diarrhea I have alluded to the increased number of infants being artificially fed. This condition I believe is not to hold.

At the last meeting of this Section the opinion was freely expressed by some of the attendants that endeavors to perfect milk modification had not only proven disappointing, but had resulted in an actual curse. If this opinion does not prevail its influence at least has been felt.

Milk modifiers have begun to show moderation in their claims; the confident tone of their papers heretofore is somewhat less characteristic. They have begun to spend

4. "Rules for the Management of Infants During the Summer Months," compiled by the Obstetrical Society and approved by the Philadelphia Board of Health, 1902.

more time in seeking for a necessity to justify the substitution of prepared food for breast milk.

That such a necessity does not exist as often as those who have been eager to demonstrate their ability to rival Nature would have had us believe, was impressed on me by a paper read before this Section last year.<sup>5</sup> Anyone likewise impressed and to the point of trying the measures therein advised, I believe, is now ready to assert that breast milk in a great many cases can be conserved, its quality improved and its supply increased, and that the number of bottle-fed infants can be reduced.

[This Symposium on Infant Feeding and Digestive Disturbances will be concluded next week by the papers of Drs. Davis, Brush, Parke and Mastin and the discussion on the nine papers.]

## FRUIT VESSELS, MOSQUITOES AND YELLOW FEVER.\*

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The subjects which are about to engage our attention have been under investigation for many months. They comprise the following points: 1. The scarcity of *Stegomyia fasciata* on non-infected fruit vessels from ports quarantined against yellow fever. 2. The scarcity of cases of yellow fever on fruit vessels from ports quarantined against yellow fever. 3. The impunity of intercourse with fruit vessels at the city wharf before the holds are fumigated. 4. The *Stegomyia fasciata* on non-infected fruit vessels from ports quarantined against yellow fever are not infected. 5. The improbability of stegomyia on infected fruit vessels becoming infected before arriving at the quarantine station. 6. The impossibility of mosquitoes on infected fruit vessels to carry yellow fever to the city before the arrival of the vessel at the city wharf. 7. The cases of yellow fever found on fruit vessels were infected ashore.

### I.—SCARCITY OF STEGOMYIA FASCIATA ON FRUIT VESSELS FROM PORTS QUARANTINED AGAINST YELLOW FEVER.

During the quarantine season of 1902 fruit vessels plying between New Orleans and the fruit ports of Central America carried marine medical inspectors, who were instructed to capture on each vessel a few mosquitoes on every trip, in order to determine the kind of mosquitoes found on board of these vessels. There were 12 fruit vessels carrying marine medical inspectors, and they made during the quarantine season about 180 trips in round figures.

The marine medical inspectors captured 208 mosquitoes on board of the vessels during that period.

The mosquitoes were sent to the Division of Entomology in Washington, and were examined by the director of the division, Mr. L. O. Howard. It is to his courtesy and kindness that we are indebted for the valuable information that follows. The report below was received from Mr. Howard Dec. 8, 1902:

The first examination of your mosquitoes has been completed and the result follows:

Port Barrios, ashore in houses, 3 specimens of *Stegomyia fasciata*, 84 in houses.

Port Limon, on board vessels, 2 specimens of *S. fasciata*, 62 other specimens.

On board vessels, mail route, P. Barrios P. Cortez, 1 specimen of *S. fasciata*, 48 other specimens.

Havana, on board of vessels, 10 specimens of *S. fasciata*, 61 other specimens.

Bocas Del Toro, ashore in houses, 21 specimens of *S. fasciata*, 2 specimens of others.

5. "The Improvement of Breast Milk and Prolongation of Lactation," Thomas S. Southworth, New York. THE JOURNAL A. M. A., Aug. 2, 1902.

\* Read before the Louisiana State Medical Society, New Orleans, April 28-30, 1903.

Belize, ashore in houses, 15 specimens of *S. fasciata*, 10 other specimens.

Cuba, ashore (no locality given) 2 specimens of *S. fasciata*, 3 specimens of anopheles.

Port Limon, in houses, 9 specimens of *S. fasciata*, 32 other specimens.

Bluefields, in houses, 4 specimens of *S. fasciata*, 49 other specimens.

Bluefields, on board of vessels, 2 specimens of *S. fasciata*, 93 other specimens.

Livingston, ashore in houses, 24 specimens of *S. fasciata*, 6 other specimens.

Port Cortez, ashore in houses, 42 specimens of *S. fasciata*, 7 other specimens.

Directing our attention specially to the mosquitoes captured on board of the fruit vessels we find that on the vessels on the mail routes comprising Port Barrios, Port Cortez and Belize 49 mosquitoes were caught, of which 1 was stegomyia and the other 48 of another kind; that the vessels from Port Limon furnished 64 mosquitoes, of which 2 were stegomyia and the 62 others of another kind; that the vessels from Bluefields furnished 95 mosquitoes, 2 of which were stegomyia and the 93 others of another kind. In résumé, 208 mosquitoes were caught on board of the fruit vessels, of which only 5 were stegomyia, that is, less than 2.5 per cent.

This number, 208, is remarkably small considering the number of vessels, of inspectors and of round trips; that is because mosquitoes are not present on all vessels and are in no great numbers when present, and therefore not very easy to find and capture. The percentage of stegomyia is remarkably small because the stegomyia is especially a house mosquito. We will see further that in the houses the percentage of stegomyia is 40 per cent.

The percentage of stegomyia found on fruit vessels is as follows: Port Limon, 3 per cent.; Bluefields, 2 1/8 per cent.; Barrios, 2 per cent.; Cortez, 2 per cent.; Belize, 2 per cent.

It would be important to determine the percentage of the males among the 208 stegomyia caught on fruit vessels. Mr. Howard's attention was called to the fact too late to ascertain this positively, as his assistant had thrown the mosquitoes away after the first examination, but Mr. Howard states in his letter that the females were enormously in the majority.

The fruit vessels plying between Havana and New Orleans during the quarantine season of 1902 furnished 71 mosquitoes, of which 10 were stegomyia and the others of another kind, i. e., 16 per cent.

### II.—SCARCITY OF CASES OF YELLOW FEVER ON FRUIT VESSELS FROM FRUIT PORTS QUARANTINED AGAINST YELLOW FEVER.

It was about fifteen years ago, in 1886, that the importation of fruit from the tropical ports to New Orleans really began. The main regulation was that no vessel should have any communication with the shore. During that time an average of seven vessels a year were engaged in that trade. Each vessel made an average of two trips monthly during the quarantine season; that is, during six months. There were, therefore, eighty-four trips per year, and during the fifteen years 1,260 trips or vessels. During these fifteen years five fruit vessels arrived at the Mississippi River Quarantine Station with yellow fever on board during the quarantine season. They were:

1887—City of Dallas, from Belize, July 6, one case.

1888—Foxhall, from Limon, August 14, one case.

1889—City of Dallas, from Livingston, October 1, one case.

1897—Jarl, from Bocas, October 27, one case at Quarantine and two in the city.

1900—Adler, from Limon, August 26, one case.

All these ports had yellow fever in those years. The percentage of vessels with yellow fever on board is about one-third of 1 per cent.