The assault on universalism

Martin McKee and **David Stuckler** watch aghast as American examples are followed to destroy the European model of the welfare state

Christmas is a time to count our blessings, reflecting how they came to be. For people living in England this reflection is more relevant than ever, as the coalition government paves the way for the demise of the welfare state. This statement will be seen by many as reckless scaremongering. The welfare state, not only in Britain but also throughout western Europe, has proved extremely resilient.[1] How could any government bring about such a fundamental change?

To answer this question it is necessary to go back to the 1940s, when Sir William Beveridge called for a national fight against the five "giant evils" of want, disease, ignorance, squalor, and idleness.[2] His call secured support from across the political spectrum. Although he sat in the House of Commons as a Liberal, his plans were implemented by a Labour government, and continued under successive Conservative ones.[3] The reasons for such wide ranging support varied but, for many ordinary people, the fundamental role of the welfare state was to give them security should their world collapse around them.

OVER NORMAL BY STANLEY DONWOOD/WWW.SLOWLYDOWNWARD.COM

That was then

There were good reasons to seek security. The British people had just emerged from a war that had shown that, regardless of how high they were on the social ladder, they could fall to the bottom in an instant. The death and destruction of war were not the only threats; a serious illness could blight a family's prospects. People wanted to be sure that they would not be on their own if disaster struck, and they were prepared to ensure this through taxes and insurance contributions. They were, literally, "all in it together," accepting rationing of food and fuel to guarantee that in the face of austerity, everyone had access to the essentials.

In the 1970s, the philosopher John Rawls developed this concept into what he called a "theory of justice."[4] He argued that a fair society was one designed as if from behind a "veil of ignorance," meaning that class and social forces were removed from policy making. As he put it, behind the veil, "no one knows his place in society, his class position or social status, nor does anyone know his fortune in the distribution of natural assets and abilities, his intelligence, strength, and the like." Rawls argued that in such circumstances decision makers would create a society that does not privilege one group over another, as no one can know where they will end up. This uncertainty about the future was a fair approximation of what many people had experienced during the war.

The postwar situation was quite different in the United States, for several reasons. The country emerged from the war with a powerful corporate sector, enriched by military spending, that could shape the political discourse in its own interests. In much of Europe, industry was devastated, and in Germany and the countries it had occupied, many major corporations were tainted by collaboration.[5 6] However, a crucial and longstanding difference was the role of race in society. In America, the rich could never fall to the bottom of the ladder, because that position was already taken. African Americans faced persistent and widespread discrimination. There was no veil of ignorance. Europeans knew they could go to bed rich and wake up poor, but a rich (and, by extension, white) American could be confident that they would never wake up black.

The consequences are apparent at all levels of American society today. In household surveys, support for welfare among white Americans is influenced by the race of the poor people who live around them: if their neighbours are white they are more inclined to generosity than if their neighbours are African-American.[7] Although inequality is diminishing across ethnic groups (just as it is has risen across classes),[8] the legacy of racial division continues to undermine support for social welfare. In states with a high proportion of African Americans, welfare payments are much less generous[9] (an illustration of the "inverse care law").[10]

"Deserving" and "undeserving" poor

Thus, one concern in explaining this American exceptionalism[11] is that welfare is not seen as insuring one's family against catastrophe but rather as a payment to people with whom one has little shared identity. In this way, society becomes divided into "deserving" and "undeserving" groups of the poor.

A second difference is that Americans have been much more likely than Europeans to attribute poverty to laziness rather than misfortune (a form of victim blaming).[12] If the rich wish to help the poor they are urged to use philanthropy, encouraged by the tax system

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and facilitated by a strong religious culture and distrust of the state. However, voluntary giving means that the donors can select the beneficiaries of their largesse, rather than leaving the choice to a democratic system. More than a third of social spending in the US comes from voluntary giving, whereas the comparable figure was less than one tenth in the pre-2004 European Union.[13]

What's in it for me?

A third factor is the relative absence of a countervailing discourse, reflecting the absence of a strong left wing or trade union voice. The entrenched dominance of the American two party system stymies the development of left wing political parties, while the geographical dispersion of population during the 19th century constrained the ability of a national trade union movement to organise.[8] Industrialised countries with a greater fraction of workers in unions, one indicator of the power of the political left, invest more in social welfare.

Understanding where the money comes from is only half the picture of the welfare system. The final main difference between the United States and Europe relates to what the wealthy get back from the state. This is much less in the US than in Europe. In every area the US is less generous; from education, to healthcare, to unemployment benefits. On average, the US invests about $3170 (£2031; €2370) per person less than would be expected if it were a member of the pre-2004 European Union, given its national income (authors' calculations).[14] In other words, the state is not there to help the rich and, in many respects, it is doing less than ever—for example, by disinvesting in public universities.[14 15] Thus, the state does not offer a system of mutual security. Instead it provides a basic safety net, albeit an increasingly threadbare one. The advantage of the American system, if you are rich, is that you can pay much less in taxes. Indeed, the low tax/low welfare system is so skewed that a billionaire will pay a much smaller proportion of income in taxes than the poorest paid workers, so that effectively the poor are subsidising the rich.[16]

By contrast, in Scandinavia, taxes are high but, in return, the rich obtain a comprehensive package of high quality benefits either free or at minimal cost, including child care, healthcare, social care, and university education. There is a clear trade-off: you pay higher taxes but you get more back in return (as well as living in a more harmonious, safer society).[17]

Recipe for destruction

So for those who wish to destroy the European model of welfare state, the structural weaknesses of social welfare in the United States offer an attractive model. First, create an identifiable group of undeserving poor. Second, create a system in which the rich see little benefit flowing back to them from their taxes. Third, diminish the role of trade unions, portraying them as pursuing the narrow interests of their members rather than, as is actually the case, recognising that high rates of trade union membership have historically benefited the general population.[18 19] Finally, as Reagan did when cutting welfare in the 1980s,[1] do so in a way that attracts as little attention as possible, putting in place policies whose implications are unclear and whose effects will only be seen in the future. All these strategies can be seen in the UK today.

The tabloid press, much of it owned by multi-millionaires, is at the forefront of the first approach. Each day they fill their pages with accounts of people "milking the system." By constant repetition they create new forms of word association, constructing a cultural underclass. "Welfare" is invariably associated with "scroungers."[20] "Bogus" invariably describes "asylum seekers."[21] They accept that there is a group of deserving poor, whose situation has arisen from "genuine misfortune" (which seemingly excludes refugees caught up in wars), but when these groups appear in their pages it is because they have been let down by the state, which is devoting its efforts to the undeserving. And as a growing body of research shows, this continuous diet of hate does make a difference.[22-24]

Republicans claim that low taxes and small government have spared it from the European disease. That is utterly false. The US is vastly outperformed by northern Europe's high-tax-and-spend states.

These countries tax heavily but also spend efficiently. They buy superb public health, quality childcare, proficient public education, quality infrastructure, and remarkable social equality. The results are lower unemployment rates, smaller budget deficits, much lower poverty and smaller trade deficits than in the US. These countries also enjoy higher social mobility, life expectancy and life satisfaction than the US.

Nor have they suffered slower growth in per capita incomes. From 1980 to 2009, US per capita income grew by an average of 1.7 per cent. Northern Europe averaged about the same. In the US, most gains accrued to the top of the income distribution. Median male earnings in the US have not risen since 1973.

–From "Death by strangling: the demise of state spending " by Jeffrey Sachs, *Financial Times* 16 December 2011

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Such vilification of the undeserving poor is not new. What is changing in the United Kingdom is the progressive exclusion of the middle classes from the welfare state through incremental erosion of universal benefits. The logic is appealing, but highly divisive: Why should the state pay for those who can afford to pay for themselves? Why should "ordinary working people" pay for "middle class benefits"? The economic crisis has given the government a once in a lifetime opportunity. As Naomi Klein has described in many different situations, those opposed to the welfare state never waste a good crisis.[25] The deficit must be reduced, and so, one by one, benefits are removed and groups are pitted against each other, as the interests of the middle class in the welfare state wither away.

The assault begins here

The first cut was to universal child benefit. This has been paid to all mothers, regardless of family income. It recognised the importance of children to society as a whole, not just to an individual family. It was also cheap, simple to administer, and free from anomalies. The government will now restrict child benefits to anyone in a family where one person is a higher rate tax payer. The problems were apparent from the start. A family with four children and two wage earners, each earning just below the higher rate tax threshold, would earn a total of up to £84 950 per year, supplemented by child benefit of £3146. A similar sized family in which only one parent worked but earned just over the tax threshold, at £42 475, would get nothing. If that parent was a widower, they would lose a further £5077 Widowed Parent's Allowance, which is linked to child benefit, resulting in an 18% drop in income. Only a saint would avoid asking why they pay their taxes at all in such circumstances.

The next thing to go was affordable university education. This was more difficult. The government first had to make the case that a university education was mainly a personal benefit, rather than a societal one. Graduates could expect higher incomes, on average, so they should pay for the privilege. The contribution they would make to society, as doctors, teachers, social workers, or in myriad other ways counted for nothing. The government argued that publicly funded education was unaffordable, yet the new system will be more expensive than what it replaced.[26] But this is viewed as a price worth paying to remove a universal benefit. Moreover, students faced with years of personal debt know that some of their fees are being used to provide bursaries for poorer students. It is easy to see how, as they struggle to pay back their debt, this generation may also ask why they are paying taxes.

These recent assaults on universal programmes are just the start. Ministers have made it clear that they see railways, which since privatisation have required much greater public subsidies, as "rich man's toy."[27] We are fed statistics showing that those who travel by train tend to earn above average income, so fares must rise above inflation. Of course, the reason (we are told) that the privatised railways are by far the most expensive in Europe is not because their shareholders are making excessive profits from what is in effect a state guaranteed monopoly but rather because of restrictive practices by trade unions, an argument that helps to erode support for them even further. Why should the ordinary commuter pay taxes to support this undeserving workforce as well as ever increasing fares?

The Mirrlees Review on the tax system, commissioned by the Institute for Fiscal Studies, has highlighted what it sees as an anomaly, whereby many of life's necessities, such as food, as well as things that make life a bit more civilised, such as books, are free from value added tax. It argues that this universal policy should be redressed and, if it causes hardship, then the poor (although it admittedly does not preface this with "undeserving" but by now most readers will get the message) should receive subsidies to help them.[28] Once again, the ordinary shopper will ask why they should be paying taxes.

No more insurance

The direction of travel should now be clear. More and more, the middle classes will ask why they are paying into a system that gives them little back. The idea that the state is an insurance system, from which they can benefit if they are in need, is steadily eroded. Even the word "insurance" will be taken out in chancellor George Osborne's plans to merge national insurance with taxation. There will be ever greater reductions in the funding, and inevitably the quality, of those remaining services used by the middle classes, such as primary and secondary education and healthcare, persuading them that they would be better off seeking private options. Public services will become like public hospitals in the United States, a service for the poor. As Richard Titmuss famously said, a "service for the poor" inevitably becomes "a poor service," as the vocal and politically active middle class abandon the system.[29] The ground rules are already being laid in healthcare, as the health secretary has sought to weaken his responsibility for a comprehensive health system. At some stage in the future any vestigial safeguards could disappear and commissioning consortiums, by then

funded from personalised budgets, would become, in effect, insurance companies, with all sorts of ways to limit whom they enrol and what they cover.

Who benefits from this progressive degradation of the welfare state? Obviously not the lower classes. But nor do the middle classes, as the new, complex, and individualised systems are more expensive than what existed previously, often of poorer quality, and invariably far more complicated. The real beneficiaries are the very rich, who no longer have to pay for services they never used anyway.

Will the British people allow the welfare state to be dismantled? Not yet. But the situation could easily change. The experience of the United States shows how easily people can be persuaded to vote against their own economic interests.[24] By visualising the stark reality of the future that may lie ahead of us we may be forced to challenge our own complacency. In this way, we can only try to emulate the "spirit of Christmas yet to come" in Dickens' *A Christmas Carol* and hope that we will have the same happy result.[30]

Martin McKee professor of European public health, Faculty of Public Health and Policy, London School of Hygiene and Tropical Medicine, London WC1E 7HT, UK
martin.mckee@lshtm.ac.uk
David Stuckler university lecturer, Department of Sociology, University of Cambridge, Cambridge, UK
This paper was drafted by MMcK and revised by DS, following a request from Tony Delamothe. It draws extensively on a speech given by MMcK to the Public Health Association of Australia in September 2011
Competing interests: None declared.
Provenance and peer review: Commissioned, externally peer reviewed.
References are in the version on bmj.com.
Cite this as: *BMJ* 2011;343:d7973

Hand-out Britain

Has a dependency culture made us sick, asks **Steve Reed**

Our society operates on the basis that you make the rich work harder by paying them more, but you make the poor work harder by paying them less. Compare the multimillion pound bonuses handed out to London's City financiers with the benefit cuts intended to encourage the poor into work.

The British government is cutting incapacity benefits because of the vast sums lost to alleged benefit cheats. Let's put the problem in perspective. According to the charity ActionAid, more than 12 times as much money is lost through offshore corporate tax havens as through benefit fraud.[1] Yet the government is planning to relax legislation aimed at reducing tax haven abuse.[2]

Of course there are cheats in any system and they deserve to be exposed. But Britain has high numbers of people receiving incapacity benefit not because of an over-generous welfare system but because the way we treat poor people makes them ill. People who have had power taken away from them are more likely to have high levels of stress. Many poor people are denied the chance of a decent job and a decent home, yet they see all around them a voracious consumer society that has locked them out.

And the poor shall be sent empty away

Many of the coalition government's reforms are making life harder for the very poorest people. Caps on housing benefit are moving poor families away from where there are jobs and people they know to unfamiliar areas with higher unemployment. Proposed cuts in council tax benefit will hit the working poor hardest. Job cuts in the public sector are disproportionately affecting low paid women, while working women are being clobbered with more responsibility for childcare and care for elderly relatives as public services are reined back. Cuts to local services are being targeted at the poorest parts of the country—compare the £37m (€43m; $58m) cut in funding to London's inner city borough of Lambeth with the £1m cut in funding to its leafy and affluent Richmond borough this year. Massive cuts in the building of houses and schools and in major transport projects are throwing more people out of work at the same time as the government has scrapped schemes that get people back to work. The chancellor's autumn statement this month froze tax credits for working families on low pay, prompting the respected children's charity Barnardo's to comment: "It is a desperate state of affairs when the government's own analysis shows that a further 100 000 children will be pushed into poverty as a result of tax and benefits changes announced today."[3]

Youth unemployment has topped a million for the first time in two decades, but instead of encouraging young people to upgrade

Lambeth: disproportionately affected by cuts to local services

MIKE KEMP/IN PICTURES/CORBIS

their job skills the government is trebling university tuition fees and scrapping weekly payments that help children from poor families stay on in education. Telling poor people they're lazy makes little sense when the government is making it so hard for them to find work.

The way we run public services offers more clues as to why some people are pushed into a life of dependency. How the state behaves influences how individuals behave. You can see this effect in the tax system, which the government adjusts annually to encourage behaviours it wants and discourage those it doesn't want. A major side effect of top-down public services—especially on poorer people, who rely on more services—is that they increasingly lose their sense of self reliance. Power over key aspects of their lives is taken away as things are done to them rather than with them. The cumulative effect of being told where you will live, where your children will be educated, what happens to you when you fall ill or become older is that people lose responsibility for their own lives. They experience public services as a system that does things to them whether they want it or not. We make them dependent and then criticise them for it.

Disempowerment to the people

On some estates in Brixton, south London, in the area I represent, seven out of 10 adults of working age have no job. Most families are single parent households usually headed by a woman. Large numbers of families are overcrowded, and, with over 500 000 people on the housing waiting list in London alone and house building close to an all time low, that is unlikely to change. Violence and antisocial behaviour is higher on these Brixton estates than elsewhere. Many children grow up without knowing any adults in full time work. They become socialised out of the idea of work. The only people they see making money in their communities are drug dealers and other criminals. When their grandparents become elderly and frail they receive care services only if their needs are severe, and then they are told who will come into their home, when they will eat, when they will bathe, and sometimes even when they will go to the toilet. The sense of disempowerment is almost total.

Young people grow up with almost no idea of how they can break out of this and access the opportunities they see others in wealthier communities taking for granted. So should we be surprised when some people in these circumstances play the system if that's the only option we've given them?

A J PHOTO/SPL

Sick leave and turnover fall when staff are given a stake in the company they work for

The problem, of course, predates the current government. Its roots go back decades. Lambeth is one of several councils across the country aiming to change the power imbalance by changing the way we run public services. As a cooperative council (www.lambeth.gov.uk/cooperativecouncil)—working in closer cooperation with the communities and people we serve—we want to give more power back to people so they can take back responsibility for their own lives. That means more cooperatively owned and managed housing, a bigger say for people using services such as home care, youth services, or schools. It will start to make a difference, but alone it is not enough. We also need to change poor people's relationship to work so that it becomes a more positive experience.

The short route from low pay to incapacity benefit

For many low paid workers, life is becoming increasingly stressful. The Equality and Human Rights Commission's recent review of home care for older people highlighted cases of physical abuse, theft, neglect, and disregard for privacy and dignity (November 2011).[4] In April this year, the Low Pay Commission reported that 10% of home care workers are paid below the minimum wage, with some workers paid per visit rather than per hour, and with no reimbursement for travel costs.[5] There's a link between the findings of these two high profile studies. Too many home care workers, encouraged to complete each visit as quickly as possible (thus with pay as low as possible), are unable to form relationships with the older people they care for and feel pressured to complete the visit as quickly as possible. This dehumanises the service being provided and makes instances of neglect more likely. The worker has little or no job satisfaction, little incentive to do a better job, little spare cash at the end of a tough working week, and increasing levels of stress. Unsurprisingly, levels of sickness absence are high and so is employee turnover. When the stress gets too much and illness follows, some workers move on to long term sickness benefit. And it's not just care workers. Similar examples exist in almost any low paid employment.

But there is another way. Mutual home care organisations such as Care and Share Associates (CASA) and Sunderland Home Care Associates have found they can cut both sick leave and staff turnover by giving their employees a stake in the ownership of the company they work for. More decisions are taken communally and there may be a profit sharing scheme. Even though pay rates are still relatively low, employees feel a greater sense of control over the work they do. Empowerment seems to be critical to reducing stress and increasing happiness.

Many people who have become ill and found themselves living on incapacity benefit ended up in that situation because of a toxic mixture of limited opportunity, capped aspirations, miserable working conditions, and a sense of almost total loss of power over their own lives. The stress this creates leads to illness. A dependency culture is what happens when you take power and responsibility away from people because dependency is all they're left with.

In place of demonising the poor

We need a radical change in the power relationship between citizens and public services, and between workers and the organisations they work for. Instead of blaming unemployed people for not having a job, we need government intervention to generate more jobs and then help people develop the skills they need to do them. We must hand back power to people who have none and give them back the sense of self reliance and aspiration that politicians and councils have taken away. That approach, rather than demonising the poor, is the way to tackle dependency.

Steve Reed council leader, Lambeth Council, London SW2 1RW, UK
steve.reed100@btinternet.com
References are in the version on bmj.com.
Cite this as: *BMJ* 2011;343:d7828

Evolutionary biology within medicine: a perspective of growing value

Evolutionary biology needs to be further integrated into medical research and teaching, believe **Peter Gluckman** and **Carl Bergstrom**

In the preface to his 1794 treatise *Zoonomia*—perhaps the first book in English to present concepts from which modern evolutionary thought eventually arose—Erasmus Darwin wrote that the purpose of such studies is to elucidate the origins of disease. Yet evolutionary biology has had little explicit role in the training of health professionals[1] and thus in how medicine is practised and research questions are developed.

Over the past decade, however, the explicit application of evolutionary principles has started to appear within a small but increasing number of medical schools, reflecting a growing recognition of the important perspectives offered on the determinants of health and disease both in individuals and across populations.[2-5] The American Association of Medical Colleges has recently recommended establishing evolutionary biology as a required premedical competency and emphasised the value of evolutionary approaches within the medical curriculum itself.[1]

How should medical schools and programmes for undergraduate, specialist, and continuing medical education training incorporate evolutionary biology into medicine?[6]

Major themes in evolutionary medicine

Evolutionary science addresses medicine in a manner distinct from but complementary to other basic sciences, and provides hypotheses to explain many aspects of human biology and anatomy.

Some of these hypotheses are adaptive explanations that tell us about the functional significance of traits. For example, human infants are the fattest of all mammals at birth and this has implications for the propensity for humans to develop obesity and its complications later in life. This trait probably has its origin in the need to defend the rapidly growing brain against undernutrition that was likely during weaning.[7] Understanding this could have direct implications for optimal approaches to infant nutrition.

Others are phylogenetic explanations that explain the evolutionary history of traits. Our inability to synthesise vitamin C, for example, has its origin in our frugivore primate ancestry, and is exposed as scurvy only when humans encountered atypical diets such as those on 18th century ship voyages.[5] Life history perspectives have allowed a better understanding of the significance of the changing age of puberty and provide an explanation of how developmental factors increase the risk of disease later in life. Studies of coevolution are essential to understanding antibiotic resistance and the role of the gut microbiome.

Importantly, evolutionary principles generally provide explanations of the origins of individual variation in vulnerability to disease rather than the cause of disease itself.

Different levels of explanation

The distinction between explanations at the proximate level (pertaining to direct physiological and ontogenetic causes), and explanations at the ultimate level (pertaining to the evolutionary origins, history, and reasons for the persistence of a trait), has useful heuristic value.[8] Proximate explanations lay out the mechanistic chain of disease development and cause along which we hope to intervene; their study and application dominates in medical research, training, and practice. Ultimate explanations, however, interpret how these vulnerabilities came to be in the first place, which has implications for patient and population management. Taken together, proximate and ultimate understandings provide a comprehensive view of a particular clinical state.

DARWIN COLLEGE, CAMBRIDGE, UK / BAL

Erasmus Darwin, grandfather of Charles and a scientist in his own right

Type two diabetes mellitus, for example, can be understood in terms of altered insulin release by the pancreatic beta cell and impaired action via its receptor and signalling cascade (proximate causation); or as a mismatch between evolved biology and the evolutionarily novel nutritional and energetic environments in which most humans now live (ultimate causation).[9]

Both approaches have clear value in explaining the problem to the patient and both lead to potential therapeutic approaches, whether pharmacological or lifestyle based. Proximate explanations are the basis of classifications of disease causation generally used in pathology (neoplastic, inflammatory, immune, and so on). Classifications based on ultimate explanations to explain vulnerability have also been developed.[4 5] The distinction and synthesis of these two levels of explanation provides an integrative view of human biology and enhances clinical practice. Patients often find the ultimate levels of explanation easy to comprehend and satisfying.

Health, longevity, and fitness

Human evolution is based on selection for maximal reproductive success (which evolutionary biologists term fitness) rather than for health or longevity; this is a fundamental evolutionary principle yet tends to be poorly appreciated within medicine. Survival to reproduction and throughout reproductive life will be the focus of natural selection; survival later in life will be less strongly selected and thus selection may have compromised health in middle and old age.[10] The principle of fitness provides a partial explanation for the emergence of non-communicable diseases in middle age and the failure of natural selection to minimise the risk of such disease.

The concept of trade-offs

Organisms cannot be perfect at everything. Selection typically drives the evolution of a beneficial trait until the marginal benefits of continuing are balanced out by the marginal costs of doing

so. So the size of the fetal head is constrained by mechanisms limiting fetal growth to maternal pelvic size, contributing to the challenges of human obstetrics, as distinct from the ease of delivery in other primates. Long human postnatal dependency is thus explained; we are more immature at birth than the other great apes because brain development must be abbreviated in utero for successful delivery.

Life history trade-offs between early investment in reproduction versus later investment in repair and maintenance are at the basis of our understanding of the biology of ageing,[10] and provide explanations for many other aspects of the human condition. For example, individuals living in uncertain circumstances are likely to deploy strategies appropriate for a shorter life span, such as earlier puberty, as evidenced by the younger age at menarche of girls born into disadvantaged environments in the developing world and migrating to the West,[11] and by earlier menarche of girls in Western populations of lower birth weight. There may be broader public health implications for such trade-offs, where investment is made for the present rather than later.[12]

Understanding the dynamics of ongoing change

The human organism is a complex multi-species assemblage. Our somatic cells are outnumbered 10 to one by prokaryotic symbionts, commensals, and pathogens present within our body.[15] We have only recently started to understand the significance of this microbial flora. Understanding that host and microbe alike have been shaped by ongoing selection allows us to make sense of how such communities are assembled and regulated by our own physiology and experiences. For example, alterations in gut microbiota are associated with both caesarean section and lack of exposure to breast milk, and both have been implicated in the increased prevalence of allergic disease[16]; these findings have given rise to the growing study of the use of probiotics as components of infant formula.

We are now able to comprehend and model medically relevant contemporary evolutionary changes. Many involve pathogen evolution, either at the scale of an individual host (such as the evolution of the human immunodeficiency virus in response to antiretroviral therapy) or at the population level (such as annual evolution of the influenza virus, and the evolution and spread of antibiotic resistant bacteria). Evolutionary models at the level of a single organism have proved useful in understanding the progression of neoplasia and the development of resistance to chemotherapy.[17]

Impact of recent rapid environmental change

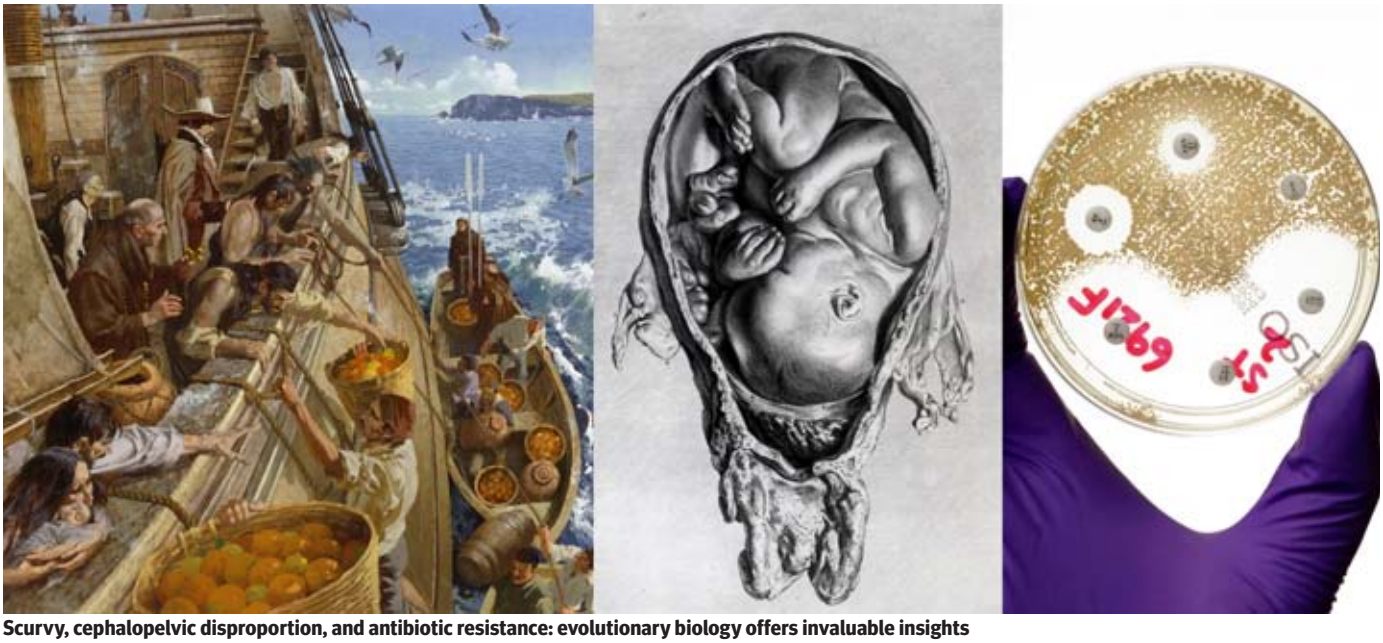
Given the rapid environmental changes resulting from our evolved technological capacity and affecting our nutritional, social, and physical environments, mismatches can occur between our present environmental exposures and those for which our physiology has evolved, as illustrated by the example of metabolic disease.[9]

The place of evolutionary medicine in practice and research

Evolutionary thought will only on occasion directly affect individual therapeutic decisions. Yet it will form a critical part of the worldview for the practice of medicine. Evolutionary reasoning provides a conceptual framework within which to situate the profusion of facts that constitute medicine, and so helps organise knowledge of biological systems.[4] It allows the physician to answer patients' questions about the origin of symptoms and disease in a more holistic and often more meaningful manner. It can be of particular value in understanding psychiatric symptoms such as phobias, and can be used as part of their clinical management.[18] Evolutionary thinking also provides an evaluative context in which to consider individual clinical decisions and the medical scientific literature. For example, what is the plausibility and therapeutic significance of selection arguments used to explain ethnic differences in the origin of hypertension?[19] What is the appropriate approach to antibiotic use to minimise the risk of resistance in a hospital?[20]

Medical research is intrinsically concerned with application and intervention, and it is from the proximate level insights that we are most likely to be able to develop direct applications. However, ultimate explanations provide a powerful tool for generating productive hypotheses about proximate cause.

Recent observations, for example, demonstrate that neural maturation is not complete until after 25 years of age, and there is evidence suggesting that the delay, in association with earlier pubertal maturation, contributes to mental health (and other) disorders of adolescence.[21] Several alternative hypotheses, each with different implications, derive from an evolutionary analysis: firstly, perhaps late neural maturation has always occurred and it is the complexity of modern society that exposes the consequences; secondly, perhaps it takes longer for the brain to mature because learning the necessary societal tasks takes longer in a complex society; and thirdly, perhaps the pattern of Western child



ROBERT MCGINNIS/NGIC/BRIDGEMAN/DONCASTER AND BASSETLAW HOSPITALS/SPL

Scurvy, cephalopelvic disproportion, and antibiotic resistance: evolutionary biology offers invaluable insights

rearing has affected the maturation of components such as the frontothalamic pathways regulating impulse control.[9]

Each of these hypotheses can be tested empirically: the first two by cross cultural studies of neural maturation and the last by evaluation in different educational systems. The implications could be considerable for medicine, psychology, and social science. In short, by asking how and why features of our biology have evolved, we arrive at a new set of research questions and a new proximate level research agenda.

Evolutionary approaches have long played a vital role in prevention, treatment, and management strategies in the domain of infectious disease. Many aspects of microbial ecology come together to create a so called perfect storm for rapid evolutionary change: pathogens typically have huge population sizes and short generation times while undergoing strong selection from the immune system and antimicrobial chemotherapies alike. We see this in the rapid emergence of multidrug resistance. Solving the problem will require consideration of how antibiotic use should be modified to take account of the evolutionary principles involved.[20 22] The study of the ongoing evolution of influenza virus strains plays an important role in vaccine strategies. The same principles may be important in cancer chemotherapy as well.

A common misperception is that evolutionary biology is an inherently historical science and thus cannot be subject to hypothesis testing. From this, it is mistakenly concluded that evolutionary concepts remain hypothetical and often teleological. This is wrong on two counts. Firstly, evolutionary change can be readily observed, measured, and perturbed in real time, particularly in medically relevant systems such as microbial pathogens.[23] Secondly, as geologists and astrophysicists know well, historical hypotheses are fully testable: different past scenarios make different predictions about present observables, and we can test these predictions by looking at new data. Nesse has laid out some of the criteria that are useful in testing evolutionary hypotheses.[24]

The future of evolutionary medicine

Evolutionary medicine will not—and should not—emerge as a distinct clinical discipline. Rather, evolutionary reasoning is a core competency just as anatomy and communication skills are core competencies for most physicians. Evolutionary reasoning will only rarely lead to different therapeutic choices, as in the case of antibiotic management, although it may lead to new clinical insights. Evolutionary biology provides a worldview for the physician—an integrated view of human biology, and a powerful paradigm for generating a broader research agenda. Evolutionary explanations may offer the patient valuable insights into their condition: "Why is this happening to me? Why is my body letting me down?" Science, through an understanding of our evolutionary history and the evolutionary processes that constructed our physiology, will come closest to answering the question, "What does it mean to be a human organism?"

"Evolutionary thinking could shed light on the psychological travails of obedience"

Peter D Gluckman professor, Centre for Human Evolution, Adaptation and Disease, and the National Research Centre for Growth and Development, Liggins Institute, The University of Auckland, Private Bag 92019, Auckland 1142, New Zealand
pd.gluckman@auckland.ac.nz
Carl T Bergstrom professor, Department of Biology, University of Seattle, Washington, USA and Santa Fe Institute, Santa Fe, New Mexico, USA

Acknowledgments: The authors thank Jevin West, Tatjana Buklijas, Alan Beedle, and Felicia Low for their helpful comments and suggestions. PDG is funded by the National Research Centre for Growth and Development. CTB is funded by the National Institute of General Medical Sciences Models of Infectious Disease Agent Study program cooperative agreement 5U01GM07649. PDG heads the Centre for Human Evolution, Adaptation and Disease, which investigates how ecological and evolutionary-developmental interactions with the environment influence human health and non-communicable disease. He is a co-author of a textbook on evolutionary medicine, and has introduced evolutionary medicine to the medical curriculum at the University of Auckland. CTB is an evolutionary biologist whose mathematical modelling and computer simulation work has contributed to studies of the role of information in social and biological systems. His recent projects have contributed to a number of applied studies in disease evolution, including analysis of antibiotic resistant bacteria in hospital settings and models of the interaction between ecology and evolution in novel emerging pathogens. Both authors contributed to the preparation and review of the article. PDG is guarantor.

Competing interests: None declared.
Provenance and peer review: Not commissioned; externally peer reviewed.

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Cite this as: *BMJ* 2011;343:d7671

Neo-evolution: is *Homo sapiens* ready?

Harvey V Fineberg contemplates the next phase of human evolution

How would you like to be better than you are? Suppose with just a few changes in your genes you could get a better memory—more precise, more accurate, and quicker. Or maybe you would like to be fitter, stronger, have more stamina. Would you like to be more attractive and self confident? How about living longer, with good health? Or perhaps you are one of those who has always yearned for more creativity. If you could have any of these it would be a very different world. Is it just imaginary, or is it perhaps possible?

Adaptation determines evolutionary success

As a physician I came to realise that the goal I was working towards was different from the goal of evolution—not necessarily contradictory, just different. I was trying to preserve the body. I wanted to keep us healthy. I wanted to restore health from disease. I wanted us to live long and healthy lives.

By contrast, evolution is all about passing on the genome to the next generation, adapting and surviving through generation after generation. From an evolutionary point of view, you and I are like the booster rockets designed to send the genetic payload into the next level of orbit and then drop off into the sea. To evolution but not to ourselves, our bodies are expendable. I think we would all understand the sentiment expressed by Woody Allen when he said, "I don't want to achieve immortality through my work. I want to achieve it through not dying."

Evolution does not necessarily favour the longest lived. It does not necessarily favour the biggest or the strongest or the fastest, nor even the smartest. Evolution favours those best adapted to their environment. That is the sole test of survival and success.

Looking ahead

In light of the past trajectory of evolution and the place of humans in evolution, what can we contemplate as the next phase of our evolution? I would say there are at least three possibilities.

Stasis

The first possibility is that we will not evolve. As a species we have reached a kind of evolutionary equipoise. And the reasoning behind that would be, firstly, that through medicine we have managed to preserve a lot of genes that would otherwise be selected out and removed from the population. And secondly, as a species we have so configured our environment that we have managed to make it adapt to us as well as us to it. And by the way, we immigrate and circulate and intermix so much that you cannot any longer have the isolation that is necessary for evolution to take place.

Evolution as usual

A second possibility is that evolution will be of the traditional kind—natural, imposed by the forces of nature. And the argument here would be that the wheels of evolution grind slowly, but they are inexorable. And as far as isolation goes, when we as a species do colonise distant planets there will be the isolation and the environmental changes that could produce evolution in the natural way.

Neo-evolution

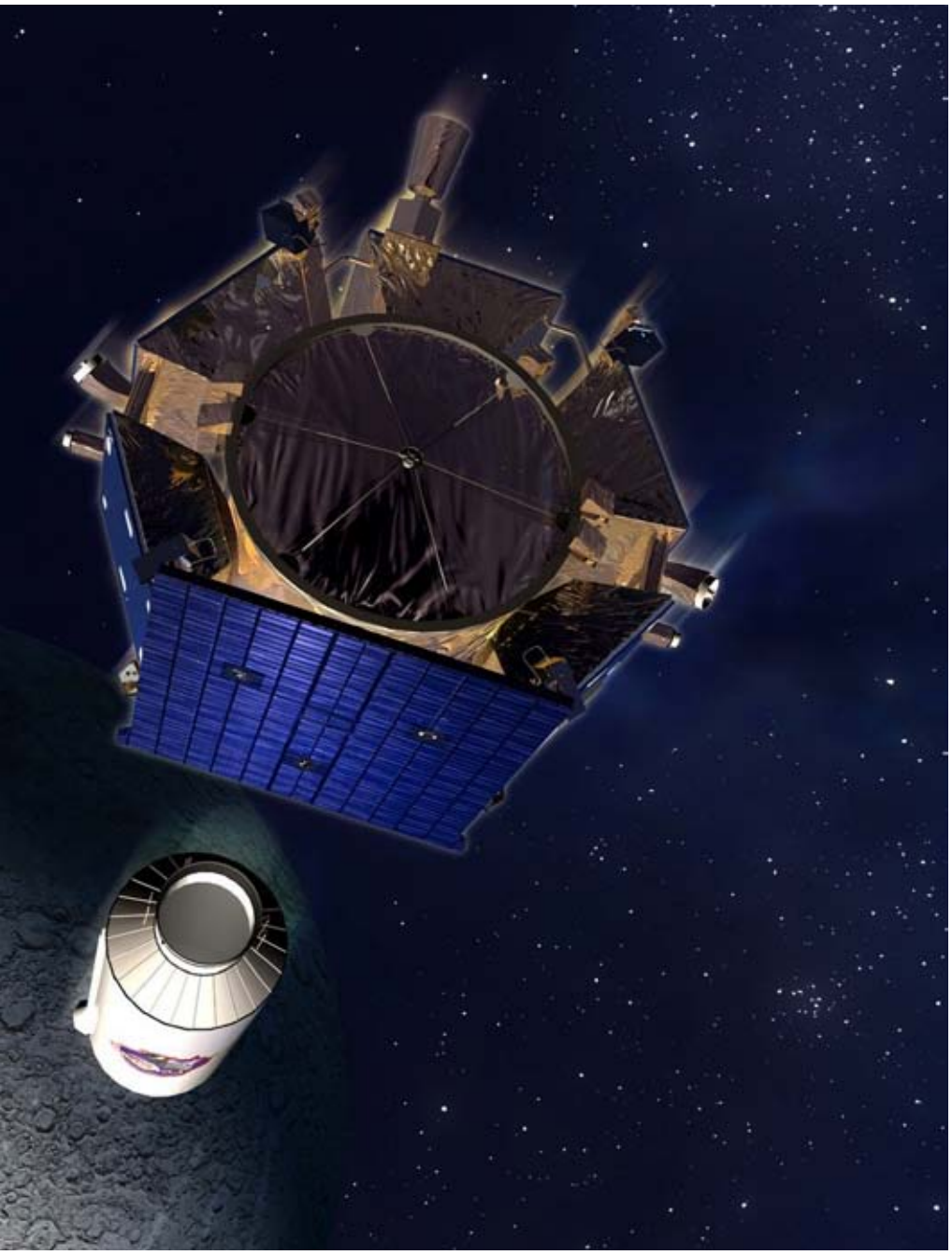
But there is a third possibility, an enticing, intriguing, and frightening possibility. I call it neo-evolution—the new evolution that is not simply natural but is guided and chosen by us as individuals. Now how could this come about? How could it be possible that we would do this? Consider first the reality that people today, in some cultures, are making choices about their offspring. In some cultures, parents choose to have more males than females. It is not necessarily good for society, but it is what the individual and the family are choosing. Today, where the technology is available, families with genetic disorders use preimplantation genetic diagnosis to screen embryos for inherited conditions such as cystic fibrosis or haemophilia A, and, more recently, for the predisposition to breast cancer (presence of the BRCA1 gene).

Think also if it were possible for you to choose not simply the sex of your child or reduce the likelihood of inherited disease but also to make the genetic adjustments in your body that would cure or prevent diseases. What if you could make the genetic changes to eliminate diabetes or Alzheimer's disease or reduce the risk of cancer or eliminate stroke? Would you not want to make those changes in your genes? If we look ahead, these kinds of changes are going to be increasingly possible.

NASA

You and me baby ain't nothin' but booster rockets

The Human Genome Project started in 1990 and took 13 years to complete, at a cost of $2.7bn (£1.73bn; €2.00bn). The year after it was finished, in 2004, you could accomplish the same task for $20m in just three to four months. Today you can have a complete sequence of the three billion base pairs in the human genome at a cost of about $20 000—and in the space of about a week. It will not be long before the reality will be a copy



PHILLIPPE PLAILLY/SPL

Genome to go

of the human genome for $1000, and increasingly available for people. In January 2011 the National Academy of Engineering awarded its Draper Prize to Francis Arnold and Willem Stemmer, two scientists who independently developed techniques to encourage the natural process of evolution to work faster and to lead to desirable proteins in a more efficient way—what Arnold calls "directed evolution." A couple of years ago the Lasker Prize was awarded to the scientist Shinya Yamanaka for his research in which he took an adult skin cell, a fibroblast, and by manipulating just four genes induced that cell to revert to a pluripotential stem cell—a cell potentially capable of becoming any cell in the body.

These changes are coming. The same technology that has produced human insulin in bacteria can make viruses that will not only protect you against them but will induce immunity against other viruses. Believe it or not there is an experimental trial going on with vaccine against influenza that has been grown in the cells of a tobacco plant. Can you imagine something good coming out of tobacco?

These are all reality today. Imagine, though, that you could not only change the genes in your body's cells, but also change the genes you pass to your children. What if you could change the sperm and the ova or the newly fertilised egg and give your offspring a better chance at a healthier life—eliminate diabetes, eliminate haemophilia, reduce the risk of cancer? Who does not want healthier children? And then that same analytical technology, that same engine of science that can produce the changes to prevent disease, will also enable us to adopt superior attributes now possessed by a gifted few. Why not have the quick wit of a game show champion, the analytical foresight of a chess master, a photographic memory, and perfect musical pitch? Why not have the quick twitch muscle that will enable you to run faster and for longer? Why not live longer? These will be irresistible.

And when we are at a position where we can adopt the attributes we want and pass them on to the next generation, we will have converted old style evolution into neo-evolution. We will take a process that normally might require 100 000 years and compress it down to 1000 years—and maybe even to 100 years.

Will we be wise enough for this future?

These are choices that your grandchildren or their grandchildren are going to have before them. Will we use these choices for ourselves to make a society that is better, more successful, kinder? Or will the sum of our individual choices in some ways diminish us as a society? Will we make a society that is more boring and more uniform or more robust and more versatile? These are the kinds of questions that we will face. And most profoundly of all, will we ever be able to develop and inherit the wisdom that we will need to make these choices wisely? For better or worse (and sooner than you may think) these choices will be up to us.

Harvey V Fineberg president, Institute of Medicine, Washington, DC, USA **fineberg@nas.edu**

This article is based on a talk given at the Technology, Entertainment and Design (TED) conference, February 2011, Long Beach, CA, USA. www.ted.com/talks/harvey_fineberg_are_we_ready_for_neo_evolution.html.

Competing interests: None declared.

Provenance and peer review: Commissioned; not externally peer reviewed.

Cite this as: *BMJ* 2011;343:d7649

Jellyatrics

The sweets celebrating 90 years of Jelly Babies left **Desmond O'Neill** with a bitter aftertaste

MARK THOMAS

bmj.com/blogs
Read blogs by Desmond O'Neill at http://bit.ly/rRMWGQ

A bag of Jellyatrics sat on the patient's bedside locker, a gift from her granddaughter. These superannuated jelly babies (created to celebrate 90 years of Jelly Babies) prompted predictable good natured banter, allowing my mind to wander off on a variety of confectionery and gerontological fugues.

First was curiosity as to which older people might feature in the pack—what would gelatinous versions of mature figures such as Charlotte Rampling, Helen Mirren, Jack Nicholson, and Clint Eastwood look like? Sadly, the manufacturers suffered from demographic and sociological tunnel vision, and those once pluripotential jelly babies had gained little from the longevity dividend: Frau Zimmer, Mister Miser, Pearl Stitch, Bill Bird, and Benny Dorm had clearly crashed and burned at some stage on the successful ageing highway.

My gustatory centres were simultaneously intrigued. Could the increased propensity to diabetes mean that they were sweeter than their infantile analogues? Would I be able to taste the β amyloid? Might the sarcopenia of later life make the texture lean and stringy? Or like aged fine wines and good cheese, would the taste be even more subtle and complex, with a long finish?

À la recherche

But as I, on behalf of science, undertook (repeated) empirical trials of these hypotheses, a different part of my brain was rebelling. Akin to the memories unleashed by the Proustian madeleine, the sickly sweetness evoked waves of emotion and reflection about how we engage with ageing.

These were all the more acute because of sensitisation by the recent excellent series of review articles in the BMJ.[1-3] Their quality highlighted the paradox that while we have made enormous strides in our knowledge and skills of how to provide effective care for older people as well as in the development of specialist services in geriatric medicine and old age psychiatry, these advances are still only applied to a minority of older people who need them.

The fabric of the health services remains stubbornly indifferent to incorporating such life changing advances, failing to assess function, adequately diagnose its causes, prioritise multimorbidity, and provide appropriate treatment. For example, although many in care homes work against the odds to provide a humane environment, as argued by Professor Graham Mulley in a recent BMJ personal view,[4] BBC documentaries such as the deeply troubling *Can Gerry Robinson Fix Dementia Care?* remind us that the application of expertise in the care of older people remains discretionary in a way that would be unthinkable for other areas of care.

This failure raises troubling questions about the myopia of the wider medical and nursing professions over incorporating geriatric or gerontological expertise into their practice. At the heart of this professional hiatus is a failure to genuinely value older people as our peers.

Too sweet to be wholesome

Objects of folk culture such as Jellyatrics tap into and permit a reductionist, simplistic, and negative view of ageing that diminishes the richness, variety, and relevance of older people—and our acquiescence and tolerance in turn diminishes ourselves and our families. Not only do most of us have older relatives who will gain enormously from age attuned care, but the next generations of older people will be us.

And the final verdict on Jellyatrics? After the initial sugar rush, the taste (in many senses of the word) is poor, and the aftertaste is undeniably bitter. As for the humour, the perceptive will realise that the joke is actually on us.

Desmond O'Neill consultant physician in geriatric and stroke medicine, Trinity College Dublin, Centre for Ageing, Neurosciences and the Humanities, Trinity Centre for Health Sciences, Adelaide and Meath Hospital, Tallaght, Dublin, Ireland **doneill@tcd.ie**

Competing interests: None declared

Provenance and peer review: Not commissioned; externally peer reviewed.

References can be found on bmj.com.

Cite this as: *BMJ* 2011;343:d7447