

Notes on Practical Nursing.

THE DIETING OF PATIENTS.

LECTURES TO PROBATIONERS.

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IX.—MILK—VARIOUS TESTS—STERILISATION.

At our last lecture we saw that cows' milk forms the basis of the food of infants brought up by hand, and, indeed, we may further say that we rely upon it almost entirely for nourishment in the great majority of acute illnesses. To-night, therefore, I propose to demonstrate the difference between good and poor milk, to show you a method of roughly estimating its quality and to explain why it is generally considered safer to pasteurise or sterilise it before using it for infants or sick persons.

We may describe milk as a compound fluid holding in suspension certain fatty and albuminous matters, and it is upon the proportion of these in the percentage composition of the whole that we estimate the quality of the milk.

We begin our investigations by testing the reaction of the milk with litmus paper. It should be almost or entirely neutral. When *quite* fresh it is slightly alkaline; this soon passes off, and it becomes neutral and eventually acid, the degree of acidity depending upon the length of time it has been standing exposed to the air. If it shows a markedly alkaline reaction after standing some hours, you may be sure that it has been adulterated by the addition of some chemical preservative.

Sour milk is caused by certain bacteria (*bacteria lactis*), which either find their way into the fresh milk from the atmosphere or the interior of vessels which have previously contained milk and have not been properly cleansed and scalded.

The particular action of the bacteria consists of converting the "sugar in milk into lactic acid, which coagulates the casein" (*Whitelegge*). The further decomposition of milk is brought about by other bacteria when lactic fermentation has prepared the way for them.

It is a matter of everyday experience that warmth and certain conditions of the atmosphere favour the "souring" of milk, and Sir Lauder Brunton has pointed out that milk swallowed after the bacterium *lactis* has found an entrance (although its action be barely perceptible) will, "when put into a warm stomach, undergo change, and will become sour and even putrid in a comparatively short time," and, it is possible, may, by causing gastric disturbance, "destroy the last chance of life" in a patient hovering between life and death.

We will now proceed to take the specific gravity of a sample of milk by means of a lactometer (being

careful that the instrument does not touch the sides of the vessel containing the milk, otherwise the result will not be trustworthy). The reading at the surface of the liquid is 1,031. It should be 1,030 to 1,032 at 60° Fahr., temperature slightly altering the reading. Thus, according to Parkes, 1,029 at 70° Fahr. becomes 1,030 at 60° Fahr., and 1,031 at 40° Fahr. So our sample is correct in this respect. I add a little water, and you observe that the specific gravity is at once lowered.

We now test another sample of the same milk, from which we skim some of the cream. You see that the reading on the lactometer is somewhat raised, but by judiciously adding water we can bring it again to the correct unadulterated milk standard (1,031) of the first sample. You can readily understand that, taken alone, the specific gravity test is unreliable; it is not so when it is considered in conjunction with a test for estimating the quantity of cream, which I will now show you, first explaining that an average sample of milk should contain about 10 to 12 per cent. of cream. A good Alderney cow's milk will sometimes show as much as 30 to 40 per cent.

True, the public health authorities only insist upon 9 per cent., but this is a very low standard, fixed with a view towards protecting the small retail dealer, and scarcely high enough for an infant's food.

I have here a cylindrical glass vessel graduated to 100 c.c. and filled with milk, which has been standing undisturbed in it at a temperature of 60° Fahr. for eight hours. We can calculate that 70 per cent. of the cream will have now risen (*Whitelegge*), and as nine divisions of the glass contain cream above its junction with the milk, we can easily reckon that our sample contains 12.857 per cent. of cream, and is therefore satisfactory.

Milk may be contaminated in many ways: it has the property of absorbing sewer and other poisonous gases, which cause no alteration in its appearance or taste, and yet produce toxic effects when swallowed. You must, therefore, be careful in selecting the place for its storage. Boiling does not render these poisons harmless; it does, however, destroy bacteria, and so will prevent fermentation and decomposition.

Various epidemics have been traced to the milk supply of the sufferers, and it is now known that milk may be the carrier of the microbes which cause many diseases, the bacteria finding their way into the milk either from a diseased udder, the milker's hands, the atmosphere, unclean vessels, or dilution with infected water. We may mention especially the specific germs of enteric fever, tuberculosis, infantile cholera, green diarrhoea of infants, scarlet fever, and diphtheria. Fortunately, however, these cannot survive a temperature of 70° C., although according to many authorities their

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