

## Out of the Box



As promised in my last column, I am sticking to the principles of the new nutrition science, as set out in *The Giessen Declaration*<sup>1</sup>. Here I consider the value and meaning of time. Nutrition as an integrated biological, social and environmental science necessarily involves knowledge and understanding of processes that develop over time, such as evolution, adaptation, culture, tradition and custom.

### Evolution and adaptation

How long do evolution and adaptation take? This issue was debated by Tony McMichael and John Potter during meetings of the expert panel responsible for the first report of the World Cancer Research Fund on global prevention of cancer<sup>2</sup>.

John maintained, on evolutionary as well as epidemiological and experimental grounds, that diets including plenty of whole grains (cereals) protect against diseases of the alimentary tract. Tony took a longer view, suggesting that the human gut, which evolved and adapted with *Homo sapiens* around 200 000 years ago, may well not be adapted to food systems in which grains are staple foods, that began with agriculture 'only' around 10 000 years ago.

So which are the diets to which we are adapted: those of gatherer–hunters or those of peasant–agriculturists? This question was also recently addressed by the distinguished anthropologist S Boyd Eaton, who has advocated 'the palaeolithic prescription' since the 1980s<sup>3,4</sup>.

There is now a mass of evidence enabling nutritional analysis of what palaeolithic people ate. Compared with current recommendations, they ate less carbohydrates, mostly from roots and tubers (around 35% of total energy) with some sugar from fruits and honey; more fat (also around 35% of energy) although not much was saturated; and a lot more meat, so their diets were extremely high in protein, almost all from animal sources (around 30% of energy).

So what? Boyd Eaton proposes that the findings of modern nutritional epidemiology, and therefore current dietary recommendations, can be tossed in the trash, because they do not take evolution into account. He states: 'Humanity's gene pool was selected when man's remote ancestors lived as Stone Age hunter–gatherers' and so 'optimum nutrition in the present should comprise the essentials of what it was for [our] earliest behaviourally-modern ancestors'.

But before we all go shooting our sirloin, is he right? His thesis and the studies on which it is based may be gender-biased. He assumes that palaeolithic people were hunter–gatherers, whereas other scientists believe – as I

do – that the accurate term is 'gatherer–hunter', with its implication of not so much haunch of sabre-tooth tiger and more roots like manioc (cassava)<sup>5</sup>. However, maybe protein intake was bumped up by lashings of frogs, locusts and grubs.

The main objection to Boyd Eaton's proposal is that we have no reason to believe that palaeolithic people lived as long as we do. There is no selective advantage in humans continuing to live after they have bred and raised their young; in which case, palaeolithic people who survived into adulthood probably usually died around their 40s, with a few surviving to be elders and advisors to the family or tribe. Given this, relatively carnivorous diets high in fat, and extremely high in animal protein, evolved with physically very active populations who usually did not live long enough to suffer from chronic diseases. This does not mean us.

My opinion is that food systems high in meat, protein and fat are pathogenic. And it seems safe to assume that gut microbial ecology can quickly adapt to diets high in a variety of grains.

It is also safe to assume on evolutionary principles, as pointed out by Ricardo Uauy and Erik Diaz<sup>6</sup>, that humans are designed to work physically hard to produce food for subsistence and also to survive periods of acute food shortage, and are not about to become adapted to food systems stuffed with super-size hamburgers, cola drinks and other energy-dense fatty, sugary and/or salty processed products. More on obesity below.

### Culture, tradition and custom

What about the effects of changes over time in culture, tradition and custom on nutrition and public health? The general theory of Hugh Trowell and Denis Burkitt on the emergence and prevention of chronic diseases<sup>7</sup> was formulated over many years, with the support of scores of collaborators. It uses results from all sorts of descriptive and observational studies, as well as from intervention trials in which symptoms of diabetes and cardiovascular disease have been reversed<sup>8</sup>.

It takes into account the changes in food systems and thus of dietary patterns intrinsic in the shifts from gatherer–hunter to pastoral to peasant–agricultural ways of life; and then to industrial–urban ways of life in which traditional food systems become disrupted, and traditional knowledge of the value of balance in agriculture and food culture is ignored and then forgotten<sup>9</sup>.

The theory proposes that the key causes of the global rise in chronic diseases of all systems of the body are changes in the patterns of food production and consumption that result in diets becoming depleted in fibre and high in processed and refined fats, starches and sugars and also in salt and alcohol; and equally rapid changes to physically inactive ways of life.

Hugh Trowell and Denis Burkitt were both clinicians by training; but if they were writing now, I think they would pay more attention to the underlying and basic social and environmental causes of disease. Their theory may be somewhat over-enthusiastic in its emphasis on the importance of diet<sup>10,11</sup>, but it has never been fundamentally challenged; it is embedded – with or without acknowledgement – in many if not most general surveys and reports on the causes of chronic diseases; and it forms a basis of public health nutrition as now taught and practised.

### The meaning of migration

This is all the more striking because the integrated method they used to build up their theory then became generally abandoned. In particular, descriptive epidemiology, tracking changes in patterns of health and disease over space and time, is considered not groovy by researchers these days. Reviews of ‘the literature’ now tend to refer to observational or ‘ecological’ studies in a tone similar to that used of stage-coaches in accounts of transport systems – an advance on cleft-stick runners and the teachings of the Yellow Emperor, but in these advanced days no longer deemed to be worth admission as useful evidence.

I disagree. Take migrant studies. These track people of the same ethnic background over time, as they move from their own country to other parts of the world. Their results can be awesome. Larry Kolonel’s group showed over 25 years ago that in one generation, rates of stomach cancer in Japanese immigrants to Hawai’i dropped by almost half; and in two generations rates in the immigrants’ children were down by over two-thirds. By contrast, rates of breast and colorectal cancer rocketed<sup>12</sup>. Tony McMichael and colleagues obtained similar findings in Australia among immigrants from different countries in Europe<sup>13</sup>; and later showed that rates of breast cancer in Italian women immigrants increased about three times after 17 and more years of residence in Australia<sup>14</sup>. Max Parkin, Calum Muir and colleagues in the descriptive epidemiology group at the International Agency for Research on Cancer in Lyon have published comparable findings for Chinese men who emigrated to Hawai’i and Los Angeles<sup>15</sup>.

Such studies are rightly said to ‘provide compelling evidence that cancer is principally determined by environmental factors’<sup>16</sup>. The same applies to descriptive studies of populations that stay in the same place over time, while their environment changes. When Hugh Trowell and Denis Burkitt began their medical and surgical

careers in East Africa in the 1930s and 1940s, obesity, diabetes, stroke and coronary heart disease were rare among native Africans. On a trip in 1931 Julian Huxley said that the only fat African woman he saw worked in the Nairobi brewery<sup>17</sup>. But by the early 1990s chronic diseases had become epidemic in cities throughout Africa, as well as throughout the Middle East, Asia and Latin America, at a speed much faster than previously occurred with the industrialisation of Europe and North America<sup>18</sup>.

Studies of migrants, and of other populations whose ways of life are changing, prove that diseases such as cancer are not genetically determined. Of migrant studies, Srinath Reddy says that they ‘should alert policy-makers and public health activists to anticipate the emerging epidemics and plan for appropriate programmes of primordial and primary prevention... this may be the migrant’s most valuable message to the families back home’<sup>19</sup>.

I agree. I also believe that the more narrowly focused types of observational and experimental study that pay no attention to changes over time, produce data that may be highly statistically significant, but may well have no real meaning or value.

### Time as an arrow

Now, here are some thoughts about the nature of time itself. This involves confronting assumptions that are built into language, and what we learn as we grow up, as well as what we are trained to accept in our education.

Inclusion of the phenomenon of change over time will mean a big shift in the teaching and practice of nutrition science; for such processes have been neglected or even ignored by the biochemical and physiological approaches that, since the mid-nineteenth century until recently, have dominated nutrition science<sup>20</sup>.

But what is time? This is a concept we refer to and make use of constantly, but whose meaning is elusive; and we may not realise that our way of thinking about time is different from that of people living in other cultures.

Those of us brought up in the modern European tradition have been led to imagine that progress is like the flight of an arrow shot into the future. We say ‘there’s no time like the present’. The concept of time and of life itself, as a flow from the past to the present and future, is displaced by a succession of now... and now... and now, like a series of photographs taken with a camera using a motor drive.

As part of this linear concept of time, the past is relegated and rejected in favour of the now and the new. This belief drives the fashion industry, and most current research science. In which case more research will always be needed, on the assumption that new studies, new methodologies, new techniques, will be – must be – superior to those devised now, and should displace them; just as those devised now are superior to those of the past

and certainly should displace all work done BED (before electronic databases). In this way research science is a machine for the perpetual proliferation of new breakthroughs.

This attitude to the past and to the future is caricatured by the injunction ‘every day in every way, things are getting better and better’. And we do seem to have a need to believe in perpetual progress. Catastrophes tend to disconcert us; we treat them as aberrations, and feel a need to fix them or forget them. We reject the idea that other societies in ancient or recent history could have been better than ours.

The acceleration of technology lets us assume that we are more advanced and intelligent than people from other cultures and than our ancestors. Correspondingly, histories of the progress of public health, and indeed general histories of modern civilisation (written from the point of view of the material winners), typically state that children continue to become healthier, and often speculate that, in the not too distant future, humans will commonly live to the age of 100. The conventional wisdom still is that, on the whole, with some setbacks, every generation of humans is better off than every previous generation.

### Time as a cycle

But in our field of nutrition and public health, it seems to me that the weight of evidence now contradicts the notion that things always get better. My impression, taking physical, mental and emotional health all together, is that as a whole, by most measures, global human health is now deteriorating. In particular, in the case of child health and of life expectancy, it looks as if the history of public health and its place in modern civilisation are now in need of a rewrite.

We – by which I mean people like you and me – tend to overlook or play down evidence that public health is degenerating, for a number of reasons. First, people like us are privileged and are shielded from unpleasant realities. Second, we are accustomed to the double-speak whereby ‘health’ means disease and increased expenditure on treatment of disease is taken as an indicator of improved health. Third, we pay too much attention to mortality and not enough to morbidity: a society where people die two years older, but are dependent on drugs for eight years longer, is more diseased. Fourth, people professionally engaged in public health naturally want to believe that on the whole things are getting better. And fifth, having been indoctrinated with the concept of perpetual progress, we can’t get our heads round the idea that things can get worse.

But it seems to me and to colleagues who have developed the *New Nutrition Science project* thus far that the linear concept of ‘time’s arrow’, on which the notion of perpetual progress is based, is obviously wrong: it is

unhelpful, misleading, and does not correspond to experience. The spiral motif, identifying this column as an expression of the three-dimensional new nutrition science, is designed as a reminder that our journey through life, and the process of better understanding, including within all scientific disciplines, is better seen not as linear but cyclical. This is the teaching of the philosophies on which Eastern societies are traditionally based, and of many if not all pre-literate societies.

The cyclical concept of time, in which the past becomes the basis for understanding, begins with the observation that we all return from whence we came, just as civilisations rise and fall for reasons that only studies of the past can illuminate<sup>21</sup>; as do epidemics. A spiral is cyclical, not just circular. We become evolved and enlightened not by escaping from the past, but by the understanding that lets us return to, reflect on and rise up from past states and times<sup>22</sup>.

### The significance of obesity

The opposite process, of swirling down into a shrunken and darkened state – ‘going down the drain’ as we may say, is represented by a vortex. And this now seems to be the image that fits the new pandemic that, after AIDS, challenges our Western notion of perpetual progress: which is the current increase in childhood obesity and diabetes in early life, at phenomenal rates that, as far as I know, nobody predicted fifteen or even ten years ago. Something has gone very wrong, which we can’t overlook and don’t know how to fix.

Obesity is a disease which, unlike others, is obvious. You don’t need to be an expert to know that obesity is increasing. Anybody who lives in a rich country or in a city in almost all countries can see what people look like at work and play now, compared with times gone by. When I was at school in England, fat kids were rare. But in the last decade rates of obesity in English 11–15-year-olds have almost doubled, and in 2004 more than 25% of these schoolchildren were obese. This disaster is characterised as ‘a public health timebomb’<sup>23</sup>, because obese children who remain obese as adults – as most do – are twice as likely to die by the age of 50.

It is also reckoned that over 50 000 English children now have metabolic syndrome, the cluster of overweight and interrelated pathologies that sharply increases the chances of ‘adult-onset’ diabetes which, as the name implies, was until recently practically unknown in children. Rates of this type of diabetes in British children have increased by a factor of 10 in the last five years<sup>24</sup>. A representative of Diabetes UK comments: ‘we will soon be seeing our children growing up losing limbs and going blind’<sup>23</sup>.

It is now often stated that today’s British children on average may well die younger than their parents. It seems safe to say that they will be disabled for more years before they die. Such predictions are supported by a comparison

of rates of disease in 55–64-year-old men in the UK and the USA<sup>25</sup>. In the UK average expenditure on health care is somewhat over £1000 a year; in the USA, just under £3000 a year. ‘Health care’ really means disease treatment, which is to say drugs and surgery mostly; so it’s no surprise that in this US population group rates of cancer and heart disease are more than 50% more common, and rates of diabetes more than twice as common, compared with the UK. Why the difference? James Banks of University College London, lead author of the study, thinks that state of health in early life is a plausible explanation. ‘The obesity epidemic began later here; we are now catching up’, he says. ‘If that is the explanation then this health gap may potentially be closing in the future’<sup>25</sup>. He means ‘disease gap’, of course.

My guess, and hope, is that the worldwide rise in childhood obesity and early-life diabetes will prove to be the ‘tipping point’ that shocks professionals into action: meaning, working in alliance with citizens’ action groups, and becoming activists themselves, in the tradition of John Snow, and alongside the scientists and civil society organisations who champion the cause of breastfeeding. This theme is touched on elsewhere in this issue<sup>26,27</sup>.

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