WN *Hot stuff*

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Evolution. Species. Ecology
Who, what and why are we?

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Access July 1998 Asia Pacific JCN Mark Wahlqvist on econutrition here
Access June 2013 Michael Pollan on the human microbiome here
Access March 2014 Asia Pacific JCN Mark Wahlqvist on ecosystem health here

Summary

Mark Wahlqvist writes: The thesis of this short commentary is that the concept of individual separate species, devised around 250 years ago by Carl Linnaeus (whose family intermarried with mine) and developed by Charles Darwin around 150 years ago, is flawed and troublesome. Followers of Darwin see his theory as implying and justifying incessant struggle between and within individual species. This idea of constant conflict is extended to include political and economic activity.

But the living world is mainly not competitive but collaborative. As Lynn Margulis and other naturalists and microbiologists show, we humans co-exist with, and live and thrive because of, the microbiome of protective bacteria in and on us, that are over 90 per cent of the cells of the human body, and that interact with us. We are not separate individuals. We need to think again about who and what we are. Like all the living world, our selves are ecological. Evolution is not of species but of systems. The correct ecological perception of reality has potential to resolve what now seem to be intractable problems of human health and society.

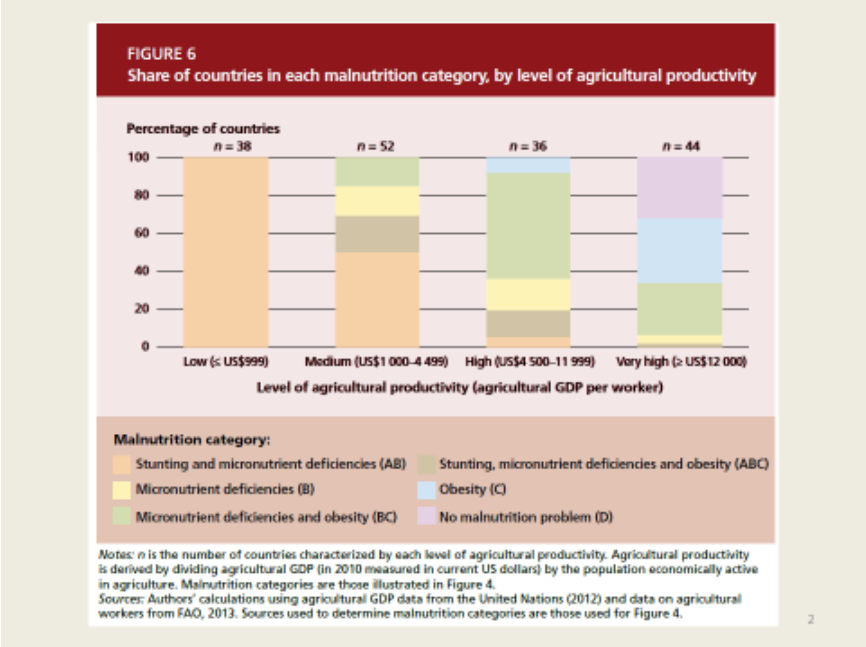
Editor's note

Hot stuff is a *WN* occasional series on innovative, speculative or controversial topics. Contributions address areas and issues of importance to public health and nutrition that need to be discussed and better understood. These may be regularly exposed in popular print and electronic media, while being relatively ignored, overlooked or neglected in the scientific and academic media, or else addressed extensively in publications sometimes supposed to be outside the scope of nutrition science.

Human populations in most countries are now said to suffer a so-called 'double burden of disease', or even a 'triple burden', a term referring to a combination of endemic or epidemic stunting and micronutrient deficiencies, with infectious diseases, together with too much body fat and related disorders and diseases. But this is a mere description, as is 'a spectrum of nutrition-related disorders and diseases'. It has no indication of causality.

So what does it mean? The descriptive term is generally taken to imply that if we had enough protein, micronutrients (especially zinc for growth, iron and other nutrients to prevent anaemia, plus others for brain development and the immune system) without consuming too much dietary energy, then most would be well. But as I shall outline here, as a consequence our attention and resources are often misdirected, because of an inadequate diagnostic and management plan.

This is illustrated by the 2014 UN Food and Agriculture Organization report (1) whose graphic (below) shows correlations between average national income (GDP) per agricultural worker (see below), and types of malnutrition. As income rises, stunting becomes accompanied by micronutrient deficiencies, which are then accompanied by obesity, which then becomes dominant.



But is this really true – or sufficiently true? And are stunting, deficiency diseases, diet-related infections, and obesity, the only main health conditions that matter? I suggest not. The FAO report and graphic is in fact not about agriculture, development and 'undernutrition'. It concerns the effect of an abundant food supply on development of obesity in conjunction with complex nutritional problems. The purple bar on top of the column on the far right seems to show that the proportion of the population with no 'nutrition-related disorders' increases with increase in income. But a deeper analysis would surely show that many of these people suffer from many disorders and diseases caused by their dietary patterns, in turn caused by faults in food systems.

Food-based dietary guidelines include recommendations to breastfeed, to have a diversified diet, and to be physically active. But what impedes this ideal is not just lack of money or will-power. The issues are ecological, involving our habitat, household, community and its infrastructure.

Part of an ecological system

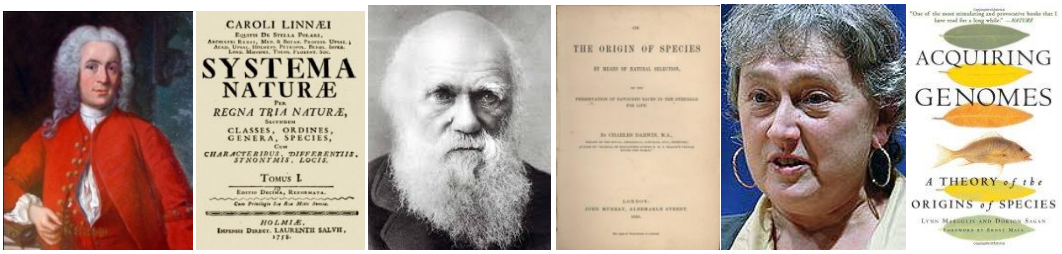
Counted as cells, less than 1 of us is human and more than 10 of us is bacteria, all over us, on all our inside surfaces but mostly residing in our guts. At right is one commensal bacterial species

Above all, we are not separate from our environment, and are changing by the moment in relation to it, perhaps within limits to remain healthy. More than 90 per cent of our genome is microbial, made up of cells without a nucleus. The remainder is what we usually regard as ourselves, which are cells with nuclei. Our bacterial microbiome is inside and outside us, mostly in our guts, and also in all our body's systems and all over our skin. There is no interface, no barrier, between us and the ecosystem in which we live. We merge into it and it merges into us. The microbiome plays an active role in all aspects of our physiology and pathology, energy balance included. We are part of an ecological system.

In addition, our endocrine system depends on the hormonal properties of food. This has been known since the pioneering work on plant food oestrogens and the menopause by my own group at Monash University over 20 years ago (2). These pathways may be corrupted by endocrine disruptors which cause energy

dysregulation and thus diabetes and other conditions. There were few if any sources of these disruptors before the plastics which now dominate the everyday environment started to be used in the mid-20th century.

We are as one with our environment



Carl Linnaeus systematised the living world in terms of species. Charles Darwin attributed evolution to competition between species. Lynn Margulis and many others see not competition but collaboration

It was once thought that only the tongue and nose have sensory receptors for taste and smell. But we give too much importance to our heads and faces. In fact these are widely distributed in the body, with its microbiome. The act of walking on soil or grass (but not flooring or concrete) activates micro-organismal networks. This is just one example of how we are connected and responsive to our environment.

So who and what are we? We are ecological creatures. We are not a separate insulated species. This insight has profound implications for our health and well-being, and that of the whole living ecosystem, including us, now suffering massive destruction.

Thinking and acting as if we are disconnected from the whole living ecosystem is making big trouble for the human species. One result is the syndrome of body composition disorders of which obesity is just the most visible one. There are now plenty of studies showing that healthy physical environments increase human good health and well-being. The reverse is also true. Unhealthy environments make people unhealthy, physically as well as mentally and emotionally.

The implication is that body composition disorders are not only about the amount and the nature of what we eat. One antidote and remedy to obesity can be regularly to walk and talk with a companion in the natural environment.

Ecosystem health disorders

Disorders of body composition are far more complex than is implied by 'stunting' and 'obesity'. Taken all together, body composition disorders involve all tissues and organs, including the gut, liver, blood and lymph tissue, nervous system, and indeed all human and also bacterial tissues and functions. Immuno-competence and inflammatory processes are also involved. Building on earlier work on eco-nutrition (3), I propose a whole new concept of 'ecosystem health disorders' (4).

Also, care is needed with the concept of 'stunting'. In itself, shortness is not unhealthy. It is when it is caused by nutritional inadequacy, infection or infestation, that shortness may be properly referred to as 'stunting'. This requires good knowledge of the food patterns of the community where shortness is prevalent, or of specific short people. It can be a mistake to accelerate the growth of short children. This may increase the risk of obesity and also of cancer, as evident in the population of Taiwan, where much of my work is now done.

A diversity of foods, including a plentiful variety of vegetables and fruits, is a safe good delivery system for nutrients, and is associated with healthy body composition. It is important that food is consumed in whole or relatively unprocessed form. When food has lost its structure, usually through excessive processing, problems of growth and of body composition are more evident. It is best when most foods are freshly cooked at home. The acts of food preparation, cooking, presentation and eating also increase and improve life expectancy and quality. Humans are the only animals that cook, and we need to cook in more sustainable ways (5).

We also need to eat economically and equitably. It is ecologically unsound to eat a lot of meat, and the more fish and dairy products that are eaten, the less there will be to go round. The consequences of climate change and ecosystem loss will exacerbate this problem. In these circumstances, obese people may be blamed, even though they too are suffering from a ecosystem health disorder.

Becoming connected

We are socio-ecological creatures. It is difficult to achieve optimal health in isolation, without a supportive network. In the case of childhood obesity, this is well illustrated by the EPODE network, begun in French villages by Jean-Michel Borys and colleagues in 1993, which has now has spread to Belgium, Spain, Greece, and outside Europe to Australia and Mexico. It involves the whole community and is one of the few success stories in the arrest of the epidemic of child obesity. It is an ecological approach (6).

The rate of disappearance of ecosystems is now accelerating, while the global population continues to expand. The mismatch between ourselves and our ecosystem requirements is already gross. We are compromised further with every lost ecosystem, and we do not know when chaos will ensue. Our future is non-linear and fractal-like, best anticipated by imaginative and flexible systems theory.

A sense of ourselves as ecological creatures, planning as families and communities to reduce environmental pressure, renewable energy, ecosystem maintenance and renewal, cohesive and connected communities, and a whole global movement is needed to provide hope for future generations. Body composition disorders are in reality ecosystem health disorders, symptomatic of a rapidly intensifying

environmental crisis in which we humans are an integral part. We all now need to demand less of ecosystems, including those inside and around us. We also need to eat just enough for good health, and no more. But how much is this, and how can it equitably be distributed?

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Status

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