

challenged to understand the character of living things. [From “The Unbearable Wholeness of Beings”]

Contextuality turns causality upside down

To realize the full significance of the truth so often remarked in the technical literature today — namely, that context matters — is indeed to embark upon a revolutionary adventure. It means reversing one of the most deeply engrained habits within science — the habit of explaining the whole as the result of its parts. If an organic context really does rule its parts in the way molecular biologists are beginning to recognize, then we have to learn to speak about that peculiar form of governance, turning our usual causal explanations upside down. We have to learn to explain the part as an expression of a larger, contextual unity. [From “Getting Over the Code Delusion: Biology’s Awakening”]

Causes are lifted into the service of the organism

We find in every organism a *meaningful coordination* of its activities, whereby it becomes a functioning and self-sustaining unity engaged in a flexible and well-shaped response to the infinitely varying stimuli of its environment. By virtue of this coordination, every local or partial activity expresses its share in the distinctive character of the whole. The ability of the organism to pursue its own ends amid an ever-shifting context means that causal relations become fluid and diffuse, losing all fixity. They are continually subordinated to, or lifted into service of, the agency of the organism as a whole. [From “The Unbearable Wholeness of Beings”]

Its life all the way down

The one decisive lesson I think we can draw from the work in molecular genetics over the past couple of decades is that life does not progressively contract into a code or mechanism or any other reduced “building block” as we probe its more minute dimensions. Trying to define the complexity of the chromosome, according to geneticists Shiv Grewal and Sarah Elgin, “is like trying to define life itself”. Having plunged headlong toward the micro and molecular in their drive to reduce the living to the inanimate, biologists now find unapologetic life staring back at them from every chromatogram, every electron micrograph, every gene expression profile. Things do not become simpler, less organic, less animate. The explanatory task at the bottom is essentially the same as what we faced higher up. It’s rather our *understanding* that all too easily becomes constricted as we move downward, because the contextual scope and qualitative richness of our survey is so extremely narrowed. [From “Getting Over the Code Delusion: Biology’s Awakening”]

Eat to Regulate Your Genes?

As you may have learned in biology class, a protein-coding gene is a segment of DNA that can be “transcribed” into messenger RNA, which then is (or may be) “translated” into protein. The entire process is broadly known as “gene expression.” However, one of the hottest fields of research in molecular biology over the past decade or two has to do with DNA regions that produce a wide assortment of non-protein-coding RNAs. These noncoding RNAs perform a wide range of regulatory functions in the cell. And one of the most important classes of these regulatory molecules consists of what are called “microRNAs,” or miRNAs. Their manifold functions primarily have to do with the regulation of gene expression, and their activities are interwoven with almost every aspect of an organism. Likewise their malfunctioning: the presence of the wrong miRNA in the wrong place at the wrong time contributes to many diseases, including cancers.

It has long been regarded as impossible for an miRNA ingested in an animal’s food to function as an miRNA in that animal. Avoiding degradation, getting from the digestive tract into the bloodstream, and moving from the bloodstream into tissues and organs—these seemed to be insurmountable barriers. But researchers have now brought the startling and wholly unexpected news that animals, including mammals, can assimilate in functional form at least some of the miRNAs they ingest from food. For example, plant-derived miRNAs have been identified in the blood serum and tissues of mice. One of these miRNAs was found to regulate gene expression in such a way as to affect levels of low-density lipoproteins in the mice. That same plant-derived miRNA is present “at a relatively high level” in human serum. The researchers (Zhang et al. 2012) conclude that “plant miRNAs in food can regulate the expression of target genes in mammals.”

Commenting on the implications of this research, another team of biologists write: “For decades there have been debates on the safety of transgenic [genetically engineered] food with regards to human health and the environment. This profound discovery by Zhang et al. should make decision takers more cautious when considering the issues that may arise from the consumption of transgenic crops.” (Jiang et al. 2012)

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REFERENCES

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