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You fight them, yet you can't live without them. Our bacterial warfare has led to an increase in antibiotic-resistant bacteria. In a not so distant future, even routine surgery may lead to incurable infections. One of the alternatives to traditional antibiotics is to exploit other forms of warfare between bacteria. Lactic acid bacteria are a natural part of human diet and microflora, and they are also deliberately added in foods and beverages such as in yogurt, salami and wine. Lactic acid bacteria (and other bacteria) produce bacteriocins, which are small proteins (peptides) that kill other, and in many cases pathogenic, bacteria. In general, bacteriocins kill by binding to a specific molecule (a so-called bacteriocin receptor) on the target cell which leads to membrane leakage and cell death. Bacteriocins from lactic acid bacteria are used today as natural additives in food preservation (as opposed to traditional chemical additives), but other potential uses include therapeutic probiotic agents or the direct use of bacteriocins as alternatives to, or in concert with, antibiotics. In order to exploit the full potential of bacteriocins, a detailed knowledge of their function is needed.

Lactobacillus plantarum is a lactic acid bacterium that produces several bacteriocins, including plantaricins EF, JK and S. These bacteriocins consist of two different peptides (i.e., two-peptide bacteriocins), of which both peptides must be present to kill the target cell. Bie Ekblad has in her doctoral thesis studied how the individual peptides of plantaricin EF and S work together. In aqueous solutions, bacteriocins are unstructured (flexible), but become structured, and therefore less flexible, when they come into contact with the target membrane. Two-peptide bacteriocins contain one or more specific motifs (a particular pattern of amino acids), which are important for the peptides ability to connect to each other and to the bacteriocin-receptor in membranes. Ekblad identified how the two individual peptides of plantaricin S looks like in membranes as well as analyzed which of the above-mentioned motifs (and other amino acids) are important for the bactericidal effect of plantaricin EF and S. Ekblad have also followed up previous results about a putative plantaricin JK receptor and confirmed this as a likely target for plantaricin JK in two different types of bacteria. Results indicate that plantaricin JK recognizes a limited area of the receptor. Such knowledge is important for rational use (and design) of bacteriocins.