“As their highnesses travelled”, wrote Horace Walpole in an 18th century letter to a friend, commenting on a fairy tale he had been reading, “they were always making discoveries, by accidents or sagacity, of things they were not in quest of.”

It was Walpole who suggested that the word “serendipity” be included in our vocabulary after reading the Three Princes of Serendip. Serendip is the old Persian name for Sri Lanka. Nowadays serendipity is defined as the finding of something unexpected and useful particularly whilst looking for something entirely unrelated, or to use the visual words of Pek van Andel, studying serendipity and a winner of the Ig Nobel prize: “looking for a needle in a haystack and rolling out of it with a milkmaid.” Since 1994, Serendip has also been an interactive educational website that helps people improve their chances of deliberately making discoveries by chance. The discovery of cheese is a notable example of serendipity.

[Image: Illustration of serendipity: looking for a needle in a haystack and rolling out with a milkmaid.]
4.1. OLD CHEESE

Biotechnology is at least as old as documented history. Before 700 BC Homer, the author of The Iliad and The Odyssey, the oldest preserved examples of Greek literature, described a simple, yet interesting biotechnological experiment. He wrote that if you crush a fig branch and then stir the crushed part into milk, a solid forms in the milk, leaving a fluid which can then be drained off. What he was describing here is the making of a type of cottage cheese. What Homer didn’t and couldn’t know, is that the crushed fig branch oozed a little sap which contained the enzyme ficain (or ficin). This enzyme causes the casein (curds), the components in milk that help form cheese, to separate for the most part, thus making the casein curdle.

From an even earlier age comes yet another cheese story. By removing the fourth stomach of a freshly slaughtered young calf and pouring milk into it, the same process can be observed: the casein in the milk curdles. Here too a similar kind of enzyme is responsible for this action, namely chymosin (also called rennin), which leaks from the stomach wall and enters the milk. The chymosin then divides up the casein into a large part (90%) that separates out and a small part (10%) that remains dissolved in the residual liquid (whey). This must have been a mysterious but useful occurrence for observers in ancient times. As far as we’re concerned it is one of the first ever biotechnological applications.

4.2. TRADITIONAL CURDLING

In the nineteenth century there emerged a little understanding of what curdling actually involved. Furthermore, the first curdling company was founded in that century, in 1875 in Copenhagen by a man called Christian Hansen. Hansen bought rennet stomachs from freshly slaughtered young calves and, using salt solution, extracted the chymosin from them. The extract, rennet, is one of the first standardised, industrial products to be used in a biotechnological process, i.e. cheese-making. The Christian Hansen company is still producing rennet today, in virtually the same way. However, since 2002, the company has been working on new developments in collaboration with Novozymes, also a Danish company and one of the world’s biggest enzyme manufacturers, which makes frequent use of modern biotechnology (Textbox 4.1).