Tea

How Long Should Tea Steep?

In Southeast Asia, tea leaves were chewed or infused in prehistoric times. Tea has been cultivated in China since the fourth century before our era, and its use was transported to Japan in about the sixth century. But if the practice of infusion is universal, all herbs and plants are not endowed with the same capacity for releasing scents and flavors.

Orientalism and, it must be confessed, a certain perfectionism about tea and its preparation, established its use in our countries, where we have not entirely forgotten that country people have made infusions from plants since time immemorial: mint, linden . . .

Let us give in to the tea craze. How long should it steep? Some tea drinkers recommend letting it steep longer than is necessary for extracting all the color, because certain flavors are released from the vegetable substances more slowly than the colorants. No doubt that is true, but only up to a certain limit, in particular the one that corresponds to the extraction of the tannins, substances that are bitter and astringent.

If this limit is passed, the solution of putting milk in the tea remains, but . . .

Tea in Milk or Milk in Tea?

When preparing tea with milk, should you pour the tea into the milk or the milk into the tea? Naturally, this is only a problem for those who, like the Eng-

lish, mix tea and milk together, but its answer may explain why our friends across the Channel are such tea enthusiasts. Prepared according to their method, tea loses its natural bitterness.

Even without having a taste for tea, we must recognize its great delicacy. Its light bitterness allows its delicate flavor and subtle scents to come through. How to retain those latter characteristics without the former? That is the milk's role, no doubt added originally for its natural sweetness, then embraced for the antibitter properties it possesses.

Tea is bitter because it contains tannins, those same compounds that give certain wines their astringency or even a marked bitterness, those same molecules that make a rose petal seem bitter if you put it in your mouth. Milk, on the other hand, contains many proteins, long chains folded back on themselves, that sequester the tannins. They bind themselves to them, destroying the bitterness.

An easy test of this is to add cold, raw milk to cold tea infused for a long time: the bitterness disappears. This same experiment, however, fails "hot," because the heat denatures the proteins, that is, it unravels them and deprives them of their sequestering properties. If tea that has steeped too long is added to milk that has boiled, the bitterness remains. Still worse, the taste of cooked milk masks the tea's flavors!

We now have all the elements we need to answer the initial question. If you add milk to very hot tea, its proteins will be denatured, and the tea's bitterness will remain. On the other hand, hot tea added to cold milk will lose its bitterness because the final temperature of the mixture will not be higher, at least at first, than the temperature at which proteins are denatured, and the proteins will sequester the tannins.

Change Tea's Color?

As long as we are adulterating tea, let us mention lemon. Why does its juice make tea lighter in color?

Does it, too, contain proteins that sequester the tea's colorant molecules? No, the explanation is of another order, more chemical than physical. Let us notice, first of all, that the tea to which lemon juice is added does not become

colorless, or even yellow, like the lemon juice. Its red color turns to orange, because its red pigments are weak acids (acids are molecules that contain a hydrogen atom capable of dissociating under certain conditions). In the presence of lemon juice, that is to say, a stronger acid, the yellow color of the nondissociated form becomes apparent.

By adding bicarbonate to tea—and I do not guarantee the gastronomic results of this experiment—we obtain the reverse effect. An intense brown color develops as a result of the dissociation of the acid groups and the appearance of the other dissociated form of the pigments.

How Can We Not Spill the Tea When Pouring It?

The "teapot effect" is one of the most disagreeable phenomena encountered in cooking. With certain teapots, the one pouring knows in advance that the boiling liquid will spill on the knees of the guests or at least on the carefully washed and ironed tablecloth.

Physicists who recognize this effect have found an answer, but it is a Pyrrhic victory: they try teapots out before buying them. The effect was studied by Marcus Reiner in 1956 at the Technical Institute of Israel. Then, in 1957, Joseph Keller of New York University explained the phenomenon.

In physics, the flow of a liquid is characterized by the current lines, which are tangential to the velocity vector of water. More concretely, you can form an image of these lines by putting small colorant particles into a flowing liquid; the streaks of color are the current lines.

When water flows over a horizontal surface, the current lines are horizontal and parallel, but when the liquid encounters an obstacle, the lines draw together and the speed of the liquid increases; simultaneously, the pressure diminishes. This increase in speed is well known to all sailors. When a current rounds a point, the water accelerates ahead of the point.

The decrease in pressure, imperceptible to the sailor, becomes evident, alas, when you pour tea. In passing near the lower edge of the spout, the current is pulled downward by the weight of the liquid, so that it accelerates and its pressure decreases.

The pressure decreases at the edge of the spout, did we say? Since liquids have a tendency to be displaced from zones of high pressure to zones of low pressure, the tea that accelerates is plastered to the side of the teapot. That is what scientists call the Bernouilli effect, and it lets them make a liquid flow the length of a long glass tube. In the case of tea, the liquid faithfully follows the contour of the teapot . . . and ends up on the table!