

found that in very hot summers the infant mortality was no greater than in summers of medium heat. He noticed the fact that as soon as the outdoor thermometer registered 60° and remained at that for some days the trouble began. Now, milk begins to turn at 60° F., and as milk was and still is the chief article of infant dietary, the conclusion was natural that the food had a good deal to do with the trouble. He also noticed that breast-fed children, as a rule, were exempt. His conclusions have been verified by other researches.

Weinert claims that of 602 fatal cases recorded by him only 24 were breast-fed, cow's milk being the food of the balance.

Holt states that of 431 cases only twelve per cent. had been breast-fed. Hope, of Liverpool, states that of one thousand fatal cases only thirty had the breast exclusively. Ballard states that of three hundred and forty-one fatal cases only seven had the breast. That is, out of one thousand nine hundred and forty-three cases only ninety-nine, or about four per cent., had been fed on the breast alone.

These statistics bear out the statements of Dr. Siebert, because mother's milk is not affected by the heat in the same way as cow's milk, and hence the low mortality in breast-fed children; moreover, children fed during cold weather on cow's milk generally do well. Hence our conclusion that the action of heat on the cow's milk is the chief cause. Vaughan, of Ann Arbor, was the first on this continent (to my knowledge) to draw attention to the presence of a chemical prism in milk, which was being fed to a child suffering from cholera infantum. He has published a number of similar cases since. From this milk he was able to separate a substance which crystallized, and which when fed to rabbits produced diarrhoea and vomiting. He named it tyrotoxin, and was able to group it in the diazo-benzol series. He has been able to produce this poison artificially, but has not yet ascertained definitely the exact germ on which the development of tyrotoxin depends. His contention was that this poison was one of the pathogenic organisms of cholera infantum, but only one of a class which were cathartic in nature and all of which were liable to develop in milk.

This brings us to the central point of the

paper, viz., the view that the presence of bacteria in the intestinal canal is the cause of the different kinds of diarrhoea, and these bacteria produce this result by a toxic ptomaine which is thrown out by them in the process of digestion. Certain antecedent conditions may be necessary to produce these symptoms—such as a vitality depressed by heat and bad hygiene, or a functional indigestion produced by too frequent feeding, improper food, or failure of the digestive powers for any reason. Result the same always—a partially digested mass of food, which at the body temperature rapidly ferments, and thus a fitting soil is furnished for bacterial growth.

Let us review briefly the evidence in favor of this contention:—

1. Diarrhoeas begin when the temperature rises to 60° F., at which temperature milk begins to ferment.

2. Children in the country are comparatively free, because they can always have fresh cow's milk. Breast-fed children have been shown to be very free.

3. Cow's milk agrees fairly well, in cities and towns, with children in cold weather; but in milk carted long distances and thus placed under conditions favorable to bacterial growth, and in warm weather, these diarrhoeas begin.

4. Actual discovery of a toxic poison known to result from the activity of germ life, which was being fed to a child suffering from cholera infantum, and which ptomaine, when fed to animals, produced the symptoms of cholera infantum.

5. There is undoubted evidence that impure milk, in which germ life is always active, will produce these summer diarrhoeas.

6. Several varieties of these summer diarrhoeas are infectious.

7. Bacteria can produce intestinal disturbance, e.g., the typhoid bacillus, the tubercle bacilli, and the comma bacillus of Asiatic cholera.

All these facts point very strongly, in fact positively, to the bacterial causation of these summer diarrhoeas, but we are not able yet to specify the particular type of bacillus which causes any particular form of diarrhoea. In the faeces of a healthy suckling child two bacterial forms are found, viz., the bacterium lactis