Poison running through my veins

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Go shopping in any large supermarket in a Western country and you are likely to find yourself bombarded with enticements to purchase 'organic' produce. In so doing, you are made to feel as if you have added a personal contribution to the welfare of our dear green planet. Those slightly higher prices surely are a justified donation in support of hard-working local farmers, struggling to compete with predatory agri-business. Why, their produce has probably been brought to the shelves directly from the field, lovingly delivered on the back of someone's bicycle saving all the waste and pollution of air-shipment from some slave plantation in another hemisphere. Not to mention the care that you have taken to protect your own health, along with that of your family, dinner-party guests, and so on. Those malformed carrots, liberally smeared with muck and marked by injuries sustained from a hand-held farm implement, just look so much more real. Why would anyone other than a brain-washed ignoramus ever purchase anything from the regular produce shelves?

The fact that one of the criteria demarcating organic products from the 'inorganic' variety is the complete absence of any genetically modified ingredients, should nevertheless give us pause for thought. Most readers of *EMBO reports* consider themselves sophisticated enough to factor out this small concession to popular prejudice, if it means that their milk is free from antibiotics, that their eggs have been culled from hens actually free to move several limbs simultaneously, or that their culinary herbs have been grown in natural soil rather than a drip-fed cocktail of chemicals.

But, is it really true that organic food is infused with natural vitamins and ethical values and free from extraneous toxins? The answer can be inferred from looking

carefully at the laws that govern the use of the term 'organic'. The term itself is, of course, quaintly inaccurate. A fully organic lettuce would not be green, whilst a wholly inorganic apple would consist of just a few grains of salt. The renditions of the term in other languages are equally misleading. In Finnish, a potato that is not 'luomu' ('according to nature') would presumably come from the realm of mythology. And unless specifically marked as 'biologique', sausages displayed on market stalls throughout France should be amazingly free of protein, lipid, carbohydrate or nucleic acid.

More serious enquiry leads to the astonishing fact that wine made from organic grapes in the EU or the USA is frequently derived from crops treated with the 'organic' fungicide copper sulphate. Organic farmers may use any amount of this chemical deemed necessary for the protection of their crops, provided they take steps to minimize its accumulation in soil. In addition to copper sulphate, a long list of 'natural' chemicals is allowed in organic farming in most jurisdictions, including sodium hypochlorite (*aka* household bleach), lime sulphur (a corrosive mixture of calcium polysulfides) and nicotine sulphate (a highly toxic compound derived from tobacco).

Rotenone, used in mitochondrial research labs worldwide as a highly potent inhibitor of respiratory complex I, has been demonstrated to cause a Parkinson's disease-like pathology in experimental rodents. But in many countries it can also be liberally sprayed on your organic strawberries. Happily, arsenic, strychnine and lead salts are not, to my knowledge, allowed anywhere, and the use of tetracycline and streptomycin to protect organic apples and pears will soon be phased out, at least in the USA. But, where authorized by a licensed veterinarian, many other drugs may be

administered to organic livestock, as deemed necessary for animal welfare. Similarly, processed foods listed as organic can contain many substances known to be toxic, including hydrogen peroxide, sulfur dioxide, the suspected carcinogen carrageenan (a food stabilizer extracted from red seaweed) and a wide spectrum of colouring agents, so long as they are of vegetable origin.

Whilst the list of chemicals used in non-organic agriculture and food production is undoubtedly as terrifying, the decision as to what is and isn't permitted in the organic sector seems arbitrary, and there is no guarantee of it being less poisonous or more wholesome. Yet it gets the nod from policymakers and is sold at a premium, for reasons that are unclear to consumers.

My point is not to invoke a wholesale condemnation of the organic food industry, even though specific processes can be questioned. The motivation behind organic farming, namely to promote sustainable and healthful practices, appears laudable. But it would be far more credible if it were truly evidence-based. The blanket rejection of genetic modification technologies, under the organic label, is a particularly glaring example of what's wrong. Each case should be judged on its merits. The current public attitude of 'organic good, GM bad' is pure prejudice. Intelligent consumers, or the regulatory agencies that represent them, should be able to consider all relevant facts that are needed to reach rational decisions. This should include the right to judge whether a particular genetic technology is preferable to the indiscriminate use of toxins, preservatives or fertilizers – whether these were invented by chemists or just happen to have been widely applied in past centuries.

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