gradual until we reach the same extent with our butter as we have with our cheese in the English market, and our farmers will then be in a prosperous condition.

Yours truly,

PETER MACFARLANE.

10th February 1900.

Thanks for the hint about the calves. Veal, in Montreal, is far from being what it ought to be; it is often tough, dry, and fatless. A really good "fillet of veal," from a well-fattened calf, is one of the most delicious joints ever put on the table.

ED.

BACTERIA.

Lecture by Mr. Samuel Lowe.

I stated that there were no bacteria in the milk so long as it is in the cow's *udder*, if she is perfectly healthy; but you must not imagine that the same holds good as to the milk in the *teat*. In the former case, it is hermetically sealed from the air, while the air, having accesss to the drop of milk left in the end of the teat, impregnates it with bacteria, and, the animal warmth of the cow being just the thing for their development, the milk remaining in each of the teats soon swarms with them. In the first jets of milk that spirt from the teats, are found about 50,000 bacteria to the cubic centimètre of milk, that is about the contents of a thimble, while in the milk towards the end of the milking, there are not more than 500.

Even if I were to enumerate separately the other sources of contamination, it is the atmosphere that is the chief source. Thanks to the kindness of Prof. Russell, of the experiment-station of Wisconsin, I will presently show you on the screen, with the magic-lantern, (1) the importance of that source of infection. Professor Russell showed that, the cows being milked in the cowhouse during winter, there fell on an average, each minute, into a pail, ten inches in diameter, 5,300 bacteria. If the precaution had been taken to wash the cow's udder and the milker's hands, before milking, the number would be reduced to 1,300 a minute. In an analogous experiment, made in the open air in August, the diminution of the number of bacteria was 89%. It is not unusual to give the cows hay just as the milking is about to begin, and when that is done the air is found to be loaded with dust and the spores of bacteria. Prof. Russell's experiments show that, under these conditions, more than 160,000 microorganisms fall into the pail a minute, while if the milking is done under conditions of absolute precaution, the number may be reduced to 2,400 a minute; and the milk drawn in the latter case has kept sweet for 24 hours more than under ordinary conditions, the two milks being kept in the same room. It does not follow that, because so large a number of bacteria get into the milk, that on that account the milk will not keep. The preservation of milk depends entirely upon its subsequent treatment. If the milk were cooled down to a temperature hard upon 32° F., immediately, that is, within two or three minutes after its being drawn, it would keep for a very long time; because, at such a low temperature, the bacteria are reduced to inactivity, and rendered utterly incapable of multiplying. On the other hand, if the milk were carried off at once, heated up to 160° F., and kept there for 20 minutes, all the bacteria present would be destroyed and only a few germs would remain. If the milk, before it could get infected anew with bacteria, were promptly reduced to 50°, it would equally keep sound for a very long time. The chief causes of bad milk are: 1. the introduction of a great number of bacteria; 2. the high temperature at which it is kept; the latter cause being by far the most influential. The warmer the milk is kept, up to a certain degree, the sooner it spoils, because the bacteria develop more rapidly. The activity of the growth of the bacteria induces their rapid multiplication along with quick chemical modifications.

THE SOURCES OF FLAVOUR AND AROMA IN BUTTER AND CHEESE.

Now that you know why sweet milk becomes sour, you will the more easily understand whence the aroma and flavour of butter and cheese are derived. My principal reason for detaining you so long on this subject of bacteria is, to show you that it is to them that we owe both the good and the bad flavour of butter and cheese. I hope to convince you that each distinct flavour or aroma is due to one species of bacteria, and, besides, that it is possible to isolate each of these species, and, thanks to them, to obtain any flavour or aroma we want.

(1) See p. 282 of the 15th annual report of the D. Ass.