

Nano-nonsense

There is a strange familiarity about this scenario: scientists find a new avenue of research to explore and governments start to believe that this area of work will be economically beneficial. New funding schemes are created and directors rename their research institutes to match these opportunities. But then, critics raise concerns about the potential consequences of this new research, newly anointed experts add to the chorus, and politicians feel that the winds have changed and begin expressing a need for caution. Consequently, meetings are convened to tease out the perceived dangers, resulting in many carefully worded reports that all delay the use of this new technology. Scientists are put on the defensive and their projects are delayed. We experienced such a scenario in the 1970s when recombinant DNA technology became available. We have seen it again recently with the debate about genetically modified (GM) organisms, which brought continents to the brink of economic warfare. Now it seems that we are about to witness a rerun of such events, with nanotechnology at the centre of the stage.

Recombinant DNA technology has become so widely used that it seems incredible today that it once aroused such passion when it first made the headlines. We were warned that moving DNA across species barriers was a major risk and were presented with scary scenarios of what might happen if GM bacteria escaped from the laboratory. Scientists were accused of playing God by choosing the genes to shuffle among organisms, and were scolded for exaggerating the scientific and medical benefits that would come from their research. Today, millions of patients and employees who benefit from biotechnology would say that a lot of good has resulted from recombinant DNA technology.

Equally, GM plants have been presented as such a potential threat that for some people, their banning, burning and blocking is apparently beyond the need for any rational justification. But the available data point to

GM crops being innocuous—economics excluded. Nonetheless, the general public and, by extension, the politicians have been scared into believing that the word 'Frankenfood' means something, that all butterflies in the vicinity of a field of GM plants are doomed and that the weeds of the world will acquire uncontrollable powers to resist the best efforts of the agro-chemical industry. So far, there are no signs of these disasters happening and useful plant derivatives may hopefully become an essential component of the diets of millions worldwide.

Nanotechnology is a surprising target for a new campaign—but then I do not read science fiction and have therefore failed to see its potential to raise the ire of those who criticize any new technologies. The scary scenario presented in this fictional world is that anything on the nanometre-scale is so small that it could easily pass through the skin into the body and eventually reach the brain. And if that isn't bad enough, the scientists might go even further and empower nanodevices to replicate, or programme them to target different organs. And who knows what other evil things they might do with this power. The fact that potentially mutagenic compounds in cosmetics are able to pass through the skin is cited as a justification for a moratorium on the application of nanoproducts to skin. But then a logical extension of this is to worry about the food that we ingest because it infiltrates our bodies at will and carries with it some nasty elements and additives. Similarly, particles from clothes—not to mention washing powder residues—are in dangerously intimate contact with us. And then there are all those air contaminants, which you can see on a sunny day if the angle of the sun is right, that are also sneaking into our system. Yes, there is a lot to worry about, a lot that needs much more study and many types of products and developments that would qualify for a moratorium. But this does not happen because there is sufficient common sense in the populace to ensure that we are not all driven crazy by potential risks.

So what will happen? I am sure that the call to impede the advances of research in nanotechnology will provoke a response. The 'old combatants' of past anti-scientific wars will be there and will express the same concerns for all of humanity. The scientists and the nano-engineers will declare that there is no conceivable problem, but will nevertheless be forced to behave as if there is one. There will be a need for more studies on this topic, and the precautionary principle will be revisited to dominate all other available data about risks and benefits. Nanotechnology will be viewed as a major risk in some parts of the world and this will lead to another delay in the introduction of a new and promising technology. Other countries will take a more positive stance and rate the benefits of nanotechnology higher than the risks, and they will see the delays elsewhere as an opportunity for their own economies.

The core problem, of course, has little to do with nanotechnology. It is the ongoing conflict between those who embrace the changes that come with new vistas of research and those who loathe and dread them. This is happening at a time when all economic indicators show that knowledge-based economies will be the next step in the development of advanced societies and that agrarian-based societies are a thing of the past. 'Economy' juxtaposed with 'society' is also at the heart of many tensions. And these will not go away unless everybody admits and considers the real benefits of progress, and until those who lead the charge to improve the world by means of science and technology listen to and talk to those who express concerns. It is only through such debates that risks and benefits are weighed up, so that a new technology may find the necessary support in society to be allowed to proceed. In the meantime, let's not allow science fiction to take over our brains.

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