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'Organised Irresponsibility': Contradictions in the Australian Government's Strategy for GM Regulation

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ABSTRACT *This article is a critical transdisciplinary overview of genetically modified (GM) crop regulation in Australia. It appears that the Gene Technology Act 2000 rests on an elective affinity between genetic determinism in science and neo-liberal trade policy. The article finds problems arising from this affinity in local understandings of GM science; bureaucratic organisation; the implementation of risk assessment; preference for the World Trade Organisation (WTO) regime versus Biosafety Protocol; Federal–State relations; and advocacy of the principle of coexistence. In response to these shortcomings, the article proposes a broader social basis for evaluation of technologies such as GM and offers some ethical parameters to guide this discursive politics. The text is written to help those active in the regulation of GM in Australia to reflect on the complexity of epistemological and ethical issues involved. As such, the article is both a case study and an intervention, although plainly, each substantive area visited in the survey is grist for deeper research by political scientists.*

Introduction

In 2003, a special 50th anniversary issue of the journal *Nature* celebrated Watson and Crick as the founding fathers of genetic determinism, and at the same time called for a more sophisticated science. The reductionist theory that posits a 1 : 1 relation between a gene and a particular trait is no longer held with total professional confidence. Alternative approaches such as complexity or dynamic genomics have thrown doubt on much biotechnology research using the received paradigm. By these more dynamic models, self-regulation

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within the genome includes interactions between redundant or junk DNA whose role is not understood, unpredictable jumping elements called transposons and newly discovered varieties of RNA (Kollek, 1995; Eddy, 2001; Commoner, 2002). Theorists of complexity genomics reject the reified notion of the gene as a quintessential biological determinant, attending to nature's circular feedback processes rather than imposed lines of human intention. Their argument is that it is precisely this mobility internal to the genome which maintains the stability of ecological processes in nature.

Worldwide, scientists are in disagreement among themselves on whether genes are units or whether they are controllable (ISIS, 2003).[1] Nevertheless, in Australia, the classic reductionist model of genetic determinism reigns, and this scientific belief has become embedded in what many perceive to be the 'national interest'. An economistic growth-oriented agenda has framed the official approach to GM in Australia since the early 1990s. Similarly, political party platforms reveal the Federal Government under the Liberal Party, and most States under the Labor Party, to be equally pro-free trade and pro-genetically modified (GM) development. Even though scientists have no generally shared understanding of what 'a gene' is, and the construct may even be a convenient fiction (Hubbard & Wald, 1993), the notion of a fixed biological unit thrives, because it is necessary for the law of corporate patents to operate. This is why the Gene Technology Act 2000 adopts a theory of genetic determinism, regardless of the fact that its scientific basis is under challenge. However, this crude affinity of neo-liberalism and scientism results in problems for GM regulation. These show up in bureaucratic organisation, in the implementation of risk assessment, in tensions between the World Trade Organisation (WTO) regime versus the BioSafety Protocol, in Federal–State relations, and in the question of GM coexistence versus liability.

After a critical survey of aspects of the Gene Technology Act 2000, the article looks at how GM assessment might be democratised, and it offers some ethical principles for deliberation over new technologies. Fundamental uncertainties in GM science mean that precautionary regulation is imperative and, where scientific doubt remains, that decision-making is legitimated by public participation.

Bureaucratic Segmentation

The Act, Part I, Section 3 states 'The object of this Act is to protect the health and safety of people, and to protect the environment, by identifying risks posed by or as a result of gene technology, and by managing those risks through regulating certain dealings with GMOs.' The Act calls for appointment of a Gene Technology Regulator, who will work in conjunction with Commonwealth and State regulatory schemes, all under the aegis of a Federal–State Ministerial Council.[2] The compartmentalisation of this regulatory framework is immediately apparent. The Regulator's office (OGTR) is located within the Commonwealth Ministry for Health rather than under the wider remit of the Department of Environment and Heritage. This could prove to be a mistake if

GM crops are widely released, especially GM eucalyptus, a keystone species of Australian habitat. From an ethics perspective, the framing of the Act is conceptually dualist, lending itself to a treatment of human and environmental impacts as if they were separate spheres. The Act is also anthropocentric, inclined to hierarchical stewardship of humans over nature rather than an ethic of reciprocity with it.[3]

The Gene Technology (Consequential Amendments) Act 2000 provides that all pre-existing authorities should take advice from the Regulator in relation to applications for approval of a GM dealing.[4] These are the National Agricultural and Veterinary Chemicals Register, Australian and New Zealand Food Authority, National Industrial Chemicals Notification and Assessment Scheme, Therapeutic Goods Administration, National Health and Medical Research Council, Australian Quarantine and Inspection Service and various State Government authorities. Although these bodies share a common methodology for risk assessment and risk management, there are loopholes in the institutional net. For instance, while regulation of GM crops falls to the OGTR, and herbicides are handled by the Australian Pesticides and Veterinary Medicines Authority, the interaction of these two aspects of a product is not necessarily evaluated. Similarly, Australian GMO quarantine provisions under AQIS are ineffective and lack coordination with the OGTR (Tranter, 2003).

To assist the Gene Technology Regulator and Ministerial Council, the Act establishes a Gene Technology Technical Advisory Committee (GTTAC), a broad-based Gene Technology Community Consultative Committee (GTCCC) and an interdisciplinary 'expert' group known as the Gene Technology Ethics Committee (GTEC). These Ministry-appointed committees meet with discrete non-synchronised agendas. It should also be noted that GTTAC, GTCCC and GTEC are not representative of class, ethnic and gender interests in the citizen population. Plainly, the idealised science and ethics envisaged by those who framed the Act are disconnected from any grounding in lived social relations.

Value-Free Risk Assessment?

OGTR decisions based on risk assessment are conceived as a predominantly quantitative evaluation and as 'best practice'. Guidance on incoming GM licence applications falls exclusively to GTTAC, composed of scientists who tend to understand their research and advisory roles as value-free. Yet as scholars of science and technology studies point out, values and ethics will enter the practice of GM science when it comes to selecting research techniques and technologies; in defining what constitutes the normal life-cycle of an organism; in choosing to cull, poison, blind or sterilise an animal; in deciding which units to treat as commensurable; in electing to separate risk assessment and risk management; in determining which risks matter and which do not. Most significantly, adoption of a particular theoretical paradigm, be it genetic determinism or complexity genomics, commits the scientist to a set of ontological assumptions about how nature is made up. This, in turn, draws the

scientist into an environmental ethic, a set of beliefs about what a good humanity–nature relationship is.

However, under the administration of the Gene Technology Act 2000 the conventional, almost gendered, western divide between the sphere of 'hard' science versus 'soft' cultural values prevents most technical experts on GTTAC from exploring these deeper dimensions. By default, therefore, an aura of scientific neutrality prevails around OGTR work. The Act takes the genetic determinist model as an epistemological given, to which technologists, ethicists and community, may then respond. Yet if, in this era of post-normal science, the actual behaviour of DNA is better characterised by dynamic complexity, then all parties have cause for concern about their capacity to offer reliable judgements.[5] The intracellular determinants of a DNA sequence are not fully known; DNA is not necessarily constant as it moves across species, and variability is also observed within individual organisms. The genomes of both germ and somatic cells may mutate over time and respond to environmental factors. Humanly engineered transgenic lines are especially unstable, because these use invasive bacterial or viral vectors to cut across long-evolved barriers between species (Wills, 2002).

Thoughtful scientists warn that if vector viruses or bacteria stray, horizontal gene transfer may result in environmental and public health hazards of potentially epidemic proportion (UCS, 2004). However, the Regulations on Dealings with GMOs fail to engage with this complexity. Part 3, Licensing system Division 1, Regulation 10 states:

Risk assessment – matters to be taken into account

(1) (a) any previous assessment, in Australia or overseas, in relation to allowing or approving dealings with the GMO; and
    (b) the potential of the GMO concerned to:
        (i) be harmful to other organisms; and
        (ii) adversely affect any ecosystems; and
        (iii) transfer genetic material to another organism; and
        (iv) spread, or persist, in the environment; and
        (v) have, in comparison to related organisms, selective advantage in the environment; and
        (vi) be toxic, allergenic or pathogenic to other organisms.

(2) '... the Regulator must consider both the short term and the long term'.

More detailed risk assessment and management information is contained in the Gene Technology Regulations, Schedules 1–4.

In short, as the Gene Technology Act 2000 stands, bureaucratic compartmentalisation, an outmoded model of genomics and a naive concept of 'value-free' risk assessment, result in intricate methodological dilemmas being treated reductively, and thus inaccurately, as routine aspects of scientific management. In each case, the intent is technocratic control, but the

unintended effect is a kind of 'organized irresponsibility', to borrow Beck's colourful phrase (1995: 63–5).

'Organised Irresponsibility'

The Gene Technology Act 2000 sets out four categories by which applications for dealings with GMOs are assessed for approval by the OGTR. They are:

Exempt Dealings (limited modifications, laboratory contained);
Notifiable Low Risk Dealings (or NLRD – requiring conditions);
Licensed Dealings (DIR intended for release or NDIR no release); and
Registered Dealings (licensed and assumed safe).

The OGTR is required to seek GTTAC advice only when a dealing is intended for environmental release (DIR). By early 2004, the OGTR had approved DIR status for cotton, canola, oilseed poppy, sugar cane, pineapple, carnation, cholera vaccine, papaya and grapevine. The OGTR was considering release for lupin, white clover, porcine and fowl adenovirus vaccine. In the DNIR category, 241 licences had been issued, 1266 notifications of low-risk dealings received, 1741 contained facilities certified and 130 organisations accredited.

The OGTR website indicates plants in cultivation across the six Australian States and two Territories. The main commercial release is herbicide tolerant Roundup Ready (HT) cotton. New dealings under evaluation include drought resistant wheat and recombinant bovine herpes virus vaccination for cattle. The website indicates numerous biomedical dealings under the NLRD category, although the warning of a 600-page download may discourage the curious. The OGTR taxonomy contains no category for dealings which are released unintentionally. Such spills may be due to inadequate contained-use or waste management practices. It is cause for additional ecological, medical and ethical concerns that OGTR proposals for review of the Gene Technology Regulations loosen this schema further by expanding the exempt category, and by making arrangements for notifiable low risk dealings more flexible. Consistent with the prevailing neo-liberal emphasis on voluntary regulation, the OGTR has entertained a user-pay style of recovery of assessment costs from commercial licence applicants; but if this went ahead, it could be seen as compromising government.

While the GMO Licence Application Form asks for comprehensive information on a plant or invertebrate dealing, it is not apparent that OGTR takes full account of the international literature. For example, regardless of whether one accepts the received determinist paradigm or the alternative integrative model, Jasanoff (1993) advises that the practical interface between research and application is loaded with scientific indeterminacy. Indeterminate factors include:

- horizontal gene transfer resulting in complex collateral impacts on the water cycle, soils, plants, animals, humans, or across all kingdoms;

- artificial isolation of a species from essential (but unknown) metabolic linkages within a given habitat;
- limited generalisability due to size of the experimental area;
- limited generalisability due to inappropriate temporal scale of trials; and
- inability to take account of non-quantifiable synergistic interactions between biota.

In the laboratory setting, problems of containment may include greenhouses with earthen floors, caged transgenic fish in open ponds, vaccinations with transgenic viruses, excreta from GM animals and so on. Other failures of containment may arise by oversight after the fact. For instance, in the OGTR application for a DIR licence, Part 6, item 10 asks for 'Details of whether the [i.e. viral] vector will be present in the final construct and if not, how it will be removed' (OGTR, 2001).

How can risks be identified empirically when the fundamentals of GM science are not settled? How can risks be identified when empirical assessment of future scenarios is logically impossible, and how can risks be managed, if they cannot be scientifically identified? Moreover, beyond these doubts, are kinds of uncertainty related to social factors. Under the Gene Technology Act 2000, social factors are treated as external to science. There is thus no attempt to sample class, ethnic, gender, age and species differences in response to GMOs or their products. *Ipso facto*, future human health impacts are not amenable to risk assessment. Expert committees like GTTAC and GTEC need to recognise that the scientific monitoring and management of GMOs relies on phenomena such as cultural practices, organisational norms, political climate and even international trade requirements.

The Precautionary Principle

Many scientists and ethicists alike propose that where scientific and social uncertainty exists, the 'precautionary principle' is the appropriate stance for science, government, and publics. The principle requires that risk avoidance be the decision norm, where there is a possibility of environmental damage or social deprivation arising from a proposed action. The Gene Technology Act 2000 does contain a version of the precautionary principle. As the Act Part I, Section 4(a) states '...where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation'. The multiple negatives in this wording do not lend themselves to clear sighted action.[6] Equally disturbing is Levidow's judgement that the principle can be 'used to justify whatever governments were inclined to do anyway' (Salleh, 2001).[7]

The Act Part 6, Division 3, Section 79 states 'Regulator not to make determination unless risks can be managed'. Nevertheless, it became public knowledge in 2004 that the Australian Government was not attending to a

report by the Commonwealth Scientific and Industrial Research Organisation (CSIRO), which pointed to some 150 aspects of uncertainty surrounding GM crop development, three-quarters of them not regularly looked at by the OGTR. As one non-governmental organisation (NGO) spokesperson observed: 'Why has a 3-year research project worth $5.3million been suppressed and the scientific evidence it contains not been used in the assessment procedures for GE crops?' (Greenpeace, 2004). Subsequently, questions raised in the Senate Estimates Committee revealed a problem with root exudates from Bt Cotton plants undermining the viability of microbial communities in soil (CSIRO, 2003). To be fair, it is likely that that some omissions on the part of the OGTR reflect the fact that the Gene Technology Act 2000 asks for something that is technically impossible to deliver. In other words, the uncharted fluid complexity of the genome, combined with practical problems of the kind described by Jasanoff, mean that risk assessment is unworkable.

Internationally, the precautionary principle is endorsed through the Convention on Biological Diversity and Biosafety Protocol. Although this Protocol could be strengthened in a number of areas, it is the best available instrument for GM regulation at this time.[8] Nevertheless, Australia joins the United States and other Miami Group members in favouring the neo-liberal World Trade Organisation's de-regulatory regime.[9] In fact, whereas the EU and some 79 nations support the Convention on Biological Diversity and Biosafety Protocol, Australian and US negotiators have worked together in international meetings to dilute it, in particular Article 18 on handling, transport, packaging, and identification of GMOs and Article 27 on liability and redress.

In short, even if the Australian Government were committed to the international Biosafety Protocol and precautionary principle, and even if the principle was better formulated in the Act, fundamental concerns pertaining to scientific uncertainty in GM research remain.

Profits Versus Accountability

The construction of scientific knowledge and the construction of law take place in a world of uneven power relations, and unequal opportunities between classes, genders, ethnicities and species. Sociologists and agriculturalists in the global South point out that despite PR hype about feeding the Third World, it is in fact a small privileged fraction of humans in the developed North who benefit, or rather profit, from the GM industry (Bauman *et al.*, 1996). In Australia the most active pharmaceutical firms are Bayer, Syngenta, Aventis, and very significantly Monsanto, which controls over 90% of global GM seed cultivation. Syngenta applied recently to patent 40 varieties of rice across 115 countries, and had this not been blocked by NGOs it would have been able to annex the gene sequences of 23 major food crops (ETC Group, 2005). Syngenta eventually withdrew its proposal, but the list of NGO lobbying targets reveals the global mesh of new agencies that now determine what we

eat. These are the European Patent Office (EPO), World Intellectual Property Organisation (WIPO), US Patent and Trademark Office (USPTO), the Food and Agriculture Organisation (FAO) and Consultative Group on International Agriculture Research (CGIAR).

Reassuringly, the Gene Technology Act 2000, Part 5, Division 5, Section 57 states 'The Regulator must not issue a licence unless the Regulator is satisfied that the applicant is a suitable person to hold the licence.' Less reassuringly, in 2003 the OGTR licensed at least one company with a record of prior convictions.[10] As things stand at the time of writing, citizen trust in business, science and government is at an all-time low (Wynne, 2001) and it seems that citizens are not trusted either, at least in Australia, as only global positioning systems (GPS) locations are provided for GM field trials. The political economy of genetic engineering runs way ahead of its science, ethics and public accountability, but the disjunction is eased by public relations. Even so, in the attempt to manage what they see as 'public fear', corporate and government use of public relations (PR) can further damage trust. PR communications often foster an overly simplistic view of scientific advice as objective and of community perceptions as subjective, and thus inferior. Conversely, theorists of democracy such as Christoff (1996) identify a valuable critical reflexivity in public attitudes – as people judge their governments for introducing unnecessary threats into their lives.

Locally, a unique interdepartmental organisation known as Biotechnology Australia (BA) has responsibility for conducting the country's National Biotechnology Strategy. Part of this job involves boosting public awareness of GM's many uses, and to this end it monitors scientific communication in the media aggressively. In 2004, along with the Commonwealth Department of Health, BA promoted a conference linking business and science in Brisbane, with US GM and Nanotech entrepreneur Craig Venter as keynote. Simultaneously, BA co-sponsored the 7th World Congress of Bioethics in Sydney. Biotechnology Australia is said to be working up a national ethics code on GM, an activity that appears to shadow the proper statutory remit of GTEC as expert ethics advisory committee to the OGTR. The respective roles of BA, GTEC, and indeed, the OGTR, should be clarified when the Act is reviewed. It is important for the public to know when the OGTR delegates or out-sources its functions, and to whom.

Coexistence or Bio-colonisation?

In ensuring that government responds to industry in a coordinated fashion, Biotechnology Australia turns from public relations manager to driver of GM in Australia. This is where international law becomes salient to the institutionalised disconnection that pervades the regulatory system. The WTO was set up in the 1990s under the auspices of neo-liberal governments and firms, to facilitate global markets. The WTO obliges signatory nations to place the regulation of marketing matters under its jurisdiction. Clearly, it is

important that any WTO-directed harmonisation of law between governments or different levels of government does not drive environmental and health regulations down to the lowest common denominator. There is a chance of this, as the WTO sees national controls as barriers to free trade. The list includes import tariffs, quarantine programmes, producer subsidies, environmental laws and occupational health and safety management systems (OH&S) standards (Lim, 2004). Under this 'new world order', the powers of a nation or of a federated body such as the European Union (EU) may be weakened as issues become subject to legal determination by ad hoc WTO tribunals.[11]

In the Australian context, the precise effect of WTO provisions across existing relations between Federal and State Governments should be spelt out, if not publicly debated, when the Gene Technology Act 2000 is reviewed.[12] By the turn of the millennium, Australian States and Territories were developing their own approaches to GM. The Northern Territory enlisted help from Aboriginal communities to identify plant-based medicines, and tropical Queensland with its rich storehouse of biodiversity was moving ahead with incentives to attract biotech research and development (R&D). Victoria is now taking the research lead, with Melbourne University especially keen to enjoy the fruits of industry. In a climate of competition for GM profits, the Australian Federal structure offers an opportunity for companies to play off one State against another. Not surprisingly, by late 2004, two State governments which had agreed earlier to community demands for a moratorium on commercial GM releases now began to apply *ad hoc* exemptions. The South Australian Government stated that GE canola trials were now intended for commercial purposes. In New South Wales, the Environment Minister came under public pressure for full details on canola cultivated in tandem with high yielding natural varieties, and Bayer withdrew. Then in 2005, the Victorian Government admitted that it had secretly allowed Bayer to grow canola, despite a ban in place until 2008.[13]

In 2003, as negotiations for the Australian/US Free Trade Agreement were going on, a Gene Technology Standing Committee (GTSC) of the Federal–State Ministerial Council overseeing GM, called for a policy principle on the 'coexistence' of GM and non-GM production on adjacent lands. The public consultation brief on coexistence did not canvass impacts on farmers, nor the extent of consumer resistance to GM foods, nor the gross value to Australia of organically grown versus non-GM crops, nor were potential disbenefits of GM crops to the public in terms of human health or environmental damage factored in. For example, data from the US Department of Agriculture shows a massive increase in pesticide use on herbicide tolerant (HT) crops between 1996 and 2003 (Benbrook, 2003). To the contrary, the industry group Gene Technology Grains Committee (GTGC), playing a major role in this consultation, argued for business as usual, compliance with National Competition Policy and voluntary stewardship – 5-metre buffer zones, and no liability or clean-up mechanism: all this, even though GMOs are known to be wind, water or tyre-born for many kilometres.

In short, Australian commitment to the WTO regime may lead to a lowering of standards and even GM bio-colonisation by default. On the other hand, if social relations were not tied to global market competition, regulatory agencies might not licence products on the basis of poorly validated findings. In this more open society, public trust in science and government would be enhanced without the need for public relations managers.

Liability and Redress

The consultation brief on the 'coexistence principle' mentioned circumstances where: 'A grower may wish to challenge a non-GM designated area…'. This appeared to be an implicit reference to non-GM farmer Schmeiser in Canada, sued by Monsanto after the company found their GM seed growing in a ditch near his property. Schmeiser (2004) had to pay compensation to the corporation for this unwanted contamination. In Australia, Common Law renders GM farmers liable for unintentional contamination of non-GM land – corn and canola being especially active cross-pollinators. However, the victim has to establish indisputable proof of harm, which is difficult. Certainly, compensation should be payable if conventional farmers in a coexistence region are unable to guarantee delivery of non-GM and pesticide free produce, but likelihood of recovery by a non-GM farmer is slight (AGDA, 2003). Could dairy or honey producers gain redress through the WTO with a claim that GM designated areas constitute a market nuisance to them? Who would fund these international hearings? Yet, even where liability and redress were honoured by the polluter pays principle, monetary compensation is little use in mending a fragile ecological web.

Significantly, the Gene Technology Act 2000 does not cover liability and redress, and this is a major anomaly for the review to consider. The OGTR may require an applicant to get insurance. However, insurers are wary of GM because the calculation of risk is so hard. A strict legal liability regime covering producers, growers and distributors is needed for GM, similar to the one covering medical pharmaceuticals. Another path to justice has been outlined by Rogers (2002), an environmental lawyer who thinks that third-party property rights lost by non-GM producers, could be compensated by recourse to the Commonwealth Constitution s51 (xxxi). In Rogers' opinion, a blanket case of this kind would be speedier than redress via Common Law remedies such as damages from trespass, negligence or nuisance.

The international literature on GM raises further matters between the GM farmer and corporate supplier. A seed purchase contract may expose the farmer to prosecution over equipment usage and storage practices. Corporations or governments may require to see fields and record books. Farmers may be penalised for saving patented seed, whether purchased or wind-borne. As Charman (2003) describes the plight of agriculturalists in the US Mid-West, the corporations have basically imposed their will across the land by means of unruly seed. The same type of bio-colonisation is happening in Mexico and in China.[14] GM cropping is especially problematic in countries where farmer

literacy is low, but even in the developed world farming families may be forced to walk, unable to meet the cost of monopoly owned seed or the insurance premiums necessary for protection from suits. Abandoned land is cheap and bought up readily by agribusiness. So the cycle moves on, and a modern enclosure movement gains momentum.

Deliberative Futures

The Gene Technology Act 2000, Part 8, Division 4, Section 112 states:

The function of the Ethics Committee is to provide advice, on the request of the Regulator or the Ministerial Council, on the following:

(a) ethical issues relating to gene technology;
(b) the need for, and content of codes of practice in relation to ethics in respect of conducting dealings with GMOs; and
(c) the need for, and content of, policy principles in relation to GMOs that should not be conducted for ethical reasons.

The ethics advisory committee, GTEC, is invited by OGTR to address the interplay of values and risks, but in procedural isolation from the technical committee or from ongoing public debate. Hence in 2003, while GTEC was deliberating the ethical implications of trans-kingdom gene transfer, the OGTR was processing hundreds of other applications. Similarly, while the community committee, GTCCC, was calling OGTR attention to widespread disquiet over canola crops, GTTAC advised the OGTR to licence environmental release, and it did so. This split between technical facts versus social values weakens the counsel of government advisers, so when the Act is reviewed the committees could, perhaps, be invited to design a process for conjoint evaluation of applications. In so doing, some attention to how knowledge is constituted would be beneficial. At present, the conversation labours under the positivist assumption that epistemology (how people arrive at facts) and ethics (what people value) are distinct realms.

Equally unhelpful is the plethora of inchoate acronyms such as OGTR, GTTAC and DNIR, which leave people in the dark as to how and by whom they are governed. As noted already, the Gene Technology Act 2000 is embedded within a political model whereby government and the corporate sector drive technological development and citizen opinion is drawn in after the fact. By contrast, democratic governance is transparent and pluralistic, devising procedures so that a variety of lifestyles and values can flourish (Dryzek, 2000; Dobson, 2003). In fact, it will be argued below that this social inclusiveness would help make the Act more consistent with what it purports to do. An independent and conscientious Australian Government would also sign up to the Biosafety Protocol and join the broad majority of countries building strong environmental law. A competent Act would enable the repeal of

unpopular OGTR decisions and allow automatic reassessment of GM licences every three years. It is simply not ethical for governments, transnational firms or scientists to expect others to carry risks calculated on a rough balance of probabilities. To protect people's health and environments against far-reaching industrial impacts, and to protect animal species threatened by the next wave of product innovation – cloning and xenotransplantation – governments will have to deepen their reach into discursive politics. Deliberative democracy enlists ongoing citizen guidance from below in accord with the participatory principle. This is not to be confused with a consumer-focused public relations exercise orchestrated by a PR firm.[15]

The comfortable affinity between neo-liberalism and reductionist science can lead policy makers to say that the public is deficient in its understanding of science; but this anxiety may be a defensive projection on the part of 'insecure institutions unable to adopt more self-reflexive orientations towards their own social relations and cultural parochialism' (Leach *et al.*, 2005: 8). The new profession of scientific management seems as yet too politically immature to acknowledge that it represents only one of many ways of 'being in the world' and one of many 'ways of knowing'. This is where insights from the communitarian model of democracy can contribute to a review of the Act. As international scholars such as Visvanathan (2005) point out, it is time to meet the liberal pretension to neutrality with cross-cultural claims for 'cognitive justice'. Committees such as GTEC and GTTAC are dominated by an unreflexive masculine, middle-class subculture that unwittingly excludes other kinds of citizen opinion. Under such conditions, the use of consensus procedure can even become a kind of discrimination.

In short, just as the reductionist science of GM creates biological monocultures, the neo-liberal agenda spreads cultural homogenisation. While the focus of government is on potential benefits of GM, socio-economic and environmental costs introduced by the industry remain to be addressed. To rectify this, the conversation between corporate marketeers and environmental managers should be broadened to include a diversity of community voices.

Vernacular Audits

Under the Gene Technology Act 2000, GM is taken for granted as a desirable market commodity, and ethical evaluation is raised too late in the day. Australians have a right to informed analysis of potential long-term GM impacts on ecologies and social systems. A science and technology agenda should be articulated up-front and its adoption rest with the people at large. The countrywide GM Nation consultation carried out in the United Kingdom during 2004 is one exemplar although this, too, came late. Logically technological futures will be designed, discussed and democratically endorsed before any case-by-case licensing is adopted. This precaution is crucial with GM, an experimental practice that may have irreversible impacts on the course of evolution and on human societies.

In embracing citizen inputs, there are many publics – even intergenerational ones. Given Australia's proactive trading role in an era of globalisation, it is also appropriate to weigh up the consequences of industry decisions on overseas communities. The principle of food sovereignty is central to ethics. It is applicable where the Australian/US Free Trade Agreement undercuts consumer standards, and it applies in poor African nations where GM products, unsaleable in the North, are dumped as aid.[16] Another facet of food sovereignty is the glyphosate treadmill, which occurs when herbicide is tied into a GM package. Farmers in Argentina are now discovering the ecologically disastrous costs of this.[17] The official Australian enthusiasm for free markets leads governments to externalise environmental and human costs. Ethicists such as GTEC should be drawing attention to this, as well as to the colonising aspects of technology transfer, and the corporate bribery and environmental racism that sometimes goes with it.[18]

A redesigned Act might elect citizen juries to judge corporate product applications on a 'do we need this?' basis. Visvanathan (2005) calls these combined risk and ethics assessments 'vernacular audits'. Citizen juries might look into alternative non-GM economic futures, even futures inspired by non-western communitarian templates. The strength of this approach is its protection of cultural diversity as well as biodiversity (Shiva, 1989). Each class, gender, ethnicity and species has a specific experience of reality and values grounded in that.[19] So, too, as GTTAC might note, there are many sources of technical expertise in relation to managing nature (Guha & Martinez-Alier, 1997). Lay assessments of risk developed by farmers working hands-on with ecosystems are often finely honed and multifactorial, something not always appreciated by practitioners of a reductionist laboratory science. This is not a claim to superior knowledge but a claim about relevant knowledge. Similarly, the skills and insights of women who are prime carers of human bodies offer a capacity that merits equal representation at the political table – remembering always the democratic point that such women actually constitute a majority worldwide. It is established empirically that they oppose GM risk-taking more strongly than men (Norton, 1999) and profound reasons for this are explored in the ecofeminist literature (Salleh, 1997).

And there are others whose citizen voices are silenced by the liberal state. Currently, following National Health and Medical Research Council guidelines, First Nation peoples are addressed in the third person as collectivities. Yet given corporate patenting of indigenous intellectual discoveries, Aboriginal members speaking for their traditional values and knowledge of biodiversity should be indispensable to GTEC (Christie, 2001). The Act does not cover patents and intellectual property rights, but it is difficult to discuss the ethics of GM without looking at this, or at Regional Agreements covering commercial dealings on indigenous country. Without this expanded civility, the profits of GM will again flow to less needy sections of the global economy at the cost of Aboriginal wellbeing. The review of the Act might accommodate these problems by drawing on ILO Convention 169.[20]

An Ecological Ethic

The Gene Technology Act 2000 asks GTEC to deliver an ethical formula on GM acceptable and applicable to business leaders, scientific IBCs, policy planners and publics. This is quite a task, although one thing is plain: the search for ethical principles in a rapidly globalising world will have to move beyond the rehearsal of Greek philosophy, Christian sentiment, humanist platitudes or the recitation of voluntary moral competencies such as honesty and courage. Against the suppositions of some liberal bioethicists, professionalising ethics by disconnecting it from the context of power, its socio-economic and cultural outcomes, does not enhance objectivity. An ethics committee which disregards the political economy of GM is a contradiction in terms, no matter how rich its professional base. An appropriate ethic for GM is an ecological one, bridging the artificial line between humanity versus nature. That arrogant fictional divide has allowed the West to treat nature instrumentally as a mere resource, but now science teaches that we do this at our peril.

Conscious of the 'intrinsic value' of biodiversity as expressed in the Convention on Biological Diversity, ethical dialogue on GM will place human needs inside an ecological frame, thus:

- Ecological Sustainability: provisioning ourselves without compromising the survival of ecosystems, other species, other societies, or future generations.
- Socio-Economic Justice: realising our global material interdependence with secure and equitable livelihoods for all.
- Cultural Autonomy: valuing people's differences and reinforcing the diversity of social practices.

These nested and integrative objectives should be ethical benchmarks as the Act is reviewed. Alternatively, Commonwealth and State Governments could adopt this framework for an open democratic appraisal of the desirability of committing Australia to a GM future on the back of very uncertain science.

Unfortunately, as the Gene Technology Act 2000 goes to review, the OGTR and its satellite committees are more likely to follow the US trend for decision-making by a substantively narrow and formulaic risk analysis. But given existing tensions between markets, basic science, regulatory structures and public wellbeing, the only coherent ethical action at this time is a Moratorium on further GM releases until they are demonstrated safe. A global majority of participating nations at the 2004 World Conservation Congress of the IUCN arrived at just such a position. Nevertheless, it is one thing to debate the merits of GM on the relatively level playing field of intellectual exchange and another to shake off parasitical economic interests embedded in global and local political institutions. Practical Australian activists will most probably work in both directions simultaneously, pursuing a moratorium with a thoughtful review of the Act, as fall back position. On a deeper level, we might use this

moment to reflect on the old illusion that Humanity is somehow over and above Nature, rather than part of it.

Notes

1. This paradigm shift is resulting in intellectual suppression of scientists (GMWatch, 2004). See Hindmarsh (1995) for the political economic background to this contest.
2. The first Gene Technology Regulator appointed is Dr Sue Meek. She has a background in virology, biotech promotion, intellectual property, has worked for the Australian Department of Foreign Affairs and Trade and held membership of the Australian Institute of Company Directors.
3. For an introduction to environmental ethics, see Curry (2006).
4. A dealing may be a genetically modified organism (GMO) or a GMO product, e.g. Biosteel, a bullet-proof silk produced from mammary secretions of a transgenic cow modified by insertion of protein from a spider genome (Salleh, 2002). The GMO "product" category is regulated at OGTR discretion, as are LMO-FFPs, used in food, feed or processing, without notification to importers.
5. The official Australian approach has much in common with the simplistic 'sound science' model promoted by industry. The critique of this by Levidow and Carr (2000) has been prescient in terms of current trans-Atlantic GM disputes. The OGTR would do better to take on board the *Amicus Curiae* Brief (Busch *et al*., 2004), prepared by risk analysis experts for the EU Biotech dispute hearing at the WTO. See also Funtowicz and Ravetz (2004).
6. One suggestion is to replace wording of the precautionary principle in the Gene Technology Act 2000 with that used in the Protection of the Environment Administration Act (1991) (NSW). The relevance of the Environmental Protection and Biodiversity Conservation Act (1999) (Cth), and of Environmental and Social Impact Assessments is another issue for review of the Act. Personal communication, Jo Immig, NSW GE Advisory Council.
7. For Levidow's work on precaution see: http://dpp.open.ac.uk/profiles/llevidow.htm
8. For example, the Advance Informed Agreement Procedure in the *Biosafety Protocol* provides some protection for importers of GMOs; the definition of contained-use is weak. Tladi (2005) considers that ambiguities in the *Protocol* concede too much ground to the WTO.
9. The WTO operates with a set of three agreements (1) Sanitary and Phytosanitary Measures (SPS), (2) Technical Barriers to Trade (TBT) and (3) the General Agreement on Tariffs and Trade (GATT). Lim (2004) notes that although the SPS acknowledges the precautionary principle, the WTO and *Biosafety Protocol* remain at odds.
10. To underline the seriousness of this problem: it is widely known that Monsanto is under civil and criminal investigations by the US Justice Department and the Securities and Exchange Commission, after admitting to bribery of Indonesian Government officials in the face of local farmer opposition to GM cotton. Bayer too has transgressions, which were put before the OGTR by the GeneEthics Network during public consultations over Canola. Among these: 'In 2002, after a 9 month investigation, a Peruvian Congressional Subcommittee found significant evidence of Bayer's criminal responsibility for the 1999 organophosphate poisoning of 42 children, 24 fatally' (GeneEthics Network, 2003).
11. A degree of destabilisation has been seen already in the WTO reaction to the 15 nation European Union's careful approach to GM crops and imports. The EU position was challenged in 2003 at the WTO by the US, Canada and Argentina as a *de facto* 'moratorium' and contravention of trade norms. At the same time as hearings were in progress, trade sanctions on the EU were mooted with the disappointing result that EU bureaucrats conceded to some imports for processing (Mayer & Grove-White, 2005). The EU Biotech case has now been resolved by the WTO in favour of the US and fellow challengers, resulting in an intensification of grassroots resistance to GM across EU nations.
12. These matters fall between international and constitutional law, and none of the three specialist lawyers approached by the author while writing this article felt sufficiently informed to provide comment.

13. Personal communications: Jeremy Tager, Greenpeace and Bob Phelps, GeneEthics Network, 2005.
14. Silvia Ribeiro, ETC Group Workshop, in conjunction with the Conference of the Parties to the Convention on Biological Diversity (COP/MOP 1), Kuala Lumpur, 23 February 2004. On the situation in China, see Anonymous (2004).
15. A balanced evaluation of biotech novelty would be structured by grassroots commonsense and transdisciplinary in scope. The Victorian Biotechnology Advisory Committee (VBEAC) has been proactive in recommendations for more comprehensive public consultation on GM, and one technique that might be adapted for this is Multi-Criteria Mapping (Dietrich & Schibeci, 2003).
16. The African Model Law on Safety in Biotechnology conceives of Africa as a centre of crop biodiversity and demands broad decision making to protect that heritage. The Food Aid Convention states that GM aid is a last resort. Another exemplary approach to regulation is outlined by the Penang based Third World Network, see Singh Nijar (1999).
17. Adolfo Boy, Chair, Institute of Sustainble Agriculture, Argentina, at the UNEP Seminar on Biosafety Capacity Building, in conjunction with the Conference of the Parties to the Convention on Biological Diversity (COP/MOP 1), Kuala Lumpur, 23 February 2004.
18. Environmental racism commonly involves the unwanted dumping of waste in impoverished black communities, see Bullard (1993). Biopiracy of indigenous traditional knowledge may also be considered a form of environmental racism. See also SDEHC (1993).
19. The objection that animals are not ethical subjects overlooks, *inter alia*, the concern that dogs show for distressed humans. If humans do not recognise ethical expression in animals, this may be a cognitive deficit in our species, not theirs.
20. This is a reference to the General Conference of the International Labour Organisation, C169 Indigenous and Tribal Peoples Convention, Geneva, 1989. ILO c169 updates the 1957 Indigenous and Tribal Populations Convention, replacing the earlier assimilationist orientation. Thus, 'Recognising the aspirations of these peoples to exercise control over their own institutions, ways of life and economic development and to maintain and develop their identities, languages and religions, within the framework of the States in which they live'. See also Kari-Oca (1994).

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