

The Flap over Butterflies

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The flap of a butterfly's wings may or may not lead to a tornado. But misuse of science for political effect can certainly lead to bad policy.

ON 24 June 1999, Greenpeace activists dressed as butterflies picketed a meeting of European Union environment ministers in Luxembourg with a banner reading 'Give butterflies a chance—Stop Genetix Crops'. They urged—successfully as it turned out—the ministers to take a precautionary approach and prevent the commercial growing of genetically modified (GM) crops.

The scientific basis for this demand was a piece of research published in a letter to the journal *Nature* which indicated that monarch butterfly larvae fed with milkweed dusted with pollen from GM maize suffered adverse reactions, including death. The case has become a notorious example of the misuse of both science and the precautionary principle for political effect. It also demonstrates the need for careful risk-analysis in the development of regulatory approaches to technologies such as GM.

The precautionary principle is subject to growing abuse by environmental groups, to the point that it is becoming a seriously debased maxim. While it appears in numerous versions, it makes a recommendation in favour of caution when the risks of environmental harm are serious or irreversible. This is sensible enough, although the principle cannot alone be operationalized, because it cannot tell us how much caution we should exercise.

The precautionary principle asks us to act with care under conditions of uncertainty, and not to allow the absence of scientific certainty to serve as a reason for deferring action. It is this aspect which, in the butterfly case, demonstrates the extent to which the principle is being abused by Greenpeace, since it is invoking the precautionary principle on the basis of a single piece of scientific research.

The precautionary principle talks about lack of certainty, and a single scientific paper is a very long way from that. All manner of scientific papers are published which turn out to be wrong, and were we to act in a precautionary

manner on the basis of them all, our regulation would be confused, contradictory and very costly.

Greenpeace and other environmental groups were responsible for another example of this in the US. A single paper in *Science*, in June 1996, by scientists from Tulane University suggested that minute quantities of mixtures of endocrine-disrupting chemicals were up to 1,600 times more chemically active than the chemicals alone. Congress reacted with the passage of two new laws, the *Safe Water Drinking Act* and the *Food Quality Protection Act*, and a new mandate to the Environmental Protection Agency to develop new guidelines for endocrine disruptors, found not just in synthetic chemicals but also naturally in many foods.

Subsequent research was unable to reproduce the Tulane findings and in June 1997 the researchers acted responsibly by formally withdrawing their paper, admitting that they too had been unable to replicate their initial results.

Those conducting the GM butterfly research were equally responsible. The team leader, John Losey from Cornell University, explicitly warned that it would be inappropriate to draw any conclusions about the risk to monarch populations in the field based solely upon these initial laboratory results. This has not stopped many 'activists' from Greenpeace to the Australian Consumers' Association from doing precisely that.

Losey's caveat stemmed not just from the lack of replication of the findings in other studies, but from aspects of the experimental design which meant that the observed toxic effects had little bearing on environmental risk.

The only food provided to the larvae was the milkweed (their exclusive diet) dusted with the GM pollen; in the wild, they studiously avoid dusty leaves, moving to a clean one. Most pollen in the wild falls in maize fields, where few milkweed plants (or any weeds) are found. Maize plants pollinate for only a few days and monarch larvae only feed

for a few days; depending on weather conditions, there might be anything from a week's overlap between pollination and feeding to no overlap at all. Larger larvae are much less susceptible than small.

These are all factors which mean that, even if the toxicity results hold up, there might be a negligible risk to the butterflies. And this risk must be balanced against the benefits of the GM maize, which produces a natural pesticide.

These benefits are not only economic, but environmental. Non-GM maize crops are typically sprayed with insecticides eight to ten times, and this is likely to have a more significant impact upon monarch larvae and other insect species. Besides the pollen, the pesticide in GM maize is at least targeted at pests which attack the crop. This is, of course, only one of the possible risks associated with GM maize, but it is highly unlikely that it would be banned on the basis of this risk—unless the considerable power of the Greenpeace campaign prevails over sound risk-management.

The Greenpeace campaign succeeded with the EU environment ministers, and blockades of supermarkets and the offices of companies such as Unilever, Danone and Nestlé have business and governments alike running scared.

GM technology, like any technology, promises benefits and risks, and must be carefully regulated. But the appropriate balance is not likely to be struck when the precautionary principle is abused and risk management is replaced by scaremongering. The case for sound environmental policy is not so weak that it needs these tactics, and in the long run is—if anything—likely to be diminished by their use.

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