



European Society for Agricultural and Food Ethics (EurSafe)

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Biotechnology – The Offspring of Life Science or Techno Science?

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The 21st century is proclaimed in the media as the age of biotechnology. I would like to reflect on the ethical implications of this title and on the extent to which techno and life sciences have fused.

Let us first examine the term “biology”. Resulting from ancient Greek, “bios” at that time meant “way of life”, including a person’s conduct of his or her own life, whereas the Greek “zoë”, which is the origin of the word “zoology”, meant physical life itself. “Logos” stands for judgement, for rationality, but specified as a way of acquiring knowledge about something that makes sense to us. The logos unites mankind with the surrounding world. This ancient based definition of “biology” is often misinterpreted as if it could give us recommendations about how to make sense of our lives and the lives of other life forms. That would be to expect much more of biology than it can fulfil as a science.

Roose first introduced the term “biology” in 1797, to describe the science of living things, the biota. Since then, it has become very clear that the living subject “researcher” is separate from the life forms being studied. As a result, any statements about “the life” have to be doubted, when the context of science is left towards the everyday world, where humans are also part of, both as naturally and as culturally driven entities (Karafyllis, 2001). So, even if there are biologists today who claim to have something to say about “the evil” in nature (Wuketits, 1999) or the “selfish gene” (Dawkins, 1976), the giving of advice concerning the conduct of human life itself is now beyond the scope or outside the domain of biology – because it has become

an empirical science. Personal values are now to be excluded from analysing biota, so that objectivity is preserved. The life of the biologist (also a life form) is not the life he or she is researching. In biosciences, all living individuals of one observed and examined species are summed up in the model of one imaginary organism with characteristic features. Moreover, this separation is further enforced by first focussing on the organism apart from its surrounding nature, and then reducing the organism to its organs, tissues, cells or DNA.

Consequently, in the American tradition of scientific disciplines, the concept of life science is clearly in opposition to that of environmental science. Whereas the first centers on the life of a living entity in relation to his/her body and health, the second is related to nature outside the living entity. One might ask if this difference really makes sense, as we live in one world, not in many. We see the strange effect of this separation in the separate discourses about bio (medical) ethics and sustainability, both lead by totally different communities. One can’t divorce the term “life” in biology from the environment, as happens in “life science”, because the surrounding nature interests and inspires us and gives us not only resources, but also the phenomena on which we mentally depend. So, currently there is a difference of opinion on the meaning of “life”, depending if someone or something is the subject or object of life.

“Technology”, on the contrary, has something to say about the logos, the sense, of techniques and technical artefacts. This is so because technical artefacts are not found

in nature, but are defined as objects constructed by man. They have to fulfil a certain purpose, set by man, when they come to existence. The European idea of “technology” as sense of knowledge has been prevalent since the 19th century. This differs from the conception of the term in popular Anglo-American culture, which often refers to technological innovations themselves, such as computers or nuclear power plants, as “technology” (e.g. Feenberg, 1999). Whereas technology refers to the knowledge of the functions of the artefacts, engineering is the use of this knowledge in the design and construction of artefacts. The construction of technical artefacts is in theoretical opposition to the creation or evolution of the biota, the living entities, which developed without our influence – until now.

What are the gains, what are the losses, when “biology” and “technology” fuse to “biotechnology”? One gain would be a chance to get back to the Ancient idea of “bios” as conduct of life, including norms, as technology carries the aims and the values of the designer with it. But this chance is overcome by still separating the “life” as an object from the subject “human”. This culminates in modern Western medicine, where psychology is considered separate from body functions. Biotechnologists deal with others’ lives, not theirs, as they still want to remain true to the idea of biotechnology as a science, without taking into account society’s values. This means that biotechnology cannot mediate between the subject and the object of life. Technology, until now, always ran its course of development “outside” and at a distance from the human parts, which are referred to as the “natural” (e.g. the body, the soul). But this also has begun to change, such as in prosthetics (contact lenses are still somehow outside but the pacemaker is not), and soon, bio informatics, where the human is reduced to “wet ware”, or bio robotics, where the human life form is even regarded as substitutable.

Those who now think that biotechnology has no normative assumptions, but is just provoking them, are wrong. As explained by Darwinian evolution theory, living entities are all part of evolution and inherit functions that make the entities more or less likely to survive. Economic criteria of efficacy and efficiency are mingled into that idea of “survival of the fittest”, resulting from 19th century thinking (Karafyllis, 2002). It is this idea that engineers admire about nature, meaning “nature”, as we nowadays interpret it by the means of functions. Man does then not create functions in order to fulfil aims – an act that would require a sort of moral authorisation, but they are somehow always already given by nature. This has two aspects: for the biology-part of biotechnology it is not necessary to give a reason for the use of certain functions, because they prove to be good by virtue of their very existence. However, for the technology part it is impossible to use functions that are never fixed but always open to evolution. Dealing with fixed and closed systems, functions in their cybernetic terminology have to fulfil target values.

So, what is needed is control. That is, control as to where the evolutionary potential can be fixed within technological categories. Using genetics, and interpreting genes as programs that function in the living entity in the same way that an algorithm-based machine language functions for a computer, does this. Thus, after the fusion, biotechnology loses both what its parents “biology” and “technology” had: the openness of life, referring to form and matter, and the normative aspect of moral reasoning for inventing and using technologies. The moral question of which functions are “good” ones now refers to the programmer. After all, the old theological question of who creates life, and what for, revives. We are now faced with asking ourselves, both as subjects and as objects of life, how much control is good for us.

References

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Karafyllis, N.C., *Biologisch, Natürlich, Nachhaltig*. A. Francke, Tübingen/Basel 2001.
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Zugang einer ökonomischen Rationalität", in: Karafyllis/Schmidt (eds.), *Zugänge zur Rationalität der Zukunft*. Metzler, Stuttgart 2002 (in press).
Roose, T.G.A., *Grundzüge der Lehre von der Lebenskraft*. Braunschweig 1797.
Wuketits, F., *Warum uns das Böse fasziniert. Die Natur des Bösen und die Illusionen der Moral*. Stuttgart 1999.

Agricultural and Food Ethics between Theory and Practice

Volkert Beekman

The Dutch institutional members of the European Society for Agricultural and Food Ethics (EurSafe) gathered on April 25 to exchange views on the further development of agricultural and food ethics at the interface of theory and practice.

The meeting of the Dutch institutional members of EurSafe had a double objective:

- To reflect on the prospective substantial and strategic agenda of EurSafe;
- To reflect on the interaction between theory and practice in agricultural and food ethics.

As an introduction to these reflections, Cees Veerman (Executive Board EurSafe), Frans Stafleu (Centre for Bioethics and Health Law, Utrecht University) and Philip van Lelyveld (DSM Corporate Secretariat) presented experiences with the interaction between theory and practice in their attempts to address issues in agricultural and food ethics. Consequently, the institutional members exchanged views on the prospective role of EurSafe in four round tables. These round tables addressed:

- Food safety;
- Public debates;
- Legitimacy of agricultural and food knowledge; and
- Food and culture.

Introductions

Cees Veerman introduced the objectives of the meeting by emphasising the growing attention for ethical issues in agriculture

and food production. Although food represents people's most intimate relation with their environment, until recently most people only paid attention to products and not processes. Nowadays, however, the adagium "*Erst das Fressen dann die Moral*" no longer holds true, since the awareness amongst citizens/consumers of the ethical

dilemmas involved in, e.g., relations between food and health, between food safety and responsibility, between heaven and earth has risen dramatically. The institutional members were encouraged to use EurSafe as a forum for stimulating discussions at the interface between theory and practice. Exchanging their views with professional ethicists may facilitate their practical struggles with emergent moral dilemmas, often also representing serious threats for corporate reputations (you may think of cases like Monsanto or mink farming). Academic discussion, on the other hand, may profit from requests of practitioners for piecemeal ethical engineering.

Frans Stafleu, then, presented his experiences from a case study at CR-Delta, a company involved in embryo transplantation for livestock production. CR-Delta would like to take its ethical responsibility seriously and embraced the three "Ps" of sustainable development (people, planet, profit) as the kernel of its corporate mission. CR-Delta, however,

thought that it should not remain words, should not only be about reacting to ever-changing opinions of the public, and should not only be about informing “stupid” consumers. The true challenge was to confront corporate values – and values of board and employees – with societal values. The case study opted for an inductive approach with internal and external discussions to meet this challenge of explicating the key values of various stakeholders. Subsequently, the identified key values were grouped under three headings:

- Corporate continuity (economy, satisfaction, pride);
- Social responsibility (animal welfare, intrinsic value of nature, food safety, sustainability);
- Openness (communication, social orientation).

The next challenge was, of course, to somehow prioritise or weigh the values of, e.g., animal welfare or ecology and economy. This process of moral balancing has been made explicit, including an inventory of possible difficulties in striking a good balance. Finally, a model to support ethical decision-making by CR-Delta has been developed and will be applied by the company’s own ethical committee.

Philip van Lelyveld started by identifying four aspects on which agricultural biotechnology seems to be differently judged than medical biotechnology:

- Education;
- Image;
- Scale;
- Media.

Dutch and European regulators respond to consumers concerns about agricultural biotechnologies by messy calls for a balanced judgement of safety, transparency, freedom of choice, protection and quality of life, biodiversity and animal welfare. He

would rather embrace a truly integrated (ethical) framework that includes:

- Assessment of societal benefits;
- Scientific assessment of risks and dangers;
- Evaluation of scientific and economic driving forces;
- Identification of scientific and economic rights and obligations.

Round tables

After the three introductions the participants to the meeting split into four round tables that were to exchange views on the prospective agenda of EurSafe as a network in agricultural and food ethics.

Probably most explicit in its recommendations was the round table on public debates, chaired by Jan Staman of the Rathenau Institute. This round table emphasised that EurSafe should reflect seriously on its objectives for participating in public debates. Such participation is, after all, included in the mission statement of EurSafe. Several tasks for EurSafe were identified:

- Reflection on the contents of public debates and explicitation of key values;
- Identification of new ethical issues;
- Organisation of public meetings.

Furthermore, this round table noticed that if ethics has something to do with the societal acceptance of novel technologies, public participation in decision-making about the applications of these technologies would be crucial and ethicists should facilitate this participation by the development of appropriate procedures. EurSafe, thus, has both a substantial and a procedural role to play in public debates on ethical issues in agriculture and food production. It should do so as a society of experts in the lucidity of arguments.

The participants to this first meeting for institutional members of EurSafe concluded that it should not remain a one-off event.

Conferences & Courses

July – September 2002

- Jul 5 - 12** ***Humankind/Nature Interaction: Past, Present and Future (Italy)***
XVth Congress of the International Union of Anthropological and Ethnological Sciences. Florence, Italy. More information: Prof. B. Chiarelli, Institute of Anthropology, University of Florence, phone + 39 055 2398065, fax + 39 055 283558, e-mail: secretariat@icaes-florence2003.com, website: <http://www.icaes-florence2003.com>
- Jul 7 - 13** ***Ethics and Food in Modern Society. Food Ethics: A New Branch of Applied Ethics? (The Netherlands)***
Summer School Research School for Applied Philosophy, The Netherlands. More information: Hella van den Elshout, Department of Philosophy, Free University of Amsterdam, De Boelelaan 1105, 1081 HV Amsterdam, The Netherlands, phone + 31 20 444 66 79, fax + 31 20-444 66 35, e-mail: ozse@ph.vu.nl, website: <http://www.XS4ALL.nl/~ozse>
- Jul 8 - 14** ***35th World Vegetarian Congress “Food For All Our Future”, (UK)***
Heriot Watt University, Edinburgh, Scotland. More information, website: <http://www.ivu.org/congress/2002/>
- Jul 11 - 14** ***6th International Conference on Agricultural Biotechnologies: New Avenues for Production, Consumption and Technology Transfer (Italy)***
International Consortium on Agricultural Biotechnology Research, Ravello. More information, website: <http://www.economia.uniroma2.it/conferenze/icabr/>
- Jul 22 - 27** ***European Culture in a Changing World: Between Nationalism and Globalism (UK)***
The 8th International Conference of The International Society for the Study of European Ideas (ISSEI), The University of Wales, Aberystwyth. More information: Dr. Daniel Meyer-Dinkgrafe, Department of Theatre, Film and Television Studies, Perry Williams Building, Penglais Campus, Aberystwyth, Ceredigion SY23 3AJ, Wales UK, fax + 44 1970 622831, e-mail: dam@aber.ac.uk
- Aug 6 - 10** ***36th International Congress of the International Society for Applied Ethology (The Netherlands)***
Egmond aan Zee, The Netherlands. More information, e-mail: H.J.Blokhuis@id.wag-ur.nl or Berry.Spruijt@etho.vh.wau.nl, website: <http://www.isae2002.org>
- Aug 11 - 15** ***4th World Congress on Alternatives and Animal Use in the Life Science (USA)***
New Orleans. More information: Donna Pease, Gaithersburg MD 20879 USA, phone 301-548-7771, fax 301-548-7726, website: <http://www.worldcongress.net>
- Aug 19 - 23** ***7th World Congress of Genetics Applied to Livestock Production (France)***

Montpellier, France. More information, e-mail: secretariat@wcalp.toulouse.inra.fr, phone + 33 820 820 664, fax + 33 820 820 665, website: <http://wcalp.toulouse.inra.fr/>

Aug 28 – 31 ***Exploring Diversity in the European Agri-food System (Spain)***
10th Congress of the European Association of Agricultural Economists (EAAE), Zaragoza, Spain. More information: J.C. Bureau, Program Committee EAAE Congress, INRA-ESR, BP1, 78850 Thiverval-Grignon, France, e-mail: eaae.papers@grignon.inra.fr, website: <http://www.lei.dlo.nl/EAAE/activities/indexa.htm>

Aug 29 - 30 ***EurSafe Session at the EEN 2002 Summit (Belgium)***
Parlement Europeen, Brussels. More information, website: <http://www.eursafe.org> or <http://www.kuleuven.ac.be/een/Contents/introduction.html>

Sep 2 - 11 ***World Summit on Sustainable Development (South Africa)***
Johannesburg, South Africa. More information, website: <http://www.johannesburgsummit.org/>

Sep 3 – 5 ***BIOLAW 2002 (Thailand)***
To promote understanding of legal aspects of biotechnology and to bridge the gap between scientific and legal worlds. Bangkok. More information, website: <http://biolaw.biotec.or.th/>

Sep 4 – 6 ***International Workshop on Assessment of Animal Welfare at Farm and Group Level (UK)***
University of Bristol, UK. More information, e-mail: Langford-CE@bristol.ac.uk

Sep 10 – 13 ***Genetics and Society (UK)***
Biomedical ethics summer school. Hinxton, Cambridge (UK). More information, e-mail: m.sexton@wellcome.ac.uk

Sep 18 - 21 ***Genetic Engineering and the Intrinsic Value and Integrity of Animals and Plants (UK)***
Royal Botanic Garden, Edinburgh, UK. More information: Ifgene UK co-ordinator, Dr David Heaf, Hafan, Cae Llwyd, Llanystumdwy, LL52 0SG, UK, phone/fax 01766 523181, e-mail: 101622.2773@compuserve.com, website: <http://www.anth.org/ifgene/2002.htm>

Sep 26 – 28 ***Annual Conference European Association of Centres of Medical Ethics (The Netherlands)***
Maastricht, The Netherlands. More information, e-mail: secretariaat-ige@ige.unimaas.nl, website: <http://www.eacmeweb.com>

October – December 2002

Oct 1 - 3 ***Thought for Food. Celebrating Innovative Food Technology (New Zealand)***
NZIFST Conference 2002, Palmerstone North, New Zealand. More information, website: <http://www.nzifst.org.nz/con2002/homepage1>

- Oct 18 – 19** ***International Conference Between Technology and Humanity (Belgium)***
Congress Palace, Brussels, Belgium. More information, e-mail: post@caritas.be
- Oct 23 - 25** ***Future Food & Bioethics. Towards an International Convention on Biotech in the Plant and Foods Area (Denmark)***
Centre for Ethics and Law in Nature and Society / bioTIK - Danish Ministry of Economic and Business Affairs. Copenhagen. More information, website: <http://www.futurefood.dk>
- Oct 26 - 28** ***3rd International Symposium on Sustainable Agri-Environmental Systems: New Technologies and Applications (Egypt)***
National Authority for Remote Sensing and Space Sciences (NARSS), Cairo, Egypt, phone (202) 2964386 2975688, fax (202) 2964387 2964385, e-mail: sirahman@intouch.com, website: http://www.ifama.org/calendar/nonmem_caldetail.asp?calid=76
- Nov 24 – 29** ***Biotecnología Habana 2002: Agro-Biotech in the new millennium (Cuba)***
More information, e-mail: bioagro@cigb.edu.cu, website: <http://bioagro.cigb.edu.cu/>

2003

- Mar 20 – 22** ***Ethics as a Policy Dimension, 4th EurSafe Congress (France)***
Toulouse, France. More information: e-mail: Emmanuel.Jolivet@jouy.inra.fr
- Apr 2 – 4** ***UFAW Symposium Science in the Service Of Animal Welfare (UK)***
University of Edinburgh, UK. More information, e-mail: scioff@ufaw.org.uk
- Jul 16 - 20** ***Feeding the World: Opportunities without Boundaries (USA)***
12th World Congress of Food Science and Technology (IUFoST Congress XII), Chicago, Illinois, USA. More information, website: <http://www.worldfoodscience.org/congress/overview.html>
- Aug 10 - 17** ***XXst World Congress of Philosophy: Philosophy Facing World Problems***
International Federation of the Philosophical Society, Istanbul, Turkey. More information: fax 90-312-0296, website <http://www.tfk.org.tr/>

Books & Journals

Bobbert, M. et al., *Ethik – Umwelt –Recht. Francke, Tübingen 2002 (29 Euro, ISBN 3-7720-26230)*

A selection of recent papers on the ethical, juridical and practical discussion of environmental protection on national and international levels.

Dennerstein, L. (ed), *Women's rights and bioethics. Unesco publications (ISBN 923103765-X)*

You may download the table of content or order the book at website: <http://www.unesco.org/ethics/en/news/index.html>

European Environment Agency, *Late lessons from early warnings: the precautionary principle 1896-2000. Environmental issue report No 22, Copenhagen 2001 (ISBN: 92-9167-323-4)*

Available at website:

http://reports.eea.eu.int/environmental_issue_report_2001_22/en

European Group on Ethics in Science and New Technologies to the European Commission (EGE), *Opinion on the Ethical Aspects of Patenting Inventions Involving Human Stem Cells. 2002*

Available on website:

http://www.europa.eu.int/comm.european_group_ethics/publications_en.htm

GeneWatch, *Genetically Modified and Cloned Animals. All in a Good Cause? (£20; £5 for non-profit organisations and individuals)*

Available as pdf file on website:

<http://www.genewatch.org>

German Council of Environmental Advisors (SRU) at the Ministry for Environment, Nature Conservation, and Nuclear Safety of the Federal Republic of Germany, *Environmental Report 2002*

Available at website:

<http://www.umweltrat.de/pdf/press02.pdf>.

The report contains fundamental aspects of the connection between environmental ethics and environmental politics, an assessment of new challenges in agriculture, climate change politics and sustainability.

German Parliament Enquete-Kommission, *Recht und Ethik in der modernen Medizin*

Final report is available at website:

<http://dip.bundestag.de/btd/14/090/1409020.pdf> or background information at website:

<http://www.bundestag.de/gremien/medi/>

This report gives on about 500 pages an detailed overview of the ethical and juridical debate on preimplantation diagnosis, genetic research, stem cell research, but also on the possibilities of public participation and decision-making in the field of new technologies.

Keji, O., *Zur Philharmonie der Natur: Versuch einer ontologischen Ethik. Agenda Münster, 2002 (17 Euro, ISBN 3-89688-133-7)*

Korthals, M. & P. Thompson, *International Library of Environmental, Agricultural and Food Ethics – A new book series with Kluwer*

The ethics of food and agriculture is confronted with enormous challenges. Scientific developments in the food sciences promise to be dramatic. The concept of life sciences, that comprises the integral connection between the biological sciences, the medical sciences and the agricultural sciences, got a broad start with the genetic revolution. In the mean time, society, i.e. consumers, producers, farmers, policy makers, raises lots of intriguing questions about the implications and presuppositions of this revolution, taken into account not only scientific developments, but also societal developments (like ageing and individualisation in the Western world, or

the growth of the global population). If so many things with respect to food and our food diets will change, will our food still be safe? Will it be produced under animal friendly ways of husbandry and what will our definition of animal welfare be under these conditions? Will food production be sustainable and environmentally healthy? Will production consider the interest of the worst off and the small farmers? How will globalisation and liberalisation of markets influence local and regional food production and consumption patterns? How will all these developments influence the rural areas and what values and policies are ethically sound?

All these questions raise fundamental and broad ethical issues and require enormous ethical theorising to be approached fruitfully. Ethical reflection on criteria of animal welfare, sustainability, liveability of the rural areas, biotechnology policies and all the interconnections is inevitable. But, alas, until recently ethics has not paid much attention to these issues. Books and theories on this topic do not abound, to make an understatement. In fact, in this field there are neither accepted concepts, nor leading theoreticians, theories nor handbooks.

So, from a societal and a philosophical (scientific) point of view expectations are enormous, but until now the results of this applied form of ethics are rather meagre. We see it as our task to accept this challenge and to contribute to a sound, pluralistic and argumentative food and agricultural ethics that can try to meet these expectations. We will do this by bringing together the most important and relevant voices in the field, by providing a platform for theoretical and practical contributors with respect to research and education on all levels. We invite authors of interesting manuscript in this field to contact the editors.

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Martin, H.J., *Am Ende (-) die Ethik? Begründungs- und Vermittlungsfragen zeitgemässer Ethik.* LIT-Verlag, 2002 (26 Euro, ISBN 3-8258-5132-X)

With contributions of different German philosophers as Johann Ach, Arno Anzensbacher, Detlef Horst, Ekkehard Martens, Richard Toellner and others.

OECD, *Biotechnology Update*

The March 2002 edition of OECD Biotechnology Update is available (it is sent roughly every 6 months). It contains 14 pages with information about news, events and recent publications stemming from the Organisation for Economic Co-operation and Development's activities related to biotechnology. The new edition includes, e.g., e-mail contacts and web links for assessing recent publications on unique identification codes for transgenic plants and on "*Modern biotechnology and agricultural markets: A discussion of selected issues*". View it at website: <http://www.oecd.org/pdf/M00027000/M00027764.pdf>, or e-mail: icgb@oecd.org.

O'Neill, O., *Autonomy and trust in bioethics.* Cambridge University Press, 2002.

"Amid so much hype and yammer in the suddenly fashionable field of bioethics, it is good to turn to a book by a professional philosopher with wide experience of how ... regulation works in practice. [...] Her topic ... [is] restoring public trust in institutions, experts and authorities. [...] Though recognising that the pace of innovation is fast, she rightly believes that in bioethics we should not try to run before we can crawl" (The Economist).

UNESCO International Bioethics Committee (IBC), *Ethics, intellectual property and genomics.* Paris, 2001

Download on website: <http://www.unesco.org/ethics/en/news/index.html>

Biotech Benefits in the Dark

Gitte Meyer

Conventional wisdom of today has it that biotechnology will become the huge industry of tomorrow, a new mother of industries, developing profits on a computer business scale. But the grand economic visions are not likely to be fulfilled, claims Anthony Arundel, senior researcher at Maastricht Economic Research Institute on Innovation and Technology.

For years biotech has been framed as another computer industry in the making and has, consequently, been expected to deliver the next economic wave – a new “new economy”. Anthony Arundel finds, however, that closer scrutiny cracks the framing. Biotechnology has potentials of its own, and they are not primarily about money and market. But it may deliver in terms of environmental and health effects. There is, however, an amazing lack of data on these issues.

Nobody can tell to what extent society is actually gaining benefits from biotechnology in terms of more effective and less harmful medicines, and more sustainable methods of production in industry and agriculture. Evidence is scarce, and is not consistently collected to facilitate evaluations of whether the very large public investments in biotechnology are paying off, in terms of socially valuable innovations. Anthony Arundel is not satisfied with the quality of data on economic effects. He is even less satisfied with the almost total lack of indicators regarding applications of and benefits from biotechnology.

Effects on environment and health are policy issues, argues Anthony Arundel. Promises may need a helping hand from society to come true. Anthony Arundel says: *"My concern is that private interests, plus other factors such as overgenerous intellectual*

property rights, could conspire to limit the social benefits. They could be lost or delayed due to inappropriate public policies and private strategic decisions".

Distinguish substance from smoke

Some economists think that modern economies evolved through long waves of radical innovations. Information technology would be an already classic example of such a wave. It is characterised by being pervasive, having applications and uses in many different sectors of the economy, not least in the service sector which accounts for around seven out of ten jobs in most western societies today. On the contrary, biotechnology – also assigned a strategic role – has so far only very limited applications in the service sector. It is limited to some manufacturing sectors and to the resource sectors. This places an upper limit on the potential economic impacts of biotechnologies, argues Anthony Arundel.

One may or may not subscribe to the wave theory but *"we cannot assume that biotechnology will form the next wave. Due to their industrial structure some countries will find biotech to be much more important economically than other countries, but it will never be as big as information and communication technologies, and it could take 25 years before the full economic effects of biotech are realised"*, he says.

Figures regarding economic benefits from e.g. genetically modified crops are unsuited for ecstatic expectations. Anthony Arundel characterises the economic benefits so far of the most widely grown genetically modified crops as *"minimal and reaped by seed firms or farmers"*. As an example he points to a best-case scenario for the benefits of herbicide tolerant maize. Presupposing full adoption worldwide the scenario results in less than

two percent increase in maize production in the next decade and a 4,2 percent decline in price.

A survey among seed firms in the EU in 1999 showed that only about ten percent of the total research budget, expected to increase to fifteen percent in 2002, was spent on genetic engineering. Supposing that these spendings were used exclusively to develop new seeds 38 percent of the new seeds would be genetically modified. Anthony Arundel concludes that the actual figure will be somewhere between ten and 38 percent. The survey distinguished between genetic engineering, conventional breeding and assisted conventional breeding, using advanced techniques such as DNA marker genes and gene sequencing. No difference was found in expected employment and sales per developmental employee by type of technology. Assumptions of a harsh regulatory climate reducing the competitiveness of European seed firms were tested but not confirmed.

Some indicators exist on the direction of biotechnology research for genetically modified crops, using data from European and American field trials. Over the 1990s, the share of trials for herbicide tolerance has remained relatively steady at around half of all European trials and between one fourth and 30 percent of all US trials. The share of all field trials for product quality, industrial and environmental uses – where Anthony Arundel sees large potential public benefits – has declined in the US since 1995 and remained between ten and 15 percent of European trials. Anthony Arundel is, however, encouraged by finding that American trials for industrial uses alone increased over the decade.

Public sector research has been responsible for an increasing share of product quality, industrial and environmental trials in the US – from five percent in 1994 to approximately 25 percent by 1999. In Europe, the public sector accounts for about 30 percent of these trials.

Anthony Arundel calls for much more data on innovation, applications and effects of biotechnology in agriculture. How costly is it to introduce a trait into a plant variety by means of genetic engineering? Costs are used to justify mergers, increasing economic concentration in agro-industry, but Anthony Arundel has looked in vain for representative data on the costs. He also calls for indicators on alternative technologies, arguing that the survey of EU seed firms shows the danger of assuming the predominance of biotechnology when alternative technologies are available. The indicators needed should facilitate evaluations to determine whether biotechnology can be expected to be instrumental in realising overall goals of turning agriculture sustainable, defeating hunger and malnutrition, preventing rural depopulation, and reducing pollution of waterways from fertilizer run-off and pesticides: *"At present it is not possible for policy-makers to distinguish substance from smoke"*, he says.

Personally he is optimistic regarding the potential of biotechnology in medicine, but he finds that evidence of the unfolding of potentials is lacking. Even fewer data are available on industrial and environmental applications than for agriculture and medicine. Consistently collected data are urgently needed to feed into policy-making, he maintains.

Anthony Arundel says: *"By stressing indicators for economic outcomes and innovative activity, we run the danger of missing the main story. That is, how to ensure that biotechnology can meet its promises. I am generally optimistic about the social benefits, but they will not necessarily happen all by themselves – there are strong economic forces at work to diminish this likelihood"*.

[This article is an abridged version of an interview that can be found in full at website: <http://www.bioethics.kvl.dk/eindex.htm>]

Bioethics and Science Communication

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Berlin, Germany***

Aims and Scope

The interdisciplinary research group, founded by the Max-Delbrück-Center for Molecular Medicine (MDC) in Berlin-Buch and the Research Center Jülich (FZJ), is focused on the investigation and development of the public discourse on biomedicine. Two main issues are addressed by the group: 1) ethical questions in biomedical research; and 2) science communication on opportunities and risks of biomedicine. The aim is the systematic approach to a comprehensive dialogue on biomedicine. To assist the dialogue between science and society the critical points of controversy are to be openly discussed, approaches to possible solutions evaluated, and sound options for further action suggested.

Emphasis

- Ethics in biomedicine – Throughout the discourse, the ethical principles of applying new knowledge in biomedicine are to be transparently presented
- Actual points of interest – Cloning, the production and use of embryonic stem cells, gene therapy, and the concepts of disease.
- Science communication – Communication among science, politics, the media, and the public needs to be improved. Controversial perspectives of the opportunities and risks in biomedicine should be discussed openly. The conditions are to be examined in which the best objective argument will also be judged as the most convincing. This includes the comprehensibility and relevance of scientific information, the clarification of

uncertainties in the evaluation of opportunities and risks, and the building of trust on the basis of a fair and open dialogue.

Participation

Experts of all relevant disciplines such as biologists, physicians, social scientists and humanities, philosophers, theologians, and legal experts are invited to take part in the discussion. Through an exchange of ideas among politicians, interest groups, the general public, and representatives of industry, sustainable solutions for controversial social questions of biomedicine are to be pursued. The building of a network among the crucial institutes and stakeholders participating in the bioethics discussion in Germany is planned. This network will then be expanded to the European level.

Team

The research team was established as an independent research group on the Campus Berlin-Buch and is supported by the Federal Ministry of Education and Research. The chosen location on the Campus Berlin-Buch ensures an excellent exchange of current information due to the close proximity among scientific, clinical, and biotechnology organisations.

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Newsletter

The Newsletter of the European Society for Agricultural and Food Ethics (EurSafe) is published quarterly. The Spring Issue is published and mailed in March, the Summer Issue in June, the Fall Issue in September, and the Winter Issue in December. Requests for subscriptions and address changes should be sent to the EurSafe Secretariat (e-mail: eursafe@theo.uu.nl). Items for inclusion in

the EurSafe Newsletter should be sent to chief-editor Volkert Beekman (v.beekman@lei.wag-ur.nl). The deadlines for the next three issues of the EurSafe Newsletter are:

- Volume 4, No.3 – August 15, 2002
- Volume 4, No.4 – November 15, 2002
- Volume 5, No.1 – February 15, 2003

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