

Futurewatch

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Health/Medicine

New possibilities

Choosing Children: the Ethical Dilemmas of Genetic Intervention, J. Glover, O.U.P, 06, examines the arguments about the choices and best outcomes for children. These arguments can be resolved to produce a shared set of values to guide legitimate actions. Worries about the genetic factors offsetting optimal futures for children could be balanced with societal concerns about those born into disadvantageous situations. We need to be sure about what we are doing and why, convinced that we are not about to make mistakes in consequence and appreciate that our goals may not match those of later generations. The medical boundaries may be over but the social boundaries are still emerging.

Scientists have recently discovered how the human body sounds the initial alarm to rally inflammatory defence responses from B and T cells against invading microbes. Toll-like receptors (TLRs), cell surface proteins, are the keys which also play a major role in autoimmunity and in inflammatory conditions such as heart disease. Experimental drugs are being developed to rev up these immune alarms, and also to turn down their reactions in diseases such as hepatitis C. *Science*, 14 April 06, pp 184-187.

Mitochondria are tiny energy powerhouses, storing and releasing molecules from food, inside muscle cells. Long ago they lost significant parts of their DNA to these cells nuclei and identification of the missing genes could open up new pathways to treat some diseases, such as diabetes, and even human aging. Mitochondrial deficiency can theoretically give rise to any symptom, in any organ or tissue, at any age and with any mode of inheritance? *Nature*, 30 March, 06, pp 600-602.

D. A. Sinclair, L. Guarente, *Scientific American*, March 06, report on genes which can affect resistance to stress and disease and affect life span in a range of organisms from yeasts to humans. Variants of SIR, (silent information regulator) or sirtuins, are thought to be the master regulators of this survival mechanism and with more research they could enable new disease and life lengthening treatments.

Breakthroughs in electronic brain research are reported on the sixth sense or proprioception, which lets the brain know the relative positions in space of the different parts of our bodies. This will enable the currently fanciful possibility of sensory input into brain-machine interface to become reality. *Nature*, 13 July, 06, pp. 125-127.

Science, 26 May 06, pp. 1124-1126, discusses various research projects underway to create artificial eyes which can offer useful vision to subsets of blind people. Some possibilities utilise retinal implants with external controls, others use infrared input from goggles projecting into a video camera. Eventually ways may be found to develop electronic links feeding directly into the brain.

Health Affairs, Sept/Oct, 06 provides a selection of expert articles covering the Evolution and Future of Biopharmaceuticals. Advances in genetics and genomics have resulted in new biologic drugs targeted for specific treatments without affecting healthy cells. But there are important issues in the further development of these and similar therapies in personalized medicine. Manufacture is more difficult, limiting providers and facilitating higher prices. Incentives may be needed to encourage innovation, plus new policies on intellectual property rights. Clarification and policies will be needed on the connection between gene-base biologic tests and determination of who will benefit or be harmed.

Environments for Health: a Salutogenic Approach, J. J. Macdonald, Earthscan 05, calls for radical shift in western cultural approaches to health. Salutogenesis is the creation, formation or origins of health. This Australian academic primary health specialist calls for a systemic rethink away from illness, with more public education to build stronger support for preventive and promotive health care. Topics range widely over international policies, other cultures medicinal frameworks and cross sectorial determinants.

On policies, programmes and research

Health care reform is becoming an official Chinese priority, seen as critical to addressing the huge inequalities between the urban and rural populations. This includes big increases in medical personnel to staff rural clinics and train health workers, and to upgrade hospitals and equipment. Local governments have been ordered to provide a share in an insurance plan to provide for serious personal illnesses, with other contributions from government and the individuals. There will still remain enormous shortfalls in care provision for rural people, few farmers are covered by insurance, and the domination of for-profits policies in the last two decades has severely limited accessibility for the poor. *The Lancet*, 13 May 06, pp. 2564-2565.

UNICEF has just launched a radical new strategy in a renewed effort to meet the Millennium Development Goals for children. This includes some novel approaches: building on evidence rather than politically correct rhetoric and seeking measurable results by increasing coverage for interventions proven to reduce child mortality; joining the focus on health and nutrition in a synergetic unified movement which circumvents in-fighting; and shifting resources away from individual diseases to focus on child survival especially the poorest. Increased funding, practical and effective leadership and planning at all levels irrespective of institutional bases is needed. *The Lancet*, 2 Sept, 06, pp. 817-818.

WHO is to launch a campaign against the multi-million dollar counterfeit drug industry. National drug enforcement authorities are charged with enforcing the policy, which will also require government measures to eliminate corruption. Information from the public and medical personnel will be encouraged regarding authenticity of drugs and vaccines. Drug manufacturers are being asked to make their products more difficult to fake. An estimated one in four packets of medicines sold in street markets in developing countries is fake, often using dangerous ingredients. *Bulletin of WHO*, Sept 06, p. 689.

Predominantly New Zealand Ministry of Health researchers **R. Harris et al.** report, *Social Science and Medicine*, Vol. 63, 06 pp 1428-1441, on survey findings on self reported experience of racial discrimination and health in that country, following up on accumulating experience elsewhere that this factor is a major determinant of health. Using data from the 2002/2003 NZ Health Survey, a cross-section survey with face-to-face interviews with 12,500 people was analysed. Five items were included to capture racial discrimination in experience of an ethnically motivated attack or unfair treatment because of ethnicity. Four ethnic groups were categorised:- Maori, Pacific, Asian, European/Other. After regression analysis results from Maori reported 34% experience of such discrimination, Asian 28%, Pacific peoples 25%. This reported experience was associated with each of the health measures included:- lower physical functioning, lower mental health, smoking, and cardiovascular disease. Racism needs to be considered in efforts to eliminate ethnic health inequalities.

Australian academic researchers **P. Phongsavan et al**, *Social Science and Medicine*, Vol. 63, 06 pp. 2546-2561, report on linkages between social capital, socio-economic status and psychological distress in Australian adults, using a representative, population-wide survey. Social capital was defined by:-feelings of trust and safety, community participation and neighbourhood connections and reciprocity. Mental health was measured by a specialised scale. Community participation showed a weak, and neighbourhood connections and reciprocity a moderate, association with distress. Higher levels of trust and feeling safe were consistently associated with low levels of psychological distress. This has implications for examining social capital and also the significance of these factors for community-dwelling adults.

On addiction

N. D. Volkov, National Institute of Drug Abuse, National Institute of Health (US), *Vital Speeches of the Day*, June 06, confronts the common understanding that drug addiction is matter of free will and choice. She cites brain research on addicts to illustrate how many regions of the brain involved in such exercise of free will are damaged by addiction. Drug addiction is really a developmental disease, starting usually in adolescence and early adulthood, when the human brain is more plastic. The younger a person starts in adolescence the greater the likelihood of later problems with drug dependence. Not all young experimenters become addicted, because genetic dispositions and stressful environmental exposures play a part.

In the human brain, receptor cells act as mitigators of the transmission of dopamine, which regulates behaviour responses which keep up us healthy, such as eating. Overstimulation with dopamine through drugs destroys the receptors. At present

there is no treatment to restore them. Experiments on monkeys shows that those subject to greater environmental stress have lower receptor levels and greater vulnerability. Detoxified humans, kept clean from drugs, can recover certain receptor levels.

H. Phillips reports on research, *New Scientist*, 26 Aug, 06, into brain studies of persons with addictive behaviours, which reveals that there are similarities in the changes caused by addiction to gambling and to cocaine. Similar possibilities could be developing with other addictions such as gaming, internet chatrooms possibly exercise, food and sex. Incidence of such addiction is likely to rise, especially with computer related activities. At present treatment for the worst cases is complete withdrawal, but the underlying causes such as emotional problems also need addressing.

New Scientist, 29 July 06, pp. 6-7, reports that studies of programmes to treat drug addicted prison inmates in US prisons show that while treatment programmes, stressing avoidance, are costly, without them the addicts are recycled in and out of prison, with associated costs rising by factors of ten. Programmes must be continuous and individually tailored.

Listings

The Future of the Brain: The Promise and Perils of Tomorrow Neuroscience, **S. Rose**, O.U.P, 05. An expert discusses the biological features of the brain and its development, the new technologies for exploration and what they are revealing, the various prospects for further discoveries and the widening understanding of mental distress, and prospects for brain enhancement, all in lucid style.

E. D. Roberson, L. Mucke, 100 Years and Counting: Prospects for Defeating Alzheimer Disease, *Science*, 3 Nov, 06. Marking the centenary of the discovery of AD, this surveys, with some technicalities, the new therapies in the pipeline and the new insights which offer further treatment prospects.

Allergy: the History of a Modern Malady, **M. Jackson**, Reaktion, 06, is a well-informed survey for the lay reader, covering possible explanations for this malady, with environmental causes the most likely, plus possible lines of treatment, especially vaccination.

The Stem Cell Divide: The Facts, the Fiction, and the Fear Driving the Greatest Scientific, Political and Religious Debate of Our Time, **M. Bellomo**, AMACOM, 06. A well-written survey covering the current issues, concluding that there will be limited therapies available in the next decade but that in the following twenty to sixty years they should be more sophisticated and commonplace.

Economics/Business

Development debates

Taiwanese academic **S. H. Thornton**, *New Political Science*, Vol. 28/3 Sept 06, explores impacts of the post-1997 Asian economic crash on the political and economic policies of Asian countries, with particular reference to Philippines, Indonesia and Korea, and the underlying values assumed in their approaches to globalisation. The concept propounded by Asian economist **A. Sen**, development as freedom requires economic and political priorities be pursued simultaneously to achieve a just and sus-

tainable society. It provides an Asian Third Way, circumventing the made-in-Singapore Asian values and made-in-America globalisation. Asia new developmental model is strung on the continuum between the Sino- and Senian poles of development: development without-, and development with- freedom. The outcome of this will be decisive for the meaning of globalisation into the 21st century.

Princeton political academic **J. Pontusson**, *Challenge*, Nov-Dec 06, examines the Nordic countries social market economies which have the largest welfare states and the most egalitarian distribution of income. Yet they have performed significantly better than the social market economies of the rest of Europe since the early 1990s. The economic comparisons between the American and European models should acknowledge that there are two European models each with different emphasis. The Nordic model favouring equality, the rest stability.

Data analysis indicates the egalitarianism does not appear to have a strong impact on GDP in the OECD states 1994-2004. After a severe recession in the early 1990s, the Nordic states GDP recovered strongly, unemployment was sharply reduced but wage differential compression was sustained by collective bargaining policies which supported higher wages for the low paid and wage restraint from the better paid. This squeezed out inefficient firms who were being subsidised by low wages, while skill and performance received recognition, rather than corporate profitability. The focus has been on expansion of knowledge- and technology-intensive industries, supported by active labour market policies to shift workers from less efficient to more efficient businesses speedily. Very high levels of public investment in education, with special emphasis on improving the egalitarian spread of literacy enabled higher productivity from the lower skilled, offsetting their increased wages. Lastly there has been a major push to encourage gender equality and women's participation in the workforce even while raising children. Poverty levels for low income families are minimal compared with other OECD countries. Debate should focus on whether the present Nordic model is sustainable.

US economist **T. Palley**, *Challenge*, Nov-Dec 06, notes that export-led growth and supply side development form the basis of the development policies prescribed by the dominant global financial institutions. Development of the domestic, demand side is critical to economic growth, but it is ignored. To incorporate it would put the IMF and the World Bank at odds with their global political paymasters.

H. Dieter, *Global Governance*, Oct. 06 discusses two critical unresolved issues in the debate over the role of the IMF and its possible decline. Its governance structures are unsustainably asymmetrical, dominated by the OECD countries. Secondly it is not now providing a convincing safety net for financial crises. Alternative structures are being developed by countries such as those in Asia who have experienced financial crisis and found the IMF wanting. Present steps towards reform are timid and inadequate.

Global finance concerns

Financial Times, 28 Aug 06, p. 9. There are inadequate ways to measure the financial flows fuelling globalisation. Amalgamations of national figures are inadequate because of lack of accurate data from China and India, while measures of bilateral

transactions are asymmetric. Among the various proposals to improve matters, statisticians are seeking to maximise the use of existing national information by much more intensive co-operation, including the private sector. This would contribute to the development of a global information infrastructure. Statisticians also recognise increasingly that data will need to be collected at global level.

The Economist, 23 Sept 06, pp. 71-73, covers concerns about novel forms of debt financing of recent origin, backed by credit investment institutions handling pension funds, mutual funds and insurance companies. Much of this financing is private since banks have developed systems to hedge against risk and manage funds more effectively. Since much of the newer debt financing is not only unseen, it is little understood, as well as unregulated, and the effects if the market turns downward are uncertain.

A huge backroom debate is underway among Chinese finance officials about the management of the mountain of currency reserves China has accumulated from years of inward foreign investment, speculative currency inflows and a swelling trade surplus. There are increasing pressures internationally for China to revalue its exchange rate upwards. This would have serious impacts on the coastal export industries, while Chinese officials privately also fear something similar to the lengthy recession Japan experienced, which they ascribe to inability to manage the exchange rate. A shopping list of for goods, such as raw materials including a strategic oil reserve, is one way to cope. *Financial Times*, 25 Sept 06, p. 9.

On business, innovation, and the illicit

Economists **J. Siefried, A. Zimbalist**, *Australian Economic Review*, Vol 39/4 06, analysed the argument for metropolitan public funds to be applied to building sports major facilities. While there may be sound arguments for such investment as a contribution to local quality of life, the economic benefits offered by impact studies can be fraught with methodological errors, which are analysed.

J.R. Immelt, Chair and CEO General Electric, interviewed **T. A. Stewart**, *Harvard Business Review*, June 06, describes growth as process the programme he is leading to focus a great operating company on growing at 8% in a slow growing global economy. Focus will not only be on restructuring to cut costs but improving marketing and increasing R&D. The process arises from the need to transform across all sectors and to maintain this, with all the elements reinforcing each other. And lots more.

Illicit Flows and Criminal Things: States, Borders, and the Other Side of Globalisation, Eds. **W. Van Schendel, I. Abraham**, Indiana Univ. Press, 05. It is too simplistic to view illegal transactional linkages as nation states v. global criminal networks. More subtle and realistic distinction should be made between what states consider legitimate and what those in the networks consider legitimate. In the drug trade, moderate consumption of marijuana is treated by some states as legal. This broad analysis includes:- approaches in public law, underworlds, border controls, smuggling and the grey areas between licit and illicit.

Syndromes of Corruption: Wealth, Power and Democracy, **M. Johnston**, Cambridge Univ. Press, 06. Liberalised politics and markets provide new illicit as well as licit opportunities to pursue wealth and power abroad, and transfer the proceeds. Four distinct corruption syndromes exist reflecting and perpetuating deeper problems

of democratic and economic participation:-Influence markets; elite cartels, oligarchs and clans, official moguls. Reform ultimately is about deepening democratisation and justice.

Education

On policy

Waikato University Professor of Education, **M. Thrupp**, *Education Review*, May 5 06, pp. 8-9, interviewed **M. Nixon**, appraises trends in NZ education. The massive amount of inequity in the NZ system is the real concern, for though the decile approach to sharing resources helps, much more needs to be redistributed, together with a shift to a long-term strategy to eliminate underlying structural factors such as poverty. There are too few researchers looking into policy sociology, examining policy outcomes and relating them back to structural issues of gender, race and class. The real measure of student achievement could be the sort of society we have in the future.

J. A. Clark, Massey University, *British Journal of Educational Studies*, Sept, 06 examines some philosophical issues around the concept of social justice in education. Social justice is the essence of a just society and democracy, supported by a type of educated citizen, who has been encouraged to reflect on and practice, caring for fellow citizens. This has implications for resource allocation, curricula and more. At the core should be the notion of the policy web to which details can be applied. All must be logically connected to avoid contradictions. A past example was the half century of direction given to NZ education by the late Dr Beeby.

N. Fergany, lead author of the recent series of **Arab Human Development Reports, 2002-2006**, written by Arabs for Arabs, sponsored by UNDP, *Nature*, 2 Nov, 06 pp. 33-36 outlines the strategic vision which aims to restructure the region from within, building a knowledge-based society. Institutions of good governance are crucial. Deficits in acquisition and production of knowledge, in empowerment of women and in freedom, are examined in depth. A knowledge society in the Arab environment is a deeply political issue, since it requires total respect for the key freedoms of opinion, expression, and association. High quality education is crucial with especial attention to early childhood, higher and lifelong education. Research and technological development needs to be linked all aspects of society, together with a rapid transition to a society which values knowledge as essential in human activity. A general Arab knowledge model should be based on a return to true religion, promotion of Arabic language, furthering historic Arab knowledge, celebration of cultural diversity within nations and opening up to other societies. It must come from within and not be imposed.

Moderating the Debate: Rationality and the Promise of American Education, **M. J. Feuer**, Harvard Education Press, 06. Leading researcher and educational policy analyst argues that the current debates in US public education need to take account of the cognitive revolution which has influenced organisational theory and practice in other domains, but has yet to be applied in education. Reasonable and realistic strategies can be developed when observation and research are connected to prediction and policy development, in a climate of communication and co-operation.

Life skills formation

D. Goleman, *Educational Leadership*, Sept 06, applies some of the new knowledge about the neural wiring between the emotional and thinking centres of the brain to the leadership which promotes the optimal learning climate in schools. The resulting conceptual basis is social intelligence, encompassing both interpersonal awareness and social facility. It is now realised that the empathy and recognition of another person state of mind, which underlie this social intelligence, is caused by mirror neurons, which enable a person brain to replicate the emotional state of other people in interpersonal interaction. Trust and caring relationships are recognised as fundamental to the socially intelligent culture. Principals need to be trained in the leadership styles which promote this.

N. Higgins, *Waikato Journal of Education*, Vol. 11/2, 05, describes the use of action research which enabled a poorly-performing, low decile school to radically change its school culture, reducing or eliminating violence and bullying, while promoting trust and a caring culture. Action research is collaborative, relevant and practical, involving all members of a school community including parents. All are share in gathering information about how the school operates, the methods used, the quality of learning. This is analysed and reflected upon, then actioned to create positive changes, for school culture and learning outcomes.

Univ. Chicago economist **J. Heckman**, *Science*, 30 June 06, summarises the data and evidence on the early environment impacts on adolescent and adult achievement. A society with a second-chance policy for disadvantaged children should take note that delayed development of skills for the disadvantaged, caused by their deficient family environments, is very costly and inefficient. Life cycle skill formation is dynamic process in which early inputs strongly affect the productivity of later inputs. Therefore, where needed, interventions should begin optimally before preschool or at least then.

Improving Literacy in America; Guidelines For Research, **F. J. Morrison et al**, Yale Univ. Press, points to the declining national literacy standards and evidence that early intervention produces the most gains. Recommendations therefore include: - stating early, promote effective parenting, providing uniformly high childcare experiences, fostering children regulation as well as their literacy, individualised school instruction, enhanced quality and status of teachers, promoting dialogue between researchers and teachers.

On demographics

P. Callister et al, *Policy Quarterly*, Vol2/3, 06, examine the gender transition in New Zealand tertiary education and its implications. Women outnumber men enrolled in, or having tertiary qualifications, especially among younger women under 30 years, those remaining in NZ, and those taking post-graduate studies. Similar gendering is occurring in Maori and Polynesian groups. Only in architecture and building, agriculture and environmental studies and engineering and related fields do men predominate. This transition is also occurring in several other countries, including USA, but more so in NZ. Theories for this are diverse:- feminisation of schooling, new-female friendly courses, better earnings for educated women, slower male social develop-

ment, and changing patterns in family formation and childbirth. Overall this transition is positive, but some longer-term impacts needing research: the lag in male, especially Maori and Pacific Island participation and its impact on productivity and the labour market, uncertainties about impacts for work-life balance which are partially dependent on changes in male attitudes, and changing patterns in family and fertility choices. Women may forgo marriage and family for lack of a suitably qualified partner, or marry down, and remain breadwinners.

Listings

Educational Futures, I. Milojevic, Routledge, 05. An Australian educationalist and futurist provides an overview of the key issues and debates in OECD nations about what education is and where it should go. The futures perspective brings in approaches to time and visions of the future which underlie approaches to educational change.

Understanding Complex Systems, Feature, in *Journal of the Learning Sciences*, Vol. 15/1, 06. Much research into science learning now needs to incorporate the impacts of computational tools essential for scientific literacy. New scientific disciplines are evolving from earlier ones. The reductionist methods are being challenged or complemented by modelling, and complexity. Both provide a way of thinking which permits integrated exploration of complex conceptual spaces. Five contributors explore further.

China New Educational System, B. Robertson, *Far Eastern Economic Review*, July/Aug, 06. Under the slogan building A Socialist Countryside? China is endeavouring to massively upgrade its basic education system (currently per capita expenditure is on par with Chad) to redress the imbalance caused by the fee paying policies of the last few decades which enabled richer, urban parents to get the best for their children. Subsidies will be provided for poorer students and to provide rural teachers. The curriculum is being overhauled to develop Western style pedagogy, with classroom interaction, coursework evaluation and a focus on personal enjoyment.

Futures Thinking

Futures/Foresight in public policy

S. Paillard, *Futures*, Feb 06, outlines the role of futures studies in public policy development in Sweden, where they have played a significant role particularly since 1970. Central, regional and metropolitan government levels are involved using a number of types of practitioners. Planning and prospective units exist in a number of ministries, while Public Commissions usually call upon futures oriented researchers. An **Independent Institute for Futures Studies** (www.framtidsstudier.se) set up in 1987, is attached to the Ministry of Education and Research. It has a very long term focus (50-100 years, though some projects may be shorter term). The Institute publishes in various formats and media in order to stimulate a broad and open debate on future threats and opportunities. The principle of independence is emphasised, and the drafting of public policies is left to the government officials.

Consultation between various interest groups, citizens, political powers, workers and employers, is very much entrenched in Swedish practice. A Technology Foresight programme was also initiated 1990-2000 with a second now in process. Despite the apparent success of the use of futures studies in Swedish debate preparatory to policy making, informed critics consider that more needs to be done to avoid a reactive rather than a proactive, anticipatory approach.

Finnish futures researchers **V. Harmaakorpi, T. Uotila**, *Futures*, Sept, 06, report on a Regional Development Platform Method devised as an innovative tool in developing visionary regional capability for building competitive advantage. This tool has been tested in practice and is being further refined.

UK business futurists **L. Georghiou, M. Keenan**, *Technological Forecasting and Social Change*, Vol. 73, 06, pp. 761-777, examine what constitutes an appropriate evaluation strategy for national foresight activities in different situations. Assessment of foresight also needs to take account of it being one of several influences in public policy as well as the need for ongoing impact in strategy and policy development. There is no one-size-fits-all model.

Expert US strategic consultant, **A. Hines**, *The Futurist*, Sept-Oct 06, covers the essentials distilled from experienced professional futurists/strategic consultants. Six Phases:- Framing, organising the issues; Scanning, the organisational context; Forecasting, what will be may not be; Visioning, from the possibilities to the preferred future; Planning; Acting.

Listings

Futures Studies and Action Research, Eds. **J. Ramos, S. Inayatullah**, *Futures*, Aug, 06. Synergies are evolving from the convergence of the fields of action research/learning and futures/foresight. Theory and case studies are explored in this issue, showing the flexibility with which the processes and principles may be implemented, enabling reflective learning with a wide variety of groups.

The Biggest Questions Ever Asked, special feature, *New Scientist*, 18 Nov, 06, highly recommended for the general reader. Eight expertly written essays:- What is reality? Do we have freewill? What is life? Is the universe deterministic? What is consciousness? Will we ever have a theory of everything? What happens when we die? What comes after humans? Plus short responses on the biggest scientific breakthroughs of the next fifty years from leading scientists.

Science/Technology

Policy issues

Technological Forecasting and Social Change, Vol. 73/1,06, explores issues in risk and the governance of innovation in Europe, examining practice as well the trends in innovation systems theory, as they relate to national and European competitiveness. Innovation, technology and society are being challenged, for example in public resistance to new technologies and public involvement in the democratisation of knowledge. New forms of governance are needed to facilitate greater transparency for commercial as well as publicly funded innovation. How is the diffuse character of the pub-

lic represented in the debates about risk?

J. Rowarth et al, *NZ Science Review*, Vol.63/1, 06, examine wide ranging data regarding trends in NZ R & D, talent recruitment and innovation in comparison with other OECD countries. Short term efforts to stimulate innovation have not had the desired effects. With the primary resource sector forming a substantial part of the national economic and trading base, research and innovation from this sector is essential. NZ investment in R&D barely keeps pace with competitors, and recruitment of talented scientists, technologists and engineers seems likely to fall short of providing the needed human capital to drive the desire economic development.

NZ academic psychologists, **D. Marie, B. Haig**, *NZ Science Review*, Vol 65/1, 06 critique Kaupapa Maori Research (KMR) methodology which is affirmed in official policies governing N. Z. scientific research, especially in the social sciences. This research model is part of an agenda concerned with ecolonisation of ways of knowing, and denigrates rational scientific inquiry as being positivistic, meaning claiming to be value-free and objective. KMR also critiques standard social science quantitative methodologies but offers little as a substantive alternative. Support for evidence-based epistemologically reliable research is lacking in KMR. To produce high-quality research, KMR could usefully consider scientific realism in both the natural and social sciences, based on investigation of a world that exists independently of human experience and our knowledge of that. One version of this realism is pragmatic realism drawn from evolutionary naturalistic realism, which emphasises the centrality of cognitive control structures in the evolution of science.

Visions and debates in biotech

Challenging Nature: The Clash of Science and Spirituality at the New Frontiers of Life, **L. M. Silver**, Harper Collins, 06. A noted molecular biologist and rationalist explores spiritual beliefs and practices at many levels around the world. The meaning of science, faith, religion and spirituality is explored for an understanding of the spiritual (non-rational) basis of opposition in the anti-biotechnology and pro-mother Earth positions.

Nature, 11 May 06, pp. 143-145 reports that studies of identical twins have confirmed that there is a missing link in the DNA in the human genomic structure which regulates the response of the genes to the environment. This pigenetic code is a cryptic chemical and physical code written over the genome DNA sequences. An international project to map the code is being developed, though there is great debate about how it is to proceed.

The Strongest Boy In The World: How Genetic Information is Reshaping Our Lives, **P. R. Reilly**, Cold Spring Harbour Laboratory Press, 06. A well-informed, experienced science writer provides a tour of genetics, genomic and stem-cell biology for the general reader. It includes athletic ability and how it may be influenced by heredity as well as environment; human origins, race, longevity and how genetics influences our self-understanding, some genetically-based diseases, and much more.

Nature, 25 May 06 , pp. 383, 388-389, outlines synthetic biology as a rapidly emerging new field, which aspires to build biological structures from the bottom up. Genomes can be stripped down to their essential parts to learn more about the princi-

ples behind the architecture of life. There are concerns about the proper use of such technology, but the field is resisting external regulation fearing that it could be stultified.

Physicist and futurist **F. Dyson** looks forward to a time when the biotech industry is domesticated, *New Scientist*, 11 February 06, pp. 37-39. New species can be developed by knowledgeable enthusiasts from DIY kits as plant breeders are doing. Such kits will have these features:- growing a plant or animal under controlled conditions; simple and user-friendly instruments to allow unskilled people to manipulate seeds or embryos; a table-top genome sequencer to sequence single molecules of DNA; a table-top synthesiser able to synthesise substantial quantities of DNA with any desired sequence.

Domesticated biotech will begin with gardens and pets but beyond that living forms may develop in a reversal to a pre-Darwinian mode, when genes were transferred readily between life forms by horizontal transfer. The Darwinian evolutionary era when species developed which were relatively stable slowed the pace of evolution for over two billion years.

Cosmological

Life As We Do Not Know It: The NASA Search For (And Synthesis Of) Alien Life, **P. Ward**, Viking, 06. Warmly recommended, this account by an expert astrobiologist covers the state of our knowledge and ignorance and what it takes for life to get started.

Infinite Worlds: An Illustrated Voyage to Planets Beyond Our Sun, **R. Villard, L. R. Cook**, Univ. California Press 05. Estimates are that there may be a billion or more planets like Earth in the orbits of other stars. The text includes cosmic evolution, the Milky Way and looking for habitable planets. The extraordinary illustrations are science-based but also imaginative glimpses of possible landscapes in alien worlds.

Economist, 14 Oct, 06, pp. 87-88, reports on the recent discoveries of exoplanets, over two hundred of them. It is agreed that planets, either small and rocky or gaseous giants, formed from the disc of dust and gas surrounding a new star, but how this happens is debated and stranger discoveries may be made. Two space-based telescopes are to be launched in the next two years, one from France, COROT, (Dec.06) and one from NASA (Oct 08).

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