of butter cannot be removed by washing it with pure water. Careful manipulation, with the cream and everything else just right, will make good butter without washing. But the extra trouble is wasted.

THE "GRAIN" OF BUTTER.

When the butter has "come," and appears in little irregular masses, from a pin's head to a large pea in size, is the time to draw off the buttermilk and wash the butter in the churn. This removes most of the buttermilk. After being then gathered and removed from the churn, worked, washed and salted on the butter-worker at the proper temperature, we find upon breaking it that it has a granular look. The mass seems to be made of little particles with a slightly glistening appearance. This is called the "grain." These small particles are partially kept apart by films of water (after salting this water becomes brine), and the peculiar texture thus imparted to the butter is a test of proper manufacture. Overchurn or over-work it, churn or work it at the wrong temperature, and the grain is gone, never to be restored; and with it is gone a large percentage of the selling value of the butter. Enough water (brine) must be retained to produce this appearance, which distinguishes "butter" from "grease." Consequently, the most perfect grain is obtained by washing in the churn before the butter is "gathered."

THE BUTTER GLOBULE.

To those who know nothing of the microscope and its revelations, a world remains hidden of which they can have little comprehension. To the naked eye milk appears a smooth, uniform fluid. To the eye, added by the combination of magnifying glasses, called a "microscope," (seer of little things), it is a translucent fluid, in which float a multitude of shining globes, and these globes are butter in its primitive state. We do not *make* butter when we churn, although we say so. When the process of churning has been continued until we can see little particles of butter in the cream, we say "the butter has come," and the next proceeding (after washing) is to "gather it." But, in reality, churning is a single process. There is no difference between the "coming" and the "gathering," except that the latter is visible, while the former is invisible to the unaided sight. All that we do when we agitate cream in a churn is to throw the butter globules strongly against each other. If the cream is too cold, we may do this forever and produce no butter, for the same reason that we cannot work butter into rolls or prints when it is too cold. The globules are too hard to stick together. They merely rattle against one another in the churn, like peas in a bag. If the cream is too warm, we can churn them together and then churn them apart again, because they are in too fluid a state to hold together against the action of the churn. So no butter comes in either case—there are "witches in the cream." The true exorcist in such trouble is a thermometer.

MORE MYSTIFICATION.

The mystifiers have held high carnival over the butter globule. Nearly all of them (I do not know an exception among dairy "Professors") declare that it has a shell, or envelop of membrane. Having created this shell (as the German philosopher created an elephant, "out of the depths of his moral consciousness"), they have as much trouble with it as they had with the "animal odor." Some tell us that the cream must be kept until acidity is developed, in order to weaken the shell. One has said that the churn must be so constructed as to have a grinding action upon the cream, for the same purpose. A good many have seen the shell, not only upon the globule, but after it has been ruptured and the butter has escaped. They describe it as accurately as they described the "animal odor" when concentrated into a "yellow oil," or as the old lady described the ague which the doctor made her throw up with a dose of lobelia. She said it "looked for all the world like the yolk of an egg."

And yet we know that we can make butter as easily from sweet cream as from sour. We know that we can make butter as quickly by shaking cream in a plain, pine box as when agitated with the most scientific dasher ever invented. We know that at the right temperature we cannot carry a bottle of cream a few miles in a wagon-box without finding butter there at the end of our journey. So far we have common sense *versus* inaccurate science.

If we go further, we shall find that while 20 years ago all physiologists thought they could see a membrane on the little globule (and nothing is more easy than to deceive one's self on this point in using an imperfect instrument, or a good one unskillfully), now more than half of those who have studied the question with ability declare it to be naked. It is really a difficult question to decide. Both optically, with the microscope, and by the use of chemical tests, the highest manual skill and the best mental ability are requisite in the determination of this apparently simple problem. But the writer hopes he may say, without undue egotism, that though "only an ordinary M. D. and farmer," he, 15 years ago, and several times since, has repeated, with many variations, a great variety of tests, both on the optical and chemical side of this "membrane" question, and concluded each time with a firmer conviction that the butter globules swim "bare naked" in the serum of the milk, requiring forcible contact only, at the right temperature, to cause them to adhere to each other and form butter. When he began this study he was not aware that a single prominent scientist held any other view than that the butter globule had an envelope. Now he is happy in finding the majority upon his side, and he looks, in a few years, to see the point demonstrated, by some ingenious experiment, so that there can be no longer any dispute. Practically, it is already proved, since the practice of the dairy would not be at all modified by the demonstration referred to. Its operations are conducted exactly as though an envelope exists, and with perfect results.

Orleans Co., Vt.

LIQUID MANURE.

T. H. HOSKINS, M. D.

The economy of liquid manure is beginning to attract a good deal of attention among progressive farmers. The questions addressed to me on the subject through the RURAL Office are worthy of better answers than I can give. Some time ago, I gave, in this paper, some account of the "manure mines" which a few young Vermont farmers had discovered beneath the old tie ups of their fathers' barns. Much good manure has been excavated from such places, but a vast quantity of accumulated fertility is yet lying unthought of, or unbelieved in, there. In this country a number of farmers have cemented the "substabular" excavations thus made, and are in the habit of drawing out the liquid every spring, sprinkling it thinly upon the mowings just as the grass is starting, with very good results. I find, however, that there are many stubborn unbelievers in the manurial value of urine. Some say it absolutely does no good, while others declare it to be injurious to crops. The fact is, that we have to learn by experience how to use any new fertilizer, and are apt to make many mistakes before we get down to the real facts in the business. Meantime those who are mentally so constituted as to be incapable of anything better than snap judgments, will rush into print with the declarations of things which they have not given a fair trial.

I noticed that your contributor, Bucephalus Brown, lately