

Samples of this preserved milk have been submitted to various medical and other authorities, who report very favourably regarding it. Klein, the well-known authority on microbes and such small organisms, says he has been unable to detect the presence of any of these organisms, whether harmless or disease-producing. Professor Wauklyn also certifies that the milk is of excellent quality and excellently well preserved, and several physicians commend it as highly beneficial in wasting diseases of adults and children, and as a remedy for diarrhoea, &c. The principle on which the success of this process depends is simply that of completely sterilising the milk—that is, depriving it entirely of any of those small organisms usually known as bacteria, which are the active agents in bringing about fermentive and putrefactive changes. When these organisms and their germs are completely destroyed the milk will keep in good condition if protected from the air, which is done by hermetically sealing it up in tins. The knowledge which has been acquired of late years as to the nature and habits of bacteria renders such a process possible. Experiments have shown that, if the temperature of a liquid be raised to a considerable extent, any of these minute organisms which it may contain are completely destroyed; but the germs or spores are not so easily got rid of, as they can endure much higher temperatures than the organisms from which they are derived, and may, therefore, give rise to new swarms when the liquid cools again. Further, these germs require a certain moderate amount of heat in order to insure their development into fully-formed organisms, just as an egg requires some heat to develop the chick. It is evident, therefore, that we never can be sure that any liquid is completely sterilised by merely heating it once to a high temperature; some germs may remain, and, indeed, new germs may be formed by the organisms before they perish, and hence the labour may be lost. If, however, we first raise the temperature to such a degree that we know must destroy all the fully-developed organisms which may be present, and then allow it to remain for some time at a temperature most suitable for the development of those germs which are most advanced, we shall have a second crop of organisms, which we may then destroy as before by again raising the temperature. Even after this, however, we may still have some germs remaining, and to get entirely rid of those we must repeat the foregoing process several times perhaps, but we shall at last get rid of the trace of germs, so that no further development can possibly take place. When this stage is reached the liquid is now perfectly sterilised, and will keep sound and fresh if protected from contact with the air, which might introduce a fresh crop. This is essentially the process which is adopted in preparing this new preserved milk. The milk is taken direct from the cow, and, in the first place, is cooled down to ordinary temperature—about 50° or 60° Fahr.—and then hermetically sealed up in tins. In this state it is exposed to a temperature of about 160°, and kept at this for one hour and three-quarters or thereabout, after which it is allowed to cool down to 100°, at which it remains for some time. It is then quickly heated up again to the former temperature of 160°. This alternate heating and cooling is repeated in the same manner several times, and then finally the temperature is raised to the boiling-point of water, or about 212°, after which it is cooled again to ordinary temperature, when it is found to be completely sterilised, not a trace of any organism or germs being left, and is therefore in a state in which it can be kept for an indefinite length of time without undergoing any change. We have had a considerable number of sample tins of this milk which had been preserved from various lengths of time, ranging from six up to as much as fifteen months, and certainly, judging from these samples, the process is completely successful. It may be added also that on the tins being opened the milk does not rapidly turn sour, but may be kept for several days and still be fit for use, so thoroughly do the germs seem to have been destroyed. On the whole, the manufacture seems to be a distinct success, and well worthy of the attention of all consumers of this valuable article of diet.

VEGETABLE GROWTHS IN MILK.

In the course of a lecture on the "Chemistry of Milk," delivered by Mr. F. J. Lloyd, consulting chemist to the British Dairy Farmers' Association, at the Dairy Institute, Aylesbury, in treating of the constituents of milk, he said: "Although we have separated the fat from milk by the most perfect means which we have at our disposal, still it will remain cloudy; so that we know there must be something in it which is not like sugar in solution, but which is kept in suspension, as chemists call it, in the milk. This matter in suspension, when examined very carefully, is seen to be partly caseine, not altogether precipitated as it is by rennet, nor yet not altogether soluble. With this caseine are numerous products or substances which, so far as we know, do not always come from the cow, but which get into the milk after the milk is drawn from the cow. Some of these are vegetable growths; they are of the minutest kinds, and are called bacteria. This word is used to name all those minute substances which grow, and are most fond of growing, in milk. One of these is characteristic of milk. He would read the words of one of the greatest authorities who had studied this subject of bacteria. He said, 'The germs of the organisms called *Bacillus lacticus* are disseminated to such an extent that they never fail to be developed in milk under conditions.' Now, he wanted to explain what these ordinary minute organisms were. They were minute vegetable cells, which we hear spoken of a great deal, but which are exceedingly difficult to discover, even by means of the most powerful microscope, so infinitely small are they. After a great deal of trouble he had succeeded in making a drawing of some in cream, for he had found that these organisms were carried up in the big globules of fat forming the cream. Hence, cream is richer in these minute organisms than the skimmed milk underneath. And when we see the change they make we shall understand how important they are in connection with butter-making. When exceedingly magnified about a thousand times they can only just be seen—that is, appearing about one-sixteenth of an inch in length. But they have the power of dividing themselves, and each half will divide again, and so on infinitely at an enormous rate, and as they grow they produce certain changes in the milk. They feed upon the albumen, and they change the sugar which is in the milk into an acid, which is called lactic acid, and which causes milk to go sour, and cream too. It also gives the