



Bacteria — why we should eat them

Nowadays, we expect the food we buy to be clean and largely bacteria-free — and so it usually is. But perhaps we shouldn't be so wary of bacteria. Research is suggesting that we might be better off if some of what we eat and drink were to contain more of them!

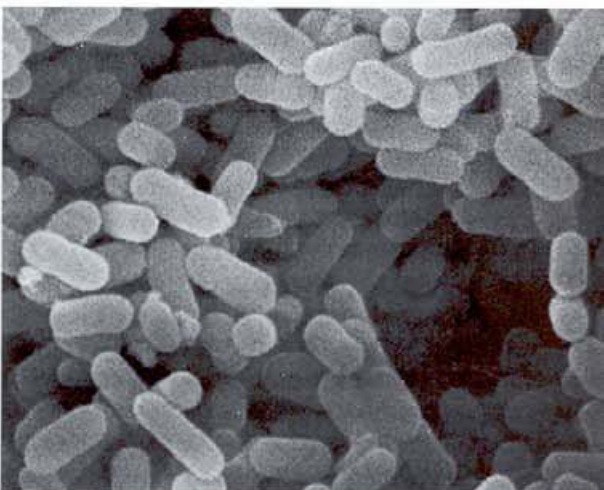
If that sounds shocking it's probably because most of us have been brought up with the idea that these micro-organisms are dirty, cause disease, and should be removed from our bodies and food. In fact, only a minority of them can do us any harm, and our bodies have evolved to live in association with millions of the creatures — in us and on us. Indeed, being colonised with the right sort of bacteria is virtually a necessity for a healthy life.

Bacteria living within us can help prevent their harmful brethren from colonising us and producing disease; furthermore, those in our intestines can provide us with essential nutrients such as B-group vitamins.

More recent research has shown that microbes can also help our digestion, by secreting enzymes that assist in the breakdown of foodstuffs. Many species of helpful 'digestive' bacteria inhabit the human gut; the continuous



The new milk Revital®.



A scanning electron microscope picture of some *Lactobacillus* bacteria.

presence of the 'wrong' type, although not causing any infectious disease, can lead to digestive disorders and unpleasant reactions to certain foods. Also, these unhelpful (although not pathogenic) bacteria may metabolise some of our food's components into potentially toxic chemicals, which may irritate the bowel and, possibly, be involved in causing liver disease and colon cancer.

Unfortunately, our gut does not always house the most useful bacterial species. A course of antibiotics, for example, by killing many



bacteria, creates a vacant niche in the tiny ecosystem of the gut that is often filled by microbes different from those present before.

A poorly balanced diet can also lead to a change in the make-up of the bacterial flora. Too much protein, and *Escherichia coli* and species of *Clostridia* may dominate, metabolising protein to unpleasant, foul-smelling, and toxic compounds like ammonia and phenol.

Research has shown that two common inhabitants of the human gut, *Lactobacillus acidophilus* and species of *Bifidobacterium*, may be able to exclude less desirable microbes and so help maintain a balanced intestinal flora. They occur naturally in various foodstuffs, but processing tends to remove them.

For example, the pasteurisation of milk, introduced mainly to kill the bacteria that cause brucellosis (a disease of cows that also affects humans), means that modern milk contains few if any of the beneficial bacteria either. However, certain spore-forming bacteria survive pasteurisation, and they will eventually turn unopened milk bad. These bacteria do not help us digest milk, but *L. acidophilus* does.

Plenty of adults cannot drink milk in any quantity because they have a 'reaction' to it. This may take the form of abdominal cramps and bloating, flatulence, and diarrhoea. The condition is often caused by a deficiency in adults of the enzyme lactase, which breaks down the natural sugar in milk, lactose.

Without the enzyme, the lactose will continue through into the colon where various bacteria will ferment it into fatty acids and gases. The presence in the bowel of the sugar and its fermentation products has an osmotic effect, causing water to be retained, hence the bloating and diarrhoea.

Lactase deficiency is rarely found in babies, but levels of the enzyme commonly decrease after weaning, as is the case in all other mammals. In adults of some races, low lactase levels exist throughout the population; but only 5–20% of Caucasian adults have the condition.

Lactose-intolerance is not the only problem; reactions to milk may also be caused by breakdown of milk proteins by unhelpful gut bacteria, and genuine allergy to milk proteins can occur. Now, however, a type of milk has been devised that will help with these problems, except the allergy. (The only solution to a genuine food allergy is to eliminate the offending article.)

The new milk, called Revital[®], is a pleasing example of the collaboration between science and industry. Dr Ron

Hull of the Dairy Research Laboratory in the CSIRO Division of Food Processing helped in the development and launch of the product in Victoria.

What is special about Revital[®] is the presence of two types of deliberately introduced bacteria — *Lactobacillus acidophilus* and the *Bifidobacterium* species. Together, they can digest milk proteins and lactose.

Not only do they help us digest the product that is their home, they can also discourage less helpful bacteria, such as spore-formers, from proliferating in the foodstuff. What's more, the food acts to 'top up' the colonies of the two useful species inside us, keeping our personal bacterial flora of the best type.

Dr Hull believes that the type of milk that adults should

be consuming is cultured milk — which until now has meant yoghurts containing *L. acidophilus*, a product that he has also studied. These have a sour taste, but Revital[®] does not — it is just like fresh full-cream milk.

Revital[®] should soon be on sale throughout the rest of the country. Dr Hull believes that in the future helpful digestive bacteria will also be added to fruit juices and other foodstuffs that are kept refrigerated. This already happens in some other countries. So have a drink and enjoy your bacteria!

Roger Beckmann

Survival of *Lactobacillus acidophilus* in yoghurt.

R.R. Hull, A.V. Roberts, and J.J. Mayes. *The Australian Journal of Dairy Technology*, 1984, 39, 164–6.

Going for green

In city traffic, nothing uses up fuel and patience quicker than frequent stopping and starting. But, since November 1987, drivers travelling down a 10-km stretch of Canterbury Road in Melbourne have been encouraged to save both.

A series of computer-controlled advisory signs provides the encouragement: motorists who choose to travel at the recommended speeds can catch a sequence of green lights.

The signs are the visible part of ADVISE (Advisory Display of Variable Information for Speed and Economy), a project funded

by the National Energy Research Development and Demonstration Council and carried out by the CSIRO Division of Building, Construction and Engineering in collaboration with the Roads Corporation of Victoria (VIC ROADS).

Using data from the VIC ROADS' computer-controlled traffic-signal



The green light — ADVISE means more of them.