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**Democracy at Stake:
Film, *Folkbildning* and Public Engagement
with Biotechnology in Sweden**

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Prologue

Musical Accompaniment: Carl Orff's Carmina Burana – *Fortuna Imperatrix Mundi*

Reeve: I'm Christopher Reeve speaking to you from New York.
I urge all of you in Sweden to watch *Vetenskapens Värld* which
will be coming on...

1st Scientist: If by the New Biology you mean that biology founded on the
discovery of hereditary factors which can be used to develop new
medicines, then you are talking about a revolution.

2nd Scientist: It's new knowledge that changes the whole of our perspective...

3rd Scientist: It goes right to the core of who we are as human beings.

4th Scientist: It's extraordinarily empowering.

5th Scientist: Truly fantastic new possibilities to understand...

6th Scientist: This is just so incredibly exciting and interesting...

7th Scientist: It's great fun. It really is.

(Female)

Reeve: So please tune in when you know the show is coming.
Make sure to be there to watch. Thank you.

(From the trailer¹ for *Life at Stake – Two Documentaries on the New Biology* broadcast on
Vetenskapens Värld, SVT2, September 2003)

¹ This trailer is currently available for download at www.folkeryden.com.

Introduction

According to Bernadette Bensaude-Vincent (2001), twentieth-century physics in the guise of relativity theory and quantum mechanics led to the infectious idea of a radical break existing between scientific knowledge and common-sense powers of understanding. Due its contagious nature, this idea came to colour science and society relations more generally, becoming particularly widespread during the Cold War when it assisted in justifying decreasing public influence over science policy. However, with the recent relative decline in the prestige of physics, and the growth in status of the biological and environmental sciences, Vincent believes that, we may be currently on the verge of a 'deep transformation in the relations between science and the public' (Vincent 2001: 109). The possibility of such a transformation is visible in the mutation of a new global interest in the 'public understanding of science' emerging in the 1980s, into a growing concern with new forms of 'public engagement with science' at the end of the 1990s. While the former, established 'scientific literacy' as something the public could at least aspire to, the latter is often advertised as coinciding with the promotion of new patterns of public involvement in scientific and technological decision-making (Elam and Bertilsson 2003).

That the current enthusiasm for public engagement with science reflects the growing power of the biological and environmental sciences to cast their shadow more broadly over science and society relations is not hard to appreciate. We need only witness, for example, the sizeable investments being made in public engagement initiatives by leading financiers of biomedical research like the Wellcome Trust in the UK. As John Durant (1999), one of the key figures behind the new Wellcome Wing at the London Science Museum, maintains, the turn to public engagement should be regarded as constituting a 'democratic turn' in the public understanding of science. It is a turn giving rise to a diverse collection of new meeting places where science and the public can come together in order to discuss and deliberate over future directions for research, and the latest developments within the biosciences in particular (see Irwin 2001, Nowotny et al 2001). However, it is the argument of this paper that if public engagement initiatives connect with efforts to democratize science and technology today, then this connection must be seen as more contingent than necessary, and subject to significant qualitative variation, as we move between cases and across countries.

Hopefully contributing to broader appreciation of this variation, this paper addresses public engagement with biotechnology in Sweden. It deals with how in this context public engagement has proceeded by, firstly, offering new life to a domestic form of public education known as *folkbildning* and by, secondly, generating a new and growing interest in film as a powerful medium of science communication. Although recombining science and the public in new ways, the public engagement with biotechnology discussed here will be presented as more concerned with supporting a reconcentration of scientific authority in Swedish society than its progressive redistribution. With relevant modifications, the science and society relations of the early Cold War era are currently viewed in Sweden as something worth recapturing, not transcending. This has supplied public engagement with biotechnology with another agenda where protecting the powers of discretion of those at the centre of developments is considered more important than offering inclusion to the voices of all those implicated.

In the next section, the contemporary science policy scene in Sweden will be briefly outlined. Reference will be made to the new Swedish Research Council, and the role it has played in establishing initial guidelines for domestic stem-cell research. This will be discussed as having led to the Council being charged with co-ordinating a new government-financed programme of *folkbildning* dealing with the development biotechnology as a whole. Thereafter, the Science Forum within the Swedish Research Council will be introduced as the body administering this programme of *folkbildning*. This will then be followed by a brief discussion of the historical identity of *folkbildning* as an educational activity in Sweden, and its long-standing use in the pursuit of political reforms. Next, the Science Forum's primary web-based approach to 'a new *folkbildning* for a New Biology' will be reviewed and reference made to the choice of a juvenile audience as its primary target. Then, it shall be discussed how film became a component in an expanding programme of *folkbildning* as contacts between the Science Forum and the new non-profit organization Scientists Meet Film-Makers were formed. The mediating role of the latter organization in creating the conditions of possibility for the making and public broadcasting of Folke Rydén's two-part documentary *Life at Stake* will, at this point, be discussed at some length. Then, the dramatic composition of the two films will be analysed in detail to reveal the type of public engagement with biotechnology they make possible. Attention will focus on how visions of pain and suffering are used to construct authentic statements about biotechnology in society

before a film audience. It will also be discussed how in promoting public engagement the two films seek to depict biotechnology as blessed with a pure and harmonious scientific core, but otherwise subject to controversy due to the imprint of non-scientific forces coming from the (other) spheres of politics of commerce. In conclusion, public engagement with biotechnology will be identified as a world of political invention where the authority of science in society is subject to recombination. As *Life at Stake* shows, even if the intention is to advance the discretionary powers of science this still implies the creation of new relations of connection and dependence between scientists and other actors in society.

2001 – A New Federation of Swedish Science Emerges

2001 was an eventful year in the life of Swedish knowledge society. On January 1st of that year the new Swedish Research Council came into existence as an organized federation of existing research councils in the areas of science, technology, medicine and the social sciences and humanities. The Swedish Research Council is dedicated to advancing 'basic research of the highest quality' (grundforskning av högsta kvalitet, see www.vr.se) and it can be viewed as an institutional reaction against the growing pre-occupation of Swedish research policy during the 1990s with 'strategic research' moving beyond the traditional division of basic and applied practices.

By re-emphasizing the role of basic research in Swedish social and economic development, the Swedish Research Council severs the connection between knowledge society and a qualitatively 'new production of knowledge'. Rather, it links it to the recovery and further elaboration of an 'old' production of knowledge instead.² Its arrival has coincided with widespread support for a return to the so-called 'Erlander tradition' in Swedish science and society relations. This is a home-grown tradition dating from the 1950s which takes its name from the former Swedish Prime Minister, Tage Erlander. It credits Erlander with having established a special pattern of interaction between leading scientists and top politicians which is seen to have played a vital role in the emergence of Sweden as an advanced

² For extended discussion of the transformation of neo-liberal research policy in Sweden (championing 'strategic research') at the beginning of the 1990s into 'neo-classic liberal' research policy (re-asserting the division of basic and applied research) at the end of the decade, see Elam and Glimell (2004). For an excellent book length analysis of the same developments following a slightly different conceptual framework see Benner (2001)

industrial nation in the post-1945 era.³ As the current Swedish Minister of Education, a primary adherent of the tradition, testifies:

For me, Tage Erlander has meant an enormous amount regarding how to look upon research and higher education. His strong support for science was founded upon a belief in the fundamental importance of basic research for the development of society, and in a complete confidence in the scientific community. Erlander was convinced that increased resources for basic research and the allocation of these resources according to scientists' own evaluation of the most promising research initiatives will always in the long-run give very great rewards for society as a whole (Östros 2002).

Thus, if the growth of so-called knowledge society coincides with an intensified inter-penetration of science and society in western liberal democracies; in Sweden, individual scientists and scientific institutions are currently being offered a more privileged role in the co-ordination of this process. While the emergent ethical, legal and social aspects of innovative practice within the fields of information-, bio- and nanotechnology tend to hang precariously in-between the worlds of science and politics; in Sweden they are at present being treated as firstly new challenges for science in the management of its own self-regulation. This is well-illustrated by the initial regulation of stem-cell research.

During the first year of its existence the Swedish Research Council was able to take command of the ethical regulation of Swedish stem-cell research in a way that overshadowed the efforts of the National Council on Medical Ethics (founded in 1985) to engage in the same task (Welin 2001, Persson and Welin 2001). While the Swedish Medical Research Council had already set about preparing ethical guidelines for stem-cell research during 2000; the new federated Swedish Research Council sought to heighten the legitimacy of these guidelines by including representatives from all the other disciplinary research councils in the process of their elaboration. In this way the resulting guidelines could be advertised as the product of collective scientific opinion in Sweden, and not simply collective medical opinion alone.⁴ This strategy was accepted by government, and portrayed in the media as giving rise to a higher ethical expertise than could be supplied by the National Council on Medical Ethics,

³ For further discussion of the origins of the Erlander tradition and its current resurrection, see Grandin (1999), Edqvist (2002), Elam and Glimell (2004) and Hansson and Samuelsson (2002)

⁴ For discussion of the relatively hidden intricacies of this strategy from the general public's point of view, and the limited public visibility of emergent divisions of opinion within the Swedish Research Council regards the regulation of embryonic stem-cell research, see Leijonhufvud and Welin (2002).

where the emphasis lies on the inclusiveness of its political representation instead (Elam 2004, Ideland 2002, Persson and Welin 2001)⁵.

After the Swedish Research Council made public its ethical guidelines for stem-cell research on December 4th 2001, the Social Democratic government was quick to reaffirm its confidence in the scientific community. On December 13th, still more than a month before the National Council on Medical Ethics would publish their recommendations for stem-cell research, the Minister of Education announced the allocation of 3 million crowns to the Swedish Research Council to co-ordinate a broad programme of *folkbildning* (public education) 'to strengthen public knowledge and stimulate debate' regards the so-called New Biology.⁶ According to the government press release, because the future of stem-cell research is evidently of concern to so many, and because biotechnology in general is advancing so rapidly, it must be seen as vital, not least from a 'democratic perspective', that public knowledge of contemporary science and technology be further developed (Utbildningsdepartementet 2001).

The Science Forum at the Swedish Research Council

Responsibility for co-ordinating the new programme of *folkbildning* in the New Biology fell to the Science Forum (Forskningsforum) within the Swedish Research Council. This is firstly a consultative body composed of one representative from each of the four major governmental bodies financing scientific research;⁷ one person representing all the universities and colleges in the country; the government's Chief Scientific Advisor; and six members of the Swedish Parliamentary Committee on Education (one representative from

⁵ The Swedish National Council on Medical Ethics (SMER) is affiliated with the Ministry of Health and Social Affairs. It was established in 1985 to advise the government on ethical issues raised by advances in biomedicine. It encompasses representatives from all seven of the major political parties in Sweden; plus representatives from agencies and interest groups within the health sector, as well as experts from the fields of medicine, law and philosophy.

⁶ The favouring of the term the New Biology (den nya biologin) in Sweden is itself worthy of comment. Why this nomenclature for something that elsewhere is referred to as either the new genetics or biotechnology or genetic engineering? In line with the arguments put forward in this paper, the choice of the term the New Biology in Sweden can be seen from the outset as privileging the voice of Science in the fields of its practical application. In order to avoid automatically condoning this move, I shall here treat the terms 'biotechnology' and 'science in society' as interchangeable with that of the New Biology.

⁷ These public financiers of research are : the Swedish Research Council itself, the Swedish Agency for Innovation Systems (VINNOVA), the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning (FORMAS) and the Swedish Council for Working Life and Social Research (FAS).

each of the major political parties in Sweden). Only one person within the Swedish Research Council is employed to co-ordinate the activities of the Science Forum, and only on a part-time basis.

Although the Swedish Research Council identifies the dissemination of research findings (forskningsinformation) as an important activity for it to address, the Science Forum is not firstly designed to engage in *folkbildning*. Rather, it has been conceived as 'the right place to push questions on research'⁸ and a site where key representatives of the Swedish scientific community can woo the Swedish Parliament in order to attract more funds to basic research. It is, in other words, a site for furthering the entanglement of Swedish parliamentary politics in Swedish science.⁹ Beyond this, however, and opening up for an engagement in *folkbildning*, an overarching duty of the Science Forum is also to 'safeguard the great faith in science that the Swedish public displays'; and to take measures which can help to 'extend and repair this faith as required'.¹⁰

The entrusting of *folkbildning* in biotechnology to the Science Forum can also be linked to presence within the Forum of two leading Swedish bioscientists, both already strongly committed to promoting new forms of public debate and discussion pertaining to the field. Representing all the universities and colleges in Sweden in the Science Forum is Professor Bertil Andersson, a leading biochemist, and Rector of Linköping University.¹¹ As well as establishing a major new research programme in the life sciences in Linköping encompassing the creation of 16 new professorships, Andersson was also jointly responsible for staging the public conference 'The New Biology and the Future Society', during the summer of 2001.¹² This conference was organized to commemorate the 100th anniversary of the birth of the former Prime Minister Tage Erlander, and was held at his former country home in Värmland. Among the speakers at the conference was Thomas Östros, the Minister of Education, and the

⁸ In Swedish 'Rätt plats att framföra frågor om forskning'. This is the Swedish Research Council's own characterisation of the Science Forum to be found in materials used for its public presentation.

⁹ The ability of the Science Forum to meet its primary objective has already been brought into serious doubt. In a recent evaluation commissioned by the Swedish Research Council itself, the Science Forum was accused of lacking 'strategic direction' and of being little more than talking shop (Samuelsson 2003).

¹⁰ Interview quote from Lars M. Nilsson, Science Forum, 21/10/03. In Swedish: 'att behålla det stora förtroendet för forskning att allmänheten i Sverige har...(att) bygga på och underhålla det goda förtroendet för forskning bland allmänheten.'

¹¹ During 2003, Bertil Andersson was appointed as the new Executive Director of the European Science Foundation (ESF), a position he takes up in January 2004. This appointment follows Andersson's participation in ESF's High Level Working Group investigating the case for a European Research Council.

event was intended to revive memories of the famous Rigoletto conference 'Technology and Tomorrow's Society' held at a cinema in Stockholm in 1955. Also led by scientists, this conference was similarly concerned with preparing Sweden for entry into a new technological era - the Atomic Age.¹³

Also participating in the Science Forum in his capacity as the government's Chief Scientific Advisor is Hans Wigzell and, until recently, Rector of the Karolinska Institute in Stockholm, one of Europe's largest centres for biomedical research. In 1999, Wigzell also chaired the government investigation which produced the blueprint for the creation of the new Swedish Research Council (Utbildningsdepartementet 1999). In addition to his government services, and extensive industry contacts,¹⁴ Wigzell is also a leading member of the new non-governmental organization EuroScience (www.euroscience.org), formed in 1997. EuroScience presents itself as 'the Voice of Science in Europe', and as a grass-roots organization which has spontaneously come together in order to 'construct scientific Europe from the bottom-up'. Wigzell is the chair of the Advisory Board for EuroScience's first 'Open Forum' to be staged in Stockholm in August 2004. Not a conventional conference, this event is being constructed as 'an independent arena for open dialogue on the role of science in society' and as 'the best opportunity in Europe to listen to and to discuss the latest results produced by leading scientists of international reputation in all fields' (www.esof2004.org). The institutional partners supporting EuroScience Open Forum 2004 are, apart from *Nature* and the European Science Foundation, largely Swedish and include the Karolinska Institute, Sveriges Television (Sweden's public service television company),¹⁵ and all four of the

¹² The conference was jointly organized by Linköping University and Karlstad University (Personal communication from Professor Sven Erlander 27/11/03).

¹³ Famously, Erlander spoke at the end of this conference of the 'terror mixed with wonder' he experienced in the face of contemporary science and technology. See Erlander (1956) in the published proceedings of the conference.

¹⁴ In a recent article authored by a fellow professor at Karolinska Institute, the potential clash of interests resulting from Wigzell's hybrid connections was identified as requiring closer public scrutiny. Wigzell's industry contacts were listed as including: chief scientific advisor to the pharmaceutical company Biovitrum AB (a spin-off from Pharmacia). This firm has extensive business contacts with the companies Karolinska Holding AB and Karolinska Innovation AB where Wigzell is in both cases a member of the board of directors. Wigzell has also been a scientific advisor to two large shareholders in Biovitrum AB, namely, Karolinska Investment Fund and HBM Bioventures (Thyberg 2004).

¹⁵ As is discussed at the end of this paper, SVT was recently forced to withdraw as a partner in the EuroScience Open Forum event (January 2004). At the same time the relations of corporate sponsorship behind the event have become more visible. Major funders of the event are now listed as Astra Zeneca, the Swedish Association of the Pharmaceutical Industry, the bioinformatics firm Affymetrix, and the semi-private Swedish Foundation for Strategic Research (see www.esof2004.org). The willingness of the Swedish Research Council and the other public research-funding bodies in Sweden (FAS, FORMAS, VINNOVA) to promote EuroScience through the Open Forum Event, and to treat it as if it were a Swedish governmental organization rather than a non-governmental one, remains as yet uncontroversial and spared extended public scrutiny.

Swedish governmental bodies financing research represented in the Science Forum. The secretariat for EuroScience Open Forum 2004 is housed *within* the Swedish Research Council.

***Folkbildning* Tradition and Scientific Citizenship in Sweden**

The educational activity known as *folkbildning* in Sweden is closely associated with both science and democracy. Historically, it is an activity that has attempted to wed the popularization of science to the pursuit of political reforms. For this reason it has tended to support the scientification of Swedish politics, at the same time as it has advanced the politicization of Swedish science. Scientific institutions, however, were not the pioneers of *folkbildning* in Sweden. As Kärnfeldt (2000: 107-112) relates; when the Swedish Royal Academy of Science was radically reorganized under the guidance of Jacob Berzelius in the 1820s, with the French Academy of Science as a model, scientific interest in improving the public understanding and uptake of science seriously declined, and to all intents and purposes disappeared. The initial professionalisation and specialisation of Swedish science in the nineteenth century did *not* coincide with a new commitment among scientists to popularize their work. On the contrary, they were happy to defend its exclusivity.

Rather than by recognized scientists, *folkbildning* with a strong emphasis on the natural sciences, was pioneered in Sweden by the Workers' Educational Movement from the 1880s onwards. Popular science education was conceived by the leaders of this movement as an indispensable tool of social and political reform (Ginner 1988, Kärnfeldt 2000: 180-214). Anders Nyström who founded the Workers' Institute in Stockholm in 1880 was a leading adherent of Comtean positivism (Frängsmyr 1977). In close harmony with Comte's ideas, he saw a broad schooling in mathematics, astronomy, physics, chemistry, biology and medicine as a vital *political* education and as an obligatory point of passage for the new working class in their efforts to achieve full rights of citizenship in a rapidly changing Swedish society.¹⁶

However, contained within the writings of Comte, that Nyström strived so hard to propagate, was a vision of the natural scientific schooling of the working class that went far beyond the

¹⁶ Universal suffrage for men in Sweden was granted in 1909, and for women in 1921.

depiction of a preparatory education for political citizenship. Such a schooling was also portrayed as a step towards the achievement of a commanding scientific authority by the new industrial proletariat. For Comte, true science - positive science - had no basis in metaphysics, but emerged instead out of common sense. It was to be seen as 'no more than a continuation of our daily spontaneous activity of discovering regularities that allowed predictions' (Vincent 2001: 104). Due to their possession of rugged common sense knowledge, Comte could see no group better positioned to assume control of scientific knowledge production in modern industrial society than the expanding urban and industrial proletariat. This made the task of cultivating a strong interest in, and orientation towards, the natural sciences among the working class a priority for Comte and his followers. As Kärnfeldt (2000: 186-191) describes, the radical nature of Comtean positivism as an Enlightenment project, initially rendered *folkbildning* in the natural sciences a highly controversial and contested activity in Sweden, and Nyström's newly-established Workers' Institute was forced to live a precarious existence at the beginning of the 1880s.

By 1900, however, workers' education emphasizing the natural sciences had won broad support throughout Sweden as an appropriate means of cultivating a well-informed, disciplined and competent citizenry dedicated to the non-violent reformation of industrial society. As Nyström was able to argue, a basic schooling in the natural sciences could serve to inoculate members of the working class against influence by different forms of political and religious extremism, and teach them that 'nothing is socially-useful that isn't true, and nothing is true that doesn't belong to science' (Nyström quoted in Kärnfeldt 2000: 193).

Therefore, against this historical background, it can be asserted that *folkbildning* centring on the natural sciences has long been viewed in Sweden as a practice laying the foundations for political reforms and the extension of democracy. Of tradition, real extensions of democracy in Sweden have been envisioned as proceeding through the cultivation of more scientifically-minded citizens.¹⁷ This makes it interesting to investigate how this long-term pattern of association is being both reproduced and transformed today as the task of designing and co-ordinating a *folkbildning* in biotechnology has been entrusted into the hands of the new Swedish Research Council.

¹⁷ For discussion of 'scientific citizenship' as a contemporary rather than an historical phenomenon, see Elam and Bertilsson (2003).

A New *Folkbildning* for a New Biology

The primary building block in the Swedish Research Council's programme of information and *folkbildning* on the New Biology has been the creation of a new 'web-based education site' to be used firstly in schools, as well as in organized study circles and adult education classes. The aim of this website is to provide an 'objective, pedagogic and freely-available collection of facts' regarding biotechnology, focussing on the novel possibilities and risks arising out of its development. Such a collection of facts is imagined capable of serving as a vital resource for individual members of the public, raising their abilities to both form and express an opinion about the developments in hand (ForskningsForum 2003). The new web-based education site is accessed via a larger site (www.forskning.se), providing public information about developments within Swedish research more generally which was launched in May 2002, and is also administered by the Science Forum.

The New Biology website is itself composed of a constellation of different-sized circular 'cells' of information clustered around a larger nucleus bearing the overall name of the resource. In the first instance, the user is encouraged to choose between three main areas of concern – medicine, industry and agriculture – each of which then breaks down into smaller and smaller cells of information for the user to click upon and open.¹⁸ So for example, after opting for 'medicine', you are given a further range of topics to choose between including 'stem-cells', after this you can select to find out more about adult stem-cells as opposed to embryonic stem-cells, which in turn opens up a final range of informational options. As a pedagogic tool the site enables the user to shuttle easily between the general and the particular: to choose between different areas of biotechnology and to quickly get down to (what are advanced as) useful and instructive fact-like statements concerning them.¹⁹

As a priority the New Biology website was completed and launched in mid-August 2003 to coincide with the beginning of the new school year. The Science Forum has also drawn on the

¹⁸ In addition to these three main areas of concern, three other primary cells are provided to click on. These are labelled 'history', 'methods' and 'cell-school'. From the beginning of 2004, as is discussed later in this paper, a new introduction has been provided to the site offering visitors the opportunity to view two films about the New Biology before turning to the more detailed information available.

¹⁹ The actual construction of the site was assigned to a team of 5 people led by the science educator Henrik Brändén who has also recently authored an introductory text on 'genetics, cloning and stem-cells' funded by the

services of the new Swedish Centre for School Biology and Biotechnology (www.bioresurs.uu.se) based at Uppsala University to organize special training courses for teachers in how best to utilize the new web-based resource. Arguably the identification of 'gymnasium' level students (16-18 years old) as the primary audience for the New Biology website fits well with the historical vision of *folkbildning* in the natural sciences as a form of *preparatory* education. As originally envisaged, *folkbildning* is instruction for Swedish citizens still in the making, and a form of training that precedes fuller participation in the social and political life of a rapidly changing industrial society. By focussing efforts on older school students, *folkbildning* in the New Biology can still appear as a radical Enlightenment project helping to empower young people in the future of science. This objective of young citizen empowerment is hardly controversial as it remains fully consistent with the long-term interests of established scientific authority in Sweden. As in other advanced industrial nations, persuading sufficient numbers of talented young people to enter into careers in science and engineering has been a constant concern of government research and education policy for decades. *Folkbildning* in biotechnology directed at older teenagers easily translates and transmutes into an additional measure in this endeavour.

The targetting of a juvenile audience as the most appropriate audience for the New Biology website has been reinforced by the identification of the project *Young People Speculate* (*Unga Spekulerar*), run by the Swedish Technological Foresight Initiative (Teknisk Framsyn),²⁰ as a closely aligned undertaking. Based firstly at four science and technology museums and discovery centres in Luleå, Malmö, Gothenburg and Stockholm, *Young People Speculate* has been seen as introducing another important arena where the New Biology website can be put to further co-ordinated use. *Young People Speculate* has invited school classes to reflect over the future of science and technology and is designed to help them develop their own powers of foresight based on an assisted understanding of the possibilities new technology is opening up. During 2002/2003 the ambition was to engage 100,000 teenagers and their teachers in the project based on the rationale that 'Sweden's development and future welfare depends on how today's children choose to study and work, as well as on

Swedish Royal Academy of Engineering Sciences (Brändén 2002). In addition, two university professors were also appointed to further certify the scientific accuracy of the information provided at the site.

²⁰ The main parties standing behind the Swedish Technological Foresight Initiative include: the Swedish Royal Academy of Engineering Sciences, the Confederation of Swedish Industry, the Swedish confederation of blue-collar workers LO, the Swedish Research Council, VINNOVA and the semi-private Swedish Foundation for Knowledge and Competence Development (KK-stiftelsen).

their guiding hopes and conceptions as to what the future holds in store for them' (www.ungaspekularar.nu).

However, as soon as we move beyond a first concern with providing new resources for school education in biotechnology, the Science Forum's *folkbildning* initiative immediately takes on a more ambiguous profile. A preparatory education, helping individuals to form and express opinions on biotechnology, risks taking on a different meaning for an adult and already franchised audience as opposed to a juvenile audience. In the short-term at least, it can suggest the relative disempowerment of citizens as they are imagined only formally authorized to participate in debates and decisions pertaining to biotechnology, while in practice remaining too ill-informed to do so. Given an identified need for *folkbildning*, it can be argued that citizens' existing powers of judgement in relation to biotechnology must be discounted until it can be shown (through science literacy surveys, for example) that they know better. Taking any existing convictions that Swedish citizens may display regarding, say, the ethics of embryonic stem-cell research or the environmental impacts of GM crop cultivation as *premature*, *folkbildning* also runs the risk of concerning itself more with *correcting*, rather than straightforwardly expanding, public knowledge of contemporary science and technology. These combined risks clearly grow stronger when the task of coordinating any programme of *folkbildning* in science and society relations is delivered exclusively into the hands of one organization located at the centre of developments.

Co-ordinated by a Science Forum, openly committed to preserving a high level of public trust in science, *folkbildning* in the New Biology must be seen as falling vulnerable to *scientist distrust* in the ability of the public to think through biotechnology for themselves. Although, firm assurances may be provided that the line between helping the public to think about biotechnology and telling them what to think about it will not be crossed, the temptation to do so for the scientists involved must be seen as remaining strong. Historically, *folkbildning* has opted for a natural science focus to prevent itself from falling under blatant political and ideological influence, but how can this focus be adapted to allow meaningful public engagement with the politics of contemporary science and technology? If citizens are to be genuinely enabled through *folkbildning* to both form and articulate more authoritative opinions on biotechnology, this means that its practice cannot be reasonably separated from a larger commitment to democratizing expertise within this already highly heterogeneous field.

Folkbildning will need to assist in the organization of so-called 'extended peer review'.²¹ That is public review processes, whereby the testimony of the many, rather than the few, directly implicated in the development of different areas of biotechnology can be progressively structured into decision-making procedures.

However, from the outset, democratizing expertise cannot be seen as having served as a guiding concern for the Science Forum shaping their *folkbildning* in the New Biology. This is hardly surprising as the creation of the Swedish Research Council in 2001, as mentioned above, has coincided with a renewed commitment to the primacy of basic research, explicitly conceived of as 'scientist-controlled research', in Swedish social and economic development.²² Rather than democratizing expertise, the rationale for the Science Forum's *folkbildning* has been stated clearly in terms of the need to win greater public acceptance of the achievements of contemporary science.²³ This, in itself, need not rule out a concern with democratizing science, as the latter can be viewed as vital to the achievement of greater public acceptance, however, it does also open the way again for an overriding concern with *correcting* public knowledge of biotechnology, rather than seeking to incorporate it into broader patterns of debate.

By concentrating on the production of a new website primarily, though not exclusively, designed as a complement to school science education, the Science Forum can be seen as having initially shied away from the more complex and challenging task of prioritizing *folkbildning* in biotechnology for an adult audience. During the course of 2002, however, the Science Forum chose to shift its *folkbildning* programme considerably further into adult territory by commissioning the production of two film documentaries focussing on the respective 'dilemmas' affecting the development of contemporary biomedicine and agricultural biotechnology. These two films expanded the budget of the Science Forum's *folkbildning* programme by over 2 million crowns, and have not been funded by the Ministry

²¹ The notion of 'extended peer review' widely associated with the promotion of socially responsible science is firstly to be found in the work of Jerome Ravetz. See for example Ravetz (1999).

²² A strict and unbridgeable divide between 'scientist-controlled research' and 'contract research' (forskarstyrd contra beställarstyrd forskning) was (re)introduced into Swedish science and technology policy through the influential government report *Research 2000* (Utbildningsdepartementet 1998), and then cemented further through the so-called Wigzellska report published one year later (Utbildningsdepartementet 1999).

²³ In materials used for the public presentation of the Science Forum's programme of *folkbildning* in the New Biology, the challenge facing the programme is summed up with a quote taken from an EU conference on the public understanding of science: 'The problem is not what Science can achieve. It is what Europeans will accept...'

of Education, but directly by the Swedish Research Council and two other research funding bodies participating in the Science Forum. As they can be seen as representing both the most innovative element in the Science Forum's *folkbildning* programme, and the most controversial, they shall be at the centre of discussion in the remainder of this paper.

When Scientists Meet Film-Makers

With a growing interest in the use of film, the Science Forum upgraded its engagement in *folkbildning* during the course of 2002 from a 'thematic project in research information' to a 'co-ordinated knowledge campaign on modern biological research; its applications and social implications' (ForskningsForum 2003). Film was seen as an important complement to web-based *folkbildning* through its perceived ability to stimulate greater public interest in, and concern over, developments within biotechnology. In other words, it was seen as a means of raising public demand for more detailed 'facts-based' information services. To achieve this increased demand, however, it was deemed essential that any films commissioned by the Science Forum be broadcast on Swedish public service television (SVT)²⁴.

The initial idea of making use of film came from Peter Sylwan, freelance science journalist, popular science writer, and teacher at the Institute of Communications, Campus Helsingborg, Lund University. Due to his many popular science publications dealing with biotechnology,²⁵ the Science Forum had contacted Sylwan to see if he was interested in leading the team tasked with producing the new website.²⁶ While turning down this offer, Sylwan informed of his involvement in a new non-profit organization founded in May 2001 called Scientists Meet Film-Makers.²⁷ This organization had participated in the Gothenburg Science Festival during

²⁴ Interview with Lars Nilsson, ForskningsForum, 21/10/03. Broadcast on public service television as opposed to Swedish commercial television was treated as an obvious choice due to the established identity of the former with the task of *folkbildning* and its long-term commitment to science programming.

²⁵ These publications include Sylwan (1992, 1994, 2001). Contributing to his reputation as a leading science writer and journalist, Sylwan was the Science Editor for Sweden's largest daily newspaper, *Dagens Nyheter*, during 1996-1998. He has also worked with radio and television and has himself produced film documentaries dealing with developments within biotechnology.

²⁶ Interview with Peter Sylwan, Campus Helsingborg, 20/10/03.

²⁷ The first initiative to Scientists Meet Film-Makers (Forskare möter filmare – FmF) was taken by the film producer Jan Skogström and Bengt Orhall, the former head of Swedish television's film laboratories, and later the company FilmTeknik. Their ambition has been firstly to form an organization for bringing together young film-makers and researchers enabling them to embark on projects together. Orhall and Skogström soon took contact with Peter Sylwan and Scientists Meet Film-Makers is now officially based at Lund University's Campus in Helsingborg. The goal of FmF has been expressed as follows: 'To stimulate and facilitate the meeting between science and society, to find funding for film projects, to organize seminars on film and science, to

April 2002, and entered into discussions with a number of Swedish scientists regarding possible collaborative film projects. Sylwan was therefore interested to learn if the Science Forum could imagine financing any of these projects. The immediate answer to this question was no, not unless that is, one could be found directly addressing developments within biotechnology. Given this situation, Sylwan set about sketching together with Lars Nilsson of the Science Forum, the rough outlines of a film centring on the new public 'dilemmas and choices' already made visible through the use of biotechnology in society. However, the chances that such a film would be made remained slim at this point (May 2002) as the Science Forum had already committed the 3 million crowns it had received from the Ministry of Education for *folkbildning*, and it had no guarantees from SVT that any film it commissioned would be considered suitable for broadcast.

In the face of these obstacles, Peter Sylwan and the organization Scientists Meet Film-Makers took on a crucial mediating role. The first task they addressed was that of finding a film-maker with a strong and well-established 'SVT profile' who remained available for contract by the Science Forum as an independent producer. Here, Scientists Meet Film-Makers soon succeeded when in June 2002 they approached Folke Rydén, a former foreign correspondent with SVT, who since 1998 has been working as a freelance correspondent and director/producer of documentary films. Rydén expressed an immediate interest in making a documentary about the New Biology via his independent production company Genibild AB.

On the basis of this expression of interest, and the initial concept for a film they had already prepared with the Science Forum, Scientists Meet Film-Makers took contact with Anna Schytt, one of SVT's science programmers, in order to try and obtain some sort of guarantee that SVT would broadcast a Folke Rydén documentary on the New Biology should one be made. Here again they quickly succeeded when in mid-August 2002, Anna Schytt wrote a 'Letter of Intent' to Lars Nilsson at the Science Forum, confirming that SVT was interested in broadcasting a film with the working title '*Genvägar till framtiden*' (Short-Cuts to the Future)²⁸ provided that the synopsis to be produced met with their approval, and that the project could win the funding it required. The film should engage in *folkbildning* and address relevant issues concerning the new genetics and the future of humanity. It would be shown as

introduce young film-makers into the wealth of inspiration and knowledge to be found in the university, for example, to give substance to the fruitful conflicts in the world of science' (Forskare möter Filmare nd.). The film project *Life at Stake* discussed in this paper was Scientists Meet Film-Makers first major collaborative undertaking.

an episode of *Vetenskapens Värld* (The World of Science), SVT's best known science documentary series featuring firstly internationally-produced documentaries supplied with Swedish language commentaries and sub-titles.

Supplied with the prospect of a film produced by one of Sweden's most respected and internationally awarded documentary film-makers,²⁹ as well as concrete assurances from SVT that they were not opposed to broadcasting it,³⁰ the Science Forum grew confident that financing for such a project could be obtained from among the ranks of its member organizations, and in the first instance, from the Swedish Research Council itself. For this reason, it was considered worthwhile commissioning a detailed film synopsis from Genibild AB at a cost of 250,000 crowns. This synopsis entitled '*Det gäller livet*' (*Life at Stake*) was presented by Folke Rydén and his researcher Lotta Skoglund³¹ at a meeting held at the Science Forum in Stockholm at the beginning of October 2002. After this date, Genibild AB gave the Science Forum three weeks to decide to proceed with the project, and to raise the 1.98 million crowns needed to finance it. Such a decision to proceed was soon reached, with the majority of the required funding being secured from within the Swedish Research Council, with the addition of significant contributions from the other research financing bodies FORMAS and VINNOVA.³² Instead of a single film, *Life at Stake* was sold to the Science Forum as a two-part documentary, each part to be 52 minutes in duration. Following the conventional 'red/green' divide, the first part of *Life at Stake* was to deal with new

²⁸ This initial title plays on the fact that in Swedish the word for short-cuts also reads as 'gene-ways'.

²⁹ Folke Rydén started working for SVT in 1982. Between 1989-96 he was SVT's foreign correspondent in Washington and between 1996-97 their Asia correspondent based in Hong Kong. From 1998 he has been a freelance correspondent and director/producer of documentary films. He formed his own independent film production company – Genibild AB – in 1997. In 1993, he was awarded Bonnier's Grand Prize in Journalism, one of the most prestigious awards of its type in Sweden. Several of his documentary films have also won awards at international film festivals. Rydén is also a popular public speaker and lecturer in Sweden. The topics he addresses in his talks include: 'World Correspondent – Myth and Reality'; 'Globalization and the World of Tomorrow'; 'Career Planning and Personal Development'; 'Juvenile Crime and Punishment' and more recently 'Science and the New Biology'. In addition, Rydén has been five times national skydiving champion in Sweden (see www.folkeryden.com).

³⁰ As Lars Nilsson admits (e-mail communication 26/1/04), relations between the Science Forum and SVT continued to remain 'loose' following the receipt of Anna Schytt's initial Letter of Intent. No final guarantees were given to the Science Forum that Folke Rydén's film(s) would be broadcast even after a synopsis had been produced, and during the production phase Folke Rydén largely took over the task of negotiating broadcast on SVT himself.

³¹ Like Folke Rydén, Lotta Skoglund has a long experience of working with Swedish public service television, and even radio. In addition, she has authored several popular science books focussing on women's health issues.

³² Upon television broadcast *Life at Stake* was under-financed by approximately 500,000 Swkr. At this time the Swedish Research Council had committed 800,000 Swkr to the project; FORMAS and VINNOVA 300,000 Swkr each, and SVT had bought the Swedish broadcasting rights for the two films for 100,000 Swkr. Although additional financing has been sought from among several of the larger semi-private research foundations which

understandings of sickness and health in the development of medical biotechnology, while the second part was to concentrate on the relationship between food and environment in the advancement of agricultural biotechnology.

In the preface to the synopsis, the proposed relevance of *Life at Stake* to the task of *folkbildning* is developed and discussed. In a democratic society, it is argued, all citizens share the responsibility of dealing with the challenges posed by major scientific breakthroughs:

It is up to us as individuals to decide what use we shall make of new scientific achievements and to participate in free and open debate. But without knowledge and education we risk taking dangerous and uninformed decisions...This film will, for the first time, give a broad public the opportunity to understand the consequences of the enormous breakthroughs being made by scientists. To grow aware of the dizzying developments we stand before... (Rydén 2002: 3)

Building upon this line of reasoning, *Life at Stake* is said to aim at engaging the general public by acting on their behalf, and putting the questions they are most eager to have answered to the New Biology (Rydén 2002: 5). These are presented as asking what influence biotechnology is already exerting on people's lives today, and whether or not its advance will genuinely help to make the world a healthier, and less hungry place to live in.

The dramaturgical form of *Life at Stake*, therefore, is one where Folke Rydén shall take on the role of a public envoy (a go-between) sent out on a 'voyage of discovery' into the heart of the New Biology. Not a science journalist, Rydén shall approach contemporary biotechnology by elaborating upon his established profile as a foreign correspondent for Swedish public service television. Again, he is to be filmed in the United States, Asia, Africa and other European countries, but this time, the foreign soil he is roaming shall be depicted as firstly belonging to the same 'hidden continent'; that of the global development of biotechnology. Rather than 'our man' in Washington or Hong Kong; Rydén seeks recognition in *Life at Stake* as the Swedish people's man in the New Biology.

How is this global tour to the heart of contemporary science and technology to proceed? Rydén's synopsis outlines the intention to concentrate on the collection of two types of film

came into existence in Sweden during the 1990s, the project deficit has hitherto been covered by the Swedish

testimony. In the first instance, it is intended to focus on 'strong and gripping' personal stories taken from all over the world, showing particular individuals and families in the throes of life and death decisions pertaining to the advance of biotechnology. Starting, for example, with the filming of his own willingness to subject himself, and his son, to different forms of genetic testing, Rydén presents the ambition to draw into focus the immense trauma that on occasion accompanies decisions to undergo such testing. Film testimony capable of bringing such relatively private and emotionally-charged circumstance further into the public eye is assigned by the synopsis a special moral pertinence for the advancement of public reasoning over the New Biology.

Again, we can see interesting continuities here with Rydén's previous work analysing global developments from the perspective of vulnerable individuals with everything to win or lose in the course of events. For example, there are parallels with Rydén's two films released during the nineties dealing with juvenile offenders sitting on death row in the United States, one closely following the fate of a young Hispanic boy, Miguel Martinez from Laredo, Texas. There are also affinities between *Life at Stake* and the first film Rydén released during 2003, *The Boy With No Face*, where the little Vietnamese boy Hoa tells his own story after an unexploded phosphorous bomb detonates in his face leaving him into the clutches of a vast array of international helping hands (Rydén 2003).

However, *Life at Stake* varies from Rydén's previous work in the way that its dramaturgical form is intended to privilege a second type of testimony assigned the task of clarifying the context within which the first type should be understood. Alongside a series of highly personal and emotionally-charged stories, *Life at Stake* is designed to show Rydén meeting; talking; and attentively listening to world-renowned scientists, primarily Swedish, active in the development of biotechnology (Rydén 2002: 8). In this way, Rydén's filmic journey to the heart of science and technology is also meant to appear as his own participation in a specially-organized programme of *folkbildning*. Recognized for his 'investigative journalism', Rydén could be perceived as eminently qualified to travel the world, cunningly interrogating scientists and other relevant actors, but in *Life at Stake* the intention is to portray him starting out from a situation similar to the one ascribed to his audience. Like them, he is also to be

seen as still struggling to form and express worthwhile opinions about biotechnology, obliging him to continue on his travels in search of further relevant testimony.

Folke Rydén's choice to dispense *folkbildning* through the filming of himself undergoing it can be seen as reflecting the way in which collaborative relations between Genibild AB, Scientists Meet Film-Makers and the Science Forum evolved. These relations served to transform *folkbildning* into an activity founded upon a large number of, both off-screen and on-screen, meetings between Folke Rydén and his film team and a dispersed group of research scientists. Already attached to the *Life at Stake* synopsis is a list of 46 expert advisors to the project setting out who has been contacted, or who it is intended to contact, during the making of the two documentaries. This list encompasses 39 professors and senior researchers from specialist areas embroiled in the development of biotechnology (e.g. biochemistry, cell biology, clinical genetics, chemical ecology, pharmacology, health economics, psychiatry, applied philosophy and ethnology). As well as a Swedish Nobel Prize winner (Arvid Carlsson) the list also includes several famous bioscience entrepreneurs, most notably Kari Stefansson, Managing Director of deCode Genetics in Iceland.³³

Having played a vital role at the beginning of the project, when the chances of any film at all being made remained slim, Scientists Meet Film-Makers continued to mediate between the two cultures of science and film-making throughout the production of *Life at Stake*. After the decision to go ahead with the project was taken in November 2002, co-operation between Genibild AB, the Science Forum and Scientists Meet Film-Makers proceeded firstly through regular 'reference group' meetings held at approximately 8 week intervals. The desirability of holding such meetings is already taken up in the *Life at Stake* synopsis where they are discussed as offering opportunity for the mutual exchange of information, and for expert advice and feedback to be given regarding the developing form and content of the films (Rydén 2002: 20). As it turned out, the reference group for *Life at Stake* remained limited to Peter Sylwan of Scientists Meet Film-Makers and Lars Nilsson of the Science Forum. Rather than offering expert advice themselves, these two mainly acted in support of the research process underlying the films by supplying Folke Rydén and his researcher Lotta Skoglund with a continuous stream of names and contact details connecting them up with those experts

³³ More accurately, you could say the list by giving a corporate affiliation recognizes some bioscientists more for their business activities and connections than for their continuing academic connections.

judged most suitable to talk to on any particular issue.³⁴ In this way the research process came to establish a pattern of interaction which from a very early stage exerted an influence over the dramaturgical form chosen and developed in the two films.³⁵

Images of Pain as the Touchstone of Truth

Given the task assigned to Folke Rydén's two films of putting the public's questions to the New Biology, and the decision to concentrate on the collection of two types of film testimony offering relevant responses to these questions, how was the framing of this investigative endeavour further developed? One possibility would have been to present the films as awarding bioscientists, and in particular leading Swedish ones, a 'fair public hearing'. This choice of frame appears self-evident given the Swedish research community's own decision to finance the films and the involvement of Scientists Meet Film-Makers in helping to point Folke Rydén and Lotta Skoglund in the direction of different scientists. However, although *Life at Stake* does privilege the testimony of individual scientists, the granting of these scientists a 'fair public hearing', and the chance to air their personal viewpoints, remains insufficient to capture the final orientation of the two films. Instead, the intention is to go further in unveiling the truth about biotechnology before a film audience, but not through a reliance on scientists' testimony alone. It is rather through the interspersed testimony of scientist testimony with gripping and emotionally-charged lay testimony that the films seek to help the viewer draw conclusions and pass judgement on science in society.

Starting from the association of biotechnology with a range of ambiguous threats and possibilities, Folke Rydén's two-part documentary is designed to take us closer to the truth of science in society by helping the viewer see the difference between real and imagined life

³⁴ As Lars Nilsson describes the process emphasizing the part played by Peter Sylwan: 'Peter's role was more that they (Rydén and Skoglund) would ask; "What do we know about this, that, and the other?" and Peter would say: "That is something him or her are concerned with up there in Umeå, they know a lot about that". So they (Rydén and Skoglund) would ring up and gradually find out more and more' (Nilsson interview, Science Forum 21/10/03). In Swedish: 'Peters uppgift var framför allt; de (Rydén och Skoglund) säger, "Vad vet vi om det här och det här?" och då säger Peter; "det kan de och de i Umeå; han eller hon kan mycket om det här området", så ringer de (Rydén och Skoglund) och så får de reda på mer och mer'.

³⁵ Charting this influence in quantitative terms we can divide those who Rydén is shown meeting in the two films into three categories: a) Scientific spokespersons b) Lay spokespersons whose lives are somehow at stake in the development of biotechnology c) Spokespersons from politics and commerce. In the first part of *Life at Stake* on biomedicine, we meet 11 scientific spokespersons, 12 people whose lives are at stake and 3 persons from politics and commerce. In the second part on agricultural biotechnology we meet 9 scientific experts, 3 people whose lives are at stake (all from Zambia) and 8 representatives from politics and commerce.

threatening situations connected with its development. This means that part of the aim is to set about exposing and dispelling unjustified public fears and anxieties concerning biotechnology. How is the difference between true and false, life and death situations to be established on film? Here, both films rely on the power of visible pain and suffering to deliver authenticity. As Peters (2001: 711) elaborates, the association of pain with authentic testimony can be traced all the way back to ancient Greece where the original word for torture, *basanos*, also meant a touchstone – something against which golden objects could be rubbed to see if they were genuine. In related fashion, *Life at Stake* uses images of human torture and distress as the touchstone of truth about biotechnology. While both films prize the testimony of leading minds, they also draw attention to suffering bodies as capable of saying more than words can express about science and society relations.

The first part of *Life at Stake* opens with scenes from a hospital ward making the viewer a party to what resemble a pair of deathbed confessions. We are introduced to a young man called Robert and a little girl called Johanna, both chronically-ill with leukaemia, their only chances of survival assigned to still experimental forms of treatment involving stem-cell transplantation. Robert is asked by Folke Rydén what science and medical genetics has meant to him. He replies: 'Everything, in reality, it's the whole of my future'. Moments later, Johanna's father confirms: 'Without this possibility (a bone-marrow transplant) Johanna has no chance of getting better. If you don't get better from this disease you die, it is a fatal illness. That's how it is' (Rydén 2003a: 1-2).

In similar fashion, the second part of *Life at Stake* commences with footage from Zambia, a country where, as Folke Rydén's voice-over informs us, the population has long been plagued with hunger and starvation. We are shown a young woman standing by the road-side, first talking with Folke Rydén, then standing alone. Rydén's voice-over tells us her name is Mutinta Mucindu, and that she has told him she has nothing to eat. The same day he met her, Rydén continues; 'I saw thousands of sacks of maize meal in a warehouse not far from Mutinta's home. Food aid from the United States for the starving. But this maize, I find out, is genetically-modified. And for this reason it isn't being handed out to Mutinta or anybody else' (Rydén 2003b: 1). In both films, therefore, Rydén commences by using spectacles of pain and distress to establish the justifiable authority of victims of disease and hunger in public debates about biotechnology. These are individuals, or families, whose lives are to be

seen as genuinely on the line in the development of biotechnology, making it only proper that their testimony achieves greater prominence than that of others.

However, although victim testimony may appear demanding of greater public attention, and due to its bodily basis, imbued with the power to speak louder than words, there remain reasons for examining the style of its mediation in Folke Rydén's films. For example, the emotional intensity of the initial hospital scenes mentioned above is enhanced by the overlay of excerpts from Chopin's *Fantaisie-impromptu* op.66. Similarly, the pathos of further footage from Zambia of an old woman carrying home a sack of gmo-free maize in the rain is heightened by excerpts from Schubert's *Piano Trio* op.100 lifted from the soundtrack of Stanley Kubrick's *Barry Lyndon*. More fundamentally, however, the mediation of victim testimony in *Life at Stake* requires closer examination for the way in which it is consistently mobilized to the same effect. While it could have been presented as bearing a more ambiguous message, it is repeatedly used in both films to provide hard, morally-charged reasons for the relaxation of ascribed fears and anxieties, hindering greater public acceptance of biotechnology. So returning to the reportage from Zambia, we find victim testimony confirming the role of government in spreading fears of gmos among a populace deprived of accurate scientific information. After the Zambian Minister of Agriculture is shown declaring; 'It was surprising, the dogs never ate it (gmo-maize). They would never eat it', we see Rydén interviewing another young woman called Rosemary Mumbwa:

Rosemary Mumbwa: 'No, I wouldn't like to eat it. Because you know, when you are told that there are poison in this and then you eat it, you'd be fearing'.

Folke Rydén: 'But have you seen any evidence of that claim? That it would be poisonous?'

Rosemary Mumbwa: 'No, I haven't seen any evidence'.

Folke Rydén: 'But still you're afraid?'

Rosemary Mumbwa: 'Yes'.

(Rydén 2003b: 14)

Relatedly, in the first part of *Life at Stake*, we find a meeting with the couple Joseph and Diane Rinaldi intended to help calm and soothe public anxiety over the use of pre-implantation genetic screening in the development of IVF treatment. Joseph and Diane were, we are told, 'a typical American middle-class family. But with one exception. No children' (Rydén 2003a: 17). After five late miscarriages, Diane Rinaldi testifies that her and husband saw embryo diagnostics as 'our only choice, our last hope' (Rydén 2003a: *ibid*). Their doctor then confirms that, before, all we could do was put our hand on the woman's abdomen and

say 'everything seems fine', while, 'now we have pushed to before they ever get pregnant – pre-implantation – before the embryo implants into the womb' (Rydén 2003a: *ibid*). Thereafter, we see Joseph and Diane sitting on their front lawn playing ball with their wavy-haired baby son. While we listen to Debussy's *Reviere*, Diane tells us, as Joseph nods in agreement: 'He is a big miracle, and we thank God every day, we really do. It is amazing what they could do. And to take advantage of it is I don't see a problem with it' (Rydén 2003a: 18).

Picking up on the issue of 'what could be wrong with taking advantage of the latest research if it can give a better life?', Rydén moves from the formerly childless couple to an interview with Christopher Reeve, still paralysed from the neck down after a riding accident. Without treatment based on therapeutic cloning, we are told, the former film star will never walk again. Reeve, shaven-headed, sitting in his wheel-chair, taking a drink through a plastic straw to prepare himself for interview, is shown as someone determined to exploit his celebrity status to win greater acceptance for innovations in biomedicine and research on embryonic stem-cells. Described as struggling firstly against American politicians who seek to rule such research unethical, Reeve tells Rydén:

I am very frustrated and very disappointed and angered by public policy at the federal level in this country. We have an extraordinary technology, but all kinds of stem cell research is not going forward as rapidly as it should. That is unfair to so many people that are suffering all over the world (Rydén 2003a: 19).

Taking one final example of victim testimony serving to counter and/or soothe imputed public fears and anxieties about biotechnology there is the case of Rydén's encounter with Annika Eriksson, also in part one of *Life at Stake*. Annika is a supermarket cashier who Rydén meets together with her brother at the Centre for Clinical Genetics in Uppsala, as they are about to be told the results of tests showing whether or not, they carry the breast cancer gene BRCA1. Annika tells Rydén that her aunt has had breast cancer, and that her father has tested himself, and he carries the gene. She then says that, she is already more or less resigned to the fact that she also carries the gene. At this juncture, the doctor enters the room and greets Annika and her brother. After a brief introduction, the doctor informs them both that neither carries the gene BRCA1. Annika is elated, the doctor says she must be relieved, to which she replies that it will be wonderful to ring to her father and give him the good news. Next, we see Annika in

the corridor phoning her father: 'Hi, it's me. You don't need to sound so dejected because it's okay with both Roger and me. We don't carry it'. At this point she can no longer hold back the tears, and as her hand comes up to her face we hear the opening chords of the *Adagietto* section of Mahler's 5th Symphony. The camera then stays on Annika as she moves towards a busy stairwell, repeatedly wiping tears away from under her glasses.

An interesting aspect of this last example is that it offers dramatic confirmation of the power of biotechnology, to eradicate public fears and anxieties rather than give rise to them. As Rydén comments, 'Annika got to know she was healthy before she became sick' (2003a: 7). A genetic test is seen to rescue Annika from her own false assumption, that just because her aunt and her father carry a particular gene she must carry it too. At the end of the film we see Annika and members of her family briefly once more. Rydén tells us, she says it feels like she has been given a new life. 'Now we're going to IKEA' says Annika laughing, and we see her and her family departing together. So 'victim' testimony in this case becomes all the more powerful for combatting public apprehension towards biotechnology, by the way in which it reveals to us *no* life at stake, and someone learning that they are no victim at all. In this case a genetic test can appear as good as a cure.

But what if Annika had received bad news instead? What if she'd received confirmation that she was sick in advance of illness? Although in the synopsis to *Life at Stake*, and a later draft manuscript, the intention was clearly to focus on such situations,³⁶ no one in the final film is shown receiving confirmation of genetic disorder, or having to wrestle with the choices and responsibilities following from such confirmation. We see someone else suffering the pain of not knowing, and of having to wait to find out, if they are pre-disposed to intestinal cancer or

³⁶ The introduction to the synopsis for *Life at Stake* deals with Eva and Anders Malm (Rydén 2002: 4). Anders has recently had it confirmed that he is pre-disposed to Huntington's disease. The news came when Eva and Anders were already expecting their first child and the scene described is one where a sample has just been taken from Eva's placenta in order to discover if the child is also a carrier of Huntington's disease. What future awaits Eva, Anders and their unborn child? In a draft manuscript for *Life at Stake* dated 31st March 2003 (Rydén and Skoglund 2003), made available to the author by both Scientists Meet Film-Makers and the Science Forum, a position of similar prominence to the one devoted to Annika Eriksson is devoted to a Christina Björck instead. Christina is a nurse who has established a support group called Gensvar (this is the Swedish word for sympathy, but can also be read as 'gene-answer') for women like herself who have been diagnosed as pre-disposed to breast and ovarian cancer. The intention was to show a meeting of Gensvar and follow the discussions taking place among the women present. Christina was also to be interviewed in her home about her choice to undergo surgery and have both her breasts and her ovaries removed so as to avoid the high risk of cancer. We were also to meet Christina's mother who has suffered from breast and ovarian cancer. During the interviews carried out for this study none of the parties involved in the making of *Life at Stake* have been willing to comment at length upon, or attach any significance to, the replacement of Christina Björck with Annika Eriksson during the last months of

not, but we are not exposed to anyone suffering the revelation that they *are* at serious risk of genetically-defined illness with no immediate prospect of cure. Why isn't space allocated in *Life at Stake* to individuals given this type of 'new life' by genetic testing? Cannot their 'certified victim' testimony ultimately be considered more relevant for informing public reasoning on biotechnology than Annika's type of 'imagined victim' testimony? The conclusion one is encouraged to draw is that different varieties of victim testimony have been included or not in *Life at Stake* depending upon how easily, and relatively unambiguously, they can be combined with an overriding agenda of promoting public confidence in science and technology.

Helping the Public To See Reason

Taking the analysis above a step further; not only is victim testimony used in *Life at Stake* to promote public confidence in science, but also to point to the superiority of autonomous scientific decision-making in society. Although offered visibility and voice, those whose lives are filmed at risk in the development of biotechnology, are *not* shown attempting to gain any greater control, or influence, over the science and technology determining their lives. On the contrary, they are firstly shown displaying implicit trust in science; pinning all their hopes on biotechnology, or registering their lasting debt of gratitude to it, for what it has already been able to deliver. In the first instance, those whose lives are at stake are filmed willingly surrendering their bodies, or their children's bodies, to experimental treatment and novel foods, and if not, then failing to do so for reasons other than scientific. Victim testimony in *Life at Stake* only becomes explicitly political and argumentative, when it is directed against forces portrayed as either unnecessarily obstructing, or dangerously perverting, the course of scientific and technological advance. In addition to disease and hunger, the victims in *Life at Stake*, are also meant to be seen as the victims of these, other than scientific, forces hindering their salvation.³⁷ So for example, Christopher Reeve is intended to be seen as much a victim

film production. Lotta Skoglund, however, has confirmed that the scenes involving Christina were filmed and that they shall be appearing on Swedish television in another context (Interview 3/12/03).

³⁷ So again, this explains why it would have been inconsistent to show someone being declared sick in advance of illness through genetic testing in *Life at Stake* as this would show the production of new scientific knowledge as itself capable of generating human pain and distress. Again in the draft manuscript of *Life at Stake* from March 31st 2003, we see how it was intended to explore this issue through an interview with a nurse called Ulla Platten at the Karolinska Hospital (also named in the film synopsis). Discussion was to revolve around why a significant number of people choose not to collect their test results after genetic screening and how such behaviour can be deemed both ethically defensible or socially irresponsible depending upon the circumstances.

of faceless American politicians obstructing the progress of stem-cell research (the enemies of cure), as of the accident that originally left him paralysed (the cause of illness).

Thus, *Life at Stake* concentrates on producing a particular framing of the politics of contemporary biotechnology. If constructed in a somewhat novel fashion, this framing remains a highly conventional one, and one we regularly find deployed to advance an orthodox 'Enlightenment position', on the nature and role of scientific authority in society (see Jarvie 1990).³⁸ It is a framing where new technology is depicted entering society as *neutral* technology after having emerged out of a closed and impersonal process of intellectual endeavour. This latter process is imagined to correspond with the advance of Human Reason; something which must be accepted as proceeding independently of, while always remaining vulnerable to, surrounding social, political, economic and religious forces. These surrounding forces, however, must also be envisioned as immediately coming into far more powerful play as soon as technology (the fruit of Reason) is applied in society. Viewed in this light, the politically correct task for the politics of technology to address becomes that of staunchly defending the few who stand for the true, radical promise of new technology against the many who can serve to undermine it.³⁹

Who is standing on the side of Reason and allied with the true promise of biotechnology, and who is to be seen as constituting a corrupting outside influence? Folke Rydén, the erstwhile foreign correspondent, sets himself the task in *Life at Stake* of helping viewers distinguish between the two camps, both at home in Sweden and around the world. In some contexts, the true promise of biotechnology is seen reaching fulfilment, in others, more subject to betrayal. However, this is a mapping exercise that can only be pursued so long as the promise of biotechnology is spared serious ambiguity. Therefore, an accompanying task *Life at Stake* sets itself is to show how this promise is backed by a relatively solid and undivided body of

³⁸ As Jarvie reminds us, the philosophy of the Enlightenment in its most radical renditions sees scientific knowledge leading to the exclusion of all other forms of knowledge claims. For Francis Bacon, for example, 'what had previously been considered knowledge either was not knowledge at all but something else, and should be consigned to oblivion, or at best was knowledge so gravely polluted that it was best to discard it and make a new start' (Jarvie 1990: 73).

³⁹ Perhaps the most impassioned enactment of this framing of the politics of biotechnology is supplied by the defiant Zambian molecular biologist, Luke Mumba in part two of *Life at Stake*: 'I went ahead in spite of the many, many hurdles I was facing. To really stick my neck out and say no, I still feel very strong that this technology has a role to play in this country. And I am proud of that, and I'm not giving up at all. If Zambia doesn't got biotechnology, biotechnology will come to Zambia anyway. Because we are not an island...Are we going to put a war fence, an electric fence, around Zambia. No, the biotechnology will come. So the way for it,

scientific opinion. The unity of this scientific core is shown standing in stark contrast to the many and varied non-scientific forces working to mar the future of biotechnology.

So how does *Life at Stake* set about trying to help the public see Reason in the case of genetically-modified food? At the beginning of the second film, Rydén is shown sitting in a kitchen holding a specially-prepared packet of 'corn cookies' with a Swedish label saying they are produced by Monsanto and genetically-modified. Would anyone dare eat one of these cookies Rydén asks; the answer he says depends upon where in the world you find yourself today. He is then shown walking on and off camera in the United States, Zambia, Sweden and China briefly describing how gm-foods have been received in each of these countries. How they have been either accepted without fear; totally rejected or treated with caution. Given this variable reception, Rydén then rephrases his question to: Do *I* dare eat this Monsanto cookie, which he is now filmed sniffing, and holding before his mouth. After a collage of different voices speaking for and against gm-foods, Rydén states that in his travels around the world he was continually confronted with different answers, forcing him to conclude that 'either you saw the New Biology as a threat or as the solution to several of the world's most serious problems' (Rydén 2003b: 3). In this way the 'safe cookie question', Rydén poses to himself, is quickly allowed to grow in stature, and become a surrogate for the larger one of, whether or not he and the rest of us should be prepared to accepted or reject the New Biology as a whole.

But *what* again is the New Biology, Rydén continues by asking. At this point we are transported to a laboratory environment to witness Rydén in conversation with a Swedish professor in molecular biology. The professor tells him that the New Biology is characterized by co-operation among many different sciences: chemistry, physics, mathematics, biology, medicine and computing. So we are talking about a new science, concludes Rydén: 'A breakthrough in knowledge to be compared with the discovery of the atom and the nucleus of the atom as many say' (2003b: 3). Thus, in the space of five minutes at the beginning of the second part of *Life at Stake*, Rydén succeeds in depicting a failure to ingest a genetically-modified cookie as an act equivalent to turning your back on the collective efforts of contemporary science and fundamental new breakthroughs in knowledge.

really, is for us now as a country to start preparing, so we are part, you know, of this revolution' (Rydén 2003b: 15).

The second part of *Life at Stake* is heavily pre-occupied with the issue of whether or not it is safe to eat gm-foodstuffs, and at pains to avoid lengthy discussion of the long-term environmental consequences of agricultural biotechnology. This is because in the former case a strong scientific consensus can be shown to exist, while in the latter it can not. Concentrating on the 'safe cookie question' where an unambiguous answer can be safely supplied, Rydén's primary objective is to reassure viewers that eating gm-foods is as safe as eating any other foods, and how even opponents of gm-foods do not seek to contest this fact. To help arrest what can only be judged irrational fears about eating gm-foods, Rydén takes us inside Monsanto to show us how, although the company has patent rights to protect, there is nothing they wish to hide about the basic underlying technology used to make their corn cookies.

Taking the 'safe cookie question' a step further, Rydén seeks to place consumer distrust of gm-foods in a more paradoxical light. This he does by pointing to an abundance of pharmaceuticals on sale across Europe produced through the use of gene technologies. Also, through an interview with a representative from H&M, he is able to discover that Europeans show no aversion to wearing clothes, or sitting on furniture fabrics made from gm-cotton (Rydén 2003b: 10). In this way it is implied that gm-foods have fallen foul of an undesirable process of political demonization. However, *Life at Stake* does not want this to be taken to mean that politics and commerce only have a negative role to play in the development of biotechnology.

Picking up on the testimony of the American social scientist Marion Nestle, that the safety of gm-foods does not guarantee their acceptability, Rydén is prepared to highlight the importance of issues of political and commercial governance for determining the future of biotechnology. Companies and governments are perfectly capable of mismanaging the promise of biotechnology and, therefore, we should not be at all surprised if political conflicts arise (Rydén 2003b: 18-19). Given this situation, Rydén presents Zambia's rejection of gm-foods as, although misguided, partly understandably given this African nation's concerns over issues of political and economic self-determination. However, the underlying point remains that it is both possible, and *necessary*, to draw a strict line of demarcation between the science and technology of gm-foods (safety issues) and the politics of gm-foods (governance

issues).⁴⁰ Those participating solely in the governance of biotechnology, and not in its invention, cannot be authorized to speak about the true promise of biotechnology, as they can only continue to take this on expert advice. This line of reasoning which pervades *Life at Stake* loses credibility as soon as scientific opinion on biotechnology is shown to be divided. Then, the rigid demarcation of science from politics becomes less easy to enforce as the governance of biotechnology is seen to encompass decisions favouring one line of scientific argumentation over another. For this reason, *Life at Stake* actively avoids showing scientists in disagreement over the promise of biotechnology. This is why only 1 minute out of 50 in the second part is devoted to expert testimony charting the potential long-term environmental impacts of gm-crop cultivation. This minute also ends up looking pale, against the 2 minutes 25 seconds devoted to a meeting with the colourful Craig Venter – a man often ‘compared with Newton and Einstein’ – who is shown currently exploiting gene technology to develop new microorganisms (‘...it could take 20 years, it could take 50 years’) capable of acting as alternative sources of biological energy, reducing dependence on oil and helping to *save* the environment (Rydén 2003b: 11-12).

The clinical separation of the (unified) science of biomedicine, from its (more messy and controversy-prone) politics and commerce also characterizes the first part of *Life at Stake*. For example, after a visit to China, where biomedicine is seen mobilized in support of new family planning policies amounting to a new eugenics, Rydén tells us that he ‘got the horrible feeling that the New Biology could be successfully adapted to serve all manner of purposes. As in the case of all science and technology its development cannot be halted. But it is we as citizens who decide how it should be applied’ (Rydén 2003a: 22). In other words, just as science cannot and should not tolerate any external interference as it transmutes itself into technology, neither can it be held responsible for the manner in which society ultimately chooses to deploy its inventions.

This is also the message projected when Rydén travels to Iceland to meet Kai Stefansson, Managing Director of deCode Genetics, and various Icelandic citizens concerned over the data protection issues the actions of this high profile biotech company raise. Having collected

⁴⁰ At the end of the second part of *Life at Stake*, Rydén is filmed back in the kitchen munching a Monsanto cookie. Accepting that the safety issue should be placed beyond politics and left to expert discretion, he says that just because gm-foods are safe this doesn’t mean that ‘I’ll automatically buy gm-products. This involves making economic and political choices that every individual must make for themselves. This is something, if anything I have learnt after talking with scientists and researchers around the world’ (Rydén 2003b: 24).

patient records and blood samples from approximately 90,000 Icelanders, we hear a citizen suffering from MS testifying how she doesn't approve of a private company 'taking so much data about a person and putting it all on one spot', and how this 'invites to misuse' (Rydén 2003a: 10). The worst scenario, says the leader of a patients' rights organization, is that 'people will not trust their doctors. People can not tell them their important secrets. People cannot trust scientists' (ibid: 11). On his return from Iceland, Rydén is shown visiting Huddinge Hospital, outside Stockholm, where blood samples from all newly born children in Sweden have been collected since 1975. This must constitute an enormous resource for medical research, asserts Rydén, but could this precious biobank be open to misuse? No, declares a Clinical Director reassuringly, this remains hard to believe thanks to tight legal regulation and internal hospital security (ibid: 12). Again, the conclusion Rydén's audience is being asked to draw is that politicizing biobanks only remains legitimate so long as the aim is to reaffirm their great promise for medical research, and their continuing need for strong protection against all possible forms of non-scientific control capable of undermining this promise.⁴¹

Science Film, Political Invention and the Remaking of Scientific Authority

The old biology produces objectivity by escaping as much as possible from the shackles of ideology, passions, and emotions; the New Biology feeds on all of these to render objects of inquiry more familiar (Latour 1998: 208 – adapted to Swedish circumstance).

Part one and part two of *Life at Stake* were broadcast on SVT2 on successive Mondays at the beginning of September 2003 as separate episodes of the series *Vetenskapens Värld*. The viewing audience in both cases was estimated to be 500,000. Although the Science Forum had hatched plans that each episode should be followed by a specially-organized studio debate, SVT could not be persuaded to go along with the idea.⁴² In general, both films have received

⁴¹ After *Life at Stake* was broadcast in September 2003, the same framing of the the politics of biobanks could be witnessed in the Swedish press in connection with discussions arising over Huddinge Hospital's release of blood samples to the police assisting them in their search for Foreign Minister Anna Lindh's murderer (October-November 2003). As was reported in Sweden's leading broadsheet newspaper, *Dagens Nyheter*, police access to the Huddinge biobank threatened to undermine public confidence in medical science. If as a result of this, citizens started to withdraw their blood from the biobank, the public would risk endangering themselves by denying themselves the possibility of superior diagnoses for a whole range of diseases in the future (Snaprud 2003).

⁴² In lieu of studio debates the host of *Vetenskapens Värld* was shown after each film interviewing a working scientist and a bioethicist to get 'alternative perspectives' on the developments depicted. After the film on biomedicine, a young Swedish stem-cell researcher was interviewed standing next to a more elderly Professor in

little further attention in the media, and have not been subject to extended review or discussion in the Swedish press. With their failure to provoke further discussion, the role of the films as a complement to the Science Forum's New Biology website has gained increasing emphasis. This means that the films have ended up being directed at the same younger audience as the website. In this context they have been imagined capable of priming the interest of older school students in their engagement with the site as an educational resource.⁴³

At the beginning of 2004, *Life at Stake* became a fully-integrated part of the New Biology website. A box representing the 'nucleus' of the site has been shifted to the top of the central cell bearing the name the New Biology. Clicking upon this box opens up a general introduction to the site, as well as the opportunity to view both parts of *Life at Stake* in their entirety, in either a Windows Media or Quick Time video format. With the depiction of a roll of film unravelling into a double helix and snaking its way up the right-hand side of the picture frame, it is mentioned that the two films were originally broadcast on SVT's *Vetenskapens Värld* during September 2003. It is also advertised that VHS- and DVD copies of the films are now available from the Science Forum at reduced cost for the purposes of 'non-commercial' education (www.forskning.se/nyabiologin). Literally-speaking, therefore, *Life at Stake* has been installed as a public gateway to biotechnology - as an appropriate first encounter for young Swedes in particular, hopefully pre-disposing them to further education in the many and varied aspects of the field's rapid development.

The limited ability of *Life at Stake* to live a larger public life of its own after television broadcast, and its growing incorporation into the New Biology website, is interesting to reflect upon in relation to the vision advanced by Scientists Meet Film-Makers of the

Medical Ethics. The two expressed their joint commitment to working close together, and both condemned such practices as reproductive cloning and the growth of genetic tests marketed over the Internet. After the film on agricultural biotechnology, a division of expert opinion was more apparent. First, the programme host was joined in the studio by the Vice-Rector of the Swedish Agricultural University who reaffirmed once more that it is safe to eat gm-foods. Then in a filmed interview a Danish Professor in Bioethics questioned the idea that the public was afraid of gm-foods by saying that the evidence was rather, that they were opposed to them due to the potential long-term risks associated with them. The Vice-Rector then returned to stress that it is not the technology of gene modification itself that is dangerous, only its potential misuse. As she put it; the technology is exact, but its use must be closely controlled and regulated. Thus, as in Rydén's films, the accompanying interviews also sought to draw a strict line of division between the science of biotechnology and the surrounding politics and commerce of biotechnology. The former is to be seen as only bearing promises, while the latter may bring new risks and dangers if subject to mismanagement.

⁴³ It can also be mentioned that an English-language version of *Life at Stake* has been produced in the hope that the two-part documentary can be successfully marketed abroad. In December 2003, *Life at Stake* was screened at the nature and science film festival 'Living Europe' held in Helsingborg, Sweden which was also partly hosted by Scientists Meet Film-Makers.

contemporary challenges facing science communicators. According to this vision, improvements in the public understanding of science are being hindered today by scientists' still limited understanding of public audiences, and how to attract them. Or, as Peter Sylwan of *Scientists Meet Film-Makers* chose to express it in interview:

The scientific community can come up with how many exciting new things they like, but if they cannot build bridges over to society at large, they are not going to win acceptance for their inventions...the scientific community must learn to debate on society's own terms (Sylwan 20/10/03).⁴⁴

What is poorly appreciated, Sylwan argues, is that in order to advance public knowledge of science, communicators must be prepared to draw on public emotions. Emotional engagement with science provides impetus to new patterns of public reasoning over science. To be willing and prepared to learn of new things (for example, embryonic stem-cells and gm-foods), the public must be moved by them in some way first.⁴⁵ These sentiments clearly resonate with the choice of Folke Rydén as the Swedish people's man in the New Biology and with the dramaturgical form developed in *Life at Stake*. Both films can be easily interpreted as designed to heighten levels of personal and emotional engagement with biotechnology in advance of new learning experiences. As Sylwan again stresses; 'film is a very powerful emotional medium through which you can attempt to pass on knowledge with the help of feelings' (Sylwan 20/10/03).⁴⁶

So why then, given its emphasis on emotional engagement, has *Life at Stake* still failed to draw attention and generate discussion among Swedish citizens? The answer, I believe, relates to the *purification* of science in the public eye the two films pursue. By imposing such a strict division between the science-base of biotechnology and surrounding politics and

⁴⁴ The original statement in Swedish was as follows: 'Vetenskapssamhället kan göra hur spännande saker som helst, men hittar man inte bron över till kultur-Sverige, så får de inte det publika genomslaget, så får vi ingen publik... Vetenskapssamhället måste lära sig debattera på kulturens villkor'.

⁴⁵ As Sylwan again expressed this in interview: 'An intellectual message can never be understood or comprehended if it is not rooted in our emotions. Reason and emotion are not separate entities, they cannot be put in separate compartments...you cannot understand something, if you are not somehow moved by it. It has been a disservice to science communication to believe it can be cleansed of emotion and of personal experiences' (Sylwan 20/10/03). (In Swedish: 'Intellektuellt budskap kan aldrig begripas eller förstås om det inte är emotionellt förankrat. Känslor och förnuft är inte skilda saker...De går inte att lägga i separata fack... Du kan inte begripa någonting du inte känner för... Det har skadat den vetenskapliga kommunikationen – den här föreställningen att den kan vara ren från känslor och från personliga upplevelser').

⁴⁶ Again in Swedish: 'Film är ett väldigt starkt emotionellt medium, som bygger på känslor. Du förmedlar kunskap med hjälp av känslor.'

commerce, *Life at Stake* produces a vision of pure science in denial of its own political activism and economic interests. This is something, I would contend, that even an adult audience ignorant of the uses of DNA microarrays, and the difference between structural and functional genomics, will be unlikely not to notice. By failing to show scientists as politically active and economically interested in the development of biotechnology, *Life at Stake* also makes it harder for the public to appreciate the novel relations, hybrid connections and political initiative, that lie behind the making of the two films themselves.

Arguably, bringing into focus these relations, connections and initiative can reveal more about the politics of biotechnology in Sweden today, than the vision of science versus politics the films themselves project. While the films portray the advance of biotechnology as hinging upon the continued *purity* of scientific authority in society, the process of their design and making, reveal it as hinging more upon this authority's successful *recombination*. The framing of the politics of biotechnology as concerned with the protection of the true promise of biotechnology from external threats, can *itself* be seen as a product of the new relations of hybrid connection *Life at Stake* forges among working research scientists, suffering bodies, leading financiers of research, an independent film producer and public service television, not to mention the material technologies of film production and distribution themselves. As has been discussed, through its dramatic composition, *Life at Stake* weds the testimony of (those appearing as) pure scientists with that of suffering victims whose survival is to be seen as dependent upon the freedom of action of the former. In turn, this marriage is intended to result in the consummation of a further one between a new autonomous scientific authority and broad public sentiment.

Another way of saying that the future of biotechnology depends on the recombination of scientific authority in society, not its continued purity, is to say it depends on a process of political invention.⁴⁷ *Life at Stake* can, itself, be understood as a work of political invention, where the organization Scientists Meet Film-Makers should perhaps be seen as having assumed the role of political entrepreneur in its ability to bring all the relevant actors and technical capabilities together. Invention also implies experimentation, and how scientific authority is best recombined in the development of biotechnology must be seen as remaining an open question today. Different countries, it would appear, are moving towards different

⁴⁷ For extended discussion of political inventions in the field of science communication, and more generally in the governance of technological society see Elam (2004) and Barry (2001).

solutions. Currently in Sweden, as both the design and content of *Life at Stake* confirm, political invention in the governance of biotechnology is being pursued to the intended advantage of those scientists and research organizations most closely involved in the field. To an uncommon degree, bioscientists in Sweden are being entrusted with the task of standing guard over the ethical, political and commercial dimensions of their own research practices. This coincides with a return to, or rather the reinvention of, the so-called Erlander tradition of science and society relations, which it is claimed has served the nation so well in the past, and especially at the onset of the Atomic Age in the 1950s.

In line with this pattern of development, and as mentioned at the beginning of this paper, Sweden is set to host the first EuroScience Open Forum in August 2004. Again, this event constitutes an act of political invention, where the intention is not to impact on any research field in particular, but rather, on the governance of science and technology in Europe more generally. Given the unprecedented level of Swedish (public and private) support for this event, as well as for the non-governmental organization underlying it, Open Forum 2004 can be viewed as an attempt to export the current Swedish model of science and society relations to the European level. However, like *Life at Stake*, regardless of the underlying political ambition, there remain no guarantees that EuroScience Open Forum 2004 will turn out as planned. Both in their production and in their consumption, political inventions must be seen as always capable of working out otherwise and proving a disappointment to their initiators.

Already in the advance planning stages of Open Forum 2004, SVT's role as a 'founding partner' in the event has been brought into question. The legitimacy of such a close alliance between Swedish public service television and an organization representing the 'Voice of Science in Europe' became a topic of discussion in the Swedish press at the beginning of 2004 (Samuelsson 2004). Consequently, SVT has chosen to withdraw as an official sponsor, even though its name remains listed in all the published materials advertising the event. Therefore, rather than settling the issues of *who* should be involved in the recombination of scientific authority in society, and *how* they should enter into this process, both *Life at Stake* and EuroScience Open Forum may only succeed in drawing greater public attention to these issues helping to render them more controversial.⁴⁸ In this way, both may unwittingly advance

⁴⁸ As this paper is completed (April 2004), it has been announced that the thematic sessions for Euroscience Open Forum 2004 have been selected. The Programme Committee has chosen a range of topics around which open dialogue is to be pursued. These include 'Science and Ethics', 'Knowledge in Society', 'Climate and

the redistribution of scientific authority in Swedish and European society rather than its reconcentration.

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Environmental Change', 'Nanotechnology', 'Dealing with Risk' and 'Science and Arts'. Apparently, 258 session proposals were submitted under these different topics. After a 'peer review process involving high level experts' approximately 60 proposals have been accepted. The Chairman of the Organizing Committee admits that it is unfortunate that the Open Forum 2004 has had to turn down roughly 80% of the session proposals received, but it had never been expected that the event would draw such interest (Wahlberg 2004).

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Bengt Orhall, Scientists Meet Film-Makers, Stockholm, 9th October 2003.

Lotta Skoglund, Genibild AB, Helsingborg, 3rd December 2003.

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