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Darwin Close to Home the Evolution Line in Diet and Health

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Abstract

A hypothetical case is made for the selection of nutrient and energy sources for diet and health along the lines of a Darwinian model of natural selection, with the ultimate aim of choosing corrective or sustaining paths for our health maintenance. Some recent examples of scientific analysis are presented to support the proposal.

Introduction

This is about a series of events that landed in my lap as I was attending to other people's scientific findings. It is closely aligned to that of evolution that most people are familiar with, but an extension of it. An important extension to it, however, and includes health and diet as one continuum with evolution.

It all started quite simply, when I was asked if I'd be interested in attending a lecture at the University of Sydney. The lecture was aimed at obesity and insulin issues, and their clinical and medical implications and was delivered by Prof. Tim Noakes (SA) and Dr. David Unwin (UK). Prof. Noakes' talk focussed mainly on the biochemistry of diet and the body's processes, and Dr. Unwin highlighted the medical practitioner's side of the obesity and the carbohydrate issue [1,2].

Science Thrust

The science trail highlighted carbohydrate digestion and the production of glucose. If glucose is not consumed by exercise, it pushes the production of insulin and is transformed into fats and stored in fat cells of the body.

The production of glucose is not the only way to take up sugars. Other sugars, like fructose and lactose contained in fruits and milk and juices, and have a similar energy impact and are available as energy sources. Apart from the different sugars that could be used for energy there are additional sources of energy available, such as the fats and protein that we consume that can be converted and utilised by the body [3].

Observation

The very image of these other sources and the alternative pathways they would use appeared to be unstructured and open ended, and seemed to follow processes elsewhere defined in biochemistry. The question is, what if these alternative pathways relate to different circumstances? And could they work in a Darwinian-like adaption system where different circumstances create a modified process?

In a Darwinian scheme of things the best path to meet the energy and other needs would be chosen by the body itself; that is, between glucose and the other sugars, fats, protein or any combination of these - a process of natural selection. The circumstances may pertain to specific environmental circumstances, like the surplus or the lack of particular food resources or nutrients, or they may be related to health difficulties and the like. Alternatively, they may simply be a matter of choice, for a healthier or better co-ordinated life. The choices could be dependent on scientific or medical advice, but still along the lines of selection.

Would the results differ if interpreted in a Darwinian frame? Critical biochemical pathways could be identified and tested to determine how the switching between various pathways is made, and under what circumstances would a particular pathway be chosen over another. This analysis may suggest processes and assist in dealing with some of our outstanding and difficult health issues, including obesity [4].

Research by Others and the Bigger Picture

There are other pointers to an evolution link to dietary selection. A research paper by Rutger's University published recently in a scientific journal [phys.org] suggested that the genetic code be attributed as an energy source. The full title of the paper, "Genetic code evolution and Darwin's evolution theory should consider DNA an 'energy code' " [Todd Bates]. This links Darwin's theory of evolution propounded some 163 years ago to genetic science of 2020. Obviously other scientists see a continuing and relevant connection between the two.

Darwin's framework is there if all the pieces are put together and interpreted with an inquisitive frame of mind. Given the large scale patterns of the global evolutionary processes; in geography (tectonic plate movements), zoology (distinct but closely located animal species) and botany (continental distribution of plant genera), the signs are visible.

If there are doubts about the clarity of the trail for to follow, science should piece these major issues together, just as Darwin and Wallace and others did before us. The trail beyond our

relative recently discovered genetic path, with Watson and Crick's 1953 DNA discovery (along with the help of other scientists), could be that much more intricate for us to understand and piece together but still warrants intense analysis [5].

Further

Advances in science now enable us to look even deeper. It seems as though the genetic code, as a distinct entity, is not the be-all and end-all of our processes and inheritance characteristics. Scientific investigation has now taken the DNA and genome process further into the field of epigenetics, so discovery is very much still on the table.

For example, Darwin's Galápagos finches and their species' variations are now being re-examined within this deeper area of genetic variation. What caused the variation in beak enlargement in other Galapagos island finches; their diet or the circumstances? - or their circumstances and their diet? "Whilst diet is known to influence epigenetics [Michael Skinner]", results of field analysis [Sabrina McNew] noted that "... some methylated regions were associated with genes associated with beak growth." [Forbes].

The role of the methyl group (eg. methionine) in the process of methylation of genes results in the switching on and off of proteins in the biochemical processing, and is one of the hot topics of research. (Note: Some sources of methionine are broccoli and fish!). This has a direct affect on 'variation' potential without any change in gene structure, and it can happen quite quickly apparently.

Missing Link - Biochemistry to Genetics

The evidence presented by the Noakes lecture is solid as there are significant science inputs used in the the findings. So the diet and biochemistry chain at this beginning is firm; as incontestable as anything in the science world can be. At the other end of the findings are the detailed discoveries, involving DNA in the 1950's and the discovery and recognised importance of epigenetics quite recently, along with the crucial actions of the methyl groups in the delivery of gene affected influences. The notion that a Darwinian-type adaptability is in the network was apparent, once uncovered. The question is how these two monumental slabs of science-fact are linked. What is missing in this gap to link them - between the biochemistry and genetics? Is there a structure, or a line of connection?

Searching the biochemistry-to-genetics quantum in science papers revealed direct and definitive relationships between the two. The transmission from DNA to RNA has certain weak points in its copying ability - "A single-stranded genome tends to yield more mistakes during replication, meaning a high rate of mutation" [Quammen]. "...this may lead to changes in the function, expression or structure of the protein it encodes for." [wikibooks.org].

The conclusion that may be reached from this brief search is that there is no gap, that the genetics itself is the structure, that it supplies the Darwinian openings, that it supplies the opportunities to source different nutrients or energy supplies and provide different gene modification opportunities, and thus different inheritance capabilities. And this pathway, or 'line', is available everywhere, in all of the biochemical makeup [6].

Technical Evaluation and Testing

How does all of this work? As the fabric of the science interactions is complex and involved a wide spread of technical skills is required for absolute proof. But as Darwin himself worked through his ideas he relied on his specialist friends for specific scientific inputs; Charles Lyell the renowned geologist, botanists like Alexander von Humboldt and ornithologists like John Gould. With respect to the proposed evolution-biochemistry-diet link we need to do the same thing.

Technical Review

It has been pointed out by a professor at the University of Sydney that the basic premise of this paper, the apparent unstructured take-up of nutrients/energy, is very similar, or the same as, the 'metabolic flexibility' principle that has been established since 1999 by detailed scientific investigation. This agreement actually reinforces the connections made in this paper, but the findings of this paper go further [7].

Conclusion

Rather than reaffirming some of the detailed scientific work already established, the Darwinian option establishes an integral connection to an evolution line in the biochemical and genetic structure. Additionally, it crystallises an immediate and orientating framework for dietary and health actions, now so very close to home

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