Worldwide cultural differences in socio-ethical views in relation to biotechnology

A report commissioned by the COGEM (Netherlands Commission on Genetic Modification)

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Voorwoord/Preface

Het voorliggende rapport *Worldwide Cultural Differences in Socio-Ethical Views in Relation to Biotechnology (*Mondiale cultuurverschillen in de ethisch maatschappelijke opvattingen i.v.m. biotechnologie) is samengesteld in opdracht van de Commissie Genetische Modificatie (COGEM). Het is mede bedoeld ter voorbereiding van de nieuwe Trendanalyse Biotechnologie die in 2007 zal worden uitgebracht. De onderzoekswerkzaamheden (voornamelijk 'desk research') zijn verricht door dr. Henk van den Belt onder directe supervisie van Prof. dr. Jozef Keulartz. De uitvoering van het project is begeleid door een begeleidingscommissie waarin Prof. dr. Frans Brom, dr. Margaret Sleeboom-Faulkner, ir. Huib de Vriend en dr. Ineke Widdershoven-Heerding zitting hadden. Voor hoofdstuk 3, dat over de Zuid-Koreaanse stamcelaffaire handelt, is commentaar ingewonnen van de kant van dr. Ingrid Schneider en dr. Phillan Joung, een Duitse onderzoekster van Koreaanse afkomst. Beiden hebben zich uitvoerig beziggehouden met de ethische aspecten van embryonaal stamcelonderzoek. Hun commentaar is in de uiteindelijke versie van het hoofdstuk verwerkt.

De meningen die in het rapport worden weergegeven zijn die van de auteurs en weerspiegelen niet noodzakelijkerwijs de mening van de COGEM.

The present report *Worldwide Cultural Differences in Socio-Ethical Views in Relation to Biotechnology* has been commissioned by the Netherlands Commission on Genetic Modification (COGEM). It is intended to help prepare the new Trend Analysis Biotechnology, which will be published in 2007. The work on this report, mainly desk research, was carried out by dr. Henk van den Belt under direct supervision of Prof. dr. Jozef Keulartz. The implementation of the research project was overseen by a supervisory committee consisting of Prof. dr. Frans Brom, dr. Margaret Sleeboom-Faulkner, ir. Huib de Vriend, and dr. Ineke Widdershoven-Heerding. For chapter 3, which deals with the South Korean stem cell affair, we solicited comments from Dr. Ingrid Schneider and Dr. Phillan Joung, a German researcher of Korean descent. Both are experts on the ethical aspects of embryonic stem cell research. Their comments have been incorporated into the final version of chapter 3.

The views expressed in this report are the views of the authors and do not necessarily reflect the opinion of the COGEM.

Chapter 1

Worldwide Cultural Differences in Socio-Ethical Views in Relation to Biotechnology:
Overview and summary

"Culture is a notoriously slippery concept." (Jasanoff, 2005a, 22)

Introduction

In the original tender the aim of the research project reported here was formulated as follows:

> "Obtaining insight into the significance of global differences in culture for the weighing of utility and risk (proportionality) with regard to applications of biotechnology. The identification of dominant values and how they affect key choices in the process of developing and marketing biotechnological products."

The background for this research question is formed by the remarkable rise of several Asian countries in biotechnological research and the suspicion that these countries may not hold the same views as western countries on the ethical acceptability of developments in biotechnology. Europe and the US, by contrast, are held to share many norms and values, at least with regard to red biotechnology (see COGEM, 2004, p. 25-26). Where global differences in culture are the intended subject of inquiry, it thus seems that the main focus is to be on the differences between Europe and the US on the one hand and Asian countries on the other. Or as the COGEM *Achtergrondstudies* state: "After all, the cultural differences between Europe and the US on the one hand and Asia on the other are considerable" (***ibid.***).

Answering the research question was far less simple than might seem at first sight. The main underlying reason is that there is strong disagreement, both within and between relevant academic disciplines, about the precise meaning of the concept of culture, the different ways in which 'cultures' may be distinguished, the depth and scope of cultural differences, the relative stability or instability of such differences over time and the role played by 'culture' as a factor in socio-economic and political affairs. For a proper understanding of the difficulties which confront any attempt to provide a satisfactory answer to our research question, we cannot ignore these varying views. Let us therefore first make a brief tour along some relevant academic disciplines.

Academic contests about 'culture'

In the second half of the twentieth century, cultural anthropology was characterised by a sustained intellectual struggle to free itself from the massive, deterministic and monolithic view of culture that had dominated the previous period. The work of the American cultural anthropologist Clifford Geertz is a case in point. When he embarked on his anthropological career, the reigning view in his profession was that 'culture' was so diffuse and encompassing that it could offer a readymade explanation for everything people might do, think, say or believe. It was cause and effect simultaneously. Germans were authoritarian, Japanese shame-driven and the Kwakiutl megalomaniac, and they were that way because their culture made them so. It took a lot of time and effort for Geertz to gradually detach himself from this 'panoptical' idea of culture. In his view, studying other peoples' cultures involves gaining some familiarity with the frames of meaning in which they enact their lives and which are embodied in various concrete rituals and everyday practices (Geertz, 1999). In this way the

concept of culture can be cut down to size. Other cultural anthropologists also display this same tendency to prune the notion of culture into a more manageable size. This tendency is obviously related to the rejection of essentialistic explanations and to the honest attempt to avoid all eurocentrism and 'Orientalism' in contemporary cultural anthropology.

Let's turn now to the study of international relations. In this area, Samuel Huntington's book *The Clash of Civiliations and the Remaking of World Order* (1996) has been epoch-making. For many social anthropologists, however, his approach offers precisely an example of how not to go about when one has to probe the significance of cultural differences. Huntington's thesis is that in the post-Cold War world the main international conflicts will follow *cultural* fault lines. On the basis of a classification criterion that is not entirely transparent, he distinguishes eight different 'civilizations': the western, the Orthodox-Slavic, the Islamic, the Confucian, the Hindu, the Latin-American, the Japanese and the Sub-Saharan African civilization. Thus the world map is partitioned into irreconcilable, sharply demarcated and largely self-enclosed blocks of different cultures or civilizations. According to Huntington, western civilization will be increasingly challenged by the Islamic and the Confucian ('Sinic') civilizations. Backed by fast economic growth, East and Southeast Asian countries like South Korea, Cambodia and Vietnam will behave ever more assertively against the West and increasingly side with China because of a shared Confucian heritage which places hierarchical relations above the interests of individualism and pluralism. In Huntington's view, faith in the universality of democracy and human rights is no more than a western illusion. Neither does he allow much room for the counter tendencies that exist within every religion and culture or properly estimate the interaction and cross-fertilization occurring between different cultures. In fact, he makes people into the prisoners of their own civilization. Critics point to the danger of a self-fulfilling prophecy that may occur when politicians make Huntington's worldview their own and start to act according to his scenarios. Reportedly, the Iranian president Mahmoud Ahmadinejad and his generals have read Huntington's book with more than normal interest.

In economic history and in the comparative history of science and technology a fierce debate is also raging on the significance of the 'culture' factor. Here, the parameters are set by Max Weber's classical study on the relation between the 'Protestant ethic' and the rise of modern capitalism in Western Europe and his comparative-sociological investigations into the influence of Confucianism and Taoism in China and of Hinduism and Buddhism in India. Each of these religions, according to Weber, is characterized by a specific basic attitude towards the world. In Puritan Protestantism, the attitude adopted was one of (rational) mastery of the world (*Weltbeherrschung*), in Confucianism it was (rational) adjustment to the world (*Weltanpassung*), and in Hinduism and Buddhism it was escape from or renunciation of the world (*Weltflucht*) (Weber, 1920-1921). These basic attitudes explain, in a rough and ready manner, why the breakthrough to modern capitalism occurred in Western Europe and why China and India were condemned to long-term stagnation. The British embryologist and historian of science, Joseph Needham, who made an intensive study of the development of science and technology in China, held a similar view. Despite China's impressive achievements in both fields, the birth of *modern* science – in the methodical sense of a tight interaction between experimentation and mathematical reasoning – was in Needham's view nonetheless unique to Western Europe. This birth had been made possible by the emergence of capitalism, which lowered the traditional social barriers between scholars and skilled artisans and thus helped to seal the marriage between mathematics and experiment. More recently, however, historians like Roy Bin Wong and Kenneth Pomeranz, who are specialists in the comparative economic history of Europe and Asia, distance themselves considerably

from the views of Weber and Needham. They attempt to effect a paradigm shift from a 'eurocentric world history' to a truly 'global history' (for a concise and illuminating overview, see Johannes, 2006). A first result of their investigations is that Western Europe only started to take an economic lead over China around the year 1800 rather than the year 1500, as thought previously. With this temporal shift popular 'cultural' explanations for West-European supremacy referring to the Renaissance, the Reformation or the Scientific Revolution are suddenly declared irrelevant. Moreover, Western Europe's economic edge, which is largely attributed to 'coal and colonies', was only a temporary advantage. Viewed in the longer run, the period of the economic supremacy of Western Europe was no more than an intermezzo in a China-centred world economy. Thus, as a result of this new approach, Western Europe's role in world history has been strongly 'de-centred', which accords well with the region's peripheral geographic position on the Eurasian super-continent. A striking feature of the new economic historiography is that invoking cultural factors is virtually anathema – suggesting such factors for explanatory purposes seems automatically to invite the charge of eurocentrism. Not all historians, of course, have joined the bandwagon of this new tendency in historiography. Thus David Landes, in his well-known book *The Wealth and Poverty of Nations*, defiantly writes: "If we learn anything from the history of economic development, it is that culture makes all the difference. (Here Max Weber was right on.)" (Landes, 1998, p. 516).

If this brief tour along a few relevant academic disciplines has taught us anything, it is that the study of worldwide cultural differences constitutes a field of inquiry that is full of pitfalls and snags. How can we operate cautiously and wisely here?

Intermezzo: religion and bioethics

At first sight it might seem possible to circumvent the problems and controversies surrounding the notion of culture as sketched above by focusing on *differences between religions* with regard to the socio-ethical assessment of new developments in biotechnology. After all, as the above discussion also shows, many authors spontaneously start to think about religious differences when the debate is about 'worldwide cultural differences'. Why not then simply put the problematic concept of culture to one side and focus the attention instead on the diverse views of the various religions? Wouldn't it then be much easier to identify dominant values which can be related to the ethical appreciation of particular technological developments? We know, for instance, that Catholicism and orthodox Protestantism assume the personal character and inherent dignity of human life from the moment of conception and for that reason oppose research with human embryonic stem cells. That is a very simple relationship. It wouldn't seem to be too difficult to find similar relationships also with other religions like Buddhism and Hinduism. Francis Fukuyama is one who thinks there are indeed such relationships to be found. In his book *Our Posthuman Future* (2002) he suggests an important difference between eastern 'religions' and Christianity:

> "Asian traditions such as Buddhism, Taoism, and Shinto tend not to make as sharp an ethical distinction between mankind and the rest of natural creation as does Christianity. That these traditions perceive a continuity between human and nonhuman nature has allowed them to be […] more sympathetic to nonhuman animals. But it also implies a somewhat lower degree of regard for the sanctity of human life." (Fukuyama, 2002, 192).

Let us examine by way of example the attitude of Buddhism towards embryonic stem cell research.

When the New York Times asked Dr. Hwang Woo-Suk, an internationally acclaimed South Korean stem cell researcher before he fell from grace in December 2005, about his religious background, the latter answered:

> "I am a Buddhist, and I have no philosophical problem with cloning. As you know, the basis of Buddhism is that life is recycled through reincarnation. In some ways, I think, therapeutic cloning restarts the cycle of life." (Dreifus, 2004).

In South Korea, Dr. Hwang's research was supported by leading Buddhists like the Venerable Ji Kwan, director of the *Chogye Order of Korean Buddhism*. However, an internationally recognized authority on Buddhism, Damien Keown, holds that Hwang's stem cell research conflicts with Buddhist ethics: "Since therapeutic cloning involves experimentation on immature human beings, it might be thought clearly contrary to Buddhist ethics" (quoted in Frazzetto, 2004). Keown bases his claim on the fact that most Buddhist commentators adopted the classical Hindu doctrine that the transmigration of consciousness occurs during conception, "and therefore that all abortion incurs the karmic burden of killing". One would think that in the final analysis this is not that much different from the Catholic and orthodox Protestant positions on the inadmissibility of abortion and of embryonic stem cell research. But Hwang's Buddhist supporters in South Korea clearly had a different view!

Among Buddhist authorities there is apparently some disagreement about the question of whether or not embryonic stem cell research for therapeutic cloning is compatible with Buddhist doctrine. In the end, therefore, it may turn out to be far from simple to find an unambiguous relationship between a certain creed and a specific ethical standpoint with regard to a particular biotechnological development.

On closer inspection the situation is not fundamentally different with regard to the 'simple' relationship that was claimed to hold between Catholic or orthodox Protestant doctrine and the rejection of embryonic stem cell research. Let us confine ourselves to Catholicism. While the Roman Catholic Church claims to have consistently opposed abortion from the first century, liberal Catholics point at the extensive historical documentation showing the changes and reversions in the Church's vision throughout the centuries with regard to the question of when a foetus becomes a person. In the US the new Democratic Speaker of the House, Nancy Pelosi, is both Catholic and 'pro-choice'. Recently she supported a bill aimed to enlarge the possibilities for conducting embryonic stem cell research. Thus, here too there is no 'simple' relationship either.[1]

Narrowing the focus from cultural differences in a broader sense to differences between religions does not provide the desired solution.

[1] In a comment on an earlier version, Huib de Vriend suggested that in the examples given here (and also further in the text) *other* motivations, to wit, (economic and political) *interests*, rather than different religious (or cultural) views are actually of overriding importance. However, we are hesitant to frame the issue in these terms, because it would introduce an untenable contrast between religion (culture) and interests. The English social historian Edward Thompson once objected strongly to the vulgar Marxist (and vulgar bourgeois) opposition between 'morality' and 'interests': "Historical and cultural materialism cannot explain 'morality' away as class interests in fancy dress, since the notion that all 'interests' can be subsumed in scientifically-determinable material objectives is nothing more than utilitarianism's bad breath. Interests are what interests people, including what interests them nearest to heart" (Thompson, 1978, 368). Seen in this light, interests are not something standing outside the sphere of culture, forming as it were the material basis for the ideological (cultural) superstructure supposedly resting above it. Hence our reluctance to go along with de Vriend's suggestion.

A contextual, discourse-analytical approach to 'cultural differences'

In view of the huge difficulties with which the investigation of worldwide cultural differences is faced, we thought we could make a virtue out of necessity by applying a trick that is often used in the social sciences. The trick is that we use the notion 'culture', or 'cultural difference', not as a *resource* but as a *topic*. This means that we no longer directly aim at the (purported) differences in culture themselves, but turn the *discourse about* 'Asian' and 'western' culture, as it is conducted by those involved, into the object of analysis. To avoid that such an exercise degenerates into a rather sterile discourse analysis, we decided to put this discourse as much as possible in its socio-economic and political context.

Since the *Bangkok Declaration* of 1993, 'Asian values' are a much debated topic in many East and Southeast Asian countries. Out of this debate a long laundry list of purported 'Asian' (actually mostly Confucian) values can be extracted, such as: familism, filial piety, friendship, community spirit, orderliness, harmony and stability, thriftiness, diligence, the importance of education, discipline, obedience and respect for seniority and authority. Such a laundry list remains problematic, however, especially as a characterization of something as broad as 'Asian values'. Scientifically speaking, the whole notion is a non-starter, in view of the enormous ethnic, religious, economic and political diversity in Asia, even if we limit ourselves to East and Southeast Asia. Remarkably enough, this circumstance in no way prevents people from frequently invoking 'Asian values'. A contextual, discourse-analytical approach shows that for the elites in the quickly advancing countries of East and Southeast Asia there are many reasons for invoking such values, or in other words that such invocation may serve various functions.[2] First of all, appeal is made to 'Asian' values as a defence against the West, especially the US, and more specifically as a defence against western criticisms targeting the lack of democracy and violations of human rights. Appeal is also made to 'Asian' values in order to counter attempts made by international financial institutions to impose an Anglo-Saxon model of neo-liberalism and shareholder capitalism. Domestically, 'Asian' values are promoted as a counterweight to the much-feared increase of selfishness among the younger generation; in a few cases also to provide the needed cement for a multi-ethnic society (e.g. Malaysia). 'Asian' values could also serve as an ideological foundation for an enlarged regional economic block ('ASEAN + 3'), which is currently under discussion – this would be comparable to the Jewish-Christian and humanist heritage that some Europeans would like to declare the common basis of the EU. Finally, it is striking that 'Asian' values are also used to express an enhanced national confidence. This enhanced confidence is only partly based on the economic achievements that have been obtained in the past; it is based even more on the passionately held ambition to extensively invest in new areas of science and technology and thereby to challenge and compete with the West in strategically important fields (*techno-nationalism*).

The People's Republic of China occupies a remarkable position in the debate on 'Asian values', the more so as on closer examination these values are often specified as Confucian values. During Mao's Cultural Revolution Confucius was considered a major enemy of the people, whose lingering influence had to be completely eradicated (even before the Communist takeover in 1949, however, various Chinese *nationalists* had already held

[2] In a comment on an earlier version, Huib de Vriend remarked that here once again values are attributed or interpreted with a view to serving specific *interests*. We cannot deny that this seems to be the thrust of our approach, but nevertheless feel some misgivings about introducing the notion of 'interests' as an ultimate explanatory category. As theoretical debates in Science and Technology Studies (*inter alia*) have made clear, 'interests' themselves can be malleable and are often imputed and modulated. See also the previous footnote.

Confucianism responsible for the stagnation and decline of the old China). In contemporary China, by contrast, the ancient sage has been fully rehabilitated. Recently President Hu Jintao proclaimed the 'harmonious society' – which is unmistakably a Confucian notion. Chinese schools once again pay attention to Confucian teachings and everywhere around the world branches of the *Confucius Institute* are erected to promote the teaching of Chinese language and literary studies. The vicissitudes in the official recognition of Confucius – from rejection to rehabilitation – raises the question whether Chinese culture has always essentially remained Confucian ('deep down', as it were) and the events of the Mao era were no more than stirrings on the surface, or whether the recent rehabilitation only exemplifies a 're-invention of tradition' which actually does not go very deep.[3] A discourse-analytical approach must withhold from answering this question, however.

In the literature the debate on 'Asian values' is invariably related to the question whether they are conducive to modernisation and economic development. This seems immediately plausible for such values like thriftiness, diligence, the stress on education and discipline, which, on closer inspection, look quite similar to typical components of Max Weber's Protestant ethic. Some of the values that are mentioned in the laundry list, however, might easily turn from virtues into vices, depending on the circumstances. (According to Keynes, in times of under-consumption even thriftiness could become an economic vice.) During the financial crisis which affected Southeast Asia in 1997, for instance, such recognized moral pillars of the previous period of economic success like friendship and familism were suddenly unmasked as the trailblazers of nepotism and 'crony capitalism'. The crisis largely passed China, but also in this country negative sides of (purportedly) Confucian values may be noted. For ancient China Max Weber already held that familism was *too* strong, in the sense that it prevented the formation of a rational bureaucracy. In contemporary China, the respect for seniority and authority that is traditionally demanded by Confucianism appears to be a serious obstacle for building a modern science system. 'Peer review' simply does not work if research proposals or manuscripts submitted by older researchers are expected not to be turned down. Chinese science failed miserably in 2003 with the identification of the SARS virus, despite the availability of the most advanced technical infrastructure. In fact, the corona virus that is responsible for SARS had been correctly identified by a young Chinese researcher, but the latter thought it 'disrespectful' to openly challenge the *Chlamydia* hypothesis that had been propounded by an older colleague. Thus in the end, to the chagrin of the Chinese authorities, foreign researchers took the credit for the discovery and the genome sequencing (Enserink, 2003). Another striking case of a switch from positive to negative appreciation, finally, is provided by the hierarchical relations that obtained in Dr. Hwang's laboratory in Seoul. In October 2005, journalist David Klotz considered these hierarchical relations as a key to explaining why South Korea had stolen a march in stem cell research on the rest of the world: "Confucianism teaches that workplaces should be run as benevolent hierarchies, with younger and junior people obediently taking guidance from seniors." (Plotz, 2005). The report on the Hwang affair that the public prosecutor issued in 2006, however, argued that the hierarchy in Hwang's lab was far from benevolent and had in fact proved disastrous in letting the rampant perpetration of scientific fraud go unchecked (Wohn and Normile, 2006).

[3] In a comment, Huib de Vriend suggested that such a re-invention of the Confucian tradition would serve a specific, political interest. For our reservations about introducing interests as final explanations, see the two previous notes.

Cultural differences within 'the West'

When global cultural differences in the socio-ethical assessment of biotechnology are the topic of discussion, most probably differences between 'western' countries on the one hand and 'eastern' countries on the other will first come to mind and one would be far less, or perhaps not all, inclined to think of possible cultural differences within the first group of countries. While the *Achtergrondstudies Trendanalyse Biotechnologie 2004* does not fail to note that there are large differences between Europe and the US "with regard to the valuation of technology and most certainly with regard to the societal acceptance of genetic modification in agriculture" (COGEM, 2004, p. 26), the report also stresses that "there are however also many common values and norms, especially with regard to the ethical acceptability of developments in red biotechnology. The question is whether all Asian countries share those views. After all, the cultural differences between Europe and the US on the one hand and Asia on the other are considerable" (*ibid.*). The dominant idea here seems to be that Europe and the US are part of a single culture, namely 'western' culture, and therefore share many norms and values with each other. Possibly, the noted difference with regard to the societal acceptance of biotechnology in agriculture is not even interpreted in this connection as (the result of) a 'cultural' difference.[4]

In this study we also wanted to scrutinize the often tacit assumption that Europeans and Americans essentially share a single culture and that on a global scale the main cultural fault lines must be located between East and West. Such an inquiry wouldn't make much sense if we took Huntington's massive notion of culture as our starting-point – after all, he views 'western civilization' as a fairly monolithic entity. It makes much more sense, however, if we take our bearings from the concept of culture with a small c, as it is used in recent cultural anthropology.

In her path-breaking, popularly written book *Medicine and Culture* (1988), American medical correspondent Lynn Payer showed almost two decades ago that striking 'cultural differences' between highly advanced, western countries like the US, the United Kingdom and (West) Germany can even be found in a domain where they are least expected, to wit, in modern medical science and healthcare. It was notable, for instance, that doctors in the US performed six times as many cardiac bypass operations as their colleagues in Great Britain did; that low blood pressure was rewarded with reduced insurance rates in the US, whereas it was treated as a medical condition in Germany; that French doctors seldom performed hysterectomies, while they were one of the most common operations in the US; that German patients regularly suffered from '*Kreislaufstörungen*', which were not even recognized in the other countries. A more recent study that also throws light on the role of cultural differences in modern healthcare is the publication of the American medical sociologist and bioethicist Raymond de Vries, *A Pleasing Birth* (2005). In this book de Vries, a descendant of Dutch immigrants to the US, investigates the cultural backgrounds of the Dutch practice of giving birth at home, which in the eyes of most American medical specialists is highly irresponsible and almost barbaric (some specialists even consider it a form of 'child abuse'). While in most decently

[4] In his comments on an earlier version of this text, Huib de Vriend once again emphasized the importance of distinguishing between 'values' and 'interests'. He argues that what at first sight seems to be a difference in values may on closer examination turn out to be different ways of dealing with interests. De Vriend distinguishes between a typical American 'hard-line' approach and a typical European 'soft-line' approach. Our response is that differences in the way interests are dealt with may themselves be taken as (manifestations of) differences in (political) culture. In order not to prejudge the question of what are cultural differences, we try to avoid equating cultural differences *a priori* with supposedly deeply rooted differences in religious values.

developed countries around 99% of all births occur in hospitals, the Dutch still allow around 30% of their births to take place at home. It seems that they consider the process of giving birth to be a natural physiological process rather than a risky medical affair demanding special facilities that can only be offered in a modern hospital. Oddly enough, the statistics on perinatal deaths do not seem to show a disturbing picture. In general the Dutch are also quite content with their practice of giving birth at home: in their eyes the preferred location for a birth is the familiar, homely environment. It is rather significant, finally, that the Dutch word *bevallen* both means 'to give birth' and 'to please'. The examples provided by Payer's and de Vries's work illustrate that also among western countries notable cultural differences can be found. One must only be alert to them.

The influence of cultural differences between the US, the UK and Germany and more indirectly also the EU on the regulation of (red and green) biotechnology has been explored in Sheila Jasanoff's book *Designs on Nature* (2005). We therefore decided to devote an entire chapter to the analysis of her book. In comparing these different countries Jasanoff tried to find differences in *political culture* or, in other words, differences in *national styles of regulation*. In the area of agricultural biotechnology these national differences ultimately resulted in a worldwide polarisation between the 'product-based' US system and the 'process-based' EU system. This is an international disagreement of no minor importance, which according to Ernestine Meijer and Richard Stewart has even given rise to a "GM Cold War" (Meijer and Stewart, 2004). It must be emphasized in this connection that this is *not* a dispute between East and West, but a dispute within the West (in which 'eastern' countries like Japan and South Korea side with the EU), which is fought out on a global scale. This example shows that the main cultural differences in the assessment of biotechnology do not always coincide with the East-West axis. (Even if you don't want to view the different regulatory regimes of the US and the EU as the outcome of different cultures, you would still have to admit that some major differences in the assessment of biotechnology do not follow the cultural fault lines between East and West.) We have devoted a separate chapter to an analysis of the "GM Cold War" in order to examine the tenability of the European regulatory system with regard to agricultural biotechnology, to assess the ethical merits of the American refusal to introduce mandatory labelling of GM crops and foods, and to inquire how Asian countries like India and (especially) China position themselves in this conflict and which considerations guide their positioning.

Jasanoff also shows in her book that worlds of difference exist between two European countries, Great Britain and Germany, with regard to the regulation of red biotechnology. The British style is characterized by a cautious, pragmatic approach that proceeds from case to case and invests trust in the competent judgement of trustworthy and authoritative experts. A typical product of the British regulatory style is the so-called 'pre-embryo', a human foetus that is not older than 14 days and that may legally be used in scientific research (which for the rest is well-regulated). The German style, by contrast, is much more strict and restrictive. The German constitution assigns full human dignity to the embryo from the moment of conception: a legal entity like a 'pre-embryo' could not exist in Germany. Prenatal diagnostics is also precluded. With IVF all embryos must be implanted into the womb of the woman who supplied the eggs (besides, no more than three embryos may be created.) It is therefore legally impossible in Germany to create entities with a contestable legal status such as frozen embryos. Or as Jasanoff states: "The law acts in effect as an ontological prohibition, keeping entities potentially disruptive of the moral order from ever coming into being" (Jasanoff, 2005b). All this means that in the UK a relatively wide, legally protected niche exists for conducting embryonic stem cell research, while in Germany there is virtually no such niche

(an exception has been made for research with *imported* embryonic stem cells, but this exception is once more liable to such restrictions as to be practically negligible).

Different views on the ethical acceptability of embryonic stem cell research as exist between 'liberal' Great Britain and 'conservative' Germany obviously affect the common EU policy with regard to stem cell research. It also appears that such differences give rise to inconsistencies between the various agencies that are involved in the implementation of the European Directive for the legal protection of biotechnological inventions, in particular those stipulations which exclude certain inventions from being patented on moral grounds, such as in article 6.2.c "the use of human embryos for commercial and industrial purposes" (see the extensive report by Plomer, 2006).[5] There is a major disagreement on the precise scope of this stipulation. Please note that the European Union is not confronted here with deviant views on moral acceptability held in East Asian countries, but with major ethical differences within its own ranks! (In December 2003 China promulgated ethical guidelines for the conduct of research with human embryonic stem cells which essentially copy the British guidelines, including the age limit of 14 days.)

Techno-nationalism

Many rising countries in Asia strive to free themselves from their dependence on western technologies. By investing heavily in science and technology they try to catch up on and even outpace advanced countries in the West. A characteristic term that is often used in this connection is 'leapfrogging', expressing the idea that with a big jump one might become equal to or even surpass one's biggest international rivals. "We are going to leapfrog you and you will miss out", Indian biotechnologists told British Prime Minister Tony Blair when the latter visited Bangalore in January 2002. Some countries make a solemn pledge to become, within the foreseeable future, "a world leader" or even "*the* world leader" in particular areas of science and technology, e.g. in the domain of embryonic stem cell research or in bio-nanotechnology. Naturally such ambitions are informed by the pursuit of enhanced national power and prestige and are accompanied by strong chauvinistic feelings. National pride will be gratified even more if the new technologies that are to be developed receive a specific national stamp. There seems to be a strong, as yet unfulfilled hunger after international recognition. Bookstores in the South Korean capital Seoul display portraits of previous Nobel Prize winners that are followed by a blank spot under a Korean flag and a question mark, asking the seemingly all-important question: "Who will be the first Korean winner?" (Kang and Segal, 2006). This entire complex of ideas and motives is commonly designated by various authors with the term *techno-nationalism*.

Techno-nationalism is by no means unique for Asian countries. A clear historical example is the development of nuclear energy for both military and civilian purposes, by which France attempted to underline its independence, power, grandeur and 'radiance' (*rayonnement*) in the post-war, de-colonizing world. The special objects of national pride were the gas-graphite reactors, a uniquely French design deviating from the dominant American light-water reactors. However, when at the end of the 1960s France's nuclear industry intended to play a

[5] In his comments Huib de Vriend adds the observation that the European environmental directives for GMOs are also teeming with inconsistencies. Thus in Germany the national legislation implementing the EU directive for contained use excludes genetically modified organisms obtained by homologous recombination from its scope. Furthermore, there are also major differences of interpretation with regard to reference standards for establishing the effects of environmental releases. De Vriend suggests that these differences reflect different politico-economic interests rather than different moral views.

greater commercial role in the world market, the French quietly switched from gas-graphite to light-water reactors (Hecht, 1998).[6]

The strong tendency towards techno-nationalism, which can be observed in East and Southeast Asia, also has to do with the *dirigiste* role played by the government in the process of economic development during the post-war period (South Korea, Taiwan, Hong Kong, Singapore). After successfully building an industrial infrastructure, several Asian countries now take up the direct challenge of the West by trying to acquire leading positions in the new international knowledge economy. The nationalistic stakes of the game have been raised accordingly.

The concept of 'techno-nationalism' also provides a key to understand the rise and fall of Hwang Woo-Suk and the course of the South Korean stem cell affair. Hwang could grow into a national hero, the 'Pride of Korea', in the years 2004 and 2005, partly because during his career he had always played strategically on patriotic motives. He was supposed to become the first Korean Nobel Prize winner for whom the country had already waited for so long. Hwang also emphasized on each occasion that specifically "Korean" techniques were applied in making cloned embryonic stem cells. Because the national prestige of South Korea was directly at stake in his research project, ethical doubts and objections of critical groups could be effectively marginalized. Foreigners wondering with amazement about the large number of egg cell donors, were being told that South Korean women were driven by altruistic and patriotic motives. When ethical and legal irregularities in the recruitment of oocyte donors came to light later, criticism was countered with the remark that these practices had to be judged by 'eastern' and not by 'western' criteria. Thus techno-nationalism tends to deploy 'Asian values' instrumentally for the furtherance of its own innovation projects.

The idea of techno-nationalism also sheds an illuminating light on the biotechnology policy of the People's Republic of China. Despite the politics of reform and openness that is officially followed since Deng Xiaoping, Chinese political leaders are nonetheless concerned about the risk that the country may become too dependent on foreign technologies. Although China has invested heavily in science and technology during many years, these investments do not yet translate themselves into strong patent positions through which Chinese companies can conquer a share in the world market. More recently, a strategic re-emphasis on "independent innovation" (*zizhu chuangxin*) has been announced to enable China to escape from the "technology trap". In the domain of agricultural biotechnology the somewhat paradoxical situation obtains that Chinese research institutes have developed many new transgenic crop varieties, but that since the approval of *Bt* cotton in 1997 no new *species* of transgenic crops (as distinct from new *varieties* of already approved crops, like new varieties of transgenic cotton) have been approved for commercial release. Thus, since 2000 several new varieties of GM rice are waiting in vain for the green light. China also introduced more strict rules for biosafety and for mandatory labelling of GM foods. It seems that the country has one foot on the accelerator (higher expenditures on research and development for agricultural biotechnology) and one foot on the brake (regulation). Some sceptical commentators explain this situation not just from the fears among Chinese leaders to lose possible export markets, but also from their alleged conviction that the Chinese biotech sector needs more time to

[6] In his comments Huib de Vriend mentions the French scandal with AIDS-infected blood as another example of French techno-nationalism. In 1985 the French blood transfusion service refused to use an American AIDS test to screen the blood for haemophiliacs and waited until a French test would become available. The consequence was that many patients became infected with AIDS and hundreds of them died, according to estimations. These deaths could have been prevented if the American test had been used. See Anderson (1991) and Aldhous (1991).

become equal to the challenge of competing with foreign rivals. In other words, regulation is claimed to be used as a means to thwart foreign biotech companies. In our view, however, this is only part of the explanation. There is also much uncertainty about the possible reaction of the Chinese population to the commercialisation of transgenic rice; moreover, there is also an increasingly weighty group of persons within the research and government apparatus who value a careful and strict assessment of the environmental and health risks of GMOs. The bureaucratic position of this group has been strengthened through bilateral and multilateral contacts with experts from the EU occurring within the framework of 'capacity building' that is provided by the Cartagena Protocol.

In the age of globalization there is a permanent temptation to turn inwards and to strive even more vigorously for independence. Yet this may ultimately prove to be a self-defeating strategy. As Charles Leadbeater and James Wilsdon remark in their final report for the *Atlas of Ideas* project:

> "Techno-nationalists see innovation as a means to promote independence. Yet investing more in science-based innovation – as Korea found through the Hwang affair – requires greater openness to foreign ideas and international scrutiny" (Leadbeater and Wilsdon, 2007, 39).

Leadbeater and Wilsdon argue that European countries should consider the scientific and technological advance of East and Southeast Asia as an opportunity rather than a threat, and should respond creatively rather than in a constrained manner by intensifying contacts with this region as much as possible, in order to prevent a reversion to an extreme techno-nationalism on both sides. Innovation is not a 'zero-sum' game, in which the gains of one party are the losses of the other. The rise of China and other Asian countries therefore offers opportunities that may challenge European creativity and ingenuity. In this way a truly 'cosmopolitan innovation' may be encouraged.

The argument of the 'Wild East'

Policy-makers in Europe and the US often look with some jealousy to the recent rise of biotechnological research in East and Southeast Asian countries. The suspicion is that these countries can steal a march on western countries precisely because they are less hindered by moral scruples or fears about the possible consequences of new technologies for society or the environment. The conclusion that is usually drawn from this diagnosis is that for competitive reasons western countries cannot avoid to lower their ethical, social and environmental standards. James Wilsdon and his colleagues of the *Atlas of Ideas* project coined the fitting expression 'the argument of the Wild East' for this type of argumentation. In their project description they paraphrased it as follows:

> "The rise of Asian science is sometimes used as an argument for a more relaxed stance on social, ethical or environmental concerns in Europe – the suggestion being that squeamish Europeans may lose out at the expense of the 'wild East'." (Demos, 2006).

A specific variety of this type of argument is that the lack of democracy and of an active 'civil society' in authoritarian states such as China will lead political leaders to quickly approve new transgenic crops without paying too much attention to possible environmental and health hazards. In this connection Jennifer Zhao and Peter Ho speak of the scenario of the 'developmental risk society' (Zhao and Ho, 2005).

The argument of the 'Wild East' is used in various guises in several areas of science and technology, like agricultural biotechnology (Zhao and Ho, 2005), embryonic stem cell research (Dennis, 2002) and nanotechnology (Jones, 2005). In 2002 Francis Fukuyama also

held that morally dubious developments in the area of the life sciences are expected to come first of all from Asia:

> "If there is any region in the World that is likely to opt out of an emerging consensus on the regulation of biotechnology, it is Asia. A number of Asian countries either are not democracies or lack strong domestic constituencies opposed to certain types of biotechnology on moral grounds. Asian countries like Singapore and South Korea have the research infrastructure to compete in biomedicine, and strong economic incentives to gain market share in biotechnology at the expense of Europe and North America. In the future, biotechnology may become an important fracture line in world politics." (Fukuyama, 2002, 193).

As James Wilsdon and his colleagues advocate "socially responsive and accountable forms of science and innovation" (the special hallmark of the British think tank *Demos*), they are bound to reject the conclusion that is usually drawn from the argument of the 'Wild East'. They therefore go at some length to address this argument head-on. Their first counter argument states that the argument actually amounts to a counsel of despair and calls for a *race to the bottom* with regard to ethical or environmental standards and the protection of labour rights. Secondly, they contest the assumption that moral concerns or concerns about social and environmental consequences are unique to Europeans and Americans and foreign to Asians: "It is also misleading, not to mention deeply patronising, to pretend that people in India and China don't share many of these same concerns – albeit expressed in a variety of ways" (Wilsdon et al., 2005, 59). Finally, they argue that moral concerns and social and environmental requirements are not necessarily obstacles to economic development; in fact, ethical 'upgrading' can sometimes deliberately be used as a promising innovation strategy (Demos, 2006).[7]

Using the case of the South Korean Hwang affair described in chapter 3, we can add a few additional counter arguments. As a matter of fact, before Hwang's humiliating downfall in mid-December 2005 and the full disclosure of the extent of his scientific fraud, the example of South Korean stem cell research was often cited in the international media to support some version of the 'argument of the Wild East'. Thus in October 2005 journalist David Plotz raised the question "Why South Korea leads the world in stem-cell research", and his first answer was: "For starters, the country is not preoccupied with moral questions about the beginning of life…" (Plotz, 2005). No later than December 1, 2005 (that is to say, *after* it had become clear that legal and ethical irregularities had occurred in the donation of egg cells, but *before* the exposure of Hwang's scientific fraud), the British magazine *The Economist* still issued an editorial in which it broke a lance for South Korean stem cell research. The magazine dismissed the uproar over Hwang's ethical lapses as overblown and exaggerated. Thanks to a more relaxed attitude of the Korean public, in contrast to the moral "agonizing"

[7] In his comments to an earlier version of this text Huib de Vriend mentioned the example of the cooperative venture supported by the Innovation Network, TransForum, Agro & Groen and some Dutch firms to realize an agropark on Chongming island in the mouth of the Yangtze River near Shanghai, where sustainable agriculture, recreation and education will be combined. The critical question still to be answered is whether this project will abide by Dutch or (much lower) Chinese standards for animal welfare. The Advisory Societal Council (Maatschappelijke Adviesraad) of TransForum urges to follow the Dutch standards. Wilsdon and Keeley notice the ethically questionable practice of some western pharmaceutical companies to 'outsource' their animal testing operations to China in response to attractive offers made by Chinese companies, in order to evade regulatory hurdles and public opposition at home. They seem to suggest that 'socially responsible' business companies will eventually rise to the challenge: "Global businesses are well used to the challenges of managing supply chains in a socially responsible way. As R & D networks become increasingly global, these same challenges will apply to the supply chain of research" (Wilsdon and Keeley, 2007, 51).

about stem cells in the West, so the British magazine argued, Dr. Hwang had been able to forge ahead and to steal a decisive march on his western rivals. Americans and Europeans were subtly advised to set their moral objections aside for the sake of greater economic growth. It was at any event inappropriate for the West to attempt to impose its values on other cultures (The Economist, 2005).

The wisdom of hindsight allows us to deal a devastating blow to this entire argumentation. What at first sight seemed an impressive headstart, ultimately turned out to be not a headstart at all! Hwang had led the entire world and his own country astray for hundreds of millions of dollars. With hindsight, ignoring ethical concerns does not seem to be the best recipe for achieving quick scientific successes either. Whoever is ready to cut ethical corners, the Hwang scandal suggests, might also be willing to compromise on the demands of scientific integrity and accuracy. Or as an editorial in *Nature* stated: "Sound ethics and good research practice go hand in hand" (Nature Editorial, 2006).

It would be wide off the mark, moreover, to characterize South Korea as an "ethically undeveloped country" (Bogner and Menz, 2006). After the birth of cloned sheep Dolly was made public in 1997, an intense debate was held in South Korea about the ethical aspects of reproductive and therapeutic cloning in humans. Protestant and Catholic organisations, representing together about 12 million (9 and 3 million, respectively) out of a total of 48 million inhabitants of South Korea (more than the 10 million Buddhists), urged a total ban on cloning. The *Korean Bioethics Association* was also active in this field, and special legislation was being prepared. In December 2003 the *Bioethics and Biosafety Act* was passed; with some delay it was to enter into force on January 1, 2005. However, thanks to support from leading politicians and privileged access to higher civil servants, Hwang was able to secure an exemption for his research team. The supposed national importance of his stem cell research and the inflated expectations about prospective clinical applications further helped to silence critics. Partly because of Hwang's unassailable status as a national hero the legally required review of his research activities by medical-ethical committees was no more than a formality. On the occasion of the opening of the *World Stem Cell Hub* on October 19, 2005, South Korean President Roo Moo-hyun evinced a quite remarkable conception of his task: "Politicians have a responsibility to manage bioethical controversies not to get in the way of this outstanding research and progress". In short, there were surely moral doubts and concerns about Hwang's stem cell research in South Korea, but these were eventually marginalized under the influence of the rising (techno)nationalistic mood. This was not only true for principled objections against therapeutic cloning as such, but also for critical questions and doubts about the ways egg cell donors were being recruited and informed.

When in the fall of 2005 Hwang's research was criticized (once again) because of irregularities in the egg donation process, various South Korean researchers, bioethicists and authorities countered the international criticism almost instinctively by invoking their own 'Asian values'. The spokesperson of the Ministry of Health and Welfare, Choi Hee-joo, declared that "the donations were made according to values consistent with Eastern culture, and shouldn't be looked at from the standpoint of Western culture." (The Hindu, 2005). We have found out that this strategy of "playing the culture card" was used remarkably often to ward off external criticism. Apparently, a strong techno-nationalism is easily tempted to use 'Asian values' in a rather instrumental way. In the situation under consideration, however, this strategy was not very convincing. After all, also when *judged by South Korean criteria*, the recruitment of egg cell donors was morally dubious and in many respects illegal (e.g. in those cases where commercial remunerations were provided). The internationally recognized

principle of 'informed consent', which was regularly violated in the South Korean stem cell project, is also endorsed in the case law of the South Korean Supreme Court.

The South Korean stem cell affair furthermore provides a graphic illustration of the contradictions in which an extreme techno-nationalism inevitably becomes entangled. The aim was to enhance the national power, competitive capacity and prestige of South Korea through embryonic stem cell research, but the aspiration also was to become the centre of worldwide stem cell research and thus to attract foreign researchers (through the so-called *World Stem Cell Hub*). It is hardly realistic, however, to expect that those same foreign researchers will still gleefully participate when it turns out that the rights of South Korean egg cell donors have not been fully respected. The alleged 'Asian values' do not provide a solid foundation for international scientific cooperation.

In the aftermath of the Hwang scandal the rules around egg donation have been tightened and more precisely articulated, both internationally and within South Korea itself. The international scientific community dealing with embryonic stem cell research engaged in self-regulation to establish the minimal ethical ground rules for those countries and regions that are sufficiently 'permissive' with regard to the moral status of the embryo to allow this kind of research (see Hinxton Group, 2006). The rules also call upon the editors of scientific journals to help enforce these minimal ethical rules.[8] Thus, the level of the international playing field for conducting this type of research has been heightened. A race to the bottom has not occurred.

Bioethics between relativism and universalism

There is increasing attention on a worldwide scale to 'bioethical' issues in the life sciences. Everywhere committees are being installed which have to judge the acceptability of research projects and technological applications. American bioethics, especially the 'principlist' model of Beauchamp and Childress with its four principles of beneficence, non-maleficence, justice and respect for autonomy, has become an important export product in this connection. The adherents of this form of ethics claim its universal validity and hence its suitability to guide moral deliberation in different cultural contexts (Beauchamp, 2003; Gillon, 2003). However, this claim to universality has also earned a lot of criticism from the representatives of other ethical schools and from cultural anthropologists and other social scientists.

As the four principles of Beauchamp and Childress have been formulated in fairly abstract terms and thus require further specification in order to be translated to concrete situations, their model offers a large measure of flexibility for application in widely different cultural

[8] *Nature*'s chief editor Philip Campbell also signed the Consensus Statement of the Hinxton Group. This implicitly answers the question that was raised in the *Achtergrondstudies Trendanalyse Biotechnologie 2004*: "Are journals and editors allowed to impose their ethical views on others who from a different cultural background endorse an entirely different ethics? What would that mean for the development of science? However, it appears that these attempts are just rearguard actions. Given current global trends, the imposition of ethical values on other parts of the world is at any rate impossible" (COGEM, 2005, 26). It seems to us that the use of ethical standards by journal editors is described here rather tendentiously as the "imposition" of ethical values on other parts of the world. One would think that if South Koreans or Chinese want to publish their work in *Nature* or *Science*, they will have to conform to the standards (including ethical standards) employed by those journals, or else look for other publication outlets. It would therefore surely have some effect if leading international journals followed a strict ethical course. The COGEM *Achtergrondstudies* appear to depart from a hardly tenable cultural relativism, which condones the "entirely different ethics" which people are said to endorse "from their own cultural background". Arguably, the case could be made that it is rather *this* view which, "given current global trends", represents an atavism.

contexts. While universalistic in tenor, it also offers wide scope for cultural variations in its concrete elaboration. According to Raanan Gillon, 'principlist' ethics thus steers clear from the Scylla of moral relativism (each form of ethics is equally good as every other) and the Charybdis of moral imperialism (this is the only correct way to do ethics) (Gillon, 2003).

With some charity it is not too difficult to recognize in non-western cultural traditions the four basic moral principles of Beauchamp and Childress. Thus those principles can also be extracted, albeit with some effort, from traditional Confucian ethics (Tsai, 2005). However, the critical comment needs to be added here that in this ethics the principle of beneficence takes precedence, while in the *practice* of American bioethics a near-absolute priority is granted to the principle of respect for autonomy. This merely shows, according to the American communitarian ethicist Daniel Callahan, the individualist slant of 'principlist' bioethics:

> "Autonomy is […] given a place of honour because the thrust of individualism, whether from the egalitarian left or the market-oriented right, is to give people maximum liberty in devising their own lives and values" (Callahan, 2003, 289)

Some hold that it is precisely this individualist thrust which tends to make the idea of autonomy or self-determination less applicable to other cultures. The Taiwanese bioethicists Michael Cheng-tek Tai and Chung Seng Lin, for example, state that the principles of beneficence and non-maleficence are by no means foreign to Confucian ethics, but that the latter has an entirely different view of the meaning of autonomy:

> "Confucian ethics has a very different understanding of […] self determination. In a society where the family is the centre of all attention, autonomy becomes collective rather than individualistic. The centre of each person's life is not himself or herself but the family. […] Although a family is composed of many members, community starts not with the individual but with the unit of the family, which becomes the base of a macro-vision of Confucian tradition for a harmonious universe. Each person exists for the greater common good, for the greater good of the community of many different individuals." (Tai and Lin, 2001, 52).

We wonder, however, whether this rather old-fashioned and conservative formulation is still in conformity with the moral views currently prevailing in Taiwan and other East Asian countries. Can individuals in a modern knowledge society plausibly be expected to efface themselves for the greater good of the family and ultimately of the community and the universe? It would also seem that such a view might easily be abused by authoritarian regimes to enforce obedience and conformity.

A more sophisticated view on Confucianism can be found with Tu Wei-ming, professor of Chinese history and philosophy at Harvard University. Tu attempts to extract the core values from the Confucian tradition and to make them relevant for present-day debates on ethics and politics in both East and West. Confucianism, Tu argues, rejects the idea that man is a free and autonomous individual by nature, but rather starts from a *relational* conception of the human person. The 'self' is a centre of relationships and has to develop itself in and through these relationships. According to Tu, this view is eminently compatible with the recognition of human rights (Tu, 1998). What is at stake here is the recognition not only of 'negative' rights, but also of 'positive' rights. Tu reproaches libertarian philosophers like Robert Nozick to have such a one-sided image of man as to value only rights of the first kind. Confucianism gives pride of place to civil and political as well as to economic and social human rights (Hudelson, 2005-2006). Many contemporary East and Southeast Asian countries by contrast, while invoking their own 'Asian values', tend to play off the latter against the former.

A large part of the criticism on 'principlist' bioethics is not only addressed to the one-sided emphasis given to the principle of respect for autonomy, but also targets the way this principle is put into practice. In medical therapy and in medical research it is embodied in procedures for obtaining 'informed consent' from the patient or the research subject. Many social science studies point at the serious shortcomings and limitations of such procedures. Often patients are not adequately informed about possible effects of the proposed interventions or prove unable to correctly interpret the information offered (Corrigan, 2003). Of course, a defective practice does not in itself prove that the underlying principle is at fault. After all, 'informed consent' means more than that the patient simply puts his signature on the consent form. The observed shortcomings do however raise questions about the implementation of informed consent procedures in non-western countries. After all, if the application of these procedures turns out to be so problematic already in western countries, then how about their use in areas in which the basic ethical principle of respect for autonomy hardly had a chance until now to take root in the indigenous culture?

Internationally, there is also discussion about the question of whether the notion of informed consent should be interpreted in strictly individualist terms or whether it may be stretched in such a way as to meet certain culturally anchored needs and practices. A pertinent example is the multi-staged procedure followed in a research project on malaria that was carried out in Mali. First the village elders were approached, then focus group discussions were held with the heads of families, next with the mothers of the children that were to be involved in the study, and finally oral consent was asked from individual families to participate (Doumbo, 2005). It would seem that this is an acceptable, culturally adequate modification of the usual procedures of informed consent.

Within the framework of the controversial *Human Genome Diversity Project*, the idea of *group consent* was developed in order to persuade 'indigenous' peoples all over the world into cooperation (Greely, 2001). The idea has even been elaborated into a detailed *Model Ethical Protocol*, but this proved not enough to save the international research project – largely because there was too much distrust and suspicion among the representatives of 'indigenous' communities about the aims of the project (Reardon, 2005; Wasserloos, 2005; Van den Belt, 2006). The ethical innovation of *group consent* has triggered a fundamental debate about its legitimacy, which largely followed the familiar dividing lines between liberalism and communitarianism (Wasserloos, 2005). It is quite remarkable, by the way, that the Human Genome Diversity Project failed to take off almost everywhere except in China, where the first results of the genome diversity studies have already come in (Cavalli-Sforza, 1998; Chu et al. 1998). We do not know the reasons for this contrast, but they may have to do with the stronger influence of the central government. The article by Chu *et al.* only contains the perfunctory remark in its conclusion that "[i]nformed consent was obtained for the newly collected Chinese samples" (Chu et al., 1998).

In a certain sense, the debate on the alleged universal character of bioethics in general and the principle of respect for autonomy in particular has become largely 'academic'. Pragmatically speaking, there is nowadays something like a 'really existing bioethical universalism', as various East Asian countries have committed themselves to international treaties like the *Universal Declaration on Bioethics and Human Rights* (2005). The principle of 'informed consent' is also endorsed by the Chinese authorities.[9] Moreover, they have formulated

[9] In his comments on an earlier version of this text, Huib de Vriend expressed his doubts about the underlying motivation of the Chinese authorities. Did they endorse the principle of informed consent to meet the wishes of

guidelines for conducting embryonic stem cell research that closely resemble the official British guidelines (Salter *et al.*, 2006).[10] Good intentions are surely there when it comes to taking ethical principles in biomedical research seriously. However, the big problem concerns the implementation of these intentions (Hennig, 2006). In East and Southeast Asia, especially in China, a long learning process has still to be gone through, during which severe derailments and excesses cannot be excluded beforehand.

Yet it would not be very productive to passively wait with agony in our hearts until morally dubious developments in the domain of biotechnology will arrive on our shores from the East. James Wilsdon and James Keeley of the British *Atlas of Ideas* project make a strong case for "a more proactive UK or European stance on issues of ethics and governance", in line with their general plea for intensifying contacts (scientific and other) with East Asia (Wilsdon and Keeley, 2007, 50). Thus more and better alliances must be forged between scientists, ethicists and policy-makers from here and from over there. Of course, many things are already being done in this respect. Within the 'capacity building' framework provided by the Cartagena Protocol, European and Chinese experts cooperate on the regulation of agricultural biotechnology. There is also Chinese-European cooperation vis-à-vis the 'ethical governance' of biomedical research within the BIONET programme coordinated by Nikolas Rose. In September 2006, the Science and Development Network and the British Council organised a two-day workshop about 'Reporting bioethics' in Beijing for Chinese journalists. Such initiatives are very important if we want to prevent that East Asians take recourse to an intensified techno-nationalism and entrench themselves in the bulwark of their own 'Asian values'. One thing that is notable is that the Netherlands does not lead the way or even participate in such initiatives. Has our traditionally outward-oriented country turned inward and secluded itself off from the rest of the world?

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the Chinese population or only to address western criticism? Is the principle being embedded in Chinese culture or is the decision merely a response to outside pressure? Our reply is that even if one takes the latter, more sceptical position, official endorsement of this principle by the Chinese authorities will probably not be without consequences. In the end it may even create space for more participation of Chinese citizens and patients.

[10] Chinese stem cell researchers have also signed the guidelines for human embryonic stem cell research of the ISSCR (International Society for Stem Cell Research). See Daley et al. (2007).

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Chapter 2

Monsters, boundary work and framing:
Biotechnology from an anthropological perspective

Introduction

Sheila Jasanoff's book *Designs on Nature: Science and Democracy in Europe and the United States* (Jasanoff, 2005a) is a comparative study on biotechnology policy in the USA, the UK and Germany (and also the European Union) during the last three decades aimed at showing the enduring influence of some salient differences in political cultures between those countries. She herself calls it a "multi-sited ethnography". The content of the book, however, is not easy to summarize, because its extensive argument moves on different levels and is rather complex. Part of the complexity derives from the difficulty of including the European Union, alongside the UK and Germany, into the comparison. But there is also a more analytical complexity engendered by the attempt to combine key concepts from a variety of approaches, like 'framing', 'boundary-work' and 'co-production'. It is also notable that the reviews of her book do not attempt to reconstruct the full range of Jasanoff's argument, but concentrate on a few specific issues that the reviewer deems most salient (Cantley, 2005; Kinderleder, 2005; Millstone, 2005).

The purpose of this chapter is to offer a more extensive and thorough-going analysis of Jasanoff's monograph. As Professor of Science and Technology Studies at Harvard University's John F. Kennedy School of Government, and trained in law at Harvard Law School, she enjoys high standing among lawyers, sociologists and political scientists studying biotechnology policy in different countries. Getting to grips with Jasanoff's work in this area, however, also entails that we have go somewhat deeper into the theoretical issues raised by her approach. This will make the character of the present chapter rather different from that of the chapters to follow. It is emphatically *not* our aim in this chapter to set out a theory that will serve as our framework in the next chapters. We are only interested in discussing Jasanoff's comparative analysis of biotechnology policy and making it more accessible. It just so happens that her substantive contributions are wrapped up in a quite formidable theoretical garb.

In order to get a stronger hold on Jasanoff's complex and somewhat baroque argument, we piece it apart and pin it down on a number of more or less distinct 'theses'. The following main 'theses' can be extracted from her book:

- *The co-production thesis*: "Natural and social orders […] are produced at one and the same time – or, more precisely, coproduced" (Jasanoff, 2005a, 19).
- *The framing thesis*: "[E]vents do not in and of themselves dictate the pathways along which public responses will move. [They] first have to be set within an interpretive context that allows them to function as a starting point for deliberation or concerted action" (Jasanoff, 2005ba, 24).
- *The 'monster' creation thesis*: Modern biotechnology creates 'ontological novelties' or 'monsters' that challenge existing natural and social orders: "Genetic engineering threatens or calls into question many of the categories that have been accepted as foundational in the ordering of societies, both ancient and modern" (Jasanoff, 2005a, 26). "[B]iological sciences and their applications have brought about ontological changes and reclassifications in the world, producing new entities and new ways of

understanding old ones. Such changes entail a fundamental rethinking of the identity of the human self and its place in larger natural, social, and political orders." (Jasanoff, 2005a, 6-7).

- *The 'boundary-work' thesis*: New biotechnological entities require extensive work by legal institutions, ethics review boards and various other social agencies in order to fit them into existing classifications and give them a recognized and acceptable place in the natural and social orders: "A major function of policymaking for the life sciences is to create and maintain boundaries that correspond to people's preexisting ethical and social sensibilities" (Jasanoff, 2005a, 26).
- *The thesis of enduring differences in national political cultures*: The USA, Great Britain and Germany exhibit enduring differences in their policies of regulating biotechnology due to the relative 'stickiness' of early dominant framings or 'controlling narratives' of biotechnology as *product* (USA), as *process* (UK), and as socio-political *programme* (Germany) (Jasanoff, 2005a, 42-67; 274-280). These different framings are closely correlated with varying degrees of tolerance for 'monsters', ranging from encouragement (USA) through permission (UK) to prohibition (Germany) (Jasanoff, 2005b, 151).
- *The thesis of the political subservience of bioethics*: "[T]he agendas of politics [shape] the use of bioethics more than the other way around." (Jasanoff, 2005a, 201)
- *The 'nation-building' thesis*: "[P]olicies for the life sciences have been incorporated into 'nation-building' projects that seek to reimagine what the nation [or the European Union] stands for." (Jasanoff, 2005a, back flap; compare Jasanoff 2005a, p. 7).
- *The ' civic epistemology' thesis*: "[D]emocratic theory in the era of the knowledge society must actively take on board the involvement of citizens in the production, use, and interpretation of knowledge for public purposes" (Jasanoff, 2005a, 41).

Co-production

In an earlier publication, Jasanoff presented the following 'definition' of 'co-production':

> "Briefly stated, co-production is shorthand for the proposition that the ways in which we know and represent the world (both nature and society) are inseparable from the ways in which we choose to live in it. Knowledge and its material embodiments are at once products of social work and constitutive of forms of social life; society cannot function without knowledge any more than knowledge can exist without appropriate social supports. Scientific knowledge, in particular, is not a transcendent mirror of reality. It both embeds and is embedded in social practices, identities, norms, conventions, discourses, instruments and institutions – in short, in all building blocks of what we term the *social*. The same can be said even more forcefully of technology." (Jasanoff, 2004a, pp. 2-3)

She is reluctant to speak of a *theory* of co-production, but prefers to refer to it as an *idiom* or *framework* (Jasanoff, 2004a, 3). In her opinion, it is a framework that is rapidly gaining ground in contemporary Science and Technology Studies (STS), particularly because it allows avoiding the one-sided positions of both *social determinism* on the one hand and *natural determinism* (or *scientific and technological determinism*) on the other.[11] The co-production framework consistently refuses to grant causal primacy to either science/technology (or nature) or society. Other constructivist authors express the same idea in terms of the 'mutual shaping', 'mutual constitution' or 'co-evolution' of science/technology and society.

[11] One of Jasanoff's students, Jenny Reardon, used the co-production framework in her study on the vicissitudes of the Human Genome Diversity Project; see Reardon, 2005. For a critical review, see van den Belt (2006).

There are different formulations of the co-production framework. Exactly what is said to be 'co-produced' may vary: sometimes it is the natural and the social order (Jasanoff, 2005a, 19), or the natural and the moral order, sometimes it is nature and society, or nature and culture, or science and society (Jasanoff, 2004b, 17), or any elements belonging to the one or the other domain, such as "political practices, social norms, and ideas of nationhood", on the one hand, and "new biological concepts and constructs", on the other (Jasanoff, 2005b, 275). For STS researchers who follow the 'co-production' perspective, neither the natural nor the social world is a self-contained, ready-made world with fixed divisions and borders. Hence there is frequent use of phrases like "the interpenetration of science and technology with cultural expressions and social authority" (Jasanoff, 2004b, 18), "the complicated interplay of the cognitive, the institutional, the material and the normative dimensions of society" (Jasanoff, 2004b, 17) or "complex entanglements among knowledge, technical capability, politics, and culture" (Jasanoff, 2005a, 290).

One might think that the expression 'natural order' is crucially ambiguous: does it refer to our views and perceptions of the natural world, in other words to the 'order' that we ourselves construct through our classifications and theories, or to the external world to which such conceptual structures are thought to refer? The answer is that many (most?) STS researchers are not willing to make a distinction between knowledge and the external world. In STS analyses the two are most often conflated. When natural scientists succeed in getting their views and theories accepted among their colleagues, they *ipso facto*, according to this view, enrich the world with the new kinds of entities that are postulated in those theories, such as atoms, molecules, microbes, genes, black holes, quarks, gravity waves, global warming, or the hole in the ozone layer etcetera. STS students will say that science and technology (or 'technoscience', for short) are engaged in 'world-making' and are continuously proliferating new 'entities'. This is held to be true for natural entities like genes, viruses and bacteria as well as for human-made artifacts like electron tubes, transgenic organisms or cloned stem cells. (We have elsewhere criticized the refusal of 'radical' constructivists like Bruno Latour and Karin Knorr-Cetina to make a principled distinction here; see van den Belt, 2003).

Loose talk of the 'co-production' of science and society, or the natural and the social order, might also suggest the idea that these two different spheres are each time (co)produced anew from scratch, as if history starts *de novo* on each new day of the calendar. This is obviously very implausible. Jasanoff therefore reminds us that in practice many STS researchers take for granted that "in most exercises of world-making, neither science nor society begins with a clean slate but operates always against the backdrop of an extant order […]" (Jasanoff, 2004b, 19). Yet it remains tricky how much of an 'extant' order may be assumed by STS analysts as pre-given, precisely because of their 'metaphysical' commitment to a (natural and social) world that is not ready-made but always in flux. After all, a central criticism of the 'co-productionists' vis-à-vis the social determinism of the adherents of the Strong Programme is that the latter presumes a pre-existing social world with a fixed cast of actors, each equipped with a fully formed identity and with obvious interests in the issues at stake. Take a large portion of the extant social world for granted, however, and you risk falling back to an allegedly obsolete social (or cultural) determinism!

The dilemma manifests itself in the way Jasanoff takes issue with and distances herself from approaches in political science that focus on 'national styles of regulation' to explore and understand persistent differences in policymaking concerning environmental problems in various countries. In her view, "explanations based on variables such as national styles of regulation run into difficulty by failing to ask why some social structures or processes are

seen as more deterministic than others. […]. Social structures […] are not immutable; they change in the very process of enabling actors to use them" (Jasanoff, 2005a, 20). Jasanoff therefore opts for a "more fluid way of thinking about 'social kinds' such as the state" (Jasanoff, 2005a, 19). Yet in her own work she also sets out to highlight some persistent differences in biotech policy between the USA, Great Britain and Germany (and the European Union), which she attempts to understand in terms of the 'stickiness' of frames (Jasanoff, 2005a, 274 ff).[12] Why would her explanatory attempt be invulnerable to the type of criticism she levels at other policy analysts?

Framing and monster creation

Framing is a well-known theme in many disciplinary approaches. Jasanoff's colleague Herbert Gottweis also adopts a 'framing' perspective in his comparative study of stem cell politics in the USA and Germany:

> "Phenomena such as human embryonic stem cells are not simply 'objective data' for regulatory decision making. Rather, for human embryonic stem cells to become relevant in the policy process, they need to be transformed from something that is 'out there' into something that is socially and politically signified." (Gottweis, 2002, 446).

Jasanoff gives the example of the birth of Dolly the sheep, the first cloned mammal, and the destruction of the World Trade Center in New York as events that first had to be 'framed' in a certain way before they could function as a trigger for collective action:

> "[S]o Dolly's birth announcement became a challenge for 'bioethics', and the September 11, 2001, attacks were cast as grounds for a 'war on terror'" (Jasanoff, 2005a, 24).

In Jasanoff's view, frames are not free-floating; they are culturally conditioned and intersubjectively held and embed themselves in social behaviour and material culture. They thus strongly influence what people perceive as 'real' in the world around them. Frames are also discernable in the regulation of science and technology. They can be seen as "a kind of story-telling by communities situated in particular times and places who are attempting to deal with unsettling and disruptive changes in their environments" (Jasanoff, 2005a, 23).[13]

Biotechnology (taken in a broad sense) can be seen as culturally 'unsettling' or 'disruptive'. It is characteristic of this 'technoscience' that it continually places into the world new entities which from a cultural point of view may be described as 'monsters', that is to say, hybrids of nature and culture that have not yet found a recognized place within existing frames of reference and systems of classification.[14] It is precisely because of its "zeal for hybridity", according to Jasanoff, that biotechnology *inevitably* requires "ontological ordering" (Jasanoff, 2005b, 151). Categories and classifications that are called into question by biotechnology "include the fundamental divisions between nature and culture, moral and immoral, safe and

[12] Compare: "Public responses to biotechnology are […] shown to be embedded within *robust and coherent political cultures* rather than being ad hoc and contingent expressions of concern that vary unpredictably from issue to issue" (Jasanoff, 2005b, 141; my italics).

[13] Compare the following passage: "It is widely recognized by now that public problems do not simply appear on policy agendas, as if placed there through the direct imprint of exogenous events. Rather, they are framed in particular ways by cultural commitments that predispose societies, no less than the individuals within them, to fit their experiences into specific types of causal narratives." (Jasanoff, 2005b, 141).

[14] The terminology of 'monsters' is not much used in the book *Designs on Nature*, but it is used in a later essay (Jasanoff, 2005b). Here "monsters" are defined as "entities that threaten disorder by crossing the settled boundaries of nature or society" (*ibid.*, p. 151). This *concept* is also very prominent in the book, even if the *term* 'monsters' may be conspicuously absent.

risky, god-given and human-made" (Jasanoff, 2005a, 26).[15] Jasanoff uses the following set of examples to illustrate the idea:

> "We can import genes from spinach into pigs, from jellyfish into rabbits, and from fish into tomatoes; the technique of xenotransplantation allows cells from genetically altered pigs or chimpanzees to be inserted into biologically compatible humans. We can contemplate altering the human genome so as to produce enhanced human beings, with characteristic that today would be regarded as out of the ordinary, even superhuman. What, then, is nature and what is being human?" (Jasanoff, 2005a, 26).

Elsewhere she elaborates the same theme with examples derived from assisted reproduction (IVF) and cloning (Jasanoff, 2005b).

It must be emphasized that the term 'monster' does not necessarily convey a negative connotation. Admittedly, there are some authors who use the term in a pejorative sense, but they are the exception. An example is the Belgian philosopher Herman de Dijn, who can rightly be classified as a 'bioconservative' (Bostrom, 2005) because he really seems to abhor biotechnological 'monsters' (De Dijn, 2003). Many postmodernist writers, by contrast, are so excited by crossing borders and blurring distinctions that they almost seem to fall in love with any 'hybrid', 'monster' or 'cyborg' that comes along.[16] Within STS, Bruno Latour (1993; 2004) and Donna Haraway (1992) are obvious examples.[17] Other authors use the notion of 'monsters' in a more detached way as a conceptual instrument to study public responses to newly discovered or created phenomena. The *locus classicus* for this approach is Mary Douglas' anthropological study on *Purity and Danger* (1966). The Dutch philosopher of technology, Martijntje Smits, adopted and elaborated her approach to illuminate public controversies on plastics and on the release of genetically modified organisms (Smits, 2002). Jasanoff also treads in Douglas's footsteps.

There is a problem with the 'monster creation' thesis if it is taken as a specific claim about the culturally disruptive impact of modern biotechnology and the life sciences. After all, according to Latour's Actor Network Theory (ANT), *all* new facts and artifacts produced by whatever 'technoscience' are to be considered as nature-culture hybrids or 'monsters'. So then what, if anything, is so special about biotechnology? Interestingly, a similar criticism has been

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[15] Compare the following passage: "Metaphysical disorder, or confusion about how to classify things, was an inevitable by-product of genetic modification, producing attendant confusion in the practices of governance. Biotechnology disrupted ancient classifications and transgressed boundaries that had for centuries been accepted as given in Western legal and political thought. Distinctions between nature and artifice, animate and inanimate, living and nonliving, body and property suddenly became problematic, and thus in principle political, in many areas of decision making." (Jasanoff, 2005a, 280-81).

[16] Salman Rushdie excellently captures the 'postmodern' pathos: "The *Satanic Verses* celebrates hybridity, impurity, intermingling, the transformation that comes of new and unexpected combinations of human beings, cultures, ideas, politics, movies, songs. It rejoices in mongrelization and fears the absolution of the Pure. Mélange, hotchpotch, a bit of this and a bit of that is how newness enters the world. It is the great possibility that mass migration gives to the world, and I have tried to embrace it. The *Satanic Verses* is for change-by-fusion, change-by-conjoining. It is a love song to our mongrel selves." (Rushdie, 1991, 394). A similar dislike of 'Absolute Purity' can be found in the work of the French author Michel Tournier.

[17] See how one reviewer, Michael Flower, characterizes the weird entities that inhabit the 'political ecology' of Bruno Latour's recent book, *The Politics of Nature*: "The object of political ecology is not a mononature but human-nonhuman assemblages; not matters of fact, things-in-themselves, but what Latour calls matters of concern. These are tangled, risky imbroglios such as prions, genetically modified organisms, an endangered species, and cloned human embryos. They are each a human-nonhuman composite, each a politicoscientific association that we might see as *res publica*: political, moral, economic, social, and scientific concatenations that are also, increasingly, the stuff of surprising scandals that erupt in the midst of judicial bodies." (Flower, 2005, 140).

made by Noortje Marres with regard to Latour's recent thesis that scientific and political institutions nowadays are faced predominantly with "hairy objects" ("the partly unknown entities that risk disturbing social life, from 'BSE' to 'GM food'") as against the relatively simple "smooth objects" of earlier days (Latour, 2004, 24). This fact is thought to induce a major institutional crisis. Marres notes that Latour's newly invented "hairy objects" take on many of the properties he earlier ascribed to *all* new entities leaving the laboratories of technoscience. So he too suggests a historical discontinuity that cannot be justified by the ANT approach (Marres, 2005, 102-104). On her part, Jasanoff acknowledges that questions about the ontological and moral status of new entities have arisen "in connection with other technological developments", but "perhaps never with quite the urgency generated at the fast-moving frontiers of biotechnology" (Jasanoff, 2005b, 151). In other words, what may be valid to some extent for the hybrids created by other forms of technoscience, is even more strongly applicable to the products of modern biotechnology.

Another and related criticism might be that the STS analyst, by subscribing to the monster creation thesis, illegitimately prejudges the outcomes of the very process of framing he sets out to explore. Robin Williams has expressed similar reservations about how "the activist wing of the STS community" takes up the study of the impacts of genomics and nanotechnology, new technologies which in his view are "conceived from the outset as being challenging in terms of risks and social values" (Williams, 2006, 327). This goes against old constructivist tenets of agnosticism and impartiality:

> "These commitments seem to conflict with the emphasis in most STS academic analysis on the need to deconstruct the objects of study, and in particular to be sceptical about claims regarding the character and implications of technology" (*ibid.*).

By endorsing the monster creation thesis, Jasanoff effectively abandons her impartiality as an STS analyst and implicitly opposes the framing of biotechnology as *product*, or what could also be called the 'business-as-usual' frame. This frame transpires in the review of Jasanoff's book in *Nature*, written by the European top-level civil servant, Mark Cantley:

> "The perception – widespread in Europe – that biotechnology is something fundamentally new, like the discovery of electricity, or akin to black magic, is unfortunate. It has led to the assumption that there are technology-specific risks requiring ad hoc regulations and associated bureaucracies, and to consequent conflicts with sectoral regulations, as well as to international trade disputes. But not for the first time, perceptions, laws and the course of development may be driven by delusion." (Cantley, 2005).

Back in the 1980s, Cantley attempted in vain to align European biotech policy with the 'product' frame adopted in the U.S. (Jasanoff, 2005a, 79 ff). It is, of course, ironic that he does not recognize his own view as reflecting a particular framing but sees it as simply based on objective science; the other frames, by contrast, are dismissed as "delusion". Here, however, we are concerned with the possible shortcomings of Jasanoff's approach. What is problematic from a larger STS viewpoint is that she precludes the legitimacy of the 'product' or 'business-as-usual' frame by attributing *a priori* a particular character to biotechnology. This technology is seen as inherently disruptive because it inevitably challenges culturally entrenched categories and classifications, so anybody who merely sees it as business as usual must surely misjudge the issues.[18]

[18] It is no coincidence that in the WTO dispute between the USA and the European Union, Jasanoff took the side of the latter. With two American and two British colleagues, she wrote an *amicus* brief for the WRO dispute panel. See Winickoff et al., 2005.

A possible remedy might be to change the monster-creation thesis from an *a-priori* into an *a-posteriori* judgment. In other words, it is not by any 'inherent' properties that biotechnology challenges existing categories and classifications. However, as a (contingent) matter of fact it turns out that many applications of biotechnology have indeed called into question many deep-rooted views and distinctions. The latter claim can hardly be disputed.

This reformulation of the monster-creation thesis has an additional advantage. It makes clear that it depends not only on the properties of a particular technology whether or not that technology has a culturally disruptive or unsettling effect, but just as much on the prevailing categories and classifications that may be challenged or 'offended' by it. There are two variables in the equation.

A widening of the scope of cross-cultural comparison might show this more clearly. Take as a particular application of modern biotechnology the case of human reproductive cloning. Assuming the cloning technique to be much more perfect than it is today, would it be admissible for humans to be cloned in the same way as Dolly the sheep was cloned? Given the world-wide ban on human reproductive cloning, one might presume that such a proposition would offend cultural sensitivities everywhere. Yet on closer inspection the situation is more complex. We are not thinking of such a weird sect like the Raelians who hope to attain immortality by cloning. We are thinking of Buddhist scholars of the Southern or Theravada School of Buddhism who write more seriously on this subject (Promta, 2004; Ratanakul, 2006). At present they object to human reproductive cloning (and also to animal reproductive cloning, for that matter) on fairly practical grounds. Reportedly, it took 277 failures (sacrifices of embryonic animal lives!) before Dolly could be brought into being, and the poor creature also had a shortened lifespan for some still unexplained reason. These considerations militate against applying the technique in its present form. However, if these technical 'imperfections' could be remedied, Theravada Buddhist scholars say they would no longer oppose human reproductive cloning. For them it is not a problem that new human life is formed in an 'asexual' way rather than being the fruit of a union between a man and a woman, because Buddhism acknowledges many ways in which life can come into being. Nor would they consider it an offence against the individual identity of a clone to be a mere 'copy' of some 'original', for Buddhism views the belief in a well-defined identity of the individual ego as an illusion that has to be overcome in any case in order to reduce suffering. So, if only the present technical imperfections of the cloning technique could be overcome (and that of course is a big 'if'), then presumably many Buddhists would embrace human reproductive cloning and not feel offended by it as would the adherents of other worldviews who set great store by the idea of individual identity and/or by the God-given uniqueness of sexual reproduction. In short, it also depends on the culturally entrenched categories and classifications whether or not a particular technology is seen as unsettling.

'Boundary-work'

The term 'boundary-work' was originally coined by the American sociologist Thomas Gieryn to suggest a sociological approach to the long-standing problem of the *demarcation* between science and non-science (Gieryn, 1983). Philosophers had sought for a rigorous criterion with which to separate the scientific wheat from the non-scientific chaff, but never succeeded in finding one that was generally accepted. Gieryn concluded that the search for such a criterion was hopeless but that for those who engaged in debates about the demarcation between science and other forms of activity (say, religion) apparently something very important was at stake. He therefore proposed to change focus and to study the rhetorical resources that are

deployed by the parties to the dispute in question to establish and maintain or contest a particular demarcation.

The notion of 'boundary-work' has since been generalized and extended to the study of other 'boundary disputes' beyond the demarcation between science and non-science. For Jasanoff, "boundaries are everywhere at play in the world" and the task of boundary-work involves the "creation and maintenance of essential social demarcations" (Jasanoff, 2005a, 26). In fact, boundary work tends to be equated with "ontological (re)ordering". She also notes that an important part of boundary work in contemporary societies is done by legal institutions as they classify new instances under a finite set of categories. Thus the US Supreme Court decided in the well-known *Diamond v.Chakrabarty* case of 1980 that a modified bacterium capable of consuming oil spills was to be considered a man-made 'invention' for the purposes of patent law. A similar decision was reached 8 years later in the case of the famous Harvard oncomouse. Remarkably enough, however, the Canadian Supreme Court reached the opposite conclusion in 2002: it judged that higher organisms like transgenic mice were not to be considered patentable inventions (Jasanoff, 2005a, 210-213). Given that the U.S. and Canadian patent laws are quite similar, the example also shows that the outcome of legal boundary-work is not pre-ordained by the nature of the case. Another example of legal boundary work is the notorious case of *Moore v. Regents of the University of California*. At stake was the question whether people still have property rights in their tissues and cells after scientists have extracted them and converted them into 'immortal' cell lines. The answer of the Supreme Court of California was 'no', even though the researchers had made big profits out of John Moore's extremely valuable cells and tissues (Jasanoff, 2005a, 213-15).

Boundary-work is not only performed by the courts of law or other legal institutions. A fascinating example can be found in the successful British attempt to carve out a space for legitimate embryo research. In 1984 the Warnock Report to the British Parliament, named after the Cambridge ethicist Dame (later Baroness) Mary Warnock who chaired the committee, recommended the formation of a body to license embryo research within strict guidelines and to permit research only on embryos aged less than 14 days. The drawing of this particular age limit was justified with the biological argument that at this time the so-called primitive streak appears and cells begin to differentiate. A human conceptus before that age was termed a 'pre-embryo'. But it was not only biology that helped create this new entity; it owed its durable existence also to a carefully orchestrated parliamentary procedure, the deployment of secular and religious authority, the setting up of an accountable agency (the Human Fertility and Embryology Authority, created in 1990 by the Human Fertility and Embryology Act), and the typically British trust in experts.[19] Mary Warnock concentrated in her own person "the combined authority of scholarship (Cambridge University), state power (the House of Lords), and established religion" (Jasanoff, 2005a, 155); she became "virtually synonymous with British bioethics" (*ibid.*, 152).[20] The introduction of the term 'pre-embryo' was meant to counter the argument of pro-life groups that embryo research involved killing

[19] Compare the following passage: "[…] a mutually reinforcing alliance of social and scientific authority kept the barely visible, les than fourteen-day-old pre-embryo firmly demarcated from the embryo proper, allowing the former to be treated as unproblematically devoid of human traits, and hence as a suitable object of research. In a coproductionist turn, however, this splitting of the developing human embryo into two distinctive legal and biosocial entities was feasible only with the full mobilization of the state as an agent of biopolitics. The line of demarcation had to be made morally and scientifically tenable, and this in turn meant that the state had to call upon all of the reserves of authority that allow a government to construct reality on behalf of its citizens." (Jasanoff, 2005a, 278).

[20] Elsewhere, Jasanoff remarks that, arguably, the whole process necessitated "the emergence of a new social kind – the ethics expert – originally exemplified in the person of Mary Warnock" (Jasanoff, 2005a, 278).

"unborn children". As Jasanoff concludes about the 'pre-embryo': "Its ontological and political reality was not a product of biological knowledge alone but was created (or coproduced) out of a complex mix of pragmatism, empiricism, and trust in experts" (Jasanoff, 2005a, 155). The figure of the 'pre-embryo' did not make its appearance in Germany, where other social and political conditions obtained and hence an extremely restrictive regime was chosen. The British arrangement that was crafted in the 1980s would also provide the starting point and foundation for the relatively permissive regime for stem-cell research that was later developed (Jasanoff, 2005a, 198-200). Thus the creation of the 'pre-embryo' and the concomitant carving out of a niche for embryo research (or rather, 'pre-embryo' research) was an instance of successful boundary-work with durable effects.

Boundary-work is virtually everywhere. Who looks for instances of it, will surely find them. It is done in parliamentary bodies, courts of law, expert advisory commissions, ethics review boards, NGOs, and a variety of other forums (Jasanoff, 2005a, 27).

Enduring differences in national political cultures

In 1995 Jasanoff published an article in which she distinguished between three different ways to *conceptualize* or *frame* agricultural biotechnology in the regulatory cultures of the USA, Great Britain and Germany (Jasanoff, 1995). In those countries biotechnology was respectively framed as a *product*, as a *process*, and as a socio-political *programme*.

The American framing of biotechnology as a *'product'*, which was officially adopted in 1986, entailed that the risks of biotechnology were not specific to this technology and that its products should not be treated differently from similar products created by traditional agricultural or chemical processes. Hence biotechnology was to be regulated under existing rules and laws and supervised by existing agencies like the FDA, EPA and USDA. In the UK the government decided in 1990 that releases of genetically modified organisms into the environment had to be subject to regulatory scrutiny, at least provisionally, thereby recognizing that the *process* of genetic modification was a relevant criterion for regulation. The Advisory Committee on Releases to the Environment (ACRE) was charged with overseeing GMO releases. The British policy was in line with a 1990 EC Directive on the deliberate release of GMOs.

The German framing of biotechnology as a *programme* was more radical and far-reaching and reflected in particular the growing political influence of the Green Party since 1983 when they were first elected to the Bundestag:

> "The Greens and the Social Democrats argued that the risks of biotechnology were sufficiently unsettling – uncertain, potentially catastrophic, perhaps irreversible – to require a new political order for their management and control. Key to this new order would be a more pronounced voice for the public, institutionalized through new forms of public participation." (Jasanoff, 1995, 322).[21]

[21] In her book Jasanoff gives the following description of Germany's framing of biotechnology: "Germany took precaution yet one step further [than the UK] by highlighting political and ethical as well as scientific unknowns – in particular, the possibility of a programmatic alliance between science and the state that might lead to abuses of power unless the development of biotechnology was tightly controlled. These fears were reflected in numerous German legislative and regulatory enactments that sought to create categorical bright lines and guard against ambiguous or conceptually messy situations" (Jasanoff, 2005a, 275). In all this, memories to the Nazi past and the wish to position the German state as a true *Rechtsstaat* surely played a role. Yet, Jasanoff could not deny having been repeatedly struck by "an apparent yearning for moral and legal absolutes" among the Germans (*ibid.*, 278).

The *Gentechnikgesetz* or Genetic Engineering Law that was enacted in 1990 represented a compromise between such views and the more conservative views of the Christian Democrats. The law combined the functions of protection ('*Schutz*') and promotion ('*Forderung*'). It opened up participation on the government's advisory committee for environmentalists and established public hearings for deliberate release applications. However, after some highly polarized confrontations the German government decided in 1993 to rescind the right to a hearing. Participation on the advisory committee also became bureaucratized.

In 1995 even Jasanoff could not have foreseen that agricultural biotechnology would become a hot spot of citizen unrest and political contestation in various European countries in the run-up to the end of the millennium. In her article she argued that the observed cross-national variations were in agreement with generally recognized differences in regulatory styles; but she also noted that

> "the divergent forms of political accommodation worked out in each country were similar in result – in each case, the selected policy initiative blocked significant avenues of public dissent and smoothed the way for a relatively untroubled further development of biotechnology." (Jasanoff, 1995, 324).

In the concluding sentence of her article Jasanoff hinted at another explanation for this apparent convergence:

> "Explanations for this ultimate convergence lie in all probability in the theatre of international relations, where national protest politics confronted, and eventually succumbed to, the rhetoric and politics of global competitiveness" (Jasanoff, 1995, 328).

We can be quite sure that she no longer holds this view!

In her book Jasanoff picks up the analysis from her 1995 article and continues the story beyond where she had left it. Looking back she now interprets the old story (until 1995) as one of *normalization*, which was to be followed, rather unexpectedly, by a "less common story of *de*normalization" (Jasanoff, 2005a, 95):

> "The manner in which [national controversies on the deliberate release of GMOs] were framed reflected, and in a sense reaffirmed, each nation's particular style of controlling risk. In the United States, regulators claimed the authority of science to support their conclusions with regard to product safety; in Britain, by contrast, regulators relied on the more embodied concept of expert judgment to certify the safety of GM as a process; and in Germany, legitimacy was sought through targeted institutional and procedural reforms establishing new forms of dialogue between citizens and the programmatic state. ***But it was the fragility of each accommodation that proved in the end to be most unexpected.*** By the late 1990s debates reopened on issues that industry and government hoped had been definitively laid to rest." (Jasanoff, 2005a, 95; my italics).

We will not try to retell and reconstruct this "less common story of *de*normalization", because following all the historical twists and turns would take us too far afield. Suffice it to say that in the present confrontation between the USA and the European Union the different framings of agricultural biotechnology as 'product' and 'process' are still prominently active, with one side claiming the support of 'sound science' and the other invoking the Precautionary Principle. It is also obvious that a regime of labelling, coexistence and traceability would be utterly incompatible with the US 'product' frame. The recent reopening of the European market for American GM products, Jasanoff holds, is not a victory for Free Trade, but a capitulation of the 'product' frame:

"[…] the GM foods that Europe seemed ready to take into its territorial jurisdiction were not the same GM foods that U.S. authorities and producers had originally hoped to distribute in global trade. They were now clearly marked as GM, the products of an agricultural process that U.S. policy had firmly sought to naturalize and render invisible. The trade barrier against GM foods was lifting, but only on condition that U.S. manufacturers accepted Europe's framing of GM as a process that has social and legal meaning. Economic victory was premised, in other words, on ontological capitulation" (Jasanoff, 2005a, 145)[22]

Jasanoff sees enduring differences in the political cultures of the USA, Britain and Germany, not just with regard to 'green' biotechnology (agriculture, food) but also with regard to 'red' or biomedical biotechnology. In a later article (Jasanoff, 2005b, 151) she gives the following schematic overview that may be helpful to the discussion:

National strategies of normalization

US	*UK*	*GERMANY*
Monsters encouraged	Monsters permitted	Monsters forbidden
Market-regulated innovation	Expert-regulated innovation	Law-regulated innovation
Decentralized norms	Centralized norms	Centralized norms
Winner-take-all settlement of controversy	Consensual settlement of controversy	Reasoned (principled) settlement of controversy
Judicial accountability	Parliamentary and administrative accountability	Legislative accountability

A striking feature of this Table is the prominent role it accords to the degree of tolerance for monsters as a basic element in the political cultures of the three countries (to repeat, 'monsters' are described here as "entities that threaten disorder by crossing the settled boundaries of nature or society"). Remarkably enough, Jasanoff does not directly refer here to Mary Douglas's theory or the extensive body of literature on the various strategies for dealing with monsters. The US strategy of 'encouraging monsters' could be compared to what Smits calls *monster embracement*; the UK strategy of 'permitting monsters' could be likened to *monster assimilation*; the German approach of 'forbidding monsters' shows similarity with *monster exorcism* (Smits, 2002), except that rather than expelling the monster once it is there, the German approach aims at preventing the monster to show up in the first place.

Jasanoff illustrates her typology of normalization strategies with examples drawn from assisted reproduction (IVF and embryos), stem cell research, and GM crops and food. In general, the US approach encourages risk-taking and innovation regulated by the market; any adverse effects, should they occur, have to be redressed afterwards by the courts of law (judicial accountability). The new types of 'entities' that are created along the way are readily accepted, such as the new family and kinship structures that are enabled by assisted reproduction. Some U.S. states, like California, offer prospective parents (even non-genetic 'parents') plenty of possibilities to make legally recognized arrangements for having their 'own' children through IVF and gestational surrogacy. The 'natural' mother is no longer the woman who brings the child to term. In most U.S. states, moreover, prenatal diagnostic services are offered by largely unregulated, private clinics allowing would-be parents to select children with the desired sex or other desired characteristics (like tissue compatibility with a

[22] Javier Lezaun (2006) argues that the EU effort to make GMOs traceable would actually create a novel bio-legal entity or a new object of government.

diseased sibling). The only apparent exception to the predominant U.S. pattern is President Bush's aversion to embryonic stem cell research, but Jasanoff dismisses his posture as a form of presidential rhetoric aimed at placating the Religious Right as a vital component of the current power coalition. His veto covers federal funding of embryonic stem cell research with taxpayers' money, but leaves the private sector free to pursue this line of research. Recently, some U.S. states like California and New Jersey have set up their own stem cell initiatives in defiance of the President's veto, thus once more confirming the typical decentralized American approach:

> "Decentralized decisionmaking and a market-based approach to testing have produced in the United States a particularly hospitable climate for trying things out, with boundary-testing actions preceding, and provoking, the making of normative judgments." (Jasanoff, 2005b, 146)

In many ways the German approach is the exact opposite of the U.S. approach. The German Constitution accords full human dignity to the embryo from the moment of conception, so there can be no 'pre-embryo' as in the United Kingdom. Prenatal genetic diagnosis is also banned by law. The very strict legislation on assisted reproduction that was enacted in 1990 bans surrogacy and requires that all IVF embryos must be implanted in the woman who supplied the ova (besides, no more than three embryos may be created):

> "Hence, the kinds of disputes that have erupted in other countries over the ownership, use and moral status of embryos are essentially precluded from occurring in Germany. The law acts in effect as an ontological prohibition, keeping entities potentially disruptive of the moral order from ever coming into being." (Jasanoff, 2005b, 146)

In other words, monsters or potential monsters like frozen embryos are simply forbidden. Jasanoff recognizes the same approach in Germany's GM policy, especially in the new Gene Technology Act (*Gentechnikgesetz*) that was passed in December 2004 under the former Red-Green coalition government. Ostensibly created to implement European guidelines on the coexistence of GM and non-GM agriculture, the law went much further and imposed highly restrictive conditions on the cultivation of GMOs in terms of liability, the area to be planted, and notification for a national register to keep track of these crops. Some critics have even dubbed the new law the '*Gentechnikverhinderungsgesetz*' (Gene Technology Prevention Act). As Jasanoff comments:

> "On this issue as in others relating to biotechnology, Germany sought to avoid controversy by opting for a legislative framework that reduced the risk of ontological mixing or impurity – thereby also minimizing the possibility of normative conflicts" (Jasanoff, 2005b, 150).

The typical British approach steers a middle course between the American and German strategies of normalization. Like Germany, Great Britain allows innovation to proceed within a normative framework arrived at by law, rather than relying on a largely unregulated market. But whereas Germany has crafted strictly enforceable legal norms that leave no room for any deviation or discretion, Britain tolerates more ambiguity. The UK strategy preferably relies on empiricism, pragmatism and a cautious case-by-case approach where remaining uncertainties are gradually clarified by a body of trusted experts. This approach seems to have worked at its best in the British policy with regard to assisted reproduction and stem cells. The UK record in the area of GM crops and food is less impressive. It is not entirely clear to us whether the typical British normalization strategy, in Jasanoff's opinion, also fits the country's GM policy after 1996, when the BSE affair created a huge crisis of confidence among the British population. The response of the policymakers was to open up the decision-making process to a wider range of voices and opinions beyond the narrow circle of (no longer trusted) experts,

but Jasanoff also notes that the large-scale *GM Nation?* debate that was conducted in 2003 remains an *ad hoc* experiment in public participation. Perhaps an episode of '*de*normalization' cannot be expected to fit into a classification of *normalization* strategies.

Despite such loose ends and unanswered questions, Jasanoff's typology of normalization strategies for coping with monsters is surely valuable and heuristically useful, precisely because it suggests how public responses to biotechnology are embedded within "robust and coherent political cultures" and reflect durable institutional frameworks. The questions that are still open may stimulate further inquiry.

The political subservience of bioethics

Jasanoff extends her co-production framework also to the study of bioethics. She points out that when policy-makers enlisted the services of bioethicists in their attempt to address the public concerns raised by biotechnology, bioethics was itself in flux: "the effort to extend bioethics into the new fields of genetics and genomics proved to be in salient ways constitutive of the discourse itself" (172). In other words, the very content of 'bioethics' was to a large extent defined in the various attempts to 'apply' it, allowing for different specifications depending on the different contexts of application.

We can recognize here the rudiments of a sociological approach to bioethics, which currently seems to be gaining ground (Kelly, 2003; Hoeyer, 2005; Bosk, 1999; Salter and Jones, 2005; DeVries and Subedi, 1998). This new approach can be broadly characterized as social-constructivist. A typical social-constructivist approach toward the problem of how public concerns come to be framed as ethical issues would be to take a completely *agnostic* stand with regard to the contents of the term 'ethics' (and 'ethical') and leave it to the societal actors involved to define the term in their own different ways. The social-constructivist researcher would just "follow the actors" and try to document what power effects are produced by their different framings and definitions. However, Jasanoff follows this line of inquiry only to some extent, because she does not take a fully agnostic stand with regard to the concept of ethics; nor does she carry the social-constructivist type of analysis through to the end. Jasanoff notes that (bio)ethics is not the same thing everywhere and that it is understood differently in different political and cultural environments. Her way to deal with this problem is to adopt "an actor-centered comparative strategy" (Jasanoff 2005a, 172): "The task then becomes to show how each state [the United States, Great Britain and Germany] sought to institutionalize bioethical discourse for particular functions, and how civil society actors in each country understood and strategically intervened in national bioethics debates" (*ibid*.).

Scholars like Brian Wynne, Les Levidow and Susan Carr have criticized the constraining effect of bioethical discourse (Wynne, 2001; Levidow and Carr, 1997). They lament that public concerns are being 'pre-judged' when they are framed as ethical issues and that a new category of 'experts', bioethicists, rather than the public itself are allowed to voice and articulate the latter's concerns. Jasanoff endorses this type of criticism, but only with regard to what she calls "official bioethics". She also recognizes the existence of something she calls "unofficial bioethics", i.e. all the initiatives seized by civil-society organizations to promote their normative goals with respect to biotechnology by "speaking bioethics to power". In her view the entry threshold for engaging in this type of activity, compared to established fields like science and law, is still relatively low:

> "As bioethics became a powerful instrument for framing policy choices around biotechnology, numerous social actors saw the advantages of participating in the

development of the discourse, thereby challenging the state's (or, in Britain, the professional elite's) monopolistic control of the formal analysis of values. In some cases, groups formed to broaden or reshape the agenda of bioethics, pressing for ethical analysis of particular issues and developments; in others they fought for standing to insert their own ethical perspectives into policy debates. In each country, a major goal of nonstate actors seemed to be to use the rubric of ethics to create new deliberative spaces, and to some extent new languages, supplementing those offered by official policymakers. The politics of bioethics was a politics of diversification: bringing new issues on the agenda, new voices to speak for them, and new forums in which to engage with them. Bioethics, no matter how construed or where deployed, seemed in this way to overflow institutional attempts to contain it." (Jasanoff 2005a, 188).

If this is so, it would seem that there is little reason to deplore the framing power or disciplinary force of bioethics.

Comparing the discourse on bioethics, 'official' as well as 'unofficial', in the United States, Germany and the UK, Jasanoff once again notes significant differences that are closely related to the differences in the initial framing of biotechnology across the three countries in terms of 'product', 'programme' and 'process', respectively. Hence she draws the following conclusion:

"In each country […] it was not so much ethical deliberation that clarified the choices for politics as the dynamics of politics that shaped the discussion of bioethics." (Jasanoff 2005a, 193)

In the final chapter of her book, however, Jasanoff expresses her own dissatisfaction with what she sees as the limitations of the debate on biotechnology:

"Across all three countries and in almost all issue areas surveyed in this book, we are struck by the dearth of meaningful debate on the metaphysical aspects of biotechnology: that is, the debate about the kinds of entities, and associated forms of life, that the technology has sought to, or should seek to, create. Genetic modification is at its core, a means of bringing novel entities into the world, and an engaged deliberative politics might have been expected to focus in the first instance on the desirability of these new productions. How *should* we use the power to intervene in nature's processes? Yet time after time the official discourses of policymaking channeled debate toward looking only at the impacts of technologically generated things whose existence, purpose, and value were barely questioned in public or private forums." (Jasanoff 2005a, 287-288).

We can see the limitations of a consequentialist discourse merely focusing on 'impacts' of biotechnology, but we must admit that we are somewhat at a loss to imagine what a debate about the 'metaphysical' aspects of biotechnology or about the 'kinds of entities' we bring into the world would look like. Is this type of debate any different from the various forms of 'boundary work' and the taming of a great variety of 'monsters' which Jasanoff described in her book? It is a pity that she does not clarify and illuminate the type of debate she would favour any further.

A note on 'nation-building' and the European Union

In her comparative analysis of divergent political cultures in biotechnology policy across the US, Great Britain and Germany, Jasanoff ran up against a major methodological problem: what to do about the role of the European Union? Over the time period studied in her monograph (roughly 1980-2004), the EU was in the process of forming itself into a formidable supranational entity with a major role in science and technology policy, including

biotechnology policy. But how to study the policies of an agent that lacks a stable identity? Jasanoff decided to make a virtue out of necessity by putting her co-production framework to use once again:

> "[T]he formation of European biotechnology policy is a story of coproduction. It is at once about the evolutionary transformation of Europe as an economic, political, and cultural union and about the consolidation, within Europe, of the technoscientific sector known as biotechnology." (Jasanoff, 2005a, 69)

Although the EU does not represent a 'nation', this process can be compared to the project of 'nation-building' in so far as the EU as an 'imagined community' (Benedict Anderson) has to re-imagine where it stands for on a host of issues, including policies concerning the life sciences (Jasanoff, 2005a, 7).

A political entity that seems to correspond to "no well-defined niche in democratic theory" (Jasanoff, 2005a, 74), the EU is notoriously plagued with serious legitimacy problems and haunted by the ghost of the 'democratic deficit'.[23] The *White Paper on Governance*, issued by the European Commission in 2001, attempts to address these problems, but succeeds only to a limited degree. Referring to food crises and public scepticism with regard to biotechnology, the White Paper argued for more transparency in expert advice and the need to solicit a wider range of inputs into the policy-making process. In actual fact, however, participation is largely restricted to "organized sectoral actors" (Jasanoff, 2005a, 76).

Compounding the problematic legitimacy of EU decision-making is the fact that as yet there is no European *demos* or public. Jasanoff holds, however, that in the field of biotechnology policy such a European public is already being constituted through polls like *Eurobarometer*:

> "These instruments are not merely objective tools of policy and politics. They are ontological ordering devices: in sampling European opinion they help to constitute the very thing that they seek to represent – a united European polity, even though its component parts can be accessed, sampled, and surveyed only through the constituent nation-states." (Jasanoff 2005a, 85).

It does not matter that the portrait of the European public depicted by the *Eurobarometer* polls as ignorant, suspicious and risk-averse is contested by other studies like PABE (*Public Perceptions of Agricultural Biotechnologies in Europe*), which convey a more favourable picture of reflective, questioning and engaged European citizens (Marris et al., 2001). Both types of studies jointly contribute to the making of new European identities (Jasanoff 2005a, 89).

The European framing of biotechnology as a 'process' rather than a 'product', which was first solidified in 1990 in Council Directive 90/220/EEC on the deliberate release of genetically modified organisms, also had to do with the constitutive structure of the EU. Jasanoff describes how during the mid-1980s attempts were made by DG XII, the Directorate-General for Science, Research and Development, to opt for a 'product' frame comparable to the US regime, and explains why such attempts were bound to fail in the European context (Jasanoff 2005a, 78-84). There was a power struggle with other directorates about how to promote and regulate the new field of biotechnology, especially with DG XI (Environment). Unlike in the US, such interagency rivalries could not be contained by more powerful coordinative agencies (such as the Office of Science and Technology Policy dominated by the White House); moreover, European directives and regulations also had to take the positions of the Member

[23] Jasanoff quotes a British journalist commenting on the low voter turnout in European elections: "When a reality TV show attracts more votes than an election, democracy is in trouble." (Jasanoff, 2005a, 7).

States into account – in this case, countries like Great Britain and Germany had already moved away from the 'product' frame. In the following decade, the initial European 'process' frame was to have a kind of *path effect* as it was further entrenched during the 1990s, when the European Parliament was to have more influence (due to the 1992 Maastricht Treaty) and Green political parties were relatively prominent. It was at this time that the 'process' frame became more closely linked with the Precautionary Principle as its ultimate justification.

A recurrent question for the EU is whether it will adopt an "active-integrationist" or a "passive-preservationist" approach in its regulatory policy, or in other words whether it will attempt to eliminate cross-country divergences in policy framings or instead aim to maintain and protect ethical/cultural differences across Member States (Jasanoff 2005a, 71 and 91-92). This is a key question in discussions on European-funded research programmes for the life sciences:

> "The Commission's ultimate goal in science policy is to create a single European Research Area, permitting the free movement of researchers, projects, fund, materials, and topics across national boundaries. An important barrier, however, is the discrepant regulation on ethical grounds of certain types of research among the member states." (Jasanoff 2005a, 90)

Using European stem cell research policy as an illustration, Jasanoff shows that cumbersome compromises have to be hammered out, so that often no more than a "passive-preservationist" stance can be reached – even with the input of advisory bodies like the Group of Advisers on the Ethical Implications of Biotechnology (GAEIB) or its successor since 1997, the European Group on Ethics (EGE) on Science and New Technologies. Such outcomes affirm Europe's status as a work in progress (Jasanoff 2005a, 91).

Democracy and globalization

"Varying national approaches to regulation and control," Jasanoff holds, "carry specific, non-negligible consequences for democratic politics" (Jasanoff, 2005b, 153). They also carry implications for globalization and international trade.

The cross-national comparison of biotechnology politics in the USA, Great Britain and Germany shows that even Western countries may differ quite fundamentally in their responses to science and technology. It is simply not true that the combined forces of economic competition and scientific rationality inexorably drive the various national states and regions towards convergence of policies. As Jasanoff writes about the US-EU dispute about GMOs before the World Trade Organization:

> "Few starker reminders could be found that the global march of biotechnology had not automatically brought policy convergence in its wake. Indeed, in this case regulatory polarization seemed, to some, a more fitting description of what had occurred [ref.]. Here were two of the world's economic superpowers disagreeing not only about whether and how to promote biotechnology in agriculture, but, even more astoundingly, about what counts as science for regulatory purposes and how that science should be deployed in controlling the fruits of biotechnology." (Jasanoff, 2005a, 274).

Needless to say that, as an STS analyst, Jasanoff does not support her country's claim to the high ground of 'sound science' in this dispute (Jasanoff, 2005a, 107-08 and 266; see also the *amicus* brief for the WTO panel that she co-authored: Winickoff et al., 2005). Nor does she subscribe to the view which attributes the European position simply to protectionism (Jasanoff, 2005a, 10).

Actually, what type of international order is to govern the mutual relations between nation states is not settled either, but rather an issue that is contested by what in STS-jargon are called "competing ways of worldmaking":

> "The world occupied by nation states never was a single place, but always work in progress, represented and fought for according to different normative conceptions of the appropriate kinds of economic, political, social and technological integration to be attained. *Globalization has not resolved the tensions; it has if anything made the problems of coexistence more self-evident.* Whose vision of the world should be naturalized or made 'real' under these circumstances is of the utmost political and epistemological consequence." (Jasanoff, 2005a, 10; our italics).

The existence of culturally entrenched differences in policy automatically raises the question if there are possibilities of *cross-cultural learning*. Jasanoff's answer is affirmative, but she immediately lowers the expectations by saying that she will not deliver a how-to manual for better risk assessment or better standard operating procedures for public consultation. The learning effects to be expected from cross-cultural comparison, it seems, are greater cultural self-awareness and better mutual understanding. However, Jasanoff is rather averse to the idea of grafting the well-functioning parts of another country's political culture to one's own to make up for a manifest shortcoming. In theory, comparative study could help "assess the texture and quality of democracy in contemporary industrial societies" (Jasanoff, 2005a, 273). In practice, however, there seem to be many impediments to fulfill this promise. One complicating factor is that, for Jasanoff, democracy itself is also expressed in different cultural forms:

> "Democracy, too, is not a singular form of life but a common human urge to self-rule that finds expression in many different institutional and cultural arrangements." (Jasanoff, 2005a, 290).

That makes it difficult to develop a common yardstick for assessing the democratic quality of various policy approaches in different countries.

This caution may seem somewhat surprising in view of Jasanoff's rather strongly worded claim (which we earlier dubbed the *'civic epistemology' thesis*) that "democratic theory [...] must actively take on board the involvement of citizens in the production, use and interpretation of knowledge for public purposes" (Jasanoff, 2005a, 41).[24] What she describes under the rubric of 'civic epistemologies', however, are just "culturally specific, historically and politically grounded, public knowledge-ways" (Jasanoff, 2005a, 249). The results of her brief inventory of these 'public knowledge-ways' are *descriptively* interesting (to summarize her analysis: "the civic epistemologies of Britain, Germany, and the United States can be stylized, respectively, as *communitarian, consensus-seeking*, and *contentious*" – Jasanoff, 2005a, 250), but they do not help us in the *evaluative* task of finding a *normative* yardstick or criterion transcending these different political cultures.

If we are to draw up an overall balance-sheet of the relative merits and weaknesses of the American, British and German policy cultures, we could start from the premise that all three countries see themselves as deliberative democracies and derive from this fact some very general criteria in terms of representation, participation and deliberation. Indeed, this is what Jasanoff herself does in chapter 11 of her book.

[24] Compare: "any democratic theory worth its salt must take note of the human capacity for knowing things in common" (Jasanoff, 2005a, 270).

One such criterion is supplied by the *framing* function of *representation*: "the presentation *by* the public to [governing institutions] of matters that are seen to be of collective significance" (Jasanoff, 2005a, 281). Using this criterion, Jasanoff arrives at a rather negative assessment of the American policy culture:

> "[T]he rapidly achieved focus on products in the United States foreclosed wide debate on the social and ethical implications of GM technologies, particularly in agriculture, and blocked public notification, through labeling, of the production history of GM foods." (Jasanoff, 2005a, 283).

Using this same criterion, the German '*programme*' frame, which invited public debate on the physical, social and political risks of biotechnology, would look much more attractive. However, we know that the resulting restrictive regime, perhaps due to the irony of history or some mysterious defect in the German mentality, was far from attractive:

> "The resulting morally charged political environment was inhospitable to experimentation, scientific, social, or political. It discouraged risk-taking, whether in labeling food, forming novel forms of kinship, or creating borderline biological entities such as pre-embryos and stem cells" (Jasanoff, 2005a, 283).

The Germans were just a little bit too rigorous in forbidding all monsters. It appears that you cannot have your cake and eat it too. If you choose a certain political culture for its 'positive' elements, you also have to accept its 'negative' elements. Hence, in all likelihood, Jasanoff's strictures on transplanting components from one political culture to another.

It is not difficult to guess that Jasanoff's personal sympathy is largely with the British political culture.[25] It preserves the happy mean between the U.S. and the German normalization strategies. If she no longer feels at home in God's own country, she should consider transplanting herself to the other side of the Atlantic.

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[25] It is significant that she characterizes the dominant 'civic epistemology' of Great Britain as 'communitarian'. In an earlier publication she expressed her own communitarian credo: "Participation and science together often produce irreducible discord and confusion. I will suggest that two other ingredients – trust and community – are equally necessary if we are to come to grips with [environmental problems of terrifying complexity]. Building institutions that foster both knowledge and trust, both participation and community, is one of the greatest challenges confronting today's human societies." (Jasanoff, 1996)

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Chapter 3

Hwang Woo Suk and the Korean stem cell debacle:
Scientific fraud, techno-nationalism and the 'Wild East'

Introduction

The Hwang affair is a spectacular case of scientific fraud. Throughout the years 2004 and (most of) 2005, Dr. Hwang Woo Suk[26] was an internationally renowned investigator in the field of human embryonic stem cell research. With two landmark papers in *Science* magazine, his Seoul-based team was the first and only group to show that embryonic stem cell lines could be obtained by transferring the nuclear genetic material from patient-derived somatic cells into the denucleated eggs from female donors. This would be an important step towards therapeutic cloning, with highly alluring prospects for regenerative medicine. However, in December 2005 the results of Hwang's team were shown to have been faked. This ultimate exposure was the dramatic sequel to critical investigations into egg donor recruitment practices that were initiated after allegations about legal and ethical lapses had been aired.

The South Korean stem cell debacle raises lots of questions. For the scientific community and the editors of scientific journals the main question is how the process of peer review could have failed so egregiously and how in future such a failure can be prevented. We are also interested to see how, given the apparent failure of more regular procedures, the full extent of the fraud was eventually exposed. But there are other questions. The whole field of therapeutic cloning, or human embryonic stem cell research, is fairly controversial – though less so than reproductive cloning, which is almost universally condemned. Before Hwang's humiliating fall from grace, the apparent success of South Korean stem cell research was often cited by the adherents of the so-called '*Wild East argument'* (Demos, 2006) to argue for the relaxation of moral standards in the West in order to keep pace with East Asian countries. Needless to say, the outcome of the Hwang affair sheds an unfavourable light on this type of argument. Still, the case presents us with an opportunity to inquire more deeply into the socio-ethical aspects of stem cell research in East Asia and their cultural backgrounds. Was South Korea, as some have asserted, indeed an ethically underdeveloped country? If not, how then to explain that Hwang's team was initially able to flout standing legal and ethical rules with impunity? What was the role of 'Asian values' and different religious backgrounds in this

[26] *A note on the transcription of Korean names:* Han (2006, p. 4, footnote) provides useful background information about the different ways Korean names can be rendered into English. According to the Guidelines for Romanization of Korean, issued in July 7, 2000 by the Ministry of Culture and Tourism of the Republic of Korea, in Romanizing Korean names, the surname should go first, and the given name, generally composed of two syllables, should be spelled as a single word (e.g., Han Aera). But putting a hyphen between the two syllables of the given name is permitted (e.g., Han Ae-ra). In case a person had already made and used a Romanized name prior to current Guidelines, she is permitted to continue to use it. Thus Dr. Hwang's name can be Romanized as (1) Hwang Useog (in accordance with current Guidelines), (2) Hwang Woo Suk (in accordance with the continuous use exception), or (3) Woo Suk Hwang or Woo-suk Hwang (putting the surname last to conform to English usage, e.g. in English papers). In this chapter, we *attempt* to follow the rule of putting the Korean surname first. However, it will be difficult to attain full consistency, because it is precisely the tendency among Korean authors to conform to the English usage of putting the surname last which may create confusion. When we are confronted with a name like 'John Johnson', we have the cultural background to know that 'Johnson' and not 'John' is the surname. We lack this cultural background knowledge when we are confronted with a name like 'Ja Min Koo'. In those cases in which we have to refer to an American of Korean descent, like the bioethicist Insoo Hyun, we will put the surname last. In the list of bibliographic references we have indicated Korean surnames with capital letters.

entire affair? We will also have to look more closely into the role bioethicists played in the unfolding of this episode.

The Hwang affair can also be connected with another overarching theme of this report: *techno-nationalism*. We think that this concept may shed an illuminating light on Hwang's remarkable rise to power as well as on his ultimate downfall. It also helps to understand how moral doubts and objections could be effectively marginalized.

We will also pay attention to the international aspects and repercussions. A central problem for any strong techno-nationalist innovation strategy is that in this age of globalization the international interdependency of scientific research will usually reassert itself with a vengeance, as South Korea also was to find out the hard way. We will finally look at the national and international fall-out after the debacle to see how the stem cell research community made attempts to ethically tidy up its field of research.

The rise and fall of Hwang Woo Suk

In the spring of 2004 the team led by Dr. Hwang Woo Suk at Seoul National University achieved world renown when they published an article in *Science* in which they claimed to have derived a pluripotent human embryonic cell line from a cloned blastocyst (Hwang et al., 2004). Several research groups around the world had been working on this challenging task, but the South Korean team (the article had 14 Korean authors and one American, Jose Cibelli[27]) was apparently the first to succeed. To achieve this result, the researchers declared that they had collected 242 eggs from 16 women, allegedly all unpaid volunteers who had signed informed-consent forms (see the 'Supplementary Material' that was published online along with the article). After removal of the nucleus, the eggs were fused with somatic cells taken from the same donor. The ultimate yield of one embryonic stem cell line showed that the efficiency of the entire process (1 cell line in 242 tries) left much to be desired, but at least there was 'proof of principle' that it could be done. Or so it seemed.

The next breakthrough occurred a year later and was reported in another landmark paper in *Science* (Hwang et al., 2005; published online on 19 May and in print on 17 June). This time 25 names appeared above the article, including the name of Gerald Schatten from the University of Pittsburgh as the only non-Korean author (he was the 'corresponding author' who communicated between the editors and the other authors).[28] Hwang and his team claimed to have produced 11 different stem cell lines, obtained by transferring the nuclear genetic material from the somatic cells of patients suffering from spinal cord injury and other diseases into the nucleus-free eggs from female donors. This time the somatic cells and donated oocytes were from different persons, with one exception. The obvious importance of deriving 'patient-specific' stem-cell lines is that such cells are immunologically compatible with the patient and do not trigger rejection when transplanted. The authors declared that the donations had been obtained in full accordance with Korean regulations and law and donors had signed informed-consent forms. Compared to the earlier study, they reported a more than tenfold

[27] "J.B. Cibelli made intellectual contributions to the manuscript and the RNA analysis of nonhuman primate cells. All human experiments were performed in Korea by Korean scientists." (Hwang et al. 2004, p. 1674, note 30).

[28] However, note 32 of the article stated the following: "All experiments were performed in Korea by Korean scientists, and all results were obtained in Korea using Korean equipment and Korean sponsorship." (Hwang et al. , 2005, p. 1783). After publication of the article, some Korean scientists complained that Hwang had given too much credit to Schatten by designating the latter as corresponding author, thereby enhancing the likelihood that a possible future Nobel Prize had to be shared with a non-Korean (see Kim Tae-gyu, 2005e).

increase in efficiency, claiming to be able to derive a cell line in 20 tries. This alleged advance would mean that the ultimate aim of therapeutic cloning had been brought a big step closer (compare Vogel, 2005a).

In the wake of his international successes, Hwang's star rose to heights undreamt of. The South Korean government granted him the title of Supreme Scientist (Hwang was the first and until now only recipient of this title) in June 2005. In October 2005 he was appointed director of the newly created *World Stem Cell Hub*, launched to symbolize and exploit Korea's leading role in this field of research. Gerald Schatten was to chair the board of trustees of this international network for exchanging embryonic stem-cell lines and cloning technology (Dennis, 2005). Satellite laboratories were being planned in California and Great Britain. Incidentally, the venture could also be seen as an attempt to accelerate progress in the field by bypassing ethical and regulatory constraints in the United States (Okie, 2005). For William Hurlbut, a medical scientist on the President's Council on Bioethics favouring alternatives to the use of human embryonic stem cells, the whole construction amounted to an "outsourcing of ethics" (Smith, 2005). However, many American researchers were enthusiastic about the possibilities the 'hub' would offer them. The magazine *Scientific American*, finally, chose Hwang as 'Research Leader of the Year' (Cunningham, 2005).

Then the downfall occurred as in a Greek tragedy until the King of Cloning was finally dethroned. It started with rumours about ethical lapses in the procurement of oocytes. Egg donors were said to have received payment for their donations and two donors were found to be members of Hwang's team and thus in a dependent position. For Gerald Schatten, who had been co-author on the second *Science* paper and on the 'Snuppy' paper in *Nature*, these rumours were the avowed reason to suspend on 12 November 2005 his collaboration with Hwang (Cyranovski and Check, 2005a). The unresolved ethical issues also burdened the future of the newly launched World Stem Cell Hub, as many non-Korean stem-cell researchers put their participation on hold (*ibid.*). After a series of accusations, denials and partial admissions on ethical irregularities, the controversy in South Korea shifted to the validity of the results reported in the *Science* papers (Cyranoski, 2005c). Indications that a large part of the data might have been manipulated and fabricated grew stronger. Some former members of Hwang's team defected and made incriminating revelations. By mid-December 2005 Hwang had virtually lost most of his academic credibility, but the tragedy continued to unfold. Subsequently, his two *Science* papers were officially retracted (12 January 2006) and an investigative committee installed by Seoul National University concluded on 10 January 2006 that Hwang's team had not been able to produce any cloned human embryonic stem cell line at all. The whole thing had been a massive fraud (an English summary of the findings of the committee has been published as an appendix to International Herald Tribune, 2006, and to Jean, 2006). Only Hwang's Afghan hound Snuppy, whose creation had been reported in an article in *Nature* (Lee et al., 2005), proved to be a genuinely cloned creature. In 2006 the Korean public prosecutor took over with criminal investigations into embezzlement, bribery and other illegal practices.

Ethical agonizing about reproductive and therapeutic cloning

It was not South Korea but Scotland that had originally taken the lead in cloning. In 1997, Ian Wilmut, Keith Campbell and other researchers at the Roslin Institute near Edinburgh had surprised the international community by announcing the first successful attempt to create a cloned mammal, Dolly the sheep (Wilmut et al., 1997). In the wake of the ensuing global debate that was focused on the technical possibility of cloning humans, governments

everywhere took legislative steps to outlaw the cloning of human beings. There is virtually a worldwide consensus about the moral undesirability of 'reproductive cloning', but the same cannot be said of what is called 'therapeutic cloning' (Dickson, 2005a). The same technique that had been used by the Scottish researchers to create Dolly, somatic cell nuclear transfer (SCNT), can also be used for purposes of therapeutic cloning. In the latter case the cloned embryo that has been obtained through fusion of an enucleated oocyte (egg cell) with a somatic cell drawn from an adult person will not be placed into the womb of a surrogate mother and allowed to grow into a full-fledged organism. Instead, the cloned embryo will at an early stage (that is, as a blastocyst) be harvested for stem cells. Such stem cells are still relatively unspecialized ('pluripotent') and can be stimulated to develop into various tissue cells. They can thus be used as a 'repair kit' for treating all kinds of degenerative diseases, such as Parkinson's, Alzheimer's, diabetes or spinal cord injury. Therapeutic cloning is also controversial, but the moral objections against this set of techniques follow lines that are familiar from earlier debates about abortion. The Roman Catholic Church and several orthodox Protestant denominations officially reject the use of human embryonic stem cells because they date the beginning of human life (or personhood) at the moment of conception. As the technique involves killing an embryo, it would in their view be tantamount to 'murder', even if this were done to save the life of a desperate patient (for an exposition of the strict Catholic viewpoint, see Doerflinger, 1999). Many others who do not share this 'pro-life' stance, however, set high hopes on the prospect of therapeutic cloning.

For the opponents of human embryonic stem cell research, Hwang's apparent successes with *therapeutic* cloning also brought the possibility of *reproductive* cloning so much closer within reach. Dr. Leon Kass, the conservative chairman of the US President's Council on Bioethics, used a slippery-slope argument to express his worries when he heard from the results of the first *Science* study:

> "The age of human cloning has apparently arrived: today, cloned blastocysts for research, tomorrow cloned blastocysts for babymaking" (Kolata, 2004).

His reaction to the second *Science* study was an expanded version of this reply:

> "[W]hatever its technical merit, this research is morally troubling: it creates human embryos solely for research, makes it much easier to produce cloned babies, and exploits women as egg donors not for their benefit" (Kolata, 2005).

Now the slippery-slope argument was slightly weaker and the last point introduced a new element in the discussion. It may address the feminist critique that by concentrating ethical debate on the moral status of the embryo, the women behind the donated eggs are lost from view (Dickenson, 2002). However, bioethicist Arthur Caplan accuses his conservative colleagues and the religious leaders in the US of following a scare tactics:

> "There are no agreed-upon rules governing issues such as how and when you get consent from women who donate their eggs to be used in cloning experiments to create human embryos. Can or should those whose DNA or eggs are used have a say in what researchers can do with anything they create from them? How long can South Korean researchers keep stem cells made from cloned human embryos? Can they sell them to others inside or outside their country? None of these questions have answers because many politicians and religious leaders who oppose stem cell research don't want these questions answered. They want to win their argument by keeping cloning in a moral Catch-22. […] So the critics prefer to continue to leave cloning for research unregulated so that you will stay scared and cloning will stay banned." (Caplan, 2005)

Thus the wholesale rejection of all forms of cloning by the Religious Right in the US led to a failure to properly regulate egg donation procedures for the sake of therapeutic cloning. It was

only after the fall-out of the Hwang affair that some American states (e.g. California) undertook an effort to remedy this situation.

Ethical misconduct and scientific misconduct

It was Hwang's perpetration of scientific fraud (that is, his falsification and fabrication of data), rather than his ethically dubious practices of procuring eggs from vulnerable, paid and insufficiently informed donors, that angered many of his fellow scientists. Already on 15 December 2005, less than a month after choosing Hwang as 'Research Leader of the Year', the editors of *Scientific American* decided to remove him from this honoured position. Their motivation is quite revealing:

> "The allegations of ethical misconduct were very troubling, but *Scientific American's* editors felt it was important to give Dr. Hwang the benefit of the doubt until their veracity could be determined. Even when those charges were borne out, we respected that the ethics of accepted practice in this area were still somewhat murky, and we declined to judge him too quickly, although his cover-up of those problems was clearly wrong. However, scientific fraud is an unforgivable offense against the enterprise of research, and in this case, it completely invalidates the selection of Dr. Hwang for inclusion in the Scientific American 50" (Scientific American, 2005).

Ethical misconduct might be excusable, but 'scientific misconduct' (or 'fraud') constitutes an unforgivable offence! The same mindset made many stem-cell researchers suspect the reasons Schatten had mentioned in November 2005 for suspending his collaboration with Hwang. Ethical transgressions were hardly deemed a convincing reason.[29] In this connection we should remember that American scientists have waged a successful campaign for a narrow definition of scientific 'misconduct' in terms of the three specific acts of fabrication, falsification and plagiarism (FFP), against Congressional attempts to stretch the definition so as to include "other serious deviations" from accepted practice (Kaiser, 1999). The narrow FFP-definition of scientific misconduct was also the starting point of the investigative panel that was installed by the University of Pittsburgh to inquire into Gerald Schatten's role in the whole affair (University of Pittsburgh, 2006; Marris and Check, 2006; Holden, 2006). Because Schatten was far removed from the actual work done in the Seoul laboratory, he could not be charged with falsification and fabrication. His main misdemeanour was claiming senior authorship for the second *Science* paper for which his contribution had been editorial.[30] Although he enjoyed the benefits deriving from his being a senior author, he had not fulfilled the accompanying responsibilities for the manuscript as a whole, ensuring approval of the manuscript by all co-authors, and checking on the veracity of the reported data. Still, he got off the hook:

> "Dr. Schatten shirked these responsibilities, a serious failure that facilitated the publication of falsified experiments in *Science* magazine. While this failure would not strictly constitute research *misconduct* as narrowly defined by University of Pittsburgh policies [and by federal guidelines – HvdB], it would be an example of research *misbehavior*." (University of Pittsburgh, 2006, p. 9; our italics).

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[29] "As soon as his main US collaborator, Gerald Schatten of the University of Pittsburgh, announced in November that he was bailing out of his collaboration with Hwang [..], people began to speculate that Schatten must know there was a problem with the result of the seminal 2004 paper. After all, they inferred, no one would leave a wildly successful research group over ethical transgressions. Or would they?" (Nature Editorial, 2006).

[30] The panel's report is highly cynical about Schatten's co-authorship for the 'Snuppy' paper in *Nature*: "As for the brief communication to *Nature* about the cloning of the dog Snuppy, for which Dr. Schatten was a listed co-author, we have no reason to doubt Schatten's statement to us that his major contribution to the paper was a suggestion that a professional photographer be engaged so that Snuppy would appear with greater visual appeal. It is less clear that this contribution fully justifies co-authorship." (University of Pittburgh, 2006, p. 8).

In a reaction, *Science* editor-in-chief Donald Kennedy remarked: "Nobody I know knows what 'research misbehaviour' is" (Marris and Check, 2006).[31] The Hwang scandal shows that the path between unethical behaviour and outright research misconduct may be rather short (Nature Editorial, 2006). The researcher who cuts 'ethical' corners may not shrink from deliberate falsification of evidence either. As *Nature* remarks, "sound ethics and good research practice go hand in hand" (Nature Editorial, 2006).

Ethics, culture, and religion

The story of Hwang's rise and fall contains many lessons about research ethics, the limitations of peer review and the governance of science (e.g., Resnik et al., 2006; Dickson, 2005; Nature Editorial, 2006; Wade, 2005; Oldaker, 2006; Gottweis and Triendl, 2006). Our special interest here, however, is the possible influence of cultural differences in the socio-ethical assessment of biotechnology against the backdrop of the globalization of scientific research and technology development. From this specific angle the Hwang case is also especially relevant and instructive. In this connection, we have to bear in mind that the appreciation of Hwang's stem-cell work and its international significance will inevitably be strongly coloured by our awareness of its fraudulent character. Opinions may therefore vary considerably, depending on whether they were formulated before or after mid-December 2005.

A case in point is an editorial commentary published in *The Economist* on 1 December 2005, at a time when Hwang had already admitted to violating ethical rules in egg procurement but before the fraudulent character of his stem-cell work had become manifest. The commentary dismisses the ethical concerns raised by the irregularities in egg procurement as overblown and exaggerated. It condemns western "agonizing" about stem cell research and recommends the allegedly prevailing Korean view to "just get on with it" as a much healthier attitude. Thanks to this more relaxed attitude of the Korean people, Dr. Hwang had been able to forge ahead and "had stolen a march" on his western rivals. Despite his ethical lapses, he still enjoyed strong support from the Korean public and the government:

> "The strong public support for Dr Hwang is mirrored in government policy. The administration has already cleared him of substantial wrongdoing and has promised to continue its financial support for his work. Besides playing to the gallery of public opinion, it is hoping that, in the long-term, stem-cell technology could become an important engine of growth. *And that sort of belief has the advantage that you can put it in the bank*" (The Economist, 2005; our italics).

[31] There is also much resentment among Korean biologists about the light punishment meted out to Schatten. As one anonymous Korean embryologist declared: "I think he [Schatten] is the biggest beneficiary of the stem cell scandal while the loser is, as you know, Hwang and Korea" (Kim Tae-gyu, 2006c). An important part of the complaint is that Schatten has stolen 'intellectual property' from Hwang and Seoul National University (SNU). As a matter of fact, both Schatten and Hwang/SNU have each filed for patents on the creation of human embryonic stem cell lines in several countries. It may appear strange that these patent applications have not been withdrawn after the stem-cell work turned out to be a fraud. Lawrence Smith-Higgins, an official at the UK Patent Office, explains: "European patent examiners are not interested in whether something will work or not. The commercial world, which is where patents belong, will judge" (quoted in Fox, 2006). So even if it does not work you can still patent it! It remains to be seen whether any of these patents will be granted. The investigative panel of the University of Pittsburgh obliquely noted that Schatten's position as senior author of the second *Science* paper gave him "enhanced positioning for pending patent applications" (University of Pittsburgh, 2006, p. 9). How he can claim the intellectual property of an alleged invention while his authorship role was only editorial remains a mystery.

Americans and Europeans are subtly advised to follow the (presumed) example of the Koreans and set their ethical objections aside for the sake of economic growth. They are also asked not to meddle with Korean affairs:

> "Nobody likes outsiders telling him what to do, and in the wake of the controversy, many South Koreans have called on the West not to impose its values on those of other cultures" (*ibid.*).

Remarkably, *The Economist* slides back into cultural relativism here.

Invoking cultural differences may be tricky, however, especially when the precise nature of the differences is left rather vague. One would have liked to see *The Economist*'s commentary much more specific on this point. Are "outsiders" really telling "Koreans" what to do? Exactly what values is "the West" trying to impose on Korean culture that are foreign to it? Does the journal refer to the Catholic (or orthodox Protestant) view of the earliest human embryo as a full person that needs to be protected or to the importance of voluntary and informed consent in egg donation? It is hardly plausible to assert that "the West" tries to impose the former view on Korea, unless one would be willing to dismiss the Korean Catholic Church and some of the Protestant denominations as mere vehicles of foreign cultural powers. But that would call into question the multi-religious character of South Korean society.[32] Presumably, Catholicism and orthodox Protestantism are also part of Korean culture.[33] The religious leaders of the Catholic Church and of the Protestant denominations united in the Christian Council of Korea (as against the more liberal Protestants united in the National Council of Churches in Korea) are indeed firmly opposed to human embryonic stem-cell research. It is also true that there is often a considerable gap between the views of the religious leaders and those of the followers. As a Catholic clergyman, the Rev. Lemigio Lee Dong-ik, explained in December 2005:

> "Laypeople are not aware of the (negative) implications of the research and the media spread (positive) information that focuses only on national wealth and being the world's No. 1 (in this field)" (Kim Ki-tae, 2005).

The cleric was thus fully aware that his Church's message went against the united force of the strong currents of economic policy and national chauvinism, as expressed by the Korean media. He added that the Catholic Church would step up its efforts to educate the local priests and the laypersons on the implications of human embryonic stem-cell research. The Korean Catholic Church also pledged financial support for adult stem-cell research as an acceptable alternative.

Among Korea's major religions, only Buddhism supported Hwang's stem-cell research, albeit not without significant exceptions. Hwang himself, though raised as a Catholic, had converted to Buddhism in 1987. He regularly visits the famous Chondung-sa temple (Kim Tae-gyu, 2005a), and several Buddhist leaders in their turn have paid visits to his laboratory in Seoul. Hwang had also found a way to reconcile his stem-cell work with his Buddhist faith. Asked about his religious background in an interview with *The New York Times* held at the time of his first *Science* paper, he declared:

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[32] "Among the 48 million Korean inhabitants, about 10 million are Buddhist, 9 million Protestant and 3 million Catholic. About 210.000 people are adherents of Confucianism, and a smaller number follow Shamanism, a nature religion making contacts with deceased spirits." (Yoo, 2006).

[33] However, even some Korean Christians seem to have doubts whether their religion is fully part of Korean culture. "My family is Christian," explained one prominent bioethicist to Pete Shanks, "But that's only been a hundred years." (Shanks, 2006).

> "I am a Buddhist, and I have no philosophical problem with cloning. As you know, the basis of Buddhism is that life is recycled through reincarnation. In some ways, I think, therapeutic cloning restarts the cycle of life." (Dreifus, 2004).[34]

The executive director of the Chogye Order of Korean Buddhism, the Venerable Ji Kwan, also provided an interpretation of Buddhist doctrine that would justify Hwang's research:

> "Buddha taught us to give everything to the sick, whether it costs an arm and a leg. If we say nothing for Hwang, our Buddhism is dead." (Kim Ki-tae, 2005).[35]

The *Korea Times* went on reporting how the Buddhist leader invoked the difference between East and West to oppose the other religions, especially Protestantism:

> "The monk even went so far as to criticize other religions, which is rare from an adherent to a religion which avoids such provocations. 'It is nonsense for some to insist that only the embryonic stem cell, (not the adult stem cell), is living.' He went so far as to claim that Western and Eastern ethics are different but that Protestants are excessively trying to apply Western ethics here." (Kim Ki-tae, 2005).

It is not entirely clear why the Venerable Ji Kwan targeted Protestants rather than Catholics, but a possible strategic reason is that Korean Protestants were least loyal to their orthodox leaders on this issue (a survey showed that 6 out of 10 Protestants supported Hwang's research and only 2 out of 10 were opposed; *ibid.*). In any case, playing the culture card is a dangerous game, inside and outside Korea. Within Korea, the use of this strategic ploy can be linked to an atmosphere of intense nationalism in which the defence of Hwang as the 'Pride of Korea' became almost a patriotic duty.[36]

When saying that the West should not impose its values on other cultures, *The Economist* may also have referred to procedures of informed consent as an expression of the principle of

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[34] On a 2004 conference in Seattle, Hwang's co-author Moon Shin-Yong declared in a similar vein: "[C]loning is a different way of thinking about the recycling of life. It's a Buddhist way of thinking." (quoted in Frazzetto, 2004). However, Damien Keown, an internationally recognized authority on Buddhism, disagrees with this view: "I'm afraid I have to disagree with [Dr. Moon's] comments. Since therapeutic cloning involves experimentation on immature human beings, it might be thought clearly contrary to Buddhist ethics." (*ibid.*). In an earlier article written with James Hughes, Keown stated that "most Buddhist commentators have adopted classical Hindu teachings that the transmigration of consciousness occurs at conception, and therefore that all abortion incurs the karmic burden of killing" (Hughes and Keown, 1995). See also Keown's comments in 2004: "It would therefore be immoral for stem cell researchers to use either surplus, unwanted or frozen embryos created for IVF treatment – regardless of whether they would eventually be destroyed – or cloned human embryos specifically created for research purposes, such as the 30 blastocysts recently created in South Korea from which one new stem cell line was derived" (Keown, 2004). Keown's opinion is contrary to the widespread support Korean Buddhist leaders have given to Hwang's research (Kim Ki-tae, 2005). Jens Schlieter points out that "Korean Buddhist critics of cloning-for-research play an important role in the movement 'People's Solidarity for Participatory Democracy', a fact seldom mentioned in Western reports." (Schlieter, 2006, pp. 181-82).

[35] At least one leading Korean Buddhist, Do Beop, the former head of Silsang Buddhist Temple in the southern city of Namwon, takes a different view: "[Hwang's research] runs against the Buddhism's view of the world and its philosophy. The attempts to extend the human life will only magnify the crisis of the modern world, which stems from the egoistic desire of human beings." (quoted from a radio interview in Coolscience, 2006).

[36] "Dr Hwang's cult-like following was fuelled by nationalism, and has proved remarkably resilient despite evidence that he fabricated research and then lied about it" (Scanlon, 2006). Even after Hwang's official downfall, many Buddhists continued to support him and insisted that the government keep funding his research. On 3 January 2006, the same Venerable Ji Kwan declared: "I don't sympathize with Dr. Hwang because he is a Buddhist. Dr. Hwang is Korean and we need to give a Korean some applause if he or she is a leader in a certain sector" (quoted in Bae, 2006). His belief in Hwang's scientific capability was unscathed, but he once again insisted that the research "should not be influenced by Western ethics" (*ibid.*). In May 2006, after the public prosecutors had published a list of indictments against Hwang, a Buddhist leader and two Buddhist businessmen offered more than $60 million to allow the disgraced stem-cell expert to resume his research (Wohn and Normile, 2006; Coolscience, 2006).

respect for individual autonomy. Would the journal want to suggest that this ethical principle is unimportant to ordinary Koreans?[37] Moreover, if South Korea aspires to play a leading role in international stem-cell research and invites foreign researchers to participate through the World Stem Cell Hub, shouldn't the country expect those researchers to be concerned about the procedures that have been followed in procuring eggs from donors?

With hindsight, we now know that the "march" that Hwang had allegedly stolen on his western rivals did not amount to a real head start, so in the end the Korean advantage may have been illusionary. But what about the suggested cultural differences? Are Koreans really less concerned about ethical questions? And how should we deal with such cultural differences in the context of increasing globalization of scientific research? What does the Hwang affair teach us about these questions?

Hwang's rise to power and Korean nationalism

Many commentators, Korean as well as foreign, hold that Korean nationalism forms an important key for understanding the Hwang affair (McCurry, 2006; Kim Tae-Ho, 2006; Scanlon, 2006; Iglauer, 2005; Stollorz, 2005; Faiola, 2006; Huer, 2006; Yoon, 2005; Onishi, 2006, Saunders, 2006; Wikipedia, 2006). In 2004 and until the end of 2005, Hwang was a scientific superstar and the 'Pride of Korea':

> "If there is such a thing as the Korean Dream, then Hwang Woo-suk was surely its embodiment. At the height of his popularity he was regarded as a national hero. Colleagues feted him as a pioneer in his field; politicians rewarded his achievements with cash and citations; thousands signed up to an online group devoted to his genius; some even said he was performing the work of God" (McCurry, 2006).

Some authors speculate that Koreans feel a desperate need to overcome their national inferiority complex, born of a painful history of modernisation − 36 years of Japanese occupation, the Korean War and territorial division, forty years of dictatorship until 1987, and the economic crisis of the late 1990s (Kim Tae-Ho, 2006; Yoon, 2005). This nationalistic sentiment is projected on 'cutting-edge' science and technology of 'world-class' quality. It is not just that Korea is scrambling for a prominent position in what is seen as an economically important, biology-based industry of the future. Koreans are also anxious for tokens of international recognition and collectively yearned for a Nobel Prize to be awarded to their 'world-class' scientist. It would have given them reassurance that as a nation they are 'on the right track again' (Kim Tae-Ho, 2006). This entire complex of ideas and motives is often referred to as *techno-nationalism* (Kang and Segal, 2006).

It is understandable that Hwang's alleged breakthroughs in stem-cell research (internationally recognized in the *Science* papers of 2004 and 2005) helped him achieve national fame as a superstar and an almost unassailable position in Korean biomedical science. But how did he manage to muster support for embarking on this line of research in the first place? It seems that nationalism also played a prominent part as a rhetorical resource in his rise to power.

[37] Aera Han expounds that the principle of 'informed consent' is recognized by the Supreme Court of South Korea: "Medical malpractice suits have increased rapidly, and the notion of 'informed consent' has been adopted in contracts and torts through the interpretation of the Civil Code of South Korea. Since the late 1980s, the Supreme Court of Korea began to apply the principle vigorously [ref.]. Informed consent is now an established doctrine, and even if the plaintiff cannot prove the causality between the lack of informed consent and the actual harm, if she proves the lack of informed consent itself in the medical treatment in question, she may be awarded at least compensatory damages for the emotional distress caused by the deprivation of self-determination or loss of the right to choose." (Han, 2006, p. 10-11)

Hwang, born in 1953 as the son of humble peasants, had trained as a veterinarian. In 1999 he first attracted nation-wide public attention with his claim to have cloned two calves, a Holstein breed and an indigenous cattle breed, by using the technique of SCNT or somatic cell nuclear transfer (APBN, 1999). In the eyes of the public, these claimed achievements turned Hwang from an ordinary professor in veterinary medicine into a 'cloning expert'. Following debates on 'Dolly', cloning was equated with cutting-edge, 'world-class' science and technology. "In the case of science, the word 'world-class' matters to the Koreans; it acts like a magic spell" (Kim Tae-Ho, 2006). To underscore the world-class quality of his achievement, Hwang named his first cloned calf "Young Rong" – which means the world's fifth cloned animal (APBN, 1999). By cloning a native cattle breed too, he raised economic expectations and also played to Korean nationalistic sentiment:

> "He [Hwang] said the success of cloning of Korean cattle would have a major economic impact in the Korean cow industry, as many Koreans prefer beef of the Korean breed to imported beef." (*ibid*.)

There was, however, one dubious aspect to Hwang's first forays into cloning:

> "Hwang failed to provide scientifically verifiable data for the research, giving only media sessions and photo-ops." (Wikipedia, 2006)

Despite this lack of proper scientific substantiation, his claims enjoyed a favourable reception in the Korean media. Hwang may indeed have succeeded in cloning cows (as he later was able to clone 'Snuppy' the dog), but he did not publish his findings in the scientific literature and thus submit his claims to the usual peer review. That did not prevent government officials and politicians from lavishly funding his research. In fiscal year September 1999 - August 2000, the Ministry of Science and Technology provided $1.6 million for a project seeking to mass-produce high-capacity dairy cows by SCNT (Han, 2006). "Though the project failed completely, Dr. Hwang's reputation remained intact." (*ibid.*, p. 18).

Other research plans before 2004 involved the creation of BSE-resistant cows and aseptic piglets, for which he received $4.3 million and $5.5 million in government funds. Although Hwang claimed success for these projects, he once again did not submit any papers on the results (*ibid.*). A remarkable announcement was his plan to clone the virtually extinct Korean tiger (or *Mount Paektu* tiger), a subspecies of the Siberian tiger. According to Korean legend, this tiger is the sacred guardian of towns; it is a national symbol that was used in the 1988 Olympics of Seoul (Torchia, 2001). Hwang took cells from the ears of the female Korean tiger in the zoo at the outskirts of Seoul (a gift from North Korea and the only Korean tiger available in South Korea), employed a lioness as surrogate mother, but alas, the ovum died (*ibid.).* He is supposed to have said: "I'll spread the Korean people's spirit by cloning the Mount Paektu tiger" (Onishi, 2006).

Hwang was a master of public relations and networking. He was accessible to journalists and a great communicator.[38] Although presumably a 'world-class' scientist, he presented himself as an ordinary citizen and stressed his 'commonness' and humble origins. Contrary to the cosmopolitan orientation of many Korean scientists, he always struck a patriotic note in his public presentations. He was fond of varying on one of Louis Pasteur's famous statements, saying "although science has no borders, a scientist does have a nationality". His tireless efforts, underpinned by a rigorous work ethic, were devoted to the aim of putting Korea on

[38] However, he also knew how to 'use' journalists: "He carefully managed his connection to journalists, and even 'hired' some ex-journalists to his private team for dealing with the press […]" (Kim Tae-Ho, 2006). But perhaps this statement refers to the later period of human embryonic stem cell research. For the relations between Hwang and journalists, see also Kim Hee Won (2006).

the scientific world map.[39] He also regularly met with patients suffering from incurable diseases and shared his hopeful expectation with them that in the not too remote future stem-cell research would offer a cure to their ailments.[40]

Hwang also established relationships with government officials and politicians, including President Roh Moo-hyun, who grasped the opportunity to boost the waning popularity of his government by associating himself with the popular scientist. Hwang's close ties with a select group of high-ranking officials within the government bureaucracy allowed him to get generous funding for his research projects but also helped to clear away any regulatory hurdles that might otherwise have blocked these projects. (Of especially strategic importance to Hwang was Park Ky-young, who became the President's advisor for Science and Technology Policy in early 2004. In 2003 she played a prominent role in the drafting of new legislation regulating human embryonic stem-cell research and other areas of biomedical research). Policy analysts Herbert Gottweis and Robert Triendl describe the Korean system of science governance as one that lacks financial and political accountability, transparency and solid Chinese walls against corruption and cronyism:

> "South Korean science remains characterized by networks of a few individual scientists with privileged connections and access to politicians, administrators and elites. The distribution of grants and financial support is strongly based on government decisions and strategies rather than on review, competition, hearings and applications." (Gottweis and Triendl, 2006, p. 143).

Hwang was to take advantage of this system to the fullest extent.

"After achieving cloning successes with animals", according to an article in *The Korea Times* of 31 May 2005, "Professor Hwang Woo-suk jumped to human stem cell research in 2001 based on 4 billion won [roughly $4 million] in government funds." (Kim Tae-gyu, 2005c).[41] At that time political debates on the proper legal and regulatory framework for such research were still far from settled. There was a stalemate because no choice could be made between two different drafts for a new Bioethics and Biosafety Act, the one proposed by the Ministry of Science and Technology and backed by biotech researchers and industry and the other by the Ministry of Health and Welfare and backed by bioethicists and NGOs (Han, 2006, 14). However, after the commotion aroused by (false) rumours in 2002 about a South Korean woman having made pregnant with a cloned human embryo by an affiliate of Clonaid, a company linked to the sect of the Raelians (BBC News, 2002), the need to arrive at a single draft for the new law became more urgent. On 29 December 2003 the *Bioethics and Biosafety Act* passed the National Assembly; it was promulgated on 29 January 2004 and would take effect on 1 January 2005 (for an English version of the text of the law, see South Korea, 2005).[42] Hwang's stem cell research that was reported in the first *Science* paper thus occurred

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[39] In Hwang's view, effort is more important than talent: "The only road (to a success) is diligence. Even a fool can do everything if he is diligent enough to move the heart of the sky." (quoted in Kim Tae-gyu, 2005c).

[40] The canonical story is that of a 9-year-old boy, Kim Hyeoni, who had been paralyzed through a car accident and who would become '[Somatic Cell] Donor 2' in Hwang's second *Science* study. When Hwang visited Hyeoni in the hospital in April 2003, the boy reportedly asked him: "Sir, will I be able to stand up and walk again?", to which Hwang allegedly replied: "I will make you walk, I promise" (see Demick, 2006a). Later, South Korea issued post stamps dedicated to Hwang that depicted a paralyzed man in a wheelchair regaining full movement. (For a picture of the stamp, see Wikipedia, 2006).

[41] Hwang's laboratory at the College of Veterinary Medicine of Seoul National University continued with its many projects involving cloning animals even after the research on human embryonic stem cells had been initiated. In May 2004, *Nature*'s correspondent David Cyranovski described Hwang's laboratory as a "cloning factory" (Cyranovski, 2004b).

[42] The Korean Bioethics Association was not happy with this law. In a declaration of 22 May 2004 the Association stated: "We regret the fact that the new Bioethics and Safety Act will be effective beginning January

before the law took effect. The law provides, among other things, for the establishment of the *National Bioethics Committee*, under the President, to deliberate on matters concerning the establishment of major policies respecting bioethics and safety in biotechnology (articles 6 to 10); prohibits human cloning (articles 11 and 12); prohibits trading in human sperm or eggs (article 13.3); allows the use of residual embryos for stem cell research under certain conditions (article 17); and allows somatic cell nuclear transfer and the use of the resulting embryo clones for the purpose of conducting research aimed at curing rare or currently incurable diseases, under the review of the National Bioethics Committee and the approval of the Minister of Health and Welfare (articles 22 and 23).

However, the *Bioethics and Biosafety Act* contains a very odd Additional Provision 3 ('Interim Measures on Embryonic Stem Cell Research'), which had been specifically inserted to serve Hwang's interests.[43] His team was the only research team in South Korea that could meet the requirement of Additional Provision 3 when the law took effect. His stem-cell research would thus enjoy a *de facto* monopoly and be exempt from review by the National Bioethics Committee (Han, 2006, p. 44). Hwang got approval to conduct stem cell research directly from the Minister of Health and Welfare and thus bypassed the need for review from the National Bioethics Committee, which, by the way, was only formed on 7 April 2005, more than three months after the new law took effect. The Committee would issue review guidelines only after the Korean stem-cell scandal erupted. Many Koreans suspected that the insertion of Additional Provision 3 in the Act, to make it more favourable to Hwang's stem cell research, had been the work of Park Ky-young. She was rewarded in 2004 by being made one of the 15 co-authors on the first *Science* paper. After a Korean professor in the history of science, Lee Pilryeol, raised critical questions about her contribution to the stem-cell work, "Park [said] that she had played an important role in Hwang's research over the years by advising him on public attitudes to his work with transgenic livestock, but she told *Nature* that she had no specific involvement with the therapeutic-cloning paper" (Cyranovski, 2004a; see also Han, 2006, p. 39).

There were other laws and regulatory guidelines beside the *Bioethics and Biosafety Act* that were relevant to Hwang's stem-cell work, such as the Guidelines for Korean Good Clinical Practice. Institutional Review Boards (IRBs) at several hospitals and infertility clinics were supposed to oversee the egg retrieval that took place at these locations. However, they were not properly informed by the researchers about the consent procedures, risks, funding sources and other relevant aspects relating to these activities and generally discharged their supervisory duties in a formalistic and uncritical way (for a detailed analysis, see Han, 2006). Under the new bioethics law the actual creation of stem cells through somatic cell nuclear transfer needed review through the local IRB at the College of Veterinary Medicine of Seoul

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1, 2005. This act has not received the support of the scientists, doctors, ethicists, lawyers, religious leaders, and other members of the Bioethics Advisory Committee, which was overseen by the Ministry of Science and Technology between 2000 and 2001." (Korean Bioethics Association, n.d.). The Association also noted to its dismay that "it seems that our government is irresponsibly encouraging scientists to engage in this sort of research [i.e. research involving the cloning of human embryos]" before a proper regulatory framework was in place. See also the letter on 'Stem Cell Research on Korea' that the president of the Korean Bioethics Association sent to *Science* (Song, 2004) and the response by Hwang and Moon Shin-Yong. The latter declared: "The Korean Bioethics Association (KBA) is, in our opinion, not neutral and advocates restricting the pace of biomedical advancements, viewing new techniques as threats to society" (Hwang and Moon, 2004, p. 945).

[43] "Anyone who is engaged in embryonic stem cell research for the purposes mentioned in Article 17-2 at the time this Act takes effect may continue his or her research, with the approval of the Minister of Health and Welfare on either of the following conditions: (1) The researcher has been engaged in embryonic stem cell research for at least 3 years; or (2) The researcher has published at least one research paper on embryonic stem cell research in a related academic periodical."

National University. Such a body was duly created but its independence from the researchers was not secured:

> "As Dr. Hwang was a superstar in the College, he could choose anyone he liked as an IRB member. The members he chose mostly did not know what the IRB should review, and assumed the IRB was simply a formality." (Han, 2006, 52-53).

In short, due to Hwang's influence and prestige, the ethical review procedures surrounding his research including the review procedures for egg donation and retrieval were no more than empty formalities.

Criticizing a national hero

Criticism is essential to the scientific enterprise, yet through his landmark papers in *Science* Hwang acquired such a superstar status that he became "almost invincible to any criticism" (Han 2006, 42). In fact, criticizing Korea's national hero was regarded as an infamous and unpatriotic act.

It was already difficult to get a hearing for the ethical concerns that were voiced in 2004 after the publication of the first *Science* paper. As a senior biologist at Seoul National University was quoted as saying in May 2004, "No one wants to debate the ethics because the government is so excited about [Hwang's research]" (Cyranovski, 2004b).

The concerns were serious enough. Immediately after the appearance of the first *Science* paper, Hwang's team elicited amazement among foreign stem cell researchers for having been able to assemble so many egg cells, 242 in total, from 16 allegedly unpaid donors. It is known that egg retrieval, which involves injection with hormones to stimulate hyperovulation, ultrasound monitoring and surgical egg extraction with a thin needle, is an invasive and painful procedure with many risks and side effects. Jose Cibelli, the American co-author on the 2004 paper, declared: "It would never fly in the United States" (Cyranovski, 2004a). In that country, the company Advanced Cell Technology had offered donors a fee of $4.000 and had managed to recruit "just a few donors" and to assemble only 19 eggs (Kolata, 2004).

No wonder, then, that suspicions were raised. Korean bioethicists and citizens-rights activists urged Hwang's team and the relevant IRBs to be more transparent and demonstrate that ethical procedures had been followed in recruiting donors (see on the website of Korean Bioethics Association, n.d.). In an interview with *Nature* held in April 2004, a PhD student on Hwang's team, Ja Min Koo, initially declared that she and another woman in the lab had been among the donors. She later retracted her declaration, blaming the 'misunderstanding' on her poor English. The retraction was not really convincing, however, as she had also mentioned the hospital where the egg retrieval had taken place (Cyranovski, 2004a). Hwang denied that anybody on his team had donated eggs.

Cultural differences, and Korean nationalism, were also suggested to explain the success of Hwang's team in recruiting donors:

> "By contrast [to Advanced Cell Technology's use of paid donors], Hwang says Korean egg donors were not paid, and were motivated by a desire to help people, and through national pride. Cultural differences may also partly explain the Korean team's success in recruiting

willing volunteers: in Asian societies a greater stress is placed on serving the common good" (Cyranovski, 2004b).[44]

In any case, President Roh Moo-hyun left no doubt that the Korean government would not let ethical objections stand in the way of scientific progress. When he awarded Hwang a medal on 18 June 2004, he declared:

"[I]t is not possible nor desirable to prohibit research, just because there are concerns that it may lead to a direction that is deemed unethical." (Wikipedia, 2006)

Ethical concerns resurfaced with the publication of the second *Science* study, which had allegedly used 185 eggs from an undisclosed number of Korean women. In a parallel contribution to *Science*'s 'Policy Forum', the American bioethicists David Magnus and Mildred Cho criticized the incompleteness of the informed-consent forms, which failed to elaborate on the risks and side-effects of egg retrieval. They also pointed out that Hwang and his colleagues had not taken precautions against the so-called 'therapeutic misconception', engendering in the donors the false belief that their contributions might have direct clinical benefits for their diseased relatives or loved ones. Finally, one should also be alert to the possibility that oocyte donors feel coerced by their family situations into donating (Magnus and Cho, 2005). These concerns were also voiced by South Korean bioethicists (Kim Tae-gyu, 2005d).

By now, however, Hwang's position appeared even more unassailable. He was assured of high-level political support. At the opening of the World Stem Cell Hub on 19 October 2005, President Roh declared:

"[P]oliticians have a responsibility to manage bioethical controversies not to get in the way of this outstanding research and progress." (Wikipedia, 2006).

On 1 June 2005 the producer of the investigative journalism programme 'PD Notebook' (*PD Su-cheop*), a TV magazine broadcast by the Munhwa Broadcasting Corporation (MBC), the second largest TV station in Korea, received a tip-off from a former insider on Hwang's team that egg donors had been paid and that there was also a possibility that the evidence for the 2005 paper was fabricated. The name of the 'whistleblower' was later revealed to be Ryu Young June, the second author on the 2004 paper: "When Ryu heard the news of the 2005 paper, he immediately suspected fabrication, because according to his expertise and knowledge, such a quick achievement was technically impossible" (Han, 2006, 55-56). A PD Notebook team was formed to investigate the matter. They tried to work in secret but could not prevent the spread of rumours on ethical transgressions committed by the Hwang team. These rumours also reached Gerald Schatten (he had two of Hwang's PhD students working with him in Pittsburgh[45]) before he publicly broke all ties with Hwang on 12 November 2005. On 21 November another co-author on the 2005 paper, Roh Sung Il, a fertility expert at the MizMedi hospital in Seoul, gave a press conference in which he declared to have paid for the oocytes used in the 2004 study – allegedly without Hwang's knowledge (Cyranovski, 2005a). On 22 November 2005, MBC's PD Notebook broadcast the first instalment of a planned

[44] Cyranovski notes that the motivations of Ja Min Koo given in the original interview with *Nature* "fit with this picture of altruism and intense patriotism". She had mentioned "a desire to help sick children, and her love for Korea" (Cyanovski, 2004b).

[45] In October 2005, the PD Notebook investigative team interviewed Hwang's former junior researcher, Dr. Kim Sun Jong, at Pittsburgh University. "At that time, PD Su-cheop [PD Notebook] heard an important testimony from Kim that Hwang ordered him to multiply the number of stem cells from 2 to 11 by manipulating data" (Hong, 2006, 6). If Schatten became acquainted with the content of Kim's testimony, which was not made public at that time, it would of course cast doubt on his avowed motive to break with Hwang.

series of four programmes, 'The Myth of Hwang Woo Suk and the Suspicion over Eggs', which focused on charges of egg trading and donations by female research team members. The producer of the programme also indicated that his newsmagazine team had conducted DNA tests through a DNA testing firm to compare the somatic cells of the patients used in the 2005 study with the corresponding patient-specific stem cells.

On 24 November 2005, at 2 p.m. Korean time, Hwang admitted, live on television, that he had used eggs from paid donors and from two junior members of his team in his 2004 study. He asserted that it became only known to him that two researchers from his staff had donated ova when *Nature* first reported about it in May 2004. His earlier denials were said to be motivated by the wish to protect the privacy of his researchers (Cyranovski, 2005b; Cyranovski, 2005c). Nor had the junior researchers in any way been coerced to donate.[46] Hwang explained his team's resorting to somewhat questionable practices from a desperate shortage of donors. He also announced his resignation as director of the World Stem Cell Hub. After Hwang's confession, the Ministry of Health and Welfare was quick to declare that the egg donations did not involve a violation of ethical guidelines because they were made voluntarily.

When the issue of egg donation emerged, or rather resurfaced in November 2005, many Koreans tried to diminish its importance by playing the culture card. On 16 November 2006, Ahn Curie, a co-author on the 2005 paper and often Hwang's spokeswoman, "attributed the ethical controversy over obtaining the eggs to 'different standards' between Koreans and foreigners." (Kim Ji Soo, 2005). She said that "some medical practices that are accepted in Korea can be received sensitively by those abroad" (*ibid.*). Similarly, when the IRB of the College of Veterinary Medicine had to revisit the issue, it "conducted a very formalistic investigation and concluded that there had not been any major ethical violations in Dr. Hwang's research" and "attributed most controversies to the cultural differences between the Eastern tradition and Western ethics codes" (Han, 2006, p. 54). After Hwang's confessions, theologian Kim Heup Young of Kangnam University declared to American journalists: "Korean bioscientists have opened a new area of cutting-edge technology, but I don't think there is any bioethics relevant to that at this moment here. We have our different social and cultural context, so we have to formulate our own bioethics" (Vergano and Grossman, 2005). In a similar vein, Choi Hee-joo, the spokesman of the Ministry of Health and Welfare, declared that there was "no violation of ethics guidelines" because the two scientists at Hwang's lab donated their eggs "voluntarily for the success of the research by sacrificing themselves [*sic*]" (The Hindu, 2005). "He said the donations were made according to values consistent with Eastern culture, and shouldn't be looked at from the standpoint of Western culture" *(ibid.*).[47]

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[46] In an interview with *Nature*, Roh Sung Il told that one of the female assistants "felt obliged to donate after making mistakes early in the experiment that wasted eggs and set the team back by months" (Cyranovski and Check, 2005b). Bioethicist Insoo Hyun from Cleveland, Ohio, provided an interpretation of this purported motivation in terms of Korean culture: "To some degree, in Korean society, if you make a mistake you must make good on it somehow." (*ibid.*). That would make the definition of 'coercion' into "a grey area" (*ibid.*).

[47] Playing the culture card is similar to what the Korean American 'Jodi' referred to on her weblog of 15 December 2005 as 'the Korean Way' defence: "*Don't whine to us, the 'rest of the world' about what is right or wrong. You can't possibly define the standards for us. You aren't Korean! How can you understand anything we do here? This is the 'Korean Way'!*" (Jodi, 2005). Reflecting on the Hwang affair, she further wrote: "In my opinion [...], Korea tends to operate on an 'us vs. the rest of the world' mentality. An 'international mindset' exists but it's not very strong here, if you ask me. I have often encountered Koreans who believe that if the 'rest of the world' can't accept what Korea does, they can go to hell because how can they be expected to understand anything about Korea anyway? It is this attitude that I find disturbing. I believe the concept of ethics in Korea falls into this 'fuck the rest of them' thinking." (*ibid.*). A Korean engineer, Ho-Seon, responded in the following

Remarkably enough, one American (Korean-born) bioethicist, Insoo Hyun, who had visited Hwang's laboratory in the summer of 2005 on a Fullbright research fellowship, did not play the culture card but suggested that Korea's ethical standards for egg donation were even stricter than those of the US:

> "One irony of Hwang's resignation [as director of the World Stem Cell Hub] is that South Korea's egg donation standards, and those of Hwang's lab, are now stricter than U.S. standards, says bioethicist Insoo Hyun of Case Western Reserve University in Cleveland. The lab requires consent forms and psychological evaluations for donors. And earlier this year [when the Bioethics and Biosafety Act took effect on 1 January 2005], South Korea outlawed paying for eggs, which is legal in the USA." (Vergano and Grossman, 2005).

Insoo Hyun was to co-chair, with his Korean colleague Kyu Won Jung, the ethics working group of the World Stem Cell Hub (Godfrey, 2005). Perhaps as a would-be "embedded bioethicist" (Elliott, 2005), Hyun was so much taken in by Hwang's achievements that he altogether lost his critical sense. As he said in an interview held in October 2005: "In all, I've been quite impressed by Dr. Hwang and his team as well as with their willingness to accept the need for ethical discussion" (Godfrey, 2005).[48]

After PD Notebook's first broadcast on 22 November and Hwang's public confessions on 24 November, many Koreans sided with Hwang and directed their furies at the TV station: "On 26 November, demonstrators gathered outside the Munhwa Broadcasting Company in Seoul to decry the firm's lack of patriotism after it aired evidence that Hwang had lied" (Cyranovski and Check, 2005b). Eleven of the twelve companies advertising on the TV station decided to pull out (Brooke and Choe, 2005). "Two Seoul newspapers reported that angry viewers had posted photos of family members of the show's producers on the Internet, threatening to kill

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way: "The Korean people have their ways and customs. Caucasian Americans have theirs. I can sit here and write pages on pages of the faults of Caucasian Americans ... and so probably a lot of other races. […] I guess when in Korea, do as the Koreans. When in Rome, do as the Romans. When in the U.S., do as the Americans [..]" (*ibid.*). Jodi's reply to this was: "[…] I think the adage of 'When in Rome, do as the Romans do' has become a clutch too many people like to rely on. Does that mean that if the Romans kill, rape and steal, it's OK for us to do the same while in Rome? […] Some cultural differences do not have to be 'respected' […]" (*ibid.*).

[48] In early 2005, the Korean bioethicist Kyu Won Jung designed donation consent procedures (both for egg donation and for somatic cell donation) for Hwang's team. These procedures were described in an article co-authored with Insoo Hyun that was to appear in the January/February 2006 issue of the *American Journal of Bioethics*, and online in December 2005, just when the Hwang scandal broke. On paper, the consent procedures looked quite impressive and ethically rigorous, but in the article the two authors claimed they were actually put into practice by Hwang's team: "These guidelines were closely followed in the Korean research protocol that resulted in the recent derivation of eleven patient-specific pluripotent stem cell lines […]" (Jung and Hyun, 2006). When the full scale of Hwang's deception, not just with regard to the data but also with regard to egg donation procedures, became clear, the article was editorially retracted (McGee, 2006). Against Hyun's complaint that he was the victim of 'guilt by association' because the editors did not allow him to submit a modified version of the article, the latter pointed out to Hyun "that a modified manuscript would have to explain the abject failure of the authors' methods for observing, interacting with and reporting the conduct of scientists, [rather than] defend a system whose only effect to date appears to have been *to provide Hwang with the appearance of close collaboration with ethicists and ethics centers while he flagrantly defied their standard*" (AJOB editors, 2006; my italics). Their experience was an object lesson not in how to do good bioethics, but in what may happen when bioethicists are admitted into the 'inner circle' and become the 'lap dogs' (Carl Elliott) of the principal researcher: "Scientists in the lab disclosed their concerns about what would later prove to be violations of ethics in procurement, but not to the ethicists in the lab. The authors, working by their own report very intensively on site and claiming as the great advantage of their report their access to the lab, and at the invitation of Hwang, not only were unable to detect any abnormality prior to the creation of their process, nor later any failing in its implementation. [..] [T]he authors – and by extension *AJOB* – became the symbol Hwang would use to defray criticism that any impropriety had occurred" (*ibid.*). As is apparent from the last sentence, the editors also wanted to clean up their own blazon.

them" (*ibid.*). MBC received more than 500,000 angry e-mails (Demick, 2006b). Rival broadcasting companies accused the producers of the programme of having used unethical methods of journalism by exercising pressure on Hwang's assistants in order to elicit incriminating statements from them about their boss (Mitchell, 2005). MBC was forced to make a public apology for these 'ethical violations' on 4 December and decided to cancel the remaining broadcasts of the scheduled series on Hwang.

The public outpouring of nationalistic fervour and sympathy with Hwang (who in early December 2005 was hospitalized due to 'stress-related fatigue') could be channelled into demonstrations, candlelight vigils, and the "I love Hwang Woo Suk" website of the online fan-club café that was especially created for expressing moral support to Hwang's research projects (it had been set up by the ex-journalist who worked for Hwang's team, see Kim Tae-Ho, 2006). Within a week after its creation, more than 1,000 women had pledged to donate eggs to help overcome the donor shortage to which Hwang had alluded on television (Kim Rahn, 2005). A special organization, the People's Foundation for the Donation of Ova for Research and Therapeutic Purposes, was created to process and select the applications (*ibid.*). On the 'I love Hwang Woo Suk' website, the donors were celebrated as "angels in the patriotic army". The list of would-be donors was said to include "an entire high school class of 33 girls" (Brooke and Choe, 2005). The Web site also approvingly cited the comment of a man saying he "fought" with his wife because she refused to sign up. This one example appears to have been indicative of a certain numerical disparity in enthusiasm for the cause between the two genders:

> "At the height of the Hwang hysteria, a poll showed 30 percent of women wanted to donate their eggs to facilitate the research. And 45 percent of the men said that they would try to persuade their wives or girlfriends to donate." (Weisbart, 2006)

The purportedly 'spontaneous' rush to donate eggs raises serious questions about gender relations in Korea (Jinhee Park, 2006) and about the ethical issue of voluntary and informed consent. As the Korean-American weblogger 'Jodi' stated in her blog of 15 December 2005:

> "One has to wonder how much the people are being educated about the health risks of such a process. Do those school girls know what happens to their bodies? Quite disgusting how some laud even the young Hwang fans as heroes instead of doing more to protect them and educate them" (Jodi, 2005).

Can consent to egg donation really be voluntary and informed when there is such an intense nationalistic pressure to donate?

"The show must go on"

The cancellation of the scheduled follow-up broadcasts of PD Notebook might have been the end of the controversy. To many Koreans it seemed that the producer of the programme, not Hwang, was at fault.

South Korea is the most wired nation of the world. The Internet not only gave Hwang's adherents the opportunity to mobilize massive popular support, it also enabled young scientists anonymously to carry on the critical scrutiny of Hwang's research after PD Notebook had been forced into silence.

On 5 December 2005, an anonymous writer (whose ID was 'Anonymous') posted a message on the Internet bulletin board of the Biological Research Information Center (BRIC) with the sarcastic title (in English!) 'The show must go on' (Hong, 2006). He urged his readers to look for duplicated photos of the 11 stem cells printed in the supporting online material

accompanying Hwang's 2005 *Science* paper. At the end of his message he triumphantly exclaimed: "I found two! There are rumours that there are more …" (Chong and Normile, 2006, 23). More than 200 postings followed from other anonymous persons also claiming to have found duplications. On 6 December 2006, yet another anonymous posting on the BRIC website revealed serious problems in the DNA fingerprinting data of the 2005 paper. The DNA data for the patient's somatic cells and the patient-specific stem cells indeed matched, but they matched a little bit too closely. Not just the locations of the peaks were the same (as they should), but also their heights and the background noise signals – which is virtually impossible if the data refer to different, though genetically identical cells (Hong, 2006, 14). On 7 December, an anonymous poster with the ID 'Freeman' made an appeal to Occam's razor: anyone who wanted to believe in Hwang's sincerity had to account for several odd facts, which could be explained in a simple way if you assumed that he and his team had committed fraud. The likelihood that Hwang had told the truth was, in his calculation, an infinitesimal chance of one in a thousand billion (Hong, 2006, 15).

On 8 December, a group of young biology professors at Seoul National University (SNU), aware of the intense flow of critical messages on the BRIC bulletin board and other websites, called on the university to start an internal investigation to re-examine the work done by Hwang's team. Members of the team (Hwang was still hospitalized) were willing to cooperate only if the official investigation would have a limited mandate:

> "But [the representative of Hwang's team] reiterated the team would not re-verify its stem cell research paper itself, but would in the natural process of research prove its results in follow-up papers. *The team believes yielding to pressure to verify its results would set a bad precedent and harm the credibility of Korean scientists in the international community*." (Chosun Ilbo, 2005b; our italics).

Hwang's scientific supporters deliberately blurred the distinction between replication of DNA testing and replication of scientific experiments. Any request for replication or verification (of the DNA testing or the veracity of the stem cells) was repudiated as unnecessary, since in the further course of scientific research other scientists would naturally replicate the results obtained. The rather arrogant suggestion was that those who demanded replication of the DNA tests thereby simply showed their own scientific illiteracy (Hong, 2006).

On 11 December, despite resistance from senior researchers, the president of Seoul National University decided to install an official investigation committee. From that day on, developments moved quickly. On 13 December, Schatten asked his name to be removed from the list of authors on the 2005 *Science* paper. On 15 December, Roh Sung Il, the fertility expert from MizMedi Hospital, declared that Hwang had admitted to him that data were fabricated and that there were no cloned embryonic stem cells (Cyranovski, 2005d). And the rest is, as they say, history.

The Hwang affair confirms the general rule that cases of scientific fraud are seldom detected by peer review; "rather it is usually insiders and whistleblowers who first raise concerns and get an investigation started" (Gottweis and Triendl, 2006, 142). However, some have argued that sooner or later Hwang's work would have fallen under suspicion in any case, if nobody could repeat it. But on the other hand, if others had succeeded in cloning human embryonic stem cells before the authenticity of Hwang's results were called into question, the credit would still have gone to Hwang. As science journalist Nicholas Wade concludes:

> "But for the whistle-blower, Dr. Hwang might well be continuing his meteoric career on the wings of his reports in Science and Nature" (Wade, 2005).

As so often in fraud cases, however, things did not end well for the whistle-blower:

"Ryu resigned in December [2005] from his residency at the Korean Cancer Center in Seoul as the scandal was reaching its frenzied peak. […] the head of the hospital said Ryu had to resign because he had stopped coming to work and couldn't fulfil the requirements for the residency." (Demick, 2006b)

Ronda Hauben praises the 'netizens', the young scientists on the online scientific websites: "These netizens were willing to challenge the government, the press, the scientific hierarchy in Korea, and even a scientific journal with an international reputation." (Hauben, 2006)

After the debacle: the national fall-out

Official inquiries by the SNU investigation committee, by the National Bioethics Committee (triggered into action by the scandal) and by public prosecutors brought to light that many more eggs were obtained from many more donors than the numbers mentioned in the two *Science* papers suggested. In May 2006, the public prosecutors concluded in their report that from 2002 until December 2005, a total of 2,236 eggs had been collected from 122 women, of whom 71 had been financially remunerated. Payment even continued after 1 January 2005, when the *Bioethics and Biosafety Act* banning such practices went into effect (Wohn and Normile, 2006).

It was also found out that Hwang knew about the egg donation by two of his junior team members from the very outset. The report of the Prosecutor's Office concluded that there was no direct coercion. Still, obtaining eggs from persons in a dependent position is ethically questionable in the light of the Helsinki Declaration. "Dr. Hwang even requested signatures of the 15 women researchers in his team on the informed consent form for ova donation and kept the form, which suggests that he wanted his female researchers to donate eggs." (Han, 2006, 25, note 89).

One striking conclusion from the investigations was that the various Institutional Review Boards (IRBs) involved, those of the MizMedi Hospital and 3 other fertility clinics and of the College of Veterinary Medicine, had all failed miserably in their ethical review and oversight tasks.

A report by the National Bioethics Committee released on 2 February 2006 established that the ova donors had not been given sufficient information about the egg retrieval process, its risks and side-effects and the purposes of the research for which the eggs would be used (Kim Cheong-won, 2006). Several donors developed ovarian hyperstimulation syndrome. Fifteen women from the 79 who donated through MizMedi Hospital were treated for the syndrome (Chong, 2006). Several women donated eggs more than twice. "The MizMedi Hospital team even collected ova twice from a woman, who was hospitalized for side-effects after each donation" (Kim Rahn, 2006).

A coalition of 35 women's associations including the Korean Womenlink decided to file a compensation suit against the government on behalf of the ova donors suffering from side-effects (Kim Rahn, 2006; Korean Womenlink et al., 2006). Korean Womenlink had been among the first groups to raise ethical issues about stem cell research and the egg procurement process. "But back then no one listened to us and we received a lot of complaints and threats for daring to raise suspicions about Dr. Hwang", as one organizer of the association declared (Weisbart, 2006). One effect of Hwang's downfall may be that the social space for raising ethical issues will be widened. According to the coalition of women's

associations, the problems with ova donation occurred because stem cell research, "the nation's so-called next growth industry", was allowed to develop "at full speed without any consideration of women's rights whatsoever" (Korean Womenlink et al., 2006). The coalition established a reporting centre for egg donors suffering from the side-effects of egg retrieval, with a view to pressing charges against the government or the institutions involved:

> "However the major goal of our action is not monetary compensation but to publicize the social practices of trivializing women's rights to their bodies - especially the right to make informed decisions when it comes to their health. We expect that this action, by shedding light on the suppressed truths and holding the people in charge responsible, will lay the basis for establishing a system to supervise the use of biological information." (Korean Womenlink et al., 2006).

In the aftermath of the Hwang debacle, many voices have been aired in favour of a thorough overhaul of the existing *Bioethics and Biosafety Act*, so as to introduce tighter controls and more effective regulation of stem-cell research and enhance the role of Institutional Review Boards (Jin Hyun-joo, 2006). It remains to be seen whether the outcome of new legislative initiatives will live up to the expectations. What is not in doubt, however, is that the South Korean government is still firmly committed to boosting stem-cell research with a view to gaining a competitive edge over other countries in this strategic field of activity. As Professor Kim Dong-wook, the leader of a task force installed by the Ministry of Science and Technology, declared on 30 March 2006:

> "Korea must forge ahead with the medical potential-rich stem cell research despite the disgraceful scandal involving Hwang Woo-suk" (Kim Tae-gyu, 2006d).

The South Korean government intends to spend $454 million over the next 10 years on the whole stem cell area (including adult stem cell research), which is even more than had been promised when Hwang still reigned supreme (Normile, 2006). All grants will be subject to competitive review to prevent that funds are concentrated on a single person (*ibid*.). The government also seeks to revive a "pan-national" stem cell network encompassing Korean researchers working at home and abroad (Kim Tae-gyu, 2006d). The difference with the failed World Stem Cell Hub is that the new network is less international in orientation and mainly aimed at bringing in ethnic Koreans, especially stem-cell researchers working in the United States. The network will involve a stem-cell bank in which institutions like Seoul National University and MizMedi Hospital are also to participate. Given the government's determination to forge ahead with full speed again, it is to be hoped for Korean egg donors that regulatory safeguards will be instituted in time to prevent a repetition of earlier ethical shortcuts.

After the debacle: the international fall-out

For the international community of stem cell researchers, the immediate effect of the disclosure of Hwang's fraud was obviously the realization that they had been brought back to 'square one' or the situation of two years ago before the first 'breakthrough' was claimed (Lauerman and Waters, 2006). A panel of the American Association for the Advancement of Science (AAAS) concluded that the Korean scandal would have "no more than a temporary effect" on stem cell research (AAAS, 2006). Some feared that "public confidence in science" might have been damaged (*ibid.*). It is not surprising that the debacle has been used by opponents of human embryonic stem-cell research to suggest that there is something deeply rotten and ethically corrupt in this field of inquiry (Do No Harm, 2006; Doerflinger, 2006a; Doerflinger, 2006b). On the other hand, when Hwang's ethical lapses in egg procurement were disclosed in November 2005, the American bioethicists Arthur Caplan and Glenn

McGee argued that it was ultimately President Bush's veto on federal funding of human embryonic stem-cell research that was to blame for the problems:

> "A clear majority of Americans favour embryonic stem cell research. Yet there are no meaningful federal funds for such research. […] As a result, our best stem cell researchers, like Professor Schatten, are going offshore to avoid prosecution or to find research funds. *This means that ethics can get forgotten as other nations and private companies race to fill the void left by the President's reluctance to fund stem cell research*. Only a properly funded U.S. stem cell research program will guarantee oversight and the protection of all involved. Professor Hwang has gotten too powerful and the Korean government too dazzled with his work to allow him to be a sole man in Seoul." (Caplan and McGee, 2005; our italics).

This indirect accusation of the American president for ethical lapses that occurred in South Korea may even be too far-fetched for some of those who do not support his veto on human embryonic stem cell research. It is also rather arrogant and chauvinistic to presume that only the U.S. government can guarantee that ethical standards will be complied with on a worldwide scale.

Another serious issue is the suspicion that the proponents of human embryonic stem-cell research may have oversold the potential of this field of inquiry and created extravagant expectations among the public (Aldhous, 2006). This charge has been made by an opponent (Doerflinger, 2006a and 2006b), but the interesting point is that it was already ventilated by a proponent, Professor David Shaywitz, before the Hwang scandal erupted (Shaywitz, 2005; see also Shaywitz, 2006a and 2006b). In April 2005, the latter pointed out that science, that is 'good' science, can be "maddeningly slow":

> "While stem cell advocates have helped voters connect embryonic stem cell research with compelling images of patients who might one day benefit from treatment, such therapies are unlikely to emerge soon enough to benefit most current proponents [...]. Soon the advocacy groups that have been so instrumental in supporting stem cell science will face mounting pressure to demonstrate that they have bet on the right technology. From the researchers, tremendous progress will be expected, and the science is unlikely to keep pace with the eager expectations." (Shaywitz, 2005).

At that time he was also urging scientific journals not to accept research articles of questionable quality for publication. After the Hwang affair, he continued to hammer on this apparent weakness of the entire field, criticizing the spectacle of "even well-respected research journals seeming to fall over one another for the privilege of publishing the next hot paper" (Shaywitz, 2006a). However, Shaywitz also severely criticized the low quality of the research that was cited by the opponents of human embryonic stem cell research to show the good prospects of adult stem cell research or other alternatives (Shaywitz, 2006b; Aldhous, 2006).[49]

Apart from scaling down its claims and ultimate promises, the international community of stem-cell research also had to devise new ground rules for scientific cooperation across national borders in a world characterized by cultural diversity and moral disagreement about the status of human embryos. In February 2006, a group of 60 scientists, philosophers, bioethicists, lawyers, clinicians, journal editors and regulators from 14 countries met in

[49] A recent example of 'hyped' results was the claim made in *Nature* by researchers affiliated with Advanced Cell Technology, Inc. that they had been able to produce stem cells "using an approach that does not harm embryos", thus evading an obvious ethical objection that is particularly salient in the US. It later turned out that this claim had to be retracted, but in the meantime the company had raised millions from investors at heightened share prices (Hamilton and Regalado, 2006).

Cambridge, UK, to devise guidelines for ethical and legal regulation of stem cell and related research and its clinical applications (Hinxton Group, 2006; Weiss, 2006; Giles, 2006; Nelson, 2006). The meeting had already been planned two years earlier, but inevitably the deliberations took the recent Hwang scandal into account. The guidelines or principles on which the so-called *Hinxton Group* reached a consensus were thought to give humankind "the very best chance of realizing the benefits of stem cell research in an ethically acceptable manner" (Hinxton Group, 2006). There were, as transpires from this formulation, no principled opponents of human embryonic stem-cell research among the members of the Hinxton Group.

In its Consensus Statement, the group reaffirmed the requirements that scientists and clinicians should conduct research according to ethically acceptable norms; that the well-being, liberty and rights of cell and tissue donors as well as research participants should be protected; and that those donors and participants must provide valid informed consent. Any risk should be commensurate with expected overall benefit.

The Hinxton Group also calls on journal editors to support and promote high standards for scientific peer review and to require that authors claiming the generation of new embryonic stem cell lines submit data verifying the authenticity of such lines. Moreover, the source of the cells used in the research should also be clearly specified. For the purposes of oversight and ethical review, the donors of human materials in the context of human ESC research are to be treated as research subjects.[50]

To support and promote high standards for ethical integrity, journal editors are further asked to require from scientists a statement that their research conforms to local laws and policies and has been approved by all relevant oversight committees. On request from editors, authors should submit protocols approved by review boards, consent forms, and the information provided to tissue donors and research subjects.

Journal editors should also encourage authors to include explicit descriptions of their contributions to the published research, in particular in international collaborations across countries with more permissive and more restrictive laws and regulations.

Stem-cell researchers are encouraged to submit any stem cells they derive to national or international depositories and to make cell lines and data publicly available. This will facilitate replication and scientific collaboration. In the words of the Consensus Statement, human embryonic cell lines are a "precious resource".

The Hinxton Group acknowledges that scientists have a responsibility to obey the (national) law but also cautions lawmakers not to restrict citizens' conduct extraterritorially with regard to stem cell research:

> "So long as scientifically and ethically defensible hESC research is undertaken in a country in which it is legally permissible, scientists should be free to participate in that research without fear of being liable to prosecution, restriction, or discrimination in another jurisdiction" (Hinxton Group, 2006)

This problem is especially acute for German stem-cell researchers who move to other countries in an attempt to escape from the restrictive legal regime in their homeland, because

[50] As many recommendations were directed at journal editors, it should be noted that the Consensus Statement of the Hinxton Group was also signed by the editor-in-chief of *Nature*, Philip Campbell.

the German constitution proclaims "extraterritorial reach" over its citizens (Weiss, 2006). As such, the Consensus Statement will not resolve this problem for German researchers.

The Hinxton Group's initiative to devise some ethical ground rules can be seen as an attempt by the international stem cell research community (and its 'friends' in bioethics, law, regulation and publication media) to put its own house in some minimal order. The backdrop of this attempt is still an international patchwork of different laws and ethical rules governing human embryonic stem cell research. The differences to be bridged are not simply those between East and West. Within the European Union, for instance, there are also notable differences between the permissive regime of Great Britain and the restrictive regime of Germany which frustrate any overall and effective EU policy in this area. Similar differences are discernable in the United States, where in the wake of a presidential veto on federal funding the thrust in stem-cell policy has moved to the level of the states:

> "Many states are now engaged in a race to attract stem cell research with laws and regulations that defy Bush administration policy. In some cases, states are pushing for funding packages to offset the federal funding shortfall and insure that their most promising scientists don't head west [i.e. to California, where attractive conditions for stem-cell research have been created due to 'Proposition 71']. And in other cases, states are reacting strongly in the opposite fashion, considering major restrictions on the sort of stem cell research that scientists in their state can conduct." (Russo, 2005, p. 1168)

In the aftermath of the Hwang scandal, California passed the Reproductive Health and Research Bill (SB 1260) to ensure that women who provide eggs for stem cell research are fully educated about health risks and to limit compensation to reimbursing direct expenses (Darnovsky, 2006). One author has suggested that a centralized Californian stem cell bank could provide an opportunity to create an ethical and legal infrastructure for long-term public return, which might set standards with possible relevance for the USA as a whole and the rest of the world (Winickoff, 2006). His ambitious proposal also recommends including egg donors in a more participatory form of governance (e.g. by representing them on IRBs and priority-setting committees).

For the moment, however, the scene is dominated by centrifugal tendencies in the USA, the European Union and other regions of the world. The Consensus Statement of the Hinxton Group can hardly be expected to halt these centrifugal tendencies. At the most, it can be seen as an articulation of the minimal ethical ground rules for those countries, regions and areas with sufficiently permissive regimes (especially with regard to the status of the embryo) to be able to engage in in human embryonic stem cell research at all (for an updated version of the Hinxton statement, see Daley et al., 2007).

As a consequence of the Hwang affair, the requirement of informed consent has been strengthened and reaffirmed on an international scale. This does not mean that liberal self-determination (or respect for autonomy) should be seen as the alpha and omega of the ethics of stem cell research. Some feminists plead for a new culture of inalienability. Given that the "harvesting" of egg cells involves an invasive, painful and medically risky procedure, they argue that oocyte extraction for stem cell research can never be justified as part of clinical practice and biomedical research bound by the Hippocratic principle 'Do no harm' (for an exposition of this view, see Schneider, 2003). The rights of women are surely violated when informed-consent procedures are being flouted, but the problem is that such rights may even be said to be violated when such procedures are properly followed! Thus the procurement of egg cells remains the bottleneck and the ethical heel of Achilles for human embryonic stem cell research.

Conclusions

In European public debates, East Asian countries like South Korea, China and Singapore have often been depicted as countries with permissive ethical standards with regard to human embryonic stem cell research, which would allow them to gain a decisive edge in the worldwide competition around a new, biology-based industry of the future (Sentker, 2004; critically: Joung, 2004). In this context, laxer rules are considered 'Standortvorteile' ('locational advantages') in the worldwide 'Standortkonkurrenz' (Ingrid Schneider in Stollorz, 2005). This could ultimately lead to a "competitive downgrading of ethical standards" (Döring, 2005), also known as the infamous race to the bottom. East Asian cultural backgrounds are somehow thought to explain the more permissive ethical standards.

The Hwang affair is interesting in this connection, because what was supposed to be a definite advantage in the international competitive struggle − lax ethical rules and standards − turned out to be a definite disadvantage or at least a mixed blessing. In this sense, the case of the Korean stem cell debacle forms a *counter example* to the standard analysis.

It would be inappropriate, however, to consider South Korea as an ethically underdeveloped country (see also Bogner and Menz, 2006). Intense moral debates about the prospects opened by the life sciences and about the possibilities of cloning have not been absent and legislative initiatives to regulate these issues have also been taken. It was just that moral doubts and objections concerning Hwang's research projects could be too easily marginalized in an atmosphere of heightened techno-nationalism.

The national and international effect of the Korean stem cell scandal has been a tightening of the ethical-legal rules for egg donation. In this sense, there has been no race to the bottom. Rather, the level of the international playing field has been heightened. This does not alter the fact that the procurement of egg cells still constitutes the ethical heel of Achilles for human embryonic stem cell research.

In the course of various debates and controversies around egg donation and other aspects of stem-cell research, differences between "western" and "Korean" (or "Eastern") values were often invoked. It would be wrong, however, to attribute much descriptive value to such invocations. Playing the culture card was primarily done for strategic reasons, e.g. to boost nationalist fervour or to deflect criticism of ethically problematic procedures.[51] On the other hand, Korean bioethicists and civil society critics could appeal to 'international' standards, because despite all its virulent nationalism South Korea also wanted to impress the rest of the world with its scientific performance.

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[51] On some occasions, playing the culture card may be seen in a more sympathetic light. In the 1980s, South Korea attempted to resist American pressure to tighten up the protection of copyright and other intellectual property by arguing that the tradition of freely copying artistic and literary works was part of Korean culture. The U.S. government did not buy the 'culture argument' and switched to *economic* diplomacy by threatening trade retaliations. See Drahos and Braithwaite, 2002.

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(Korean surnames are in capital letters)

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Chapter 4

East Asia and the "GM Cold War":
The international struggle over precaution, labelling and segregation

Introduction

The *Draft Monitoring Report on Gene Technology and Globalization* issued by the COGEM (The Netherlands Commission on Genetic Modification) remarks that the stringent regulation requirements introduced by the EU to safeguard the freedom of choice of European citizens can have a restrictive effect on non-European producers due to the high costs of admission and certification (COGEM, 2005). The *Draft Monitoring Report* also cautions against transferring European regulatory concepts to other parts of the world in a top-down manner. Confronted with the enormous extension of the cultivation of GM crops outside Europe, it also raises doubts about whether the EU regime of labelling, traceability and coexistence can be sustained in the longer term. In one passage, the report suggests that the choice for the present regulatory regime may be unduly 'Eurocentric' and fails to do justice to the interests and values of developing countries:

> "The COGEM asks for attention to the worldwide – intended as well as unintended – effects of national and European regulations. One example is the restriction of the freedom of choice for producers in other countries, which may possibly lead to stagnation of GM agriculture and the failure to realize potential economic benefits. A strong preoccupation with one's own (national or European) values and interests may conflict with other values, like solidarity and justice. An approach which also takes the international dimension into account and which makes choices based on all arguments is definitely preferable, according to the COGEM." (COGEM, 2005, 8)

We think that the *Draft Monitoring Report* is based on an incomplete and therefore rather one-sided analysis.[52] It is indeed correct to point out that stringent EU regulations may act as trade barriers and thereby restrict the freedom of choice for countries outside Europe, especially those countries intending to introduce GM crops. On the other hand, however, the possibility to choose between GM and non-GM food may be valuable enough to warrant a deliberate (and perhaps costly) effort for maintaining it as an effective option. The report seems to assume that European consumers are peculiarly unique in setting great store on such freedom of choice. However, many countries outside Europe have also introduced or announced mandatory labelling rules for GM crops and food products (Carter and Gruère, 2003a; see also Center for Food Safety, 2006, for a recent overview). In Asia the list includes countries such as South Korea, Japan, Thailand, Indonesia, Hong Kong, Pakistan, India, Sri Lanka, The Philippines, Taiwan and even China. In some cases, as with China, governments may have decided to introduce mandatory labelling primarily on strategic grounds, but in others Asian consumers may have insisted on their right to make informed choices. Of course, it remains to be seen whether and to what extent these regulations will be effectively implemented. At any rate, it seems that safeguarding freedom of choice and promoting consumer autonomy are more than just European idiosyncrasies. One of the issues that we

[52] In our view, one can rightly criticize EU import policy on *specific* points, e.g. the fact that it requires a zero threshold and does not allow a 0.9 % threshold for GM 'traces' in imported raw materials (Huib de Vriend, personal communication). However, it seems to us that the criticism contained in the *Draft Monitoring Report* is not aimed at such details but is more generally directed against *any* comprehensive regime of labelling, traceability and coexistence.

therefore need to examine more thoroughly in this chapter is the ethical case for mandatory labelling.

The *Draft Monitoring Report* also betrays some partiality in another respect. In highlighting the 'unintended' effects of European regulations for developing countries, the report fails to point out that these effects are severely compounded by the effects of U.S. regulations and U.S. trade policy. It therefore does not get at the root of the problem. What in fact causes most trouble for many developing countries is precisely the 'regulatory polarization' (Bernauer, 2003; see also Prakash and Kollman, 2003) between the two economic superpowers, or in other words the fact that the United States and the European Union have adopted diametrically opposed regimes for regulating biotechnology. While the US chose a 'product-based' system in the mid-1980s, the EU opted somewhat later for a 'process-based' system. All the other characteristics of the two regimes – invocation or rejection of the so-called Precautionary Principle and the adoption or rejection of mandatory labelling and segregation (traceability and coexistence) – are intimately related to the initial framing decisions (Jasanoff, 2005; see also Chapter 2). Now both superpowers attempt to 'export' their regulatory regimes to the rest of the world using various carrots and sticks.[53] Each offers developing countries support for 'capacity building' in terms of its own regulatory model. In world trade, the clash between "the two Goliaths" (Thorpe and Robinson, 2004) has resulted in a virtual "GM Cold War" (Meijer and Stewart, 2004). Developing countries are "caught in the cross-fire of this GM Cold War" and are left with "serious legal uncertainty as to the role of GMOs in their national agricultural policies" (*ibid.*, p. 247). It would seem that an exploration of the strategic options that are open to developing countries has to take full account of the nature of the international situation. By the same token, to demand special concessions from the European Union with a view to relieve the difficulties for developing countries may actually be a covert call for unilateral disarmament.

In its monitoring report the COGEM further notes that regulation may be 'foreign' to developing countries. It therefore advocates a bottom-up approach rather than a top-down approach in which we simply transplant (and thereby 'impose') our own regulatory concepts and models:

> "Aid for capacity building must always fit regional needs and consider those locally involved. Top-down methods, which ignore the co-evolution of technology and society and simply impose the social, normative codes (scripts) connected to gene technology, do not deserve support. Instead, within the EU and other international agencies, attention should be drawn to the kind of bottom-up approach that is already practised in Dutch development cooperation." (COGEM, 2005, 10)

It is not entirely clear what exactly the COGEM is driving at here. Perhaps the concern is that developing countries will prove unable to set up regulatory structures allowing them to implement an effective segregation between GM and non-GM product flows and thus to ensure continued access to the European market. Of course, there are good reasons to doubt

[53] About the USA: "The USA has also used trade negotiations as a leverage instrument by making acceptance of pro-GMO policies a factor in negotiations over bilateral free trade agreements. Further, the USA consistently provides food aid in the form of GM food and last year [2003] it enacted the 'United States Leadership Against HIV/AIDS, Tuberculosis and Malaria Act', which ties funding to fight AIDS in developing countries to the acceptance of GM food. The Act embodies a 'sense of the Congress' that this condition is appropriate to overcome 'fears of benign genetic modifications to food' and help feed those infected with HIV/AIDS." (Meijer and Stewart, 2004, 253). About the EU: "The EU has imposed stringent regulatory requirements on foods containing or produced from GMOs. A country or firm can export food products to the EU only if the country or firm is listed by the European Commission as compliant with EU food safety rules." (Meijer and Stewart, 2004, 253).

the effectiveness of 'top-down' methods, but sadly enough the success of 'bottom-up' methods *in this regard* is hardly more assured. Developing countries cannot simply design regulatory structures with a view to their 'local' or 'regional' needs only; they also have to take into account their export interests and thus the regulatory requirements of the regions to which they intend to export. Would the COGEM advocate a relaxation or suspension of EU requirements if exporting developing countries prove unable to meet them? Such a move, however, would clearly undermine the position of the EU in the 'GM Cold War' with the United States. [In the quoted passage, the 'co-evolution' argument is also used somewhat asymmetrically. It is applied to the transfer of the regulatory models (codes, scripts) connected with gene technology, but apparently not to the transfer of gene technology itself. One could perhaps make an equally strong case that gene technology is being transplanted to (and thus 'imposed' on) developing countries with utter disregard for the co-evolution of technology and society. In other words, use of the normatively charged term 'imposing' (*opdringen*) in connection with the transfer of regulatory models may warrant further reflection. For an example of a 'co-evolutionary' approach to biotechnology, which regrettably also lacks full symmetry, see Juma (2005).]

The *Draft Monitoring Report* rightly notes that "in Asian countries like China and India" dependence on other countries is much smaller "thanks to a large internal market". Even in these countries, however, domestic regulatory regimes for the biosafety assessment of GM crops and foods are set up and regulatory decisions are taken also with regard to their potential international repercussions. As is well-known, over the years both countries (especially China) have invested huge R&D funds to build up their own biotech capacity and have also devoted extensive areas to the cultivation of GM crops. Their experience, and the experience of other Asian countries, with the development of biotechnology and with biosafety regulation, is highly relevant for a prognosis of the probable outcomes of the 'GM Cold War' and thus also of the long-term sustainability of the EU regime of labelling, traceability and coexistence. After all, as publicist John Feffer wrote, "Asia holds the key to the future of GM food" (Feffer, 2004). Three agricultural economists speculate more specifically about the effects of China's expected decision to release the commercial production of GM rice: "China's decision may start a domino effect that could cascade around the globe" (Rozelle, Huang and Hu, 2004). Needless to say, the expression 'domino effect' rhetorically fits the imagery of a 'Cold War' on GM crops and foods. So far, however, this allegedly impending decision has been announced several times, only to be postponed anew on each occasion. We will look more closely into the experience of China and other Asian countries later in this chapter.

The case for mandatory labelling

On the face of it the matter looks simple enough. The argument for mandatory labelling is a straightforward case of "the consumer right to know" (Leiss, 2003, 4). Yet the 'product-based' system of assessment that was adopted in 1986 as the basis of the US regulatory regime made it virtually inevitable to deny this basic right to the American consumer. This apparent anomaly in a liberal democracy and free-market economy has inspired the biotech industry and the regulatory authorities to come up with some rather sophistic attempts at justification.

The so-called *Coordinated Framework for Regulation of Biotechnology* that was set up in 1986 reflected the de-regulation agenda of the Republication administration (remember President Reagan's popular mantra of "No new rules!") and its wish to clear the way for a

nascent industry that was expected to help restore American competitiveness in world markets (Jones, 1999, Chapter 9; Prakash and Kollman, 2003). The 'Framework' posited that the risks of biotechnology were not specific to this technology and that its products should not be treated any differently from similar products created by traditional agricultural or chemical processes. Hence biotechnology was to be regulated under existing rules and laws and supervised by existing agencies like the FDA, EPA and USDA (Office of Science and Technology Policy, 1986). The USDA, with its business-friendly reputation, was chosen as the lead regulatory agency (Prakash and Kollman, 2003, 624).

Under the Federal Food, Drug, and Cosmetic Act, the FDA is charged with regulating foods and food additives, including food labelling. In May 1992, however, the agency decided it had no active role to play in the supervision of GM foods. Companies were free to market newly developed GM foods without conducting pre-market safety studies (although they were advised to conduct them as a matter of prudence). Nor did the FDA require these novel foods to be labelled. Under the pretext that GM foods were not inherently different from their non-GM counterparts, any safety concerns were dismissed *a priori* as insignificant.[54] The same consideration militated against mandatory labelling of GM foods: "Labeling was ruled out as potentially misleading to the consumer, since it might suggest that there was reason for concern." (Eichenwald, Kolata and Petersen, 2001). Indeed, the FDA put formidable obstacles in the way of those producers who wanted to advertise and label their products as 'GM-free'.[55] Other than safety and health concerns were tacitly assumed to be illegitimate reasons for labelling.

Investigative journalism has brought to light that in those years the regulatory policy of US government agencies was heavily influenced by the biotech industry: "What Monsanto wished for from Washington, Monsanto – and, by extension, the biotechnology industry – got" (Eichenwald, Kolata, Petersen, 2001). This also holds true for the position taken by the FDA in the early 1990s. In retrospect, several U.S. business executives express surprise and astonishment about Monsanto's insistent clamour to bypass the need for labelling:

> ""Monsanto forgot who their client was," said Thomas N. Urban, retired chairman and chief executive of Pioneer Hi-Bred International, a seed company. "If they had realized their client was the final consumer they should have embraced labeling. They should have said, 'We're for it.' They should have said, 'We insist that food be labeled.' They should have said, 'I'm the consumer's friend here.'" (*ibid.*)

Indeed, in following years the American rush to put GM foods on the store shelves without prior safety testing and without labelling was just the perfect ammunition anti-biotech NGOs needed to organize a worldwide opposition against the industry. Even Monsanto executives have meanwhile deplored their past 'arrogance' (*ibid.*).

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[54] "As discussed above, FDA believes that the new techniques are extensions at the molecular level of traditional methods and will be used to achieve the same goals as pursued with traditional plant breeding. The agency is not aware of any information showing that foods derived by these new methods differ from other foods in any meaningful or uniform way, or that, as a class, foods developed by the new techniques present any different or greater safety concern than foods developed by traditional plant breeding. For this reason, the agency does not believe that the method of development of a new plant variety (including the use of new techniques including recombinant DNA techniques) is normally material information within the meaning of 21 U.S.C. 321(n) and would not usually be required to be disclosed in labeling for the food." (Food and Drug Administration, 1992, 22991).

[55] "In fact, the FDA created hurdles for voluntary labeling. It requires that dairies wanting to label their milk as free of bovine growth hormone have to include a disclaimer on the label that no significant difference is shown between hormone treated and hormone free milk. Similarly, it requires grocery stores wanting to make this claim to provide verifiable paper trails that the milk suppliers did not use any hormones." (Prakash and Kollman, 2003, p. 625, footnote).

Nonetheless, the US Biotechnology Industry Organization (BIO) still clings to the same argument for rejecting mandatory labelling:

> "The biotechnology industry supports accurate and informative product labeling that communicates to consumers material information relevant to health, safety and nutrition. Misleading label information makes informed consumer choices harder. BIO believes that a system of mandatory labeling of biotech products would confuse consumers by inaccurately suggesting that these products are inherently different or pose safety concerns when compared with traditional foods." (Biotechnology Industry Organization, n.d.)

The US biotech organization continues to hide behind the policy statement the FDA issued in 1992:

> "The FDA's 1992 policy states that there is no reason to conclude that bioengineered foods differ from other foods in any meaningful or uniform way or that they present a greater safety concern than foods developed using traditional methods. Its position is that foods should be labeled according to their characteristics, not their method of production. Therefore, FDA does not require special labeling of biotechnology foods or the products of animals fed these foods." (*ibid.*) [56]

For many consumers, however, there is an eminently "meaningful" difference between GM foods and foods made with traditional methods, even if there would be no difference at all in the physical characteristics of the end product (although in many cases the difference in the method of production also results in more or less significant physical differences of the end product). This difference in method of production could be "meaningful" and important to consumers/citizens for a great variety of underlying beliefs and values, yet the FDA and the US biotech industry wilfully deprive them of the crucial information that would enable them to incorporate their values in their purchasing decisions on the market.

The irony is that some of the underlying attitudes of American consumers on the issue of GM food labelling transpire clearly enough from the focus group interviews that the FDA itself commissioned in 2000:

> "Virtually all participants said that bioengineered foods should be labeled as such so that they could tell whether a given food was a product of the new technology. What is striking about participants' initial discussion of their reasons for wanting biotechnology labeling is the widespread perception that the information they want the label to provide is how the food product was produced, rather than the compositional effect of the process on the food product. Virtually no one mentioned wanting to know the specific effects of bioengineering on the product as a reason for labeling. Instead, participants wanted to know whether the food was a product of biotechnology because they were concerned about the potential for unknown long-term effects of the technology, in particular health effects." (Food and Drug Administration, 2000).

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[56] Compare the passage from the FDA 1992 policy statement quoted in note 54. In a draft guidance for industry on voluntary labelling issued in early 2001, the FDA interpreted the meaning of the expression 'material information' occurring in section 201(n) of the Food, Drug, and Cosmetic Act (FDCA) in a particular way: "While the legislative history of section 201(n) contains little discussion of the word 'material', there is precedent to guide the agency in its decision regarding whether information on a food is in fact material. Historically, the agency has generally interpreted the scope of the materiality concept to mean information about the attributes of the food itself." (Food and Drug Adminitration, 2001). Streiffer and Rubel (2004) argue persuasively that this restrictive interpretation is unfounded and distorts the whole tenor of the FDCA. One provision in this act requires that labels on packaged foods disclose "the name and place of business of the manufacturer, packer, or distributor". Clearly, this information goes beyond the "attributes of the food itself".

Another paragraph of the report indicates that focus group participants wanted labelling of GM foods not just because of possible (long-term) health effects but also for other reasons:

> "Many participants recognized symbolic value in choosing not to buy products of biotechnology. They felt mere disclosure labeling gave them an opportunity to register their view about the wisdom of food biotechnology, i.e., to support or not support the dissemination of the technology, apart from their views about the health and safety characteristics of the individual product. They said they wanted to 'send a message' to the company." (Food and Drug Adminitration, 2000).

The category 'symbolic value' is clearly a residual category. It would not have been difficult to expand this category into a long list of possible reasons why consumers might want to know about the process by which foods are made, if the researchers had been less constrained by the FDA's official focus on the product. People who follow religious bans on food from certain sources, for example, might also wish to know whether genes from those sources end up in other foods. Vegetarians might want to know about the presence of animal-derived genes in vegetable foods. Still others might be concerned about the effects of genetic engineering on animal welfare and wish to avoid foods from genetically modified animals. Or people may view GM foods as 'unnatural'. Or people may oppose the big biotech companies, distrust regulatory agencies, or want to express their solidarity with small-scale family farms or organic farming. Or people may think that GM crops present unknown environmental risks while offering no direct consumer benefits. Some technophiles might insist on labelling because they want to consume foods produced with the latest technology. Many would value autonomy as such and strongly resent being denied the chance to exercise it. There is a virtually endless list of possible reasons (cf. Streiffer and Rubel, 2004).[57] Some of the reasons may be based on mistaken beliefs, but that does not imply that they should be dismissed as irrelevant for the exercise of consumer autonomy.

The participants in the focus group discussions commissioned by the FDA were also presented with factual information about the extent to which GM foods had entered American food stores and supermarkets:

> "[M]ost participants expressed great surprise that food biotechnology has become so pervasive in the U.S. food supply. […]. The typical reaction of participants was not one of great concern about the immediate health and safety effects of unknowingly eating bioengineered foods, but rather outrage that such a change in the food supply could happen without them knowing about it." (Food and Drug Administration, 2000)

This sense of "outrage" is quite understandable given that the autonomy of consumers has been violated by companies and regulatory authorities implementing and allowing massive changes in the food supply without their knowledge.[58] In this connection an interesting and consistent finding from the series of public opinion polls that the Pew Initiative on Food and

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[57] Compare Susanna Hornig Priest: "No one has been able to rule out consequences for human health entirely. […]. But for the most part, it is the great range of economic, regulatory, environmental, and ethical issues, *rather than food safety or human health issues of the type science can eventually resolve*, that biotechnology's critics are raising." (Priest, 2001, 8; italics in original).

[58] Among the FDA focus group participants there were some who exhibited even more extreme disaffection and distrust in their reaction: "Some participants remarked that bioengineered foods have been 'snuck in' to the food supply. They were mainly disturbed by the lack of public information and public input to a major development in the quality of their food supply. This information about prevalence served to reinforce the most negative and cynical views some participants held about food biotechnology. Some participants saw this as evidence of a conspiracy to keep consumers in the dark, that is, the rationale for not informing the public must be that there is something to hide." (Food and Drug Administration, 2000). Many proponents of biotechnology oppose labelling on the grounds that it could be 'misleading' and 'confusing'. Perhaps they should reflect more seriously on the possibility that the *absence* of GM labels could also be 'misleading' (even from their point of view), in that it might nurture the suspicion among consumers that there must be definitely 'something to hide'.

Biotechnology has published over the years is that a considerable percentage of American consumers actually believe that they have never eaten GM foods (in the November 2006 report this was 60%), while an estimated 75% of processed foods in grocery stores are GM foods or contain GM ingredients. Most, if not all, Americans must have eaten GM foods in one form or another, but only 26% say they believe to have eaten them (Pew Initiative, 2006, 2).

The exclusive focus of the FDA labelling policy statements on the health and safety effects of GM foods and the consequent restriction of relevant information to the "attributes of the food itself" rather than the "method of production" are largely beside the point. As the Canadian philosopher William Leiss declares: "This isn't about food safety. It's about the rights of citizens in a well-ordered democracy to have their freedom of choice respected by their own governments." (Leiss, 2003, 15).

Streiffer and Rubel (2004) argue that the FDA is in no way constrained by the provisions of the Federal Food, Drug, and Cosmetic Act (FDCA) to exclude mandatory labelling of information that goes beyond "the attributes of the food itself". This is rather an arbitrary restriction the FDA imposes on its own policy. In fact, the FDA's legal remit can be best construed as the protection of consumer autonomy (which includes the protection of health as a derived value). The FDCA's requirement that labelling information should be truthful and non-misleading also fits this rationale. It is particularly interesting in this connection that the FDCA explicitly says in section 343(n) that *omitting* information can also render a label misleading. Thus the deliberate withholding of information that foods have been produced by using modern biotechnology might be considered utterly misleading and therefore unlawful in view of the fact that so many American consumers wrongly believe they have never eaten GM foods.

In the focus group discussions commissioned by the FDA, "virtually all participants said that bioengineered foods should be labeled as such" (Food and Drug Administration, 2000). This outcome is consistent with the results of a large number of polls done by various groups (industry, news organisations, academics, etcetera), which all point to the overwhelming public support for mandatory labelling among the American population (Streiffer and Rubel, 2004). In a democratic society, such a strong public opinion should be a weighty *prima facie* reason to provide labelling. In the absence of convincing reasons for 'justified paternalism' to overrule these citizen preferences, Congress should therefore require the FDA to provide mandatory labelling for GM foods (Streiffer and Rubel, 2004).

However, there is no chance at present that Congress or the US government will act upon this strong ethical case for labelling. American biotech companies continue to oppose mandatory labelling, largely on the grounds that they fear that GM labels would induce the public to buy GM-free foods, thus threatening the further growth of the industry (a GM label is said to represent a 'warning signal'). While this reasoning might explain their opposition to mandatory labels for reasons of economic self-interest, it hardly makes a strong case as an ethical justification and fails to respect consumer autonomy. The economists Colin Carter and Guillaume Gruère have attempted to add some 'ethical' spin to this naked economic justification. They argue that mandatory labelling of GM food, while aiming to provide consumer choice, in actual fact restricts consumer choice. Such labelling would induce food processors, in anticipation of negative reactions from consumers and retailers, to switch to non-GM ingredients. The final result will be less choice for consumers, because GM foods will disappear from the market (Carter and Gruère, 2003b). In a critical reply, however,

Robert Streiffer and Alan Rubel claim that this argument does not address the central issue in the debate. They point out that Carter and Gruère fail to distinguish between choice and informed choice: "Because the loss of choice that Carter and Gruère predict is a loss of *uninformed* choice, that loss is irrelevant if the justification for mandatory labelling is that it facilitates *informed* choice" (Streiffer and Rubel, 2003).

It cannot be denied, however, that GM labels are often perceived by consumers as negative signals. Carter and Gruère suggest that this view also informs the position of anti-biotech groups:

> "Most environmental activists who are opposed to GM foods strongly support mandatory labeling policies. Why should they do so if they knew that it would insure a place for GM food at the retail level? To the contrary, these groups may be using mandatory labeling as a type of Trojan horse: they support mandatory labeling for the sake of consumer choice, knowing full well that this policy will lead to no choice in practice." (Carter and Gruère, 2003b).[59]

Following this (social) logic to the end would lead to an extreme polarisation of opinion: either one is in favour of biotechnology and *therefore* against mandatory labelling or one is against biotechnology and *therefore* in favour of mandatory labelling. Conversely, on this polarised logic, arguing for labelling would also be interpreted as arguing against biotechnology. Ideally, however, the case for mandatory labelling should be independent of one's position *pro* or *contra* the technology in question.

In the long run, it would probably be also in the interest of the biotech industry to escape from this lock-in effect of social polarisation. To pin one's future on the continued need to keep the general public ignorant is hardly more than a counsel of despair. As Susanna Hornig Priest observes, "appearing to have something to hide is such an extraordinarily poor public relations strategy" (Priest, 2001, 96).[60] Perhaps the prevalent negative consumer perception of GM labels should be seen as a *contingent* fact that has much to do with 'arrogant' actions of some biotech firms in the past and the circumstance that the first generation of GM products offered few if any direct consumer benefits. Things may change when the industry mends its ways or when the follow-up generation of GM products offering direct consumer benefits arrives on the market. Drawing on the literature of communications research, Priest points out that labelling might also work out in a positive way for the biotech industry:

> "Labels certainly also convey that risks are being openly communicated in a straightforward way, which is known to be an important component of public reactions to risks. In the long run, the availability of this information will very probably have a desensitizing effect on people's general concerns about bioengineering." (Priest, 2001, 96).

William Leiss refers to an interesting empirical study done in the USA about the effect of labelling rBST milk on consumers' perception of risks, which supports Priest's speculations. The study's conclusions are as follows:

> "The results indicate that greater availability of labeled milk would not only significantly increase the proportion of consumers who purchased labeled milk, its availability would also reduce the perception of risk associated with rBST, whether consumers purchase it or

[59] Huib de Vriend comments that in their campaigns environmental activists anticipate risk-averse reactions of retailers, rather than the possible rejection of GMOs by consumers (personal communication). This is in line with the economic argument put forward by Carter and Gruère (2003b), to the effect that it is food processors and retailers that will make strategic decisions in case of mandatory labelling, thus depriving consumers of their choice options *ex post*.

[60] Remember that some participants in the focus groups commissioned by the FDA concluded that "the rationale for not informing the public must be that there is something to hide" (see note 58).

not. In other words, availability of rBST-free milk translates into lower risk perceptions toward milk produced with rBST." (Zepeda et al., 2003; quoted in Leiss, 2003, 16)[61]

We agree with Leiss that this study holds important lessons for the biotech industry and for governments.

The WTO dispute and the Precautionary Principle

On May 13, 2003 the Bush administration announced that it would file a WTO case against the moratorium on genetically modified crops and foods that was *de facto* in force in the European Union since October 1998, when new approvals were frozen (Office of the US Trade Representative/USDA 2003). In the accompanying document to the announcement, then US Trade Representative Robert Zoellick called the EU moratorium illegal, in violation of WTO rules and 'non-science based': "Numerous organizations, researchers and scientists have determined that biotech foods pose no threat to humans or to the environment." (*ibid*.). According to US functionaries, lodging an official complaint with the WTO against European GMO policy was also necessary "to discourage other countries, especially those in the developing world, from using the EU regulatory approach as the basis for their own regulations on agricultural biotechnology products" (Pew Initiative, 2005, 12). Canada and Argentina joined the US case against the EU.

The US-EU disagreement over GMOs is just one episode in a longer series of disputes. Since the early 1990s, European and American approaches to environmental, health, safety and consumer regulation have drifted further apart. Whereas during the 1970s and 1980s the US regulatory regime was generally much more strict and risk-averse than the European regime, the situation was reversed during the 1990s. In David Vogel's imagery, the hare and the tortoise changed places (Vogel 2003). After 1990, America started to move like a tortoise when a sizable conservative pro-business majority in the Republican Party blocked further regulatory initiatives, helped by the fortunate absence in the States of major incidents such as the mad cow disease and a number of food scares which in Europe undermined the confidence and trust of citizens and consumers in their regulatory authorities. The creation of a single European market necessitated the strengthening of regulatory standards: a high level of health and environmental protection was critical to the legitimacy of a growing bureaucracy in Brussels. Issuing directives and regulations is the most important vehicle for shaping public policy in Europe. Simultaneously, the process of policy-making became more open and accessible to non-business constituencies. Already the Maastricht Treaty of 1992 declared the so-called *Precautionary Principle* (henceforth to be abbreviated as PP) to be a key principle of Community environmental policy; in due course, this very principle would become the avowed cornerstone of EU regulation in the areas of food safety, environment, human health, animal health and plant health. A well-known formulation of the PP is to be found in Principle 15 of the Rio Declaration: "Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation". There are, however, over twelve different definitions of the PP in international agreements (Shaw and Schwartz, 2005, 4).

[61] The Dutch Consumer and Biotechnology Foundation (*Stichting Consument en Biotechnologie*) advocated labelling not just with a view to securing the freedom of choice of consumers, but also as an instrument of trust and as a 'just in case' option (Huib de Vriend, personal communication).

All the while the US government has been sceptical of the PP, suspecting that it may be used too easily as an excuse for protectionism. The European Union had indeed invoked this principle to defend the ban on hormone-treated beef imports from the United States, which the latter successfully challenged before the WTO (Charlier and Rainelli 2002). The US government is prone to counter any invocation of the PP with a mantra-like appeal to "sound science" and to the fairly narrow provisions of the WTO Agreement on Sanitary and Phytosanitary (SPS) Measures.[62] The implied suggestion is that the PP goes beyond sound science and is therefore arbitrary. In February 2000, the Commission of the European Communities issued a communication on the PP to strengthen its policy position in order to better defend the EU from future legal challenges by other WTO members (CEC 2000). The Commission argued that, regardless of divergences in the used terminology, the PP has already become a rule of customary international law in the areas of health and environmental protection. The Commission referred, *inter alia*, to the North Sea Declaration (1987), the Rio Declaration (1992), the preamble of the Convention on Biological Diversity (1992), the Convention of Climate Change (1992) and the Cartagena Protocol on Biosafety (2000). In the communication, the Commission declined to give a precise definition of the PP, arguing that the meaning of the concept will be fleshed out by decision-makers and courts of law.

The Protocol on Biosafety (2000), which is annexed to the Convention of Biological Diversity (1992), regulates the transboundary movement of GMOs (or LMOs - 'living modified organisms', in the terminology adopted by the Protocol) for the sake of protecting biodiversity and human health. The key provision laid down in Article 7 is the so-called Advance Informed Agreement (AIA) procedure, which allows importing countries to require prior notification from parties intending to export GMOs and to demand that shipments be appropriately labelled. The importing country may also demand documentation on extensive risk assessments to be conducted by, and at the expense of, the exporting firm. In accordance with the PP, Articles 10.6 and 11.8 give the importing country discretionary room to take precautionary decisions (e.g. prohibiting imports of GMOs) in cases of scientific uncertainty.[63] The Cartagena Protocol went into force in September 2003. At this moment, the Protocol has been ratified by 137 countries. The United States has neither signed nor ratified the Protocol (it has signed but never ratified the Convention on Biological Safety). As a major exporter of GM crops, the country had been granted observer status during the talks leading up to the Protocol, a position which allowed it to exercise some influence over its outcome (Falkner, 2000).

As a defence against the charges made by the USA, Canada and Argentina before the WTO, the European Union construed Article 5.7 of the SPS Agreement as a 'precautionary' provision and also invoked the Cartagena Protocol to claim that the PP was a recognized

[62] Article 5.7 of the SPS Agreement is sometimes interpreted as reflecting the PP, but this interpretation is highly controversial because it only allows provisional measures in case of an insufficiency of scientific evidence that is supposed to be no more than a temporary affair. The article runs as follows: "In cases where relevant scientific evidence is insufficient, a Member may provisionally adopt sanitary or phytosanitary measures on the basis of available pertinent information, including that from the relevant international organizations as well as from sanitary or phytosanitary measures applied by other Members. In such circumstances, Members shall seek to obtain the additional information necessary for a more objective assessment of risk and review the sanitary or phytosanitary measure accordingly within a reasonable period of time."

[63] Article 10.6: "Lack of scientific certainty due to insufficient relevant scientific information and knowledge regarding the extent of the potential adverse effects of a living modified organism on the conservation and sustainable use of biological diversity in the Party of import, taking also into account risks to human health, shall not prevent that Party from taking a decision, as appropriate, with regard to the import of the living modified organism in question […] in order to avoid or minimize such potential adverse effects."

principle in international law. This defence was bound to fail. The long-awaited final WTO ruling, issued in May 2006 and published in September 2006, condemned the EU and 9 EU Member States for having violated WTO rules by causing 'undue delay' in the approval of GM crops and products (for the full text of the more-than-2000-pages ruling or the 21-pages findings and conclusions, see World Trade Organization, 2006). The WTO panel rejected the 'precautionary' construal of Article 5.7 and decided to refrain from expressing a view on "whether or not the precautionary principle is a recognized principle of general or customary international law" (World Trade Organization, 2006, p. 341), noting that the legal status of the PP remains unsettled. The panel also decided not to take the Protocol on Biosafety into account, arguing that this Protocol is not 'applicable' in the relations between WTO Members that are party to the Protocol and WTO Members that are not (*ibid*, p. 336). Since the US have neither signed nor ratified the Cartagena Protocol and Canada and Argentina have signed but not ratified it, none of the three complainants is a party to the Protocol.

Some pro-environmentalist commentators are worried that the precedent set by the WTO ruling may completely undermine the Cartagena Protocol:

> "In effect, the panel makes domestic measures based on the protocol, including the protocol's articles on risk assessment and risk management, indefensible if they are challenged by a non-party or free rider to the protocol under the definition of risk assessment in the WTO SPS agreement. Not becoming a party to the protocol, while intervening to prevent its implementation – as the United States, Canada and Argentina do through their participation in the so-called Miami Group at the Protocol negotiations – is apparently a bullet-proof litigation strategy against any attempt by WTO members who are also protocol parties to defend their environmental regulation of GMOs with reference to fulfilling their protocol commitments." (Suppan, 2006)

There is indeed a danger that a huge schism opens up between international trade law underpinned by effective sanctions on the one hand and international environmental law without effective sanctions on the other. It might actually undermine the long-term legitimacy of the WTO agreements, if the latter are perceived as putting narrow trade interests before everything else. Abandoning the post-war economic regime of "embedded liberalism" is likely to be a suicidal course. As a recent report from the United Nations University Institute of Advanced Studies stated, "the WTO cannot and does not stand for free trade at any cost" (Shaw and Schwartz, 2006, 11). Hence the need, as the report argues, to bridge the differences on the application of the PP in order to "uphold a rules-based multilateral trading system that ensures secure and predictable market access, while respecting health and environmental concerns" (*ibid.*).

However, bridging the differences on the application of the PP is easier said than done (see also Gerstetter and Maier, 2005). The international debate is characterized by a sterile polarization between an inflexible commitment to the PP as if it were a religious dogma and a disingenuous insistence on "sound science". One side tries to conquer the moral high ground, while the other attempts to ensconce itself on the scientific high ground. A more thorough analysis shows that strong versions of the PP are logically incoherent and untenable, while weaker versions are so ill-defined as to offer hardly any guidance for practical action (Sunstein, 2005; Van den Belt, 2003). Similarly, the clamour for "sound science" fails to recognize that any risk assessment is necessarily permeated by value judgements, if it were only for the need to strike a particular balance in the inevitable trade-off between type-1 and type-2 errors in statistical testing (Winikoff, Jasanoff, Busch et al., 2005; Thompson, 2003; Ravetz, 2005). Despite these conceptual weaknesses, both parties are reluctant to abandon their entrenched positions in the face of the ongoing "GM Cold War".

In its actual consequences for GMO policy in the European Union, the effect of the WTO ruling may be rather limited as it refers to the *de facto* moratorium between 1998 and 2003. In 2004, a new system of labelling, traceability and coexistence was put into place. The WTO ruling has no bearing on this new system. Labelling rules that have been introduced in other parts of the world also remain unaffected. Some critical NGOs therefore claim that the WTO ruling does not make much difference: "Regardless of the outcome of its current WTO case against Europe, the U.S. will face increasing global resistance to its GE [GM] food exports for the foreseeable future" (Center for Food Safety, 2006). It is for the same reason that two recognized neoconservative libertarians call the WTO decision a "hollow victory" (Conko and Miller, 2006). However, some American producers' organisations already take courage from the last verdict to urge the US government to initiate a new case against the EU before the WTO. In a press release applauding the recent ruling, the American Soybean Association (ASA) stated:

> "While welcoming this WTO ruling against Europe's flawed and non-science based approval process, ASA is also calling on the Bush Administration to mount a WTO challenge against Europe's discriminatory traceability and labeling laws that apply to biotech crops. […] This favorable WTO ruling should only be seen as 'step one' of the actions against Europe's unjustified and unscientific policies toward biotechnology." (American Soybean Association, 2006).

Several years ago a coalition of 60 European and American consumer organisations united in the Transatlantic Consumer Dialogue already sounded the alarm that national labelling laws, both in Europe and in the USA, may not be immune to a WTO challenge (CSPI International, 2000). One can hardly imagine, however, that any US government would be so reckless as to hazard mounting a WTO challenge against the European labelling and traceability regulations. Such an initiative would most likely boomerang on the home front when American consumers were to find out that their right to know has been deliberately ignored. But it may not be the first time that something hardly imaginable nonetheless becomes reality.

Worldwide GMO momentum: irresistibly advancing or losing steam?

The doubts of the COGEM with regard to the sustainability of EU regulations concerning agricultural biotechnology are informed by the view that the spread of GMOs is irresistibly advancing on a worldwide scale. In its *Draft Monitoring Report*, the COGEM refers to the figures assembled by the International Service for the Acquisition of Agri-Biotech Applications (ISAAA), which show impressive increases in recent years of arable areas grown with transgenic crops in North and South America and Asia (James, 2004). The COGEM points in particular to the examples of China and India, where large internal markets have allowed the initiation of domestic development of knowledge and technology on a relatively independent basis (COGEM, 2005). All in all, the COGEM report evokes the image of a 'Fortress Europe' shutting itself off from rapid developments in the field of agricultural biotechnology occurring in the rest of the world. The attempt to shut out GMOs developed elsewhere is the more pathetic as it will eventually turn out to be futile. Or so the COGEM report strongly suggests.

The rise of China and India as new biotech powers is sometimes also invoked by politicians to argue against the stringent environmental, social and ethical requirements in the EU, which supposedly put European countries at a severe competitive disadvantage. A case in point is the speech of British Prime Minister Tony Blair to the Royal Society in 2002:

> "The idea of making this speech has been in my mind for some time. The final prompt for it came, curiously enough, when I was in Bangalore in January. I met a group of academics, who were also in business in the biotech field. They said to me bluntly: 'Europe has gone soft on science; we are going to leapfrog you and you will miss out.' They regarded the debate on GM here and elsewhere in Europe as utterly astonishing. They saw us as completely overrun by protestors and pressure groups who used emotion to drive out reason. And they didn't think we had the political will to stand up for proper science." (Blair, 2002)

James Wilsdon and his colleagues at the *Atlas of Ideas* project have appropriately dubbed this type of argument the 'Wild East' argument: "The rise of Asian science is sometimes used as an argument for a more relaxed stance on social, ethical or environmental concerns in Europe – the suggestion being that squeamish Europeans may lose out at the expense of the 'wild East'." (Demos, 2006; see also Wilsdon et al., 2005, p. 58-60). It is a characteristic type of argument that is also used with regard to other areas of the modern life sciences, for instance in embryonic stem cell research[64] (Dennis, 2002; see also Chapter 3 on the Hwang affair), and with regard to nanotechnology.[65] As Wilsdon and his colleagues are in favour of "socially responsive and accountable forms of science and innovation", they take some trouble to confront the 'Wild East' argument. First, they state that this type of argument, when generalized, is actually a counsel of despair because it invites a race to the bottom with regard to environmental and ethical standards and the protection of labour rights. Moreover, they state, "[i]t is also misleading, not to mention deeply patronising, to pretend that people in India and China don't share many of these same concerns – albeit expressed in a variety of ways" (Wilsdon et al, 2005, 59). Finally, they hold that moral concerns are not necessarily a *barrier* to economic development; sometimes ethical 'upgrading' can be used as a deliberate innovation strategy with good prospects of success (Demos, 2006). It would be worthwhile to investigate whether these counter arguments can be elaborated and shored up further to find out if in the end a robust case can indeed be made against the 'Wild East' argument.

Here we simply note that the Indian biotech scientists in Bangalore must have conveyed a much too placid picture of their country when the British Prime Minister paid them a visit in January 2002. It is true that in the preceding decade India had built up an impressive research capacity of its own in the field of biotechnology and that the country was on the eve of approving the commercialisation of the first GM crop: *Bt* cotton, developed by the American

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[64] "Those in favour of therapeutic cloning argued that the United States risked losing the lead in an important field, whereas anti-cloning activists sought to portray China as a morally bankrupt 'Wild East' of biology" (Dennis, 2002, 335). Interestingly, a Chinese scientist in the US 'diaspora' made the following argument: "China has a cultural environment with fewer moral objections to the use of embryonic stem cells than many Western countries, and, if it can provide a supportive funding and academic environment, it could take a leading role in this field. These technologies offer unprecedented research and commercialization opportunities for China." (Yang, 2004, 210). Of course, lower ethical standards in other countries are also characteristically invoked by the proponents of a promising technology to argue for the relaxation of ethical standards at home.

[65] Richard Jones, who addresses the 'Wild East' argument in relation to nanotechnology, provides a nice characterisation of this type of argument: "There's a developing conventional wisdom about the way science and technology in general, and nanotechnology in particular, is developing in Asia. This comes in two parts: firstly, it's noted that the Asian countries - particularly China - are set to overtake the west in science and technology, and then it's suggested that what will help these countries gain their new supremacy is the fact that there, technology will be developed without moral scruples, in contrast to the self-inflicted handicaps that Western countries are suffering. These handicaps, conventional wisdom further asserts, take the form, in the United States, of opposition from the religious right to the entire secular, scientific worldview, while in Europe anti-growth, left-wing environmentalists are the major culprits. The idea of a lawless, wild east, where technological stuff just gets done without agonising about social and environmental consequences, is becoming a bit of a bogeyman for western politicians […]." (Jones, 2005).

company Monsanto in a joint venture with the Indian seed company Mahyco, was released for sale in March 2002. However, India is also home to a powerful anti-GM grassroots movement and the decision on *Bt* cotton was only taken after long and acrimonious debates. Many people in India share indeed the same or similar concerns as many Europeans. As American social anthropologist Glenn Davis Stone writes:

> "Of the developing countries involved in the global biotechnology debate, probably none are as important and hotly contested as India. This country is home to what will eventually be the world's largest population of farmers, to a vast and talented scientific establishment, to a vigorous biotech-entrepreneurial sector [ref.], and to some of the world's most savvy green activists." (Stone, 2004).

The existence of a vibrant civil society in India is proven by the fact that the country has around 1.5 million active non-governmental organisations (NGOs), many of them highly professionalized and specialized (Bound, 2007, 41).

Agricultural biotechnology in general and *Bt* cotton in particular continue to generate fierce controversy in India. Proponents of agri-biotech claim that this genetically modified crop has turned out to be a big success, citing the rapid spread of GM cotton seed (even and especially of unapproved varieties that are marketed illegally!) among eager Indian farmers as proof.[66] However, critics assert that the introduction of *Bt* cotton has proven an utter economic and ecological failure and even attribute the massive waves of suicides among cotton farmers that occurred in the states of Andhra Pradesh and Maharashtra in 2002-2003 and 2005 to increased rates of indebtedness and insolvency after the inflated expectations around the new varieties had turned sour (Padma, 2006; for an early anthropological comment on the first suicide wave, see Stone, 2002). Indeed, the controversy continues unabated. In the war of claims and counterclaims, it is extremely difficult to uncover the truth about the actual performance of *Bt* cotton (moreover, regulatory transparency and monitoring leave much to be desired).[67] As a result of the on-going furore, further approvals for new GM crops (especially GM *food* crops) that were in the pipeline have been stalled. The first crop to meet this fate was GM mustard:

> "It was expected that the GM-mustard developed by ProAgro/PGS-India (a subsidiary of the German TNC Bayer) was next in line of approval, but a final decision by GEAC [Genetic Engineering Approval Committee] has been shelved, apparently indefinitely, for

[66] When the *Bt* cotton variety of Monsanto/Mahyco was officially released in March 2002, at least 10,000 hectares in India were already planted with unapproved versions of *Bt* cotton developed and marketed by NavBharat Seeds based in Ahmedabad, the capital of Gujarat. In all likelihood the Gujarat firm had originally imported cotton with the *Bt* gene (the intellectual property of Monsanto) from North America and backcrossed it with local Indian varieties. When it became known that illegal biotech cotton was planted across India, the owner of NavBharat Seeds was sued, but calls to destroy the illegal crop without compensation were resisted by farmers, who received political support from the state government of Gujarat. Hence the spread of illegal and unapproved seed goes unimpeded. In 2004, the estimated area planted with illegal Bt cotton was 800,000 ha (Pray, Ramaswami, Huang et al., 2006, 152). Rumour has it that some of the illegal varieties are actually superior to the officially approved *Bt* variety of Monsanto/Mahyco, because they are better adapted to local conditions in India. The reality of large-scale illegal plantings makes a mockery of the Indian regulatory system. There is no chance at all that the stringent requirements attached to the release of *Bt* cotton (refugia plantings, monitoring, etc.) are going to be met. For more information on these illegal plantings and the actual implementation of regulatory requirements in the cotton fields, see also Scoones (2003) and Newell (2003).

[67] In a methodological review paper on the applied economics literature about the impact of GM crop varieties in developing countries, Melinda Smale *et al*. remark about the case of India: "Given the context of agro-ecological and social heterogeneity, an active civil society that is vocal for and against GM seed has polarized perspectives. Polarization is evident even in the peer-reviewed literature. Perhaps more significantly, the debate in civil society is carried into government decision-making fora. Thus, methods limitations, which occur in any applied research, take on particular significance." (Smale, Zambrano, Falck-Zepeda *et al.* , 2006, p. 21-22). For more background information on the "active civil society" in India, both for and against GMOs, and the resulting pressures on biosafety regulation, see Ian Scoones (2003).

reasons that are not quite transparent. One credible theory is that the fierce controversy surrounding Bt-cotton has made the authorities very cautious, in particular about approving a GM-*food* crop." (Indira et al., 2005, 119).

A lot of research work in the Indian public sector has been done to develop insect-resistant and pest-resistant GM rice varieties, but the authors of a recent evaluation study do not expect these newly created varieties to be released in the foreseeable future (Indira et al., 2005, 118, 132). In May 2004, an official taskforce on the application of agricultural biotechnology under the chairmanship of the well-known M.S. Swaminathan urged researchers and companies not to jeopardize India's trade interests: "Transgenic research should not be undertaken in crops/commodities where our international trade may be affected, e.g., Basmati rice, soybean or Darjeeling Tea" (Swaminathan, 2004, point 3 in the executive summary). India is the only country in the world which can certify its soybeans to be GM-free, and thanks to this fortunate circumstance it can claim a niche market in Japan and South Korea (Sahai, 2006).[68]

As an allegedly rising biotech power, India does not at present confirm the general picture of a relentless and irresistible advance of GM crops; rather the momentum for agricultural biotechnology seems to have run out of steam, at least for the moment. The most one can say is that the picture is decidedly ambivalent. Some leading Indian biotechnologists are highly frustrated by the extent of the domestic resistance and fear that India might be overtaken by China (Indira et al., 2005, 121; Newell, 2003, 6-7). Ironically, their worries mirror those of Tony Blair, except that for them the 'wild East' is located even further eastward.[69]

A closer look at a particular case may thus reveal a more ambivalent and complicated picture than is suggested by the figures and the reports issued by the International Service for the Acquisition of Agri-Biotech Applications (ISAAA). As a matter of fact, the numbers published by this agency have been challenged by environmental NGOs. They point out, not too subtly, that the ISAAA is a lobby organisation supported by the biotech industry:

> "'No one has any idea where they are getting their numbers from,' said David MacDonald of the Polaris Institute, a Canadian NGO. Where there is solid independent government data, such as the United States, the ISAAA numbers are inflated by five to 10 percent, he charged. MacDonald told IPS [International Press Service] that the group's reports do not cite any sources or references, nor would most governments have this kind of information. 'We and other NGOs have been trying to get independent confirmation of this data for years, without success,' he said. [Clive] James [chairman and founder of ISAAA]

[68] Some soybean farmers in Canada, especially in the province of Ontario, have been able to retain their markets in Japan and South Korea by further developing their Identity Preservation systems, as East Asian customers demanded that food-grade soybeans remain GM-free (McLean, 2004). In his study on 'the moral economy of the non-transgenic soybean', social anthropologist Gavin Whitelaw shows that the relationship between these Canadian soybean farmers and their Japanese buyers is a highly personal one, which is reinforced by annual visits to farms in Ontario that are conducted according to highly ritualized scripts (Whitelaw, 2004).

[69] A clear example of such frustration about India's alleged lagging behind China in the field of agricultural biotechnology is provided by the views aired by the biochemist G. Padmanaban of the Indian Institute of Science in Bangalore. In 2002 he complained that China was "at least six years ahead of us" and bemoaned the situation in India in the following terms: "Democracy, liberalism and religious moorings have led to a plethora of arm-chair scientists without a background in the methods of science, activists who freely misinterpret science and bioethicists who question any research on genetic make-up." (Padmanaban, 2002, 620). In 2005 he wrote with respect to the expected release of GM rice: "We are at least 5 years behind China before any of our indigenous GM rice can reach the preproduction trial stage – that is, if ever these efforts are allowed to see the light of the day." (Padmanaban, 2005, 427). There was even the looming danger that the big neighbour might already be working on India's own heritage of germplasm: "Who knows, China may be working on GM indica variety for export purposes!" (*ibid.*).

> responded that, 'We spent 10 years getting key contacts in business, industry associations and governments to compile our data.' 'We don't identify sources because our database is proprietary,' he added" (Leahy, 2006).[70]

Nonetheless, the ISAAA numbers are widely cited by many other institutions, including the FAO, "since no other global figures are available" (*ibid.*). The COGEM also used the ISAAA figures in its *Draft Monitoring Report* on biotechnology and globalisation.

Even if one ignores the precise numbers that may or may not be inflated (who can say?), it is well-nigh impossible to miss the upbeat message for the future of agricultural biotechnology when reading the verbal text of the ISAAA report. After designating China, India, Argentina, Brazil and South Africa as the "five lead biotech crop countries from the South", Clive James went on to write:

> "The collective experience and voice of these five key countries represent a coalition of influential opinion from the South re biotech crops that will also influence acceptance of biotech crops globally" (James, 2004, 11).

However, the highest hopes for the global future of agricultural biotechnology were pinned on the pending decision to approve the commercialization of genetically modified rice in China, for immediately after the just quoted passage the text continues:

> "In the near term, the one single event that is likely to have the greatest impact is the approval and adoption of Bt rice in China, which is considered to be likely in the near term, probably in 2005. The adoption of biotech rice by China, not only involves the most important food crop in the world but the culture of Asia. It will provide the stimulus that will have a major impact on the acceptance of biotech rice in Asia and, more generally, on the acceptance of biotech food, feed and fiber crops worldwide. Adoption of biotech rice will contribute to a global momentum that will herald a new chapter in the debate on the acceptance of biotech crops which will be increasingly influenced by countries in the South, where the new technology can contribute the biggest benefits and where the humanitarian needs are greatest – a contribution to the alleviation of malnutrition, hunger and poverty." (*ibid.*)

It is notable that the expected decision to release *Bt* cotton in China is not simply judged on its own merits, but is placed within the wider perspective of the global future of agricultural biotechnology. If China approved GM rice, this would presumably have huge implications for "the acceptance of biotech food, feed and fiber crops worldwide". This view on the strategic role of GM rice in the worldwide acceptance of biotech food and crops echoes the report written in 2002 by Graham Brookes and Peter Barfoot of PG Economics, UK, and appropriately entitled *GM Rice: Will This Lead the Way for Global Acceptance of GM Crop Technology?*, of which ISAAA published an abridged version in 2003 (Brookes and Barfoot, 2003).[71] The authors gave a positive answer to the question raised in the title of their report. They expected several varieties of GM rice with both agronomic and consumer benefit traits to be released for commercial use in around 2004 and to be widely available in the developing world thanks to low intellectual property restrictions (a consequence of the high public sector involvement in the development of these varieties in China, Vietnam and, partly, India). Consumer preferences for non-GM rice would be largely confined to the developed countries in the EU, Japan, and some other parts of South East Asia like South Korea, Singapore and

[70] The ISAAA figures are based on information provided by seed companies, not on agricultural statistics (Huib de Vriend, personal communication). For NGO criticism of the most recent ISAAA figures, see Burcher (2007).

[71] Graham Brookes is paid by the biotech industry. In his earliest reports the sources of funding were properly disclosed, but later on this crucial information has apparently been suppressed (Huib de Vriend, personal communication).

Hong Kong, but these would not block the development of GM rice as they represented only 2-2.5% of global rice consumption and 4% of global rice trade in 2004. In other parts of Asia, that is, in the mainstream rice producing and consuming countries, the question of GM versus non-GM was supposed to be of minor importance compared to the much more urgent issues of food security and welfare for rising populations. In the years from 2004, as a consequence of continuous yield improvements in biotech varieties and increasing price differentials between non-GM and GM rice, the balance would gradually shift in favour of the latter, until by 2012 the proportion of non-GM rice would be no more than 0.5-1% of global production and 1-1.5% of global trade. It is clear that such a rapid worldwide uptake of GM rice would also help to overcome the widespread opposition against biotech foods and to break the present stalemate.

Against the background of this scenario it is understandable why the proponents of agricultural biotechnology look forward to a decision in China on the commercialization of GM rice with so much expectation and hope. Earlier in this chapter we quoted a few agricultural economists who expressed a similar view: "China's decision may start a domino effect that could cascade around the globe" (Rozelle, Huang and Hu, 2004).

To this date, however, the allegedly pending decision on the commercialization of GM rice in China has not yet been taken (although it has been announced several times), so the predicted domino effect has so far had no chance to materialize.[72] Apparently, Chinese policymakers are struggling with serious doubts and hesitations. As the President of Monsanto in China, the only foreign company with a GM licence, John L. Killmer stated, '[China has] one foot on the accelerator, which is funding biotech research and development, and they have one foot on the regulatory brake" (quoted in Loppacher and Kerr, 2004, 9). In the remainder of this chapter we will look more closely into the backgrounds of Chinese biotechnology policy.

Biotechnology policy in China

After the death of Mao Zedong in 1976 and the subsequent fall of the so-called Gang of Four, Chinese political leaders realized at the end of the 1970s that a decade of political struggle and turmoil had left their country in a deplorable state of economic and technological backwardness. Under Deng Xiaoping's leadership (1978-1989), the People's Republic of China embarked on a long-term course of economic reforms and opening to the outside world, which was ideologically legitimated by the stress on 'building socialism with Chinese characteristics' (Deng, 1984). Rather than engaging in permanent class struggle and continuous mass mobilisation, Deng held that "the fundamental task for the socialist stage is to develop the productive forces" (*ibid.*). This overall task was captured in the slogan of the 'four modernisations' (industry, agriculture, defence and science and technology).[73] Foreign investments were welcomed as a useful supplement in this task. The 'Deng Xiaoping Theory' supplied the leadership of the Chinese Communist Party with an ideology that seemed flexible enough to reconcile its strongly nationalist pretensions with the economic requirements of attracting foreign capital and technological know-how, resulting in "a peculiar globalisation of nationalism" (Hughes, 2006). Sometimes, the balance would be tilted towards 'techno-nationalism', at other times towards 'techno-globalism' or a more

[72] The ISAAA report for 2005 simply states: "China has already field tested biotech rice in pre-production trials and is expected to approve biotech rice in the near-term." (James, 2005, 4).
[73] Political dissident Wei Jingsheng famously argues that a fifth modernisation should be added, namely democratisation. Without this latter modernisation, he claims, the other four will remain ineffective.

cosmopolitan approach towards innovation (Wilsdon and Keeley, 2007). China's participation in the World Trade Organization since 2001 may restrict its room for manoeuvre, but the Chinese policy-makers also attempt to impose their own restrictions on the commerce of China with the rest of the world (e.g. on the Internet).

As one of the 'four modernisations' that were adopted as overarching policy goals in 1978, science and technology were also given high priority alongside the transition towards a (nominally still 'socialist') market economy. In response to the American Strategic Defense Initiative ('Star Wars') and other initiatives among western countries in the early 1980s to concentrate their research efforts on a few areas of strategic importance, the Chinese leadership started the famous National High Technology Development Programme, also known as the '863' programme − where '86' refers to the year 1986 and '3' to the month of March, when the programme was adopted. This programme singled out biotechnology, information and communication technology, aerospace, laser technology, robotics, energy and new materials as strategic fields requiring preferential support for the next fifteen years (1986-2000). The place of biotechnology at the top of this list is quite remarkable and shows China's strong commitment to achieve international pre-eminence in this particular area of technology. The field was to receive 1.5 billion RMB in funding against a total budget of 10 billion RMB for the entire high-technology programme over the 15-year period (Huang and Wang, 2002 and 2003). As Craig Smith commented in the pages of the New York Times:

> "Beijing called in its top scientists from around the world and set them working on seven broad areas. Genetic engineering was at the top of the list. Since then, the double helix has replaced the atom as the symbol of the modernization drive" (Smith, 2000).

Biotechnology, or life sciences more generally, is also one of the key areas of support in the more recent '973' plan initiated in March 1997 to promote basic science and technology research (Huang and Wang, 2002 and 203).

The specific area of plant biotechnology within this larger field of biotechnology has also seen substantial increases in funding and investment. Huang Jikun and Wang Qinfang, two leading Chinese agricultural economists, estimate that annual research expenditures for plant biotechnology have jumped from 14 million RMB (or 4.2 million US $) in 1986 at the formal start of the '863' high-tech programme to 322 million RMB (or 38.9 million US $) in the year 2000 at its end, and the number of research staff almost tripled from 740 to 2128 over the same period (Huang and Wang, 2003). More recent years and investment plans for the near future indicate that expenditures for agricultural biotechnology will show further impressive increases.

Chinese research in plant biotechnology focuses on traits like insect resistance, disease resistance, stress tolerance, quality improvement and herbicide resistance in a number of crops such as cotton, rice, wheat, maize, soybean, potato, rapeseed, cabbage and tomato (Huang and Wang, 2003). By 2004, numerous GM varieties of 60 different crops had been approved for field-testing and 181 varieties of four crops (cotton, tomatoes, sweet peppers and petunias) had been approved for commercialisation (see Pray, Ramaswami, Huang et al., 2006, Table 1 on p. 144).[74] Several varieties of transgenic *Bt* cotton, some developed by scientists working at the Chinese Academy of Agricultural Sciences (CAAS) and a few developed by Monsanto and the seed company Delta and Pineland were first approved for commercialisation in 1997 (the Monsanto varieties were approved for four provinces). The

[74] This leaves the ill-fated attempt in the early 1990s to commercialize transgenic tobacco out of account: "In the early 1990s, virus-resistant tobacco variety had been commercialized before being removed from production because of pressure from an international tobacco importer" (Huang, Rozelle, Pray, Wang, 2002, 675).

case of *Bt* cotton in China has been trumpeted as a big success story: it has spread rapidly across the cotton-growing area along the Yangtse and Yellow River and led to higher yields, much lower pesticide use, higher incomes and fewer health complaints among smallholder farmers (Pray, Huang, Hu and Rozelle, 2002). Despite continued increases in research funding for plant biotechnology, however, it seems that approval procedures have slowed down to some extent. As Pray *et al*. observe in 2006: "No new *crops* have been approved since 1999" (Pray, Ramaswami, Huang et al., 2006, p. 140; our italics).[75] Given the fairly wide range of China's research in plant biotechnology, there must by now be a considerable backlog of already field-tested but still unapproved transgenic crops.

As the first signs of a slowing-down in the approval process became apparent, many commentators and professional Beijing watchers speculated that China had changed course and shifted away from its former enthusiastic embrace of agricultural biotechnology and its ambition to be a world leader in this area. Agricultural economists Huang and Wang explicitly repudiated this view in 2003:

> "We argue that while there has been a slight adjustment of GM strategies for commercialisation policy in the short run, the overall goal of China's biotechnology development has not been altered. The growth of China's public investment has not slowed, but instead accelerated." (Huang and Wang, 2003, 2).

The latter may be true, but this does not necessarily imply that the slowing-down in approvals signals no more than a "slight adjustment" of Chinese biotechnology policy in the short run, without affecting its long-term commitments. It is also possible that tensions are gradually building up because Chinese policy-makers see themselves confronted with unexpected dilemmas and conflicting demands in the international and domestic arena. Huang and Wang remark that "China is badly in need of institutional and capacity building for GMO biosafety management" (*ibid*., p.15) and they also notice a mismatch between the limited capacity for biosafety management and the extensive research capacity, especially at the local level (p. 19). They also refer to international trade concerns as a contributory, though not the dominant factor to the temporarily slowing pace of GMO commercialisation in China.

For those observers who take the official U.S. point of view on biotech regulation, what is surprising and also rather disappointing is that China seems to have moved a long distance in the direction of the EU regime of biosafety regulation (Kogan, 2005). In the run-up towards becoming a full member of the WTO in December 2001, China had also been actively involved in the negotiations leading up to the Cartagena Protocol on Biosafety, which it signed in August 2000 and ratified in May 2005 (Xue and Tisdell, 2002). In May 2001 the State Council issued more stringent safety regulations on GM crops and in July 2001 the Ministry of Agriculture passed regulations on labelling transgenic organisms (Ho and Vermeer, 2004, 162). In April 2002 China also promulgated new rules prohibiting foreign companies to invest in the domestic seed development business (Dow Jones Newswires, 2002). The labelling regulations were not immediately implemented on the domestic market, but they caused interruptions for North American exports of soybeans into China because of the time needed to obtain the required import certificates. At first China imposed a moratorium on imports of unlabelled GM soybeans. Under strong diplomatic pressure from the U.S. government, however, the country acquiesced in interim rules which allowed the continuation of North American soya exports (Keeley, 2003b, 15-17). China's own export interests were also severely hit because in 2001 South Koreans refused to purchase Chinese soy sauce made from American transgenic soybeans − a loss of an export market of 10

[75] NB: New transgenic varieties of previously approved crops, e.g. new *Bt* cotton varieties, have been approved since 1999.

million RMB or $1.2 million (*ibid.*). Already in 2000 the EU had banned imports of Chinese soy sauce containing GM ingredients. To recover and protect its own export markets for soya products in Europe, Japan and South Korea, China prohibited the domestic cultivation of GM soybeans and instituted a segregation system. American GM soybeans were henceforth to be used only as a source for animal feed (Falkner, 2005).[76] As an importer of soybeans and exporter of soy products, China seems almost literally to have been caught in the "cross-fire" of the "GM Cold War" (cf. Meijer and Stewart, 2004, 247).

It thus seems understandable that 'public concerns' about GM foods in Europe, Japan and South Korea might be important reasons for Chinese authorities to adopt a more cautious approach to the commercialisation of GM food crops. For many sceptical commentators, however, this is not the entire explanation and not even the most important part of it. A news article in *Nature* aptly paraphrases their view:

> "But circumstances suggest an alternative explanation: that the Chinese government is exploiting the biosafety issue to frustrate the commercial ambitions of Western agribiotech firms, because it realizes that its own research programme needs more time to catch up" (Macilwain, 2003, 111).[77]

Hence the resulting paradox of a country strongly committed to promoting agricultural biotechnology putting one of its feet on the regulatory brake. In other words, China has not given up the ambition to be a world leader in this particular field, but it has introduced temporary measures to allow its own technology the protected space in which to become equal to the challenge of foreign competition. Or so the explanation runs. It is interesting to note that this particular interpretation is also endorsed by Monsanto's employees in China (Dow Jones Newswires, 2002; Keeley, 2003a, 24).[78]

There is an important kernel of truth in this explanation, although it may not be the full story. After the decision to release transgenic cotton for commercial use in 1997, Monsanto was allowed to sell its Bollgard® version of *Bt* cotton in China (through two joint ventures with local seed companies), but its operations are also subjected to significant restrictions. Its

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[76] See also Cookson (2006): "[…] GM soya, one of the key biotech crops in the Americas, is not likely to be planted commercially in China for a long while. While the country imports large amounts of GM soya, the agriculture ministry perseveres with its policy of growing only non-GM soya, for export at premium prices to Europe, South Korea and Japan."

[77] Although costlier, Monsanto's *Bt* cotton varieties are said to cover about the same cultivated area as the 'Chinese' transgenic varieties. This is held to indicate their "superior quality" (Macilwain, 2003, 112). Zhao and Ho (2005) provide numerical estimates of Monsanto's share in total *Bt* cotton acreage in successive years. It rose from 37.3 % in 1997 to 65.9 % in 2000, only to drop again to a share of 15 % in 2004 (the latter figure is based on an oral communication from a Monsanto representative). This drop is explained by a flooding of the market by domestically developed *Bt* cotton seeds and by (pirated) hybrid seed varieties (Zhao and Ho, 2005, 382). Perhaps these estimates have to be taken with a large grain of salt, precisely because of the widespread pirating of seeds both from Monsanto and from Biocentury (Keeley, 2006, 301). In any case, it seems extremely hazardous to use data about acreage shares for conclusions about superior quality. Pray and his co-authors argue that the availability in China of approved alternative transgenic varieties with much lower royalties than Monsanto's cotton made biosafety enforcement there more effective than in India, where farmers either had to pay the high royalties demanded by Monsanto or take recourse to illegal varieties (Pray, Ramaswami, Huang *et al.*, 2006, 154).

[78] This interpretation is also endorsed by others: "According to Wang Weirong, a scientist with Fudan Xinyang Biotech (Shanghai, China), most GM-related products in China are currently made from imported material. He says the regulation is thus likely to form trade barriers to foreign competition, but 'When China's own biotechnologies become mature, the labelling rule might be loosened' " (Hepeng Jia, 2003). Some also see a 'techno-nationalist' motive in the decision not to grow GM soybeans in China for the time being: "Although research is underway, GM soya will not be commercialised until China has its own varieties, Mr. Huang says, 'Biotech crops in China depend on what technology is developed in the country'." (Cookson, 2006).

biosafety approval is only valid for the four cotton-growing provinces along the Yellow River, but the company has no licence to sell in the Yangtse watershed area. Monsanto is also barred from access to local germplasm and is therefore unable to engage in seed breeding. These (and other) restrictions are not imposed on its main Chinese rival, a company called Biocentury (*Chuangshiji* in Chinese) that was set up in 1998 by Guo Sandui and other researchers of the Biotechnology Research Institute under the Chinese Academy of Agricultural Sciences (CAAS) in Beijing. Sandui and his colleagues had created the 'Chinese' versions of transgenic cotton, using the pollen tube pathway technique that they patented in 1998. Biocentury is notionally a private company, but receives much support from the Ministry of Agriculture. It competes with Monsanto on terms that are carefully managed by the state. As James Keeley writes:

> "In many ways the *Bt* cotton story in China can be read as a nationalistic battle between Biocentury, the Chinese company with Chinese technology, and Monsanto, the US multinational, operating through joint-ventures with foreign technology." (Keeley 2003a, 19).

Pride about national technological achievements and the desire of the state to free itself from dependence on western technologies fit the pattern of *techno-nationalism* (Kang and Segal, 2006), which is also characteristic of other Asian countries like South Korea as is illustrated by the Hwang affair (see Chapter 3): "Techno-nationalism places a priority on science for national economic development and uses science to project national power and status" (Leadbeater and Wilsdon, 2007, 39). In the era of globalisation there is a quasi-permanent temptation to turn inwards. Yet techno-nationalism seems almost a self-defeating strategy:

> "Techno-nationalists see innovation as a means to promote independence. Yet investing more in science-based innovation – as Korea found through the Hwang affair – requires greater openness to foreign ideas and international scrutiny" (*ibid.*).

In a statement before the U.S. Congress, Richard Suttmeier explains why the Chinese authorities are currently so much enamoured by techno-nationalist prospects (Suttmeier, 2005). Despite the long-term success over the past 25 years of turning China into "the workshop of the world", the present leadership is also increasingly frustrated about the fact that the Chinese economy has largely failed to break away from the model of extensive growth (with enormous environmental costs) and has become ever more dependent on foreign technology. These frustrations can be captured in the notion of the "technology trap" (*ibid.*, p. 75). Suttmeier points out that despite the increased funding for science and technology, "China's patenting activity is disappointing and it is rare that Chinese products incorporate indigenous intellectual property" (see for confirmation also the comparative statistics on the growth of U.S. patents in the period 1992-2005 from the UK, India, China and South Korea in Leadbeater and Wilsdon, 2007, 10). As a result, "Chinese firms wind up paying substantial licence fees for [foreign] know-how, payments which cut into already rather slim profit margins" (*ibid.*).[79] Since China's accession to the WTO, dependence on foreign technologies seems to have deepened.

Suttmeier's diagnosis finds confirmation in the prominence of the new key phrase "independent innovation" (*zizhu chuangxin*) at China's Fourth National Conference on Science and Technology held in January 2006, where the long-term programme for science

[79] Incidentally, in the case of Monsanto's Bollgard® cotton, the Chinese authorities are also particularly unhappy about the height of the technological fee farmers have to pay for the use of Monsanto's *Bt* construct, to wit a fraction of 18.5 RMB of the total price of 42 RMB per kg for the major Monsanto variety sold in China (see Keeley, 2003a, 21-22). As a matter of course, this fee accrues not to the two joint ventures in China, but to the U.S. parent company.

and technology development for the next 15 years (2006-2020) was set out and discussed. To finally become a truly "innovation-oriented country", President Hu Jintao explained that China would embark upon a new path of "innovation with Chinese characteristics" (echoing Deng's older phrase "socialism with Chinese characteristics"). Other authorities like Premier Wen Jiabao used the supposedly equivalent phrase "independent innovation". Professor Bai Chunli, Executive Vice President of the Chinese Academy of Sciences, explained the meaning of the latter phrase as follows:

> "Enhancement of the independent innovation capability is key to success in the effort to develop China into an innovation-oriented country. Scientific and technological personnel must be confident in their ability of making original innovations. On no account must we limit ourselves to following what has been done outside China and dare not to do things not yet done by foreign countries." (Chinese Academy of Sciences. 2006).

Interestingly, in subsequent international forums, as if to compensate for their own audacity, Chinese authorities have made soothing gestures to the rest of the world that this new emphasis on 'independent innovation' will benefit the whole world and not be a threat to any particular country. Nonetheless, there are still many unresolved tensions and it remains to be seen where exactly the balance between techno-nationalism and cosmopolitan innovation will be struck (see also Wilsdon and Keeley, 2007, 12).

Biosafety regulation, bureaucratic politics and 'civil society' in China

The Chinese government may be exploiting public concerns about GM foods in Europe, Japan and South Korea to give domestic agri-biotech businesses more time to catch up on their foreign competitors, but this is probably not the only reason why it puts one foot on the regulatory brake. Admittedly, the 'techno-nationalism' of the Chinese leaders is strong enough to induce them to promote their own agricultural biotechnology at the expense of the technology developed and 'owned' by foreign companies. However, they have also other means at their disposal to pursue this aim. The operations of Monsanto in mainland China are actually subject to various restrictions, which are partly imposed to protect the viability of its main national rival, agri-biotech champion Biocentury. The government has still many levers in its hands to steer and manage competition in the 'socialist' market economy.

Many western observers once thought that the absence of a vibrant civil society in a still rather authoritarian state like China would have tempted Chinese leaders in pursuit of higher productivity and competitive advantage to rush through GM crops without much regard for ecological and other risks, a scenario that Jennifer Zhao and Peter Ho refer to as the 'developmental risk society' (Zhao and Ho, 2005). As Craig Smith wrote in 2000 in the New York Times:

> "Enthusiasm for the new science abounds. There is no public debate to stir up the opposition that has brought the development of genetically modified crops to a near standstill in India." (Smith, 2000)

Yet, despite the absence of organized public opposition to agricultural biotechnology, Chinese authorities have been very cautious in approving the commercialization of new transgenic crops.

There is no lack of dedicated advocates who promote the cause of agricultural biotechnology in China. Naturally, this group includes biotechnological scientists working at various state research institutes and universities. Quite a few of these researchers also occupy other roles such as company director or government advisor. Jia Shirong, for example, combines the various functions of scientist at the Biotechnology Research Institute, company director of

Biocentury, funding advisor and reviewer of biotech research programmes, member of the Biosafety Committee, and public spokesperson (Keeley, 2003b, 7). Another influential member of the pro-biotech 'discourse coalition' (Keeley, 2006) is agricultural economist and policy analyst Huang Jikun, director of the Centre for Chinese Agricultural Policy at the Chinese Academy of Sciences in Beijing. Huang is leading author or co-author of a large number of articles in international journals extolling the economic, ecological and health benefits of *Bt* cotton and transgenic rice varieties in China. The latter's publication in *Science* (Huang *et al.*, 2005) on GM rice also aimed to "contribute to the approval of the crop for commercial release" (Xun Zi, 2005, 637).

There is, however, also an emerging 'counter discourse coalition' on GMOs, still rather fragmentary but rising in importance. This coalition reflects the increasing importance of environmental discourse in China and consists of civil servants at the State Environmental Protection Administration or SEPA (an administrative unit that in 1998 was promoted to the rank of a ministry), the Nanjing Institute of Environmental Sciences (which falls under SEPA) and, curiously enough, 'activists' of Greenpeace China. A large and growing number of environmental 'non-governmental organisations' are active in the People's Republic, but they do not completely fit the western definition of an NGO because their activities are severely restrained by the state (Schwartz, 2004). These groups generally tread very carefully and avoid confrontational tactics, concentrating their campaigns instead on 'research', education and environmental awareness building. In many cases, the state has in a top-down manner allowed NGOs to form in order to advance state-approved agendas. Many of these agendas have to do with the salient tension in the Chinese political structure between the central government and provincial and local governments. The central government and the general population are increasingly concerned about the serious environmental problems to which China's relentless production drive gives rise, yet in most cases these problems are not taken seriously by the provincial or local governments to which decision-making responsibilities have devolved in the wake of administrative de-centralisation. As a counter move, the central government promotes the formation of NGOs to compensate for their own declining influence and to put pressure on sub-national governments to take environmental concerns into account. The reopened Beijing office of Greenpeace, with a staff in 2005 of 20 persons that is still growing, seems to fit this pattern.[80] Commenting on a campaign of Greenpeace against illegal deforestation in Yunnan province, activist Lo Sze Ping declared:

> "Our friend-versus-foe strategy is: with the Forest Act and the central government against the provincial government and the wood-logging company" (Yamamoto and Blume, 2005).

The structure of biosafety regulation of GMOs in agriculture has been an object of frequent inter-departmental rivalry and bureaucratic infighting. To date the Ministry of Agriculture (presiding over the Biosafety Office and its subordinate Biosafety Committee) has been able to maintain the central coordinating role, but this role is contested by SEPA. The environmental 'ministry' endorses its claims by referring to its role as executing agency for the drafting of the National Biosafety Framework under the Cartagena Protocol. SEPA is also the main Chinese recipient and focal point for European attempts to transfer regulatory models to China, both on a bilateral basis such as in workshops co-organized by the German GTZ or *Gesellschaft für Technische Zusammenarbeit* (see Liu and Xue, 2004) and in the

[80] "The office was reopened in spring 2002 after being closed down in 1995 because of an incident in August of that year when public security personnel arrested six foreign Greenpeace demonstrators, detained for one day, and expelled them from China for unfurling an antinuclear banner in Tiananmen Square" (Zhao and HO, 2005, 394). The Greenpeace International branch in Hong Kong is subject to fewer restrictions, owing to the special political position of this city, but has less access to mainland China.

multilateral context of the UNEP/GEF (United Nations Environmental Program/Global Environmental Funds) support for capacity building for the implementation of the National Biosafety Framework of China (UNEP/GEF, 2003, 2004, 2005). In these various meetings and workshops we see the Chinese 'counter discourse coalition' in full action, as Greenpeace very often also takes part in them and Xue Dayuan of the Nanjing Institute of Environmental Sciences regularly assumes the role of chief coordinator on behalf of SEPA. It seems that at least these Chinese partners are very eager to learn about European experiences with GMO regulation; they do not at all complain that the EU is trying to impose its regulatory concepts and models in a top-down manner. Of course, according to some Americans this EU-Chinese cooperation actually amounts to a conspiracy against US trade interests and disloyalty to WTO obligations (Kogan, 2005).

The Chinese Ministry of Agriculture resists SEPA's claims to the central coordinating role for biosafety regulation on the grounds that they can mobilize the greatest amount of scientific expertise available in the Chinese Academy of Agricultural Sciences and its affiliated research institutes. Yet the composition of the Biosafety Committee has been criticized as rather one-sided, because most of its members are biotechnologists. In 2003 only 10 of its 56 members were environmental scientists or ecologists (Keeley, 2003b, 6).[81] Moreover, there are also apparent conflicts of interest because several of the biotechnologists involved (like the aforementioned Jia Shirong) have a direct stake in the commercialisation of GM crops. "[I]t's like being boxer and referee at the same time", as one Chinese ecologist commented: "You can't have biosafety just to promote biotech." (Keeley, 2006, 300). Some of this common criticism has even travelled beyond the confines of bureaucratic politics and reached the public media. Thus the executive editor of *China Features*, Xiong Lei, made a remarkable argument that Chinese citizens are actually denied the right to know what they eat:

> "In theory, it seems obvious that we should have the right to know about and choose the food we eat. In reality, however, this cannot be guaranteed.
> First, in China, the decision to release GM crops for commercial use is often made behind closed doors, where biotechnologists tend to have the most say. Indeed, an investigative report in *Southern Weekend* last November (2004) disclosed that two-thirds of the 58-member biosafety committee under the Ministry of Agriculture are biotechnologists.
> Second, although regulations require food products containing GM products to be identified, the rules only cover 17 foodstuffs." (Xiong Lei, 2005)

Interestingly, this plea for 'informed choice' is combined with criticism of decision-making behind closed doors and insufficient implementation of labelling regulations. At least some Chinese consumers seem to have similar concerns with regard to GM foods as European or Japanese consumers.

In China, however, conflicts over biotechnology and biosafety generally assume the form of intra- and inter-bureaucratic quarrels, unlike in countries such as India or Brazil "where the battles are also in the courts, media and even farmers' fields, and often between civil society and the state" (Keeley, 2003b, 8). But sometimes even in China such battles reach the public sphere.

One event that caused quite a national and international stir was the presentation of a critical report on the environmental impacts of *Bt* cotton in China by Xue Dayuan of the Nanjing Institute of Environmental Sciences on a meeting of the Chinese Biosafety Research Society that was sponsored by Greenpeace and opened by a senior official of SEPA. In other words,

[81] In 2005 the number of committee members was increased to 74, with also a larger representation of food and environmental safety experts (Nakanishi, 2005)

the event showed the 'counter discourse coalition' once again in action. The report was published by Greenpeace in both Chinese and English (for the latter version see Xue, 2002). There was also a press conference attended by the Chinese press agency Xinhua, which on 4 June 2002 summarized the report as follows:

> "A genetically modified cotton plant, which makes up 35 percent of China's crop, is damaging the environment despite its success in controlling the bollworm, according to a report released in Beijing Monday. The plant, *Bt* transgenic cotton, harms natural parasitic enemies of the bollworm and seems to be encouraging other pests, according to the study by the Nanjing Institute of Environmental Sciences (NIES) under the State Environmental Protection Administration (SEPA)." (quoted in Keeley, 2003b, 20).

The next day the report was on the front page of *China Daily* and circulated throughout the world on the internet.

Representatives of the pro-biotech 'discourse coalition' were outraged. In a critical response, the aforementioned Jia Shirong and his colleague Peng Yufa called the report a "garbled and biased report" and stated that "the context of many research data is garbled in accordance with the author's own interest and will" (Jia and Peng, 2002). Apparently, having a connection with Greenpeace gave the report's author an 'interest' that spoiled his scientific objectivity (what about having a financial interest in a biotech company?). In fact, Xue had done little more than summarizing some research work done by Chinese entomologists and drawing a number of conclusions from it about possible 'adverse' environmental impacts of *Bt* cotton.

In the same month of June of the year 2002 an article was published in *The Plant Journal* under the title: 'Five years of Bt cotton in China – the benefits continue' (Pray, Huang, Hu and Rozelle, 2002).

The 'counter discourse coalition' has been able to bring the biosafety conflict out in the open but it has not succeeded in halting the further advance of *Bt* cotton in China:

> "Individual scientists may have reservations about Bt cotton, or doubt some of the evidence showing how successful it has been, but there is no grouping of people making a serious case that China should reverse its position on Bt cotton and restrict its continued use. The number of provinces in which it is being used has increased, more varieties have been approved, giving the overall impression that it is a *fait accompli*. Even Greenpeace no longer concentrates on Bt cotton in China: its efforts are now focussed on stopping the commercialisation of GM rice […]" (Keeley, 2006, 303).

These words were published in April 2006. On 25 July 2006, however, dramatic news on the fate of *Bt* cotton in China came in from a source that is above suspicion. Three researchers from Cornell University − PhD candidate Shenhui Wang, Assistant Professor David Just and Professor Per Pinstrup-Andersen (a well-known advocate of agri-biotech) − presented a paper on an agricultural economics meeting in Long Beach in which they showed that the benefits of *Bt* cotton did not continue indefinitely (Wang, Just and Pinstrup-Andersen, 2006). Using a household survey from 2004, the authors observed that by the third year from the first adoption farmers who had planted *Bt* cotton reduced pesticide use by more than 70 % and earned incomes that were 36 % higher than farmers planting conventional cotton, but by the seventh year (2004), these advantages had been completely eroded! By that year, due to the unanticipated emergence of secondary pests, they had to spray just as much as conventional farmers but they earned 8 % less because of the higher costs of *Bt* seed. In a comment on these findings Pinstrup-Andersen declared:

> "These results should send a very strong signal to researchers and governments that they need to come up with remedial actions for the Bt-cotton farmers. Otherwise, these farmers will stop using Bt cotton, and that would be very unfortunate" (cited in Lang, 2006).

This sounds very much like a desperate call for a rescue operation to save the success story of *Bt* cotton. The results of the Cornell study surely give ample food for thought. Perhaps policy-makers should also ponder the fate of transgenic cotton when they have to decide about the release of GM rice for commercial use.

Consumers, Greenpeace and GM rice

What do Chinese consumers think of GM foods and how would they react to the introduction of transgenic rice? One can imagine that these questions are of some importance to the Chinese authorities when they have to decide on the commercialisation of GM rice. Several surveys and economic studies have been conducted to probe somewhat deeper into the attitudes of Chinese consumers towards GM foods, their awareness of them and their willingness to buy such foods should they appear on the market (for an overview, see Smale *et al.*, 2006, 35). Unfortunately, the findings often point in different directions. It seems that consumer research itself has become part of the psychological warfare on GMOs and transgenic rice. This would not be entirely surprising, as the outcomes of such research may have a direct bearing on the decision to commercialize.

One outcome on which there is general agreement is that awareness of, and knowledge about, agricultural biotechnology is still rather limited among Chinese consumers. Most studies also endorse the conclusion that a large majority of consumers are in favour of labelling GM foods.[82] The latter outcome is not without political significance. In 2003 two exponents of the pro-biotech discourse coalition, economists Huang and Hu, presented a paper before the State Council of China in which they made the case for the commercialisation of GM rice. Their economic analysis of the benefits of commercialisation was predicated on *the removal of the labelling requirement* (as labelling was said to reduce the economic benefits of GM rice) (see Keeley, 2006, 303). This raises the fundamental ethical question whether the right to informed choice, which also in China seems to enjoy widespread support, should be overruled in the name of greater economic benefits.

A survey commissioned by Greenpeace and conducted in 2005 among 600 consumers in the big cities Beijing, Shanghai and Guangzhou showed that a majority of 57 percent said they would choose non-GM food over GM food. As far as rice is concerned, this share would even rise to 73%. These figures were higher than the outcomes of a similar survey conducted in the previous year 2004. This shows, according to Greenpeace, the effect of consumers becoming more aware of GM foods. Rejection of GM food is also highest in Beijing (72 %), where awareness is also highest (AP-foodtechnology, 2005).

It should come as no surprise that the highest rates of GM non-acceptance are found in studies commissioned by Greenpeace. Much depends, of course, on the precise framing of the questions and other 'technical' details. A survey of households in urban centres pointing in the opposite direction has been conducted by Huang Jikun and three co-authors (Huang *et al.*,

[82] See for instance Zhong *et al.* (2002): "When asked whether they thought GM foods should be labeled, nearly all of the 454 interviewees answered yes (95%), regardless of whether they were willing to buy GM foods or not. Such a strong response is a clear indication that consumers require the right to be informed of important and sensitive information regarding their welfare." (p. 142). See also Lü (2006): "In our interviews, all participants approved of the labelling of GM foods" (p. 263). .

2006). They present their findings in the perspective of the expected decision to commercialize GM rice:

> "China, the world's most populous nation, is likely soon to authorize commercialization of GM rice, the largest food crop in the world." (*ibid.*, 150).

The same prediction had been made by Huang in previous publications. He apparently acts on the assumption that if he repeats this prediction often enough it will automatically turn into a self-fulfilling prophecy. Huang and his co-authors summarised the findings of their survey as follows:

> "The results show that the percentages of the consumers' approval of and willingness to buy GM foods in China were high. In general, the acceptance rates were much higher than [in] all other countries that have been reported in the literatures" (*ibid.*).

So there appears to be no major problem of consumer acceptance standing in the way of GM rice commercialisation. However, Huang *et al*. also observe that two thirds of urban consumers in China have a very limited knowledge about biotechnology (in a philosophical mood one might ask what 'acceptance' means if it is not well-informed). They therefore add what seems to be a special advice on "information management" to their substantive findings:

> "New information could probably influence [consumers'] opinions rather easily. This implies that the media and the government's provision of information can play a vital role in determining consumers' acceptance of GM foods. Based on the findings of this study, we conclude that the commercialization of GM foods in China will receive limited resistance from consumers *unless there are major information campaigns against biotechnology*." (*ibid.*, our italics).

The italicized phrase at the end of this passage sounds a bit ominous. It seems to be a covert invitation addressed at the Chinese government to push through the commercialisation of GM rice while simultaneously reining in the media and NGOs like Greenpeace in order to nip possible "information campaigns against biotechnology" in the bud. Needless to say, in an authoritarian state like China, the media and NGOs have already been reined in to a large extent. It would be highly regrettable if the commercialisation of GM rice could only be carried through at the price of further restrictions on public debate.

From a broader social science perspective, 'acceptance' or 'non-acceptance' of GM foods should not be considered as a reflection of inherent characteristics of individuals, but rather be seen as the outcome of a social process involving the exchange of views and arguments. This simple consideration obviates the need for technically sophisticated estimations of consumers' presumed 'willingness-to-pay' (as they are performed by many economists) and shifts the focus of analysis to the quality of the public debate as a key variable.

In an earlier study, Peter Ho and Eduard Vermeer also reported high GM acceptance rates among Chinese consumers, but they discussed more openly and with more sophistication the effects of the existing restrictions on freedom of the press and freedom of speech (Ho and Vermeer, 2004). They put the finger on a major and politically sensitive cause of limited consumer knowledge:

> "The poor understanding of biotech and its potential risks can in large part be attributed to the state reluctance to allow the emergence of uninhibited public debates about genetic modification. This reluctance is not just driven by a fear of social unrest, but most likely also by a felt need to protect the domestic biotech industry against potential consumer resistance." (Ho and Vermeer, 2004, 169)[83]

[83] "According to Xue Dayuan, former deputy director of the Biosafety Office of the State Environmental Protection Agency, in 2004 the State Council had issued a confidential notice to concerned state institutions,

The Chinese state does not discourage all media discussion about GMOs, they add; "[r]ather, it is a matter of state-guided, "well-balanced" reporting about biotech." (*ibid*.). Ho and Vermeer argue that precisely because of the inhibition of public debate the seemingly high 'acceptance' of GMOs Chinese consumers currently display may turn out to be rather unstable. Moods can switch easily when incidents occur or new information comes in. The basis for this expectation is their own experimental result indicating that initially quite high acceptance rates can be brought down substantially by presenting extra information (both positive and negative).

Yet the inhibition of public debate is not complete. There are still possibilities for initiating 'awareness-raising' actions and some of the intra-bureaucratic conflicts also seep through into the media. The governing elite seem to be internally divided about the commercialisation of GM foods in general and of GM rice in particular. This gives an NGO like Greenpeace some room to manoeuvre.

An article appearing in *China Daily* in December 2004, on the occasion of a meeting of the Biosafety Committee assessing GM rice, was remarkably critical in tone:

> "[GM food's] impact on human health, the environment and bio-diversity has not yet been thoroughly studied under current levels of science and technology. […]. When it comes to rice specifically, things are more complicated. Rice is a traditional staple food for the Chinese. It is already eaten every day without much alteration. Experiments on animals for months or even several years are *not enough* to convince consumers that GM rice is safe for humans in the long run. […] *People should not be used as guinea pigs with food they eat every day*. The authorities must treat the matter *with more caution*." (China Daily, 2004; our italics)

Thus, although the pro-biotech lobby in China is strongly pressing for the authorisation of GM rice commercialisation, there is also significant resistance to this pressure. Expectations had been raised that the decision to approve commercialisation was imminent, but in December 2004 the Ministry of Agriculture "denied […] the possibility of an approval of commercial production in the near future" (People's Daily Online, 2005).

Greenpeace was able to capitalize in its strategy on some manifest failures in the Chinese regulatory system. As the last step required before commercialisation, farm-level 'pre-production trials' had been conducted with a number of insect-resistant GM rice varieties in Hubei province during the years 2002-2003. Huang *et al.* (2005) reported in *Science* about the positive effects of these trials in terms of higher yields and lower uses of pesticides. However, it appears that GM rice seeds from such trials have leaked into regular rice production.[84] This illegal spread of GM rice among Chinese farmers was detected in April 2005 when Greenpeace sent samples of rice bought in Hubei province to a testing laboratory in Germany: 19 of 25 samples tested positive for the presence of 'transgenic' proteins that are characteristic of one of the Chinese GM rice varieties (see also the response of two Greenpeace campaigners to the article of Huang *et al.* in *Science*: Sze and Cotter, 2005).

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which called for a halt to discussions about biotechnology in the media (Xue Dayuan, personal communication, September 2004)" (Ho and Vermeer, 2004, 169).

[84] A more ominous possibility was raised by Beijing-based journalist Lin Gu in an article appearing in the *South China Morning Post* (an English-language newspaper published in Hong Kong). He suggested that the GM rice seeds were deliberately distributed among farmers by (or on behalf of) Professor Zhang Qifa, the researcher who developed these varieties, to create a *fait accompli* and thus enforce a positive decision on commercialisation (to match legal formality with the reality in the farmers' fields). See Gu, 2005. This version is confirmed in a Greenpeace press release citing a government statement on the GM rice issue in Hubei province, published in *Hubei Daily*, 10 August 2005 (see Greenpeace, 2006).

Understandably, this finding caused great embarrassment to Chinese authorities as it suggested that the regulatory system was woefully inadequate, or as Sze Pang Cheung of Greenpeace Hong Kong declared, that the "GM industry" was "out of control" (China Daily, 2005a). The first reflex of the Ministry of Agriculture was to deny these findings and to reply that "the testing of GM rice seeds should be based on China's technical standards" (*ibid*.). This reply did not reassure all Chinese, as transpires from a comment published in *China Daily*:

> "Agricultural experts and Ministry of Agriculture officials immediately denied the Greenpeace claims and cited China's own 'technical standards' for testing GM products. *But their answers do not lessen the public's worries over the safety of GM rice*. The Greenpeace findings have sounded a warning bell." (China Daily, 2005b; our italics)

As the Chinese authorities could not immediately handle the situation, they took recourse to a well-tried and old-fashioned remedy:

> "In May [2005], the potential for negative media coverage was such that the Chinese government banned all media coverage of the GM rice leak until further notice." (Xun Zi, 2005).

However, Greenpeace and other NGOs have kept up the pressure and continued to act as gadflies to the Chinese authorities by also targeting European rice imports from China as "contaminated" with GM rice, thus raising the stakes against imminent commercialisation (Friends of the Earth International, 2006b). Traces of the illegal GM rice were also detected in food products on grocery shelves in Chinese cities, including Heinz's Baby Rice Cereal sold in Beijing (Greenpeace, 2006). Reportedly, the Chinese government has meanwhile punished seed companies and destroyed GM rice grown on the fields, while taking steps to tighten control over field trials (*ibid.*).

Greenpeace also undertook actions that were targeted at foreign companies selling food products to Chinese consumers, thus indirectly raising the latter's "awareness" about GMOs. The organisation aimed in particular at Kraft and Campbell, whose branded products were found to have GM ingredients:

> "The international brands were accused by Greenpeace of having '*double-standards*' in their GM food policy. '*Kraft and Campbell's Soup have committed not to use GM ingredients in Europe, but have not done so in China. We are demanding these companies not to sell GM food in China, as consumers deserve the same rights and safety standards everywhere*,' [Greenpeace campaigner Ma Tian Jie] said." (AP-foodtechnology, 2005; italics in original).

This emphasis on 'double standards' appears rhetorically powerful, as Chinese consumers might resent being treated as less than European consumers. However, it makes a lot of difference whether European or American consumers are taken as the standard reference for comparison.

A decision to commercialise GM rice is, of course, a political decision in which a variety of factors have to be weighed against each other. GM rice has been ready for commercialisation since 2000 (Huang *et al*., 2006, 144). In the past couple of years seemingly firm forecasts have been made repeatedly that a decision would be imminent. To date, however, such a decision has not occurred. Chinese policy-makers must have great difficulty in balancing considerations of science and technology policy, international trade, environmental and food safety, and consumer acceptance. On the eve of the Biosafety Committee meeting in December 2006, one insider, Xue Dayuan, confided his personal views to the press:

> "Xue, the Nanjing Institute researcher, said China's leaders remained divided, with those responsible for food safety and the environment wanting to go slower and those responsible

> for productivity, science and technology pushing to go more quickly. The committee that will make the licensing decision meets this month [December 2006], but its agenda is not public. Xue said it might take as long as two years for an announcement." (Fields, 2006)

Of course, Xue Dayuan is hardly a disinterested external policy observer, as he belongs to the side that wants to go slower. We do not dare to make a specific prediction about whether a decision by the Chinese authorities to commercialize GM rice is imminent, soon to be expected or perhaps will be postponed indefinitely. What is significant, nonetheless, is the fact of this apparent 'procrastination' itself. One cannot say that the commercialisation of GM rice, or of any other GM food crop for that matter, is being pushed through in China.

China's experience with biotech and biosafety policy, like India's experience, does not at all confirm the general picture of a relentless and irresistible advance of GM crops on a world scale. The partial exception is the story of *Bt* cotton, but even this 'silver bullet' has recently been 'tarnished' (we are alluding to the title of the paper by Wang *et al.*, 2006). Although the release of GM rice for commercial use, on which many biotech proponents inside and outside China had set their hopes, has not occurred so far, one might even suspect that a positive decision on commercialisation would in the end not change the global acceptance of GMOs as dramatically as the proponents expect. Conflict and controversy would almost certainly continue. It is quite possible that GM rice would become, perhaps after a few successful years, a new tarnished silver bullet. The optimistic scenarios presented by Graham Brookes and Peter Barfoot and by the ISAAA about the worldwide consequences of the commercial release of GM rice are probably based as much on wishful thinking as on hard-boiled economic reasoning.

Afterthoughts: rice and culture from an anthropological perspective

In this final section we will look at the cultural meaning of rice in Asia from an anthropological perspective. Some commentators have drawn attention to this aspect of the debate, stating that "China's internal debate over gene-altered rice treads on hallowed ground" (Fields, 2006) or claiming that "rice defines who we are" (Schuman, 2006). The Asian debate on the genetic modification of rice has been likened to "France debating whether to modify grapes" (Fields, 2006).

It is indeed highly plausible that in several Asian countries transgenic rice will arouse resistance among consumers which has deep cultural roots. This is certainly true for Japan and South Korea. Historical anthropologist Emiko Ohnuki-Tierney recounts in her book *Rice as Self* that rice has defined Japanese national identity throughout the centuries (Ohnuki-Tierney, 1993; for a shorter version, see Ohnuki-Tierney, 2004). The cycle of growing rice determined the transitions between the seasons. The rice plant growing on Japanese soil was always the symbol marking the differences between the Japanese and strangers. In South Korea, the cultural significance of rice for national identity is hardly less (Feffer, 2005). Both countries protected their own rice production behind high tariff walls and fiercely opposed attempts to reduce this kind of protectionism. When in 1993 Japan's rice harvest was extremely low, Japanese consumers persisted in preferring rice grown in their own country, despite skyrocketing prices, and vehemently resisted the government's plans to mix Japanese and foreign rice in order to overcome shortages. According to the 'urban legends' circulating at that time, imported rice was contaminated with vermin and chemicals – undoubtedly a projection of the symbolic pollution offending the purity of the Japanese soul (Ohnuki-Tierney, 1995). International negotiations on the liberalisation of agriculture always have to reckon with protesters from Japan and South Korea. In 2003, during the ministerial summit of

the WTO meetings in Cancún, Mexico, Korean farmer Lee Kyang Hae even went so far as to take his own life by way of political protest (Wallach and Tucker, 2006). Against this historical background it will cause no surprise when surveys show that consumers in Japan and South Korea reject genetically modified rice. Soya too, a crop that is processed in numerous traditional food products, must also be 'GM-free' (Severson, 2002). The legal obligation to label GM foods, which consumer organisations in Japan and South Korea have obtained through lobbying, is not just the effect of high incomes per capita, as Brookes and Barfoot (2003) suggest in their report, but derives from deeply rooted cultural determinants.

The question is whether it is only Japan and South Korea that have to be written off as potential markets for transgenic rice. There are indications that cultural resistances against GM rice, though perhaps less strong, also exist in other Asian countries. Or at least such resistances might be slumbering, ready to be aroused and activated by NGOs if only they know how to strike the right chords. After all, rice is at the basis of Asian civilisation. It is a powerful symbol and is woven into religious ceremonies and civil rites. This stark symbolic meaning is even echoed in the proclamation of 2004 as the international rice year by the FAO: "A symbol of cultural identity and global unity, rice is the world's most popular food. It shapes religious observances, festivals, customs, cuisines and celebrations" (FAO, 2004). One could add that it might also become a symbol of global division, if conflicts about genetic modification are going to run high. The Indian NGO *Thanal* already deploys the force of the symbolic power of rice for political action in its campaign 'Save Our Rice'. According to this NGO, "rice has become an inherent part of our life, culture and value systems. Rice is more than agriculture and commerce: rice is life for us" (Thanal, n.d.). Greenpeace International is conducting a similar 'Rice is Life' campaign. It is hardly possible to determine in advance how strong the cultural potential is that can be mobilised for effective opposition, but any decision to release transgenic rice in Asia for commercialisation must surely count on a strong backlash.

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