

family as the aloë. This bitter principle has been determined by Professor Church, who has made a chemical investigation into the properties of flax; but after making it he simply says it is not his business to talk of its medicinal effects, and he says no more about it. Most of the bitter stuff is at the butt of the flax-stem.

5. Have you any knowledge of a company formed in Hawke's Bay and Manawatu to utilize this refuse as a cattle-food?—I heard that such a company was being talked about, but I did not know very much about the details of it. I simply heard that there was such a company being formed.

6. It has not been a success?—No, not to my knowledge.

7. You did not hear anything as to the cause of failure?—No, I did not.

8. *The Chairman.*] Can you assure the Committee, Mr. Reakes, that under certain circumstances which you have described—namely, the concentration of a considerable amount of the decomposing juice from the flax-refuse—that a poison is developed sufficiently strong to injure the health of animals, and in some cases cause their death?—Yes; the poison that is elaborated is the same class of poison that is produced when any organic matter is undergoing decomposition, just in the same way as you get the poisons which are commonly termed ptomaine produced in decomposing meat, for instance. It is simply the result of the splitting-up by bacterial action of the material into its various chemical elements, and if taken into the system in sufficient quantity that would cause ill health, and if in larger quantities it might cause death.

9. Can you account for what I assume to be a fact—namely, that the decomposition of leaves and decaying timber, and so forth, in a block of bush does not produce these poisons and discharge them into the streams that flow through the bush? In other words, that any person having a drink in a bush stream never fears any poison from decomposition of wood and vegetable matter?—Well, that is explained through two causes. One is that the process of decomposition goes on in the open, and many of the materials that are produced simply go away in the air in the form of gases; and in the second place, anything that remains on the ground as a result of the decomposition of the leaves and other vegetable matter does not necessarily find its way into the water. It is only just what happens to be carried along on the surface to the water, and consequently you do not get the accumulation of it in the stream that you do under these circumstances where you have got a large quantity of stuff being poured in day after day.

10. Peat, for instance? You know what is meant by peat: Peat-water is brown, dark in colour, but it does not produce any bad effects from the drinking of it?—Yes, well, the same thing applies to peat that you apply to ensilage, for instance. The changes which produce peat or which produce ensilage are brought about by a chemical process. The changes which produce the decomposition of vegetable matter which is discharged into water, or of animal matter which happens to get into water, are brought about by the agency of bacteria. That is the explanation. Just in the same way that ptomaines in meat are formed by bacteria. A good deal of the poison produced is produced by the micro-organisms themselves. It is given off from them, as it were.

11. Just as alcohol is the product of a chemical change from the sugar in the fruit?—Yes; but that is produced by the fermentation set up by the fermentative processes, which are micro-organisms in one form.

12. Have you had any opportunity of witnessing the state of the Manawatu and Oroua Rivers in recent years from the deposits of flax-refuse from the mills?—No, I have not.

13. What would you say in regard to the possibilities of injuring the dairy industry from the fouling of water by flax-mills?—Well, if a dairy factory is getting its water-supply from a stream which is contaminated by flax-mill refuse having been put into it higher up, it could quite well have a very detrimental effect on the quality of the butter produced.

14. *Mr. Buick.*] If that water is used?—Yes, if that water is used in the actual manufacture of butter.

15. *The Chairman.*] Would you think it likely that ordinary well-water, not artesian water, would be affected by continuous percolation of foul water from the surface?—It might be affected if the well were in soil of a sufficiently porous character, so as to allow water to percolate through it fairly easily. I do not consider the danger would be so great as in the case, we will say, of typhoid contamination; but it is not an impossibility provided the well were sufficiently near the watercourse where the contamination existed. But if it were any distance away I do not think the risk would be very great.

16. Taking artesian water, would it be impossible for contamination to enter in here?—It would be extremely unlikely.

17. The distance would be against it?—Yes, the risk would be reduced to a minimum.

18. Take a case of this sort: we have had in evidence a dairy factory some eight miles from running water, unable to get this refuse away except by a long course of little streams and drains, and so forth. The effluent had to travel eight miles. Can you suggest anything by which the difficulty of keeping the drains clean in such a case could be overcome?—Well, it would be rather a difficult thing to do unless the dairy factory happened to be situated on land which had a deep shingle subsoil. Of course, you do not often get that sort of land in dairying districts. It is usually heavier and richer land. But if you have a deep shingle subsoil, and you dig a large enough pit, and put your drainage in it—or you might have two pits and put the drainage into each alternatively—you would, I think, be likely to satisfactorily get rid of the drainage. As an instance of that I may say that we have at our laboratory at Wallaceville a shingle-bed, and the whole of the laboratory drainage, including everything except antiseptics, goes into a septic tank—not a very large one—which discharges into a pit dug in the shingle, a pit about 6 ft. square. That has been at work now for six or seven years, and everything gets away as well now as it did in the beginning. Naturally, of course, a dairy factory would have a very much greater volume of drainage to deal with, but that is an instance of how it could be got rid of under suitable soil