

Out of the Box



As we are all being reminded, this year is the 150th anniversary of publication of *The Origin of Species*. The general theory of ‘natural selection’, derived as it is from observations of the physical as well as the living world, is flexible. Partly for this reason it continues to work well, though puzzles remain, and it can be accommodated within belief in a deity as the supreme hands-off build-and-designer. Some of the items in this issue recognise and celebrate the relevance of evolution to nutrition.

Evolution. Lactation. Immunity

The original purpose of breastmilk

David Horrobin, my contemporary at the same Oxford college (I have the freshmen’s photograph to prove this), was founder and initial editor of *Medical Hypotheses*. This is a journal that remains dedicated to his proposition that in medicine (which David always defined broadly, as an entrepreneur as well as a physician who knew that the term ‘medical’ is a subscription magnet) it is not facts but ideas that come first. Indeed; without the architecture of ideas, facts are rubble.

This is a context within which to celebrate *Nutrition Research Reviews*, a biannual sister journal which, as most recently edited by David Bender and now Kate Younger, encourages authors to submit papers that ‘advance new concepts and hypotheses’. The most recent issue includes an assiduous paper on the practical plausibility of the recommendations of the 1997 World Cancer Research Fund/American Institute for Cancer Research report, *Food, Nutrition and the Prevention of Cancer: A Global Perspective*⁽¹⁾. It also includes a systematic review of the relationship between sugared soft drinks and obesity⁽²⁾, showing once again that systematic reviews of heterogeneous studies of complex systems are intrinsically problematic⁽³⁾.

The star paper comes from the University of Western Australia⁽⁴⁾. Long, respectfully edited and compendiously referenced, it considers the evolution and purpose of lactation, with specific reference to rabbits, quokkas (a small marsupial), pigs, cattle and humans. Its thesis is that while for all mammalian species milk is of course nourishing in the conventional sense, its original purpose is immunological. It ‘contains an essential array of factors associated with the innate immune system that facilitates the neonate’s transition from the relatively sterile environment of the mother’s uterus to a postnatal environment containing a multitude of microbes including life-threatening pathogens’. In this way the mother’s milk protects

the mucosal linings of the baby’s respiratory, reproductive and gastrointestinal tracts.

The immunological function of breastmilk has been fairly well understood for some decades⁽⁵⁾, but typically only as ancillary to its nutritional purpose. The distinction is artificial. In babies and young children, protection against pathological infection is best seen as intrinsic to their nourishment. The implication is that formula feeds are not merely inferior, they are inadequate and dangerous, and in normal circumstances should be avoided. This brings us back to the origin of the term ‘mammal’, curious because etymologically it does not refer to males. The reason is gender politics: the great classifier Carolus Linnaeus chose the name in order to emphasise that live-born young should be fed by their own mothers⁽⁶⁾.

Hormones and performance

The paper also includes an intriguing figure comparing the increases in milk yields of US Holstein cows with the increases in the average speeds of Tour de France winners, from 1970 to date, with special reference to the records achieved by the US rider Lance Armstrong, who won the Tour in seven successive years between 1999 and 2005. Cows are selectively bred and genetically manipulated by the use of hormones to boost their milk production. Relying on a splendid theory published – I am delighted to report – in *Medical Hypotheses*⁽⁷⁾, the authors suggest that Armstrong’s performance resulting from natural selection (and dedicated training) that made him a one-day and then Tour contender while finishing down the field in the mid-1990s, was then boosted by removal of his left testicle after a diagnosis of cancer, with consequent hormonal changes. In other words, he became the greatest Tour champion of all time not despite of but because of cancer and its treatment.

This is no joke. Does it mean that castrati are best equipped to win long-distance cycling, swimming and running races? Will male also-runs, -swums and -rodes now be queuing up not for drugs but surgery? Was the reliance of the mediaeval Caliphate on eunuchs as Grand Viziers not so much because they could be left alone with the ladies in the harem, but more because castration makes a man more focused? Are there data on the nutritional metabolism, physical and mental performance, and vulnerability to disease, of males with single and double orchiectomy? Meanwhile, what is the connection between Lance Armstrong’s surgery and the evolutionary origins of lactation? I cannot tell you, and I invite the authors of the wonderful *Nutrition Research Reviews* paper to explain.

References

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Excellence in science

How to recognise quality

As you know, just as journals are currently ranked according to the average number of times papers within them are cited in papers published by other journals (or to be exact, those journals admitted to the ranking system), papers and therefore their authors are ranked according to their frequency of citation in other journals. As you also know, high-flying careers depend on publication not any old where, but in 'high impact factor' journals. If you write a book that changes public opinion, this doesn't count. If your findings become a basis for new international strategies, in itself this also does not count. What you need, to slip into the professorial ranks, is publication in journals whose papers are reviewed by your peers and then repeatedly referenced by other colleagues. Put like this, the system does seem somewhat inward-looking.

Sure, it is very likely that a paper published in (say) *The Lancet* is likely to be more cogent as well as more influential than another paper on the same topic published in the (imaginary) *Transylvanian Archives of Nutritional Haematology*. All the same, the 'never mind the quality, feel the width' system of grading scientists and their work has limitations. Here is a proposal. Supplement the impact factor system with a ranking system involving direct human judgement.

No, I am not suggesting that every paper published in every journal gets assessed, so that one could learn that the aforementioned paper in *Transylv Arch Nutr Haem*

came in at number 5 453 998. Rather, editors of journals, with their editorial boards, could make lists of what in their individual opinions were the top ten contributions – papers, and also editorials, reviews, commentaries, letters – published in any year, with reasons why. The lists would then be collated, and the contributions with the most mentions would become the consolidated top ten. Of these, the top three (say) could be republished the next year, suitably updated, together with a detailed commentary written by a distinguished colleague.

A more ambitious and powerful version would be a top ten trawled by the editors of one journal from their own and also other relevant journals. If the results were boring, *Medical Hypotheses* could publish a friskier list. Selective? Invidious? Subjective? Indeed, but I dare say less so than the system by which Nobel prize-winners are chosen. There again, the whiff of professional incest is not dispersed by what is after all an alternative version of peer review. The judges could therefore be not fellow specialists, but a panel of intelligent people who believe that the general topic – such as public health nutrition – is important, and who would pay a lot of attention to evident clarity and relevance. That would be fun and should be useful.

Nutrition science

Nutrition is biological – and more

Living as I do in the South, in what used to be called an LDC ('less developed country'), the notion that nutrition is – or should be sequestered as – merely a biological science seems so odd, so contrary to the realities I can experience any day, that I wonder where the idea came from. It is well-known that nutrition originated in its modern 'classic' form as a biochemical science in Europe – France, Germany and England in particular – in the first half of the nineteenth century^(1,2). Here I think is the explanation. Its formulation and development at that time and place were central parts of four inter-related phenomena: the glorification of growth, the emergence of industrialisation, the ascendancy of the rival European colonial powers, and the aggrandisement of the biological and then the medical sciences.

These can all be seen as parts of a general ideology that man (as humans used to be called) can and should control and conquer an alien nature, and – as stated in the language of the time, more candidly than now – that civilised nations have a manifest destiny to displace 'lesser breeds without the law', especially people living in nature, who for this reason can be classed with animals and insects. To adapt a phrase not initially used by Charles Darwin, and interpreted in a way that no doubt would have horrified that rusticated gentleman, in its first modern phase nutrition science was all about the breeding as well as the survival of the fittest⁽³⁾.

Positioning nutrition as a biological and more specifically a biochemical discipline was not just a theoretical exercise. It worked, in countries where food supplies had become secure as a result of mechanisation⁽⁴⁾. Physiological chemistry (as it was first called) was used to harness and master the living and physical world and, in its applications to plants and animals, engineered the diets of the masses in leading European countries, their white-dominated dependencies and the USA. More specifically, the discovery in the early twentieth century that a combination of secure food supplies and dietary manipulation more or less eliminates what came to be identified as deficiency diseases, as well as making children and therefore adults bigger and taller, and therefore stronger and more productive, consolidated nutrition as a biomedical science.

The wisdom of insecurity

The stability of this concept may depend on the assumption of secure food supplies, when food becomes a 'given', typically found in shops, with no need to pay attention to or even be aware of where it comes from, or why, or how, or from whom. In other words, nutrition is seen as just a biological discipline when the context of food is isolated to its path 'from plough to plate' and then narrowed further, to a drive from supermarket to microwave.

As soon as food becomes insecure, as it is for most people in the world at least some of the time, nutrition obviously becomes multi-dimensional, and most of all in times of crisis. Reports from UN agency people on the ground in Gaza in January⁽⁵⁾ are memorable examples. Yes, immediate needs included supplies of bread, biscuits, milk and supplement tablets, and encouragement of breastfeeding, for energy and nutrients. But also, 'key challenges' included 'lack of access to warehouses due to ongoing fighting' and 'no provision of safe routes for the UN/UNICEF to deliver urgently needed supplies'. The immediate cause of malnutrition in Gaza is lack of energy and nutrients. The fundamental cause is invasion. Biscuits won't resolve malnutrition in Gaza. What its people need to be well-nourished, in any sense of the word, is peace.

Much smaller disturbances of food systems convey the same message. In January I was staying in a house by the side of a salt-water canal by Cabo Frio, in Rio de Janeiro state. For months now in much of the country, rain – often torrential – has been constant. In January Cabo Frio is also flooded with tourists, whose effluent overwhelms the city's sewage plants. One morning the point tipped and the fish in the canal died. On our ten-metre stretch of shoreline I picked up over a thousand bodies, including many of the beautiful *peixe-voador* (flying fish). Some people said the cause was lack of oxygen because of too

much fresh water and untreated sewage. Others like me said the cause was climate change and too many people, both of which have deeper causes. The local fishing communities and their families went short, or else ate packaged food, because the environment is malnourished. On the third day there were angry demonstrations in the city, and on the fifth day two *peixe-voadors* broke surface under my window. The people are not quiet and the canal is not dead; not yet, anyway. Charles Darwin observed: 'We shall best understand the course of natural selection by taking the case of a country undergoing some physical change, for instance, of climate. The proportional numbers of its inhabitants would almost immediately undergo a change, and some species might become extinct'. Let's hope not all fish.

Of course nutrition is a biological discipline. But the time has come again for us to realise that its biological dimension should be one with its social, economic and environmental dimensions.

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Competing interests: As chief editor of the 2007 WCRF/AICR report, and director for WCRF/AICR of the 1997 report, I might look too kindly on their contents and conclusions; and affection for Noel Solomons might introduce a similar bias – though on both cases I believe not so. The spiral symbol of the New Nutrition Science project that appears at the front of this column signifies my commitment to its precepts, some of which are developed here.

Authorship responsibilities: This month the immediate sources of ideas are all referenced.

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