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Sigma B army does more than combat stress

The protein Sigma B plays a key role in helping bacteria cope with stress. The protein sends out an army of proteins to combat stress. It does this by triggering the genes for making those proteins. But Sigma B does far more, as PhD candidate Claire Yeak discovered.

She investigated what Sigma B does in bacteria belonging to the *Bacillus* family by identifying sites in the genome of *Bacillus subtilis* that bind Sigma B. That binding switches on genes that drive the creation of the

desired proteins.

The landing spot for Sigma B consists of a piece of genetic code (the promoter) with around

40 base pairs. Yeak searched the *Bacillus* genome for this sequence. 'If you find that, it'll probably be able to bind Sigma B, pointing to a possible role for the protein.' Yeak found around 156 new binding spots for Sigma B.

That increases the total known set of genes controlled by Sigma B to

more than 500. The newly discovered functions unrelated to stress include control over the use of nutrients and the swimming behaviour of *Bacillus*.

Toxic

Bacillus subtilis and its relative *Bacillus licheniformis* are used a lot in biotechnology to make enzymes. But they also make surfactin and lichenysin, substances capable of destroying the membranes of plant and animal cells. Yeak discovered that Sigma B is indirectly involved in that production and that the substances are also toxic to humans. That raises the question of whether their presence in foodstuffs such as milk is safe.

'These days, consumers prefer lightly processed foods,' says Yeak. 'It's harder to kill bacteria in those milder conditions. In fact, my research into lichenysin shows that those conditions trigger their stress system as a protection mechanism.' ^{RK}

Functions unrelated to stress include control over the swimming behaviour of *Bacillus*