

essentially milk in which alcoholic fermentation has been induced, and allowed to proceed to a moderate degree. In Tartary, where it has been extensively used for centuries, mare's milk is employed; while in Russia, according to Liebig, cow's milk is chiefly used in its preparation. I am satisfied that koumiss made from cow's milk is quite as good as that made from the milk of mares or of camels. It has also been supposed that some special ferment used in Tartary was more efficient than any other, but I believe that ordinary brewers' yeast answers the purpose equally well.

As koumiss will not bear transportation to any considerable distance, it is desirable that the mode of preparing it should be generally known. I have therefore requested Mr. George I. McKelway, of Philadelphia, who has supplied me with all the koumiss my patients have used, to give the formula for its preparation. He writes as follows: "The manufacture of koumiss is a very easy and simple process. I take—

R. Best unskimmed milk..... qt.j.
Yeast (brewers' or old bakers').. grs.c.
Cane sugar grs.c.

"Keep the mixture at a temperature of 80° Fahr. until fermentation is quite brisk, stirring it frequently, and then bottle, carefully securing the corks with strong twine or wire. After twenty-four hours it is fit for use.

"The object of the addition of the cane sugar is the certain induction of alcoholic fermentation. If the sugar be left out the result is likely to be that lactic fermentation only is set up, and the product is sour milk. The quantity of sugar used has, of course, to be judged by the richness of the milk and its consequent richness in fermentable constituents."

The koumiss thus prepared by Mr. McKelway has proved entirely satisfactory. It is a very agreeable drink, having a slightly acid taste, and containing from three to four per cent. of alcohol, one to two per cent. of lactic acid, and is highly charged with carbonic acid gas. It contains the ordinary ingredients of milk, with the exception of the lactose (sugar of milk), most of which is converted into alcohol, and lactic and carbonic acids. Koumiss is acid to litmus paper, both before and after being freed

from carbonic acid. Its specific gravity is rather less than that of the milk from which it has been made (1.040 instead of 1.043). As it is important to retain its effervescing character, it should always be drawn by means of a "champagne tap." It should be used within a few days of its preparation, since after two or three days the alcohol and lactic and carbonic acids increase so as to make it less agreeable and less well adapted to most cases. It should be kept on ice, or in a very cool place, as warmth soon causes the caseine to separate into a thick, heavy curd. Koumiss may be said, then, to fairly represent the nutritive properties of good milk, while possessing, in addition, a mildly stimulating character. The carbonic acid gas with which it is highly charged acts also as a sedative to the gastric mucous membrane, and thus renders it well adapted to cases where there is much irritability of stomach.

I have used koumiss both as an exclusive diet and as an addition to an ordinary diet. In the former case the amount taken has been, at first, two or three fluid ounces every two hours; then, in the course of a couple of days, four fluid ounces every two hours; then six fluid ounces every three hours; and finally half a pint every three hours, or two quarts in the course of a day and night. This total I have rarely exceeded, though in a few instances as much as three quarts have been taken in divided doses. Usually, by the time two quarts had been taken daily for a short time, it has proved both possible and desirable to associate with it some simple solid food. When used as an addition to an ordinary diet, I have given it to the extent of one quart daily, in doses of half a pint in the intervals between meals. Formerly the high cost of this article was a serious objection to a prolonged use of it in large quantities, but now that it can be had at the rate of one dollar for three quart bottles, this objection has been largely done away with. I see no reason, however, why koumiss should not be made according to the above receipt, by any one who finds it inconvenient to obtain it from some of the recognized manufacturers, of whom there are several in Philadelphia and New York, if not elsewhere.

I must be brief in alluding to the conditions