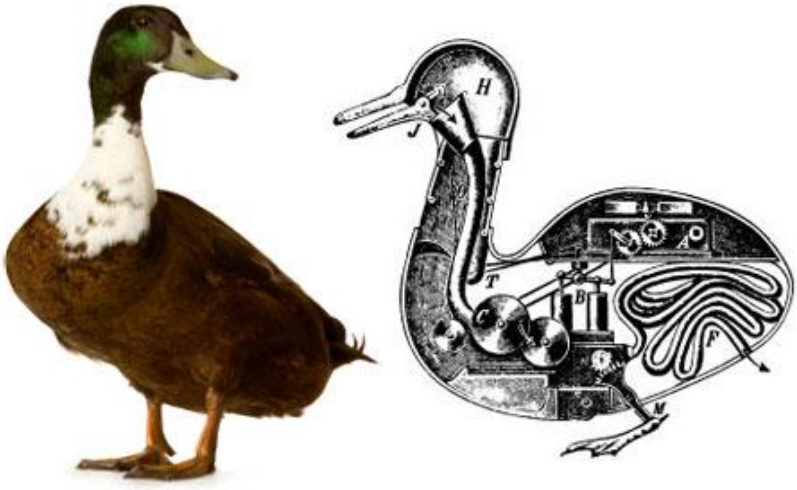
Nutrition science theory and practice

The parts and the whole

Access June 2014 Advances in Nutrition Anthony Fardet on holism here



Living things are more than the sum of their parts. The diagram of the interior of a duck, imagined as a machine like a watch (right), is from 'The Duck of Jacques deVaucanson' of 1738

Anthony Fardet writes:

I have read recent contributions to *World Nutrition* on the impact of food processing on nutrition and public health (1,2), with great interest. Such thinking, and also that in *WN* on agriculture (3-5), is sympathetic with the work I am undertaking with my colleague Edmond Rock at the French National Institute for Agronomic Research (6-8). It also echoes my previous research on the health potential of cereal products (9-14). The science and practice of agronomy is inherently holistic, and also is shaped by public policies often enacted without population or planetary health and well-being in mind. It is reassuring to find a journal with contributions that take an integrated, holistic approach to food systems, dietary patterns, health and well-being.

Reductionism

In recent centuries reductionism, in which reality is split into isolated entities, has prevailed in Western countries. Certainly in the nutrition sciences, this powerful paradigm has reached its limits. Understanding the physiological effects of separate food compounds may appear at first view to be essential. But as *The Food System* team shows (1,2), this has led to the manufacture and marketing of unhealthy and junk foods, and to the reduction of the health potential of foods to only one or a few of their chemical compounds, such as orange juice for vitamin C, or milk for calcium.

The food matrix

The reality of all living systems is much more interesting and complex. A food is not just the sum of its known constituent bioactive substances. It is a matrix of hundreds of phytochemicals, including many that even when analysed in isolation are poorly understood, and others that no doubt have not yet been identified. In any case, a reductionist view of food does not consider the structure of the food itself and its effect on physiology, or the synergistic effects of bioactive compounds. Instead, natural foods are fractionated and their ingredients isolated. An outcome of food and nutrition science has been to enable and encourage the creation of highly refined and processed food products 'enriched' with some specific bioactive compound, often in inappropriate or even pharmacological amounts, labelled and claimed as having benefits to heath (2,6,7).

All this neglects the nature of whole food. It is no surprise that 'nutraceuticals' and other 'functional foods' apparently have not checked epidemics of obesity and diet-related chronic diseases in any country. In nature, when safe and eaten in appropriate combinations, foods are generally healthy. It is the ways in which they are altered or transformed by processing that magnify their impact on health and well-being (1,8).

The parts and the whole

Living things are more than the sum of their parts. This is inherent in the life process. It is essential that food and nutrition scientists respect the whole structure of foods. Aggressive technology that ignores foods as a whole is troublesome. The more that natural foods are intensively processed and highly refined, the more energy-dense they became, and the less phytonutrient-dense and less satiating (15). The classification of foods according to the nature, extent and purpose of processing, as set out by *The Food System* team (1), which informs the conceptual framework of the national Brazilian dietary guidelines now in draft (16), is a fruitful way forward.

A systematic 'paradigm shift' from reductionism to holism is now needed. This will enable food and nutrition scientists to undertake research whose findings will have more value for human health, and greater benefit to society, the environment, and the integrity and future of the whole living and physical world, *e.g.* the respect of biodiversity and animal well-being.

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