AI: More than human

A Barbican Exhibition

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Portland Press)

Artificial intelligence (AI) is on the brink of breaching our collective consciousness. While already deeply interwoven into our way of life, many of us remain relatively unaware of its degree of influence, with even less of an idea of where its influence is likely to take us. The AI exhibition at the Barbican Centre, therefore, arrives at a pivotal moment to distil an immensely complex subject into a series of creative and engaging exhibits which will undoubtedly stimulate us to consider further its place in our own lives.

Featuring an extremely varied set of installations, the strength of this exhibition is in its ability to portray AI as a collection of disciplines from computing through neuroscience to robotics and make them relevant to everyday life. Whether you are interested in playing with AIs like Sony's robotic puppy, AIBO—which learns through interaction—or trying your hand at Go, the abstract board game which has now been mastered by DeepMind's AlphaGo, there is no shortage of interactive exhibits. Perhaps most importantly, the ethical problems AI faces are raised; of particular interest is Joy Buolamwini's project, Gender Shades, an examination of the racial/gender bias of datasets through which facial analysis AIs detect patterns. The real highlight, however, is the wonderful digital installation from teamLab, *What a Loving and Beautiful World*, a visually-stunning interactive exhibit in which Chinese characters and the natural world blend into a unique ever-changing image depending on interaction with the viewer.

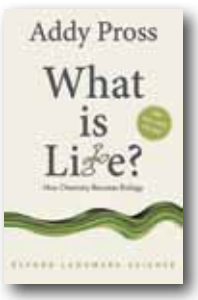
That AI will increasingly become a part of our lives is inevitable. However, the direction we allow it to take is still very much a question that we all need to be asking. Surely, then, this latest Barbican exhibition is an essential experience.

***AI: More than Human* is on display at the Barbican Centre, London until 26 August 2019.**

Interested in Artificial Intelligence? Be sure to check out our October issue—available online soon
http://www.portlandpresspublishing.com/content/biochemist-magazine-0

AI: More than Human, Barbican Centre—16 May–26 August 2019. *What a Loving and Beautiful World*, © teamLab

What is Life? How Chemistry Becomes Biology by Addy Pross



At least once in our lifetime, we must be wondering why we live, what is our purpose in life, and why does life even begin in the first place? While there are no definitive answers to those questions, science can at least provide a glimpse of thoughts to answer what life is and how does the life begin. Addy Pross, a professor of organic chemistry at Ben-Gurion University, Israel, explores the answers to 'what is life?' that science has provided so far, which also becomes the title of this book. With an homage to a text with the same title by the famed quantum physicist Erwin Schrödinger, Pross focuses on answering the question on the chemistry point of view, which he explained as a "bridge between physics and biology".

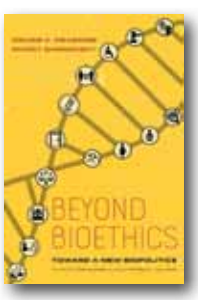
The author begins the book by explaining the striking differences between living and non-living things despite the atoms that made them are the same. As nature tends to push the system towards chaos and disorder, not towards order, how can living things, which represent order and function, be formed from the same dead atoms and molecules as in the non-living? This book attempts to explain life from the view that biology composed of chemical molecules that obey physical laws. Pross highlights some of the ground-breaking chemical experiments that were trying to answer the origin of life, especially around the 'RNA world' hypothesis which readers may find it interesting. For example, Sol Spiegelman and Gerald Joyce separate experiments on molecular replication suggest that a string of RNA (ribonucleic acid, a molecule similar to DNA that regulates gene expression) may replicate itself in a test tube without the need of a complex system. Replicating RNAs may compete, mutate, adapt, and evolve, thus demonstrating Darwin's evolutionary theory on a molecular level.

Nevertheless, there are still many questions left unanswered. For instance, even if RNA is indeed the precursor of life, how does RNA form DNA and proteins, to establish the living system as we know today. There are also no suggestions on how RNA was formed in the first place. Also, how all those biological molecules form a compartment, which we later know as a cell, that is capable of maintaining dynamic stability as opposed to its disordered environment is left unexplained. Some descriptions to answer these questions may improve the book and appeal to more readers. A chapter in this book also extensively explains the philosophical views of life, particularly teleonomy and Aristotelian philosophy, which the reviewer found irrelevant in answering how chemistry becomes biology as the author proposed in the title. Some parts are also repetitive and contain excessive prose which may be illegible for general readers.

What is life? is a suitable book for the lay audience and high school/university students who are interested in learning scientific evidence that attempt to elucidate the answers. However, some explanations require a basic understanding of scientific terminology and concepts. This book is a decent effort in enlightening the dark path of life's origin to the broader society by integrating scientific concepts and evidence in physics, chemistry, and biology with some illustrations that clarify the text. Even though the book does not provide a clear answer, it is a good start for the readers who are eager to explore further the origin of life from a scientific perspective.

Abi Ghifari
(University of Western Australia, Australia)

Beyond Bioethics: Toward a New Biopolitics by Osagie K. Obasogie and Marcy Darnovsky (Editors)



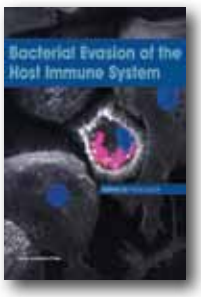
The word 'beyond' refers to a place or view that is far from a vantage point. It can mean something far back or far up front. The editors made the right choice in using the word to start this book. This book is a compendium of sharp, insightful, and penetrating essays that dare us to look at the life sciences, not with the pomp and bravura that modern science journalism tends to saturate it with, but through a critical scope that makes visible the political, social, and historical layers of science.

Darnovsky and Obasogie draw on many sources and curate only the best essays to fill their volume. They then categorized them into sections that focus on different themes, from the American roots of Nazism, to the commodification of the body, to the promise of designer babies, and more. The essays are accessible as each have been carefully screened and edited with readability and understanding in mind. Readers both from academia and the interested public are sure to profit from these pages.

Overall, *Beyond Bioethics* is an important and timely reminder for careful reflection. While biotechnology is advancing at breakneck speed, it is crucial that we take a slow and careful look at its trajectory: from where it was to where it is going. It is only by confronting the questions posed in the book and finding answers to them that we can turn our science into a science that delivers on its promises of making life easier for the whole biosphere. At the moment, what science should be is far from what science is. Reading this book is perhaps one of the first steps that we can push science to reach its potential, to make its should as its is. To make it go truly *beyond*.

Pippo Carmona
(University of St. La Salle)

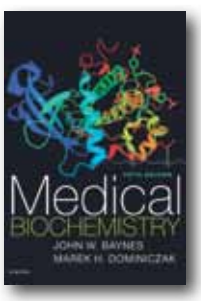
Bacterial Evasion of the Host Immune System edited by Pedro Escoll



In this volume, Escoll has compiled eight review-style chapters written by experts from across the globe into one handy book, allowing the reader to easily dip in and out of the text. Each chapter provides an in-depth and up-to-date description of the current knowledge regarding the various subversive techniques deployed by bacteria in the battle between germ and host. The level of detail is exquisite and therefore more appealing to readers with a prior knowledge of the immune system and its functions. However, the clear, colourful diagrams studded throughout the book are also very useful for consolidating all those new facts! I would particularly recommend this book to microbiology and biomedical students and researchers, as it provides an excellent resource for revision, review and reference, as well as indicating new pathways to explore and delivering copious references for further reading. Overall, I found this book enlightening and eye opening; it gave me a lot of food for thought, has inspired me in my own research and made reading papers a lot more enjoyable!

Nicola Edwards
(Manchester Metropolitan University, UK)

Medical Biochemistry, fifth edition by John Baynes and Marek Dominiczak and *Clinical Biochemistry*, sixth edition by Michael Murphy, Rajeev Srivastava and Kevin Deans



The emergence of metabolomics technologies is transforming our ability to understand the biochemical basis of disease and rejuvenating the areas of clinical and medical biochemistry. Of course, we have known for many years that perturbations to biochemical equilibria underpin many aspects of disease. Diabetes, for example, arises as we lose the ability to regulate blood sugar levels with the necessary speed and precision required to maintain homeostasis and sustain energy control.

The golden age of biochemistry, in the first and middle parts of the 20th century was full of promise. Inhibitors of enzymes in faulty biochemical pathways could hold the key to curing a multitude of diseases. Simple nutritional interventions were enough to cure some disease.

With the molecular revolution of the later part of the 20th century, however, basic biochemistry and metabolism slipped out of fashion. It seemed genes and understanding their regulation held the solutions to disease. The sequencing of the human genome was considered the pinnacle of biomedical research. However, the speed at which we have progressed with genetic information alone has failed to live up to expectation. Notwithstanding, finding mutations and novel technologies to probe gene function began to rekindle an interest in metabolism and the biochemical basis of disease. Since then, now that that mass spectrometry and nuclear magnetic resonance can simultaneously quantify thousands of metabolites in any given individual, allowing us to seek metabolic correlates of disease in an unprecedented way, biochemistry has begun to re-appear centre stage.

Baynes and Dominiczak's text book *Medical Biochemistry*, first published in 1999 and now running into its fifth edition, offers a comprehensive account of the known pathways that contribute to well-being and how their perturbation leads to disease. Starting with overviews of the fundamentals of biochemistry, the key chemical components of our body and their interactions, the book then covers biochemical contributors to physiology and how their malfunction can cause disease. Particularly helpful for medical students trying to grapple with biochemistry are the clinical cases that enrich each topic and bring the subject into a clinical context. It was nice to see an appendix added to include more of these too. Baynes and Dominiczak is the best book available to learn about biochemistry in medicine. Murphy, Srivastava and Deans author the sixth edition of *Clinical Biochemistry*, first published in 1995. This latter offering is less deep and covers less ground that the former, acting more as an aide memoire than a comprehensive learning tool, however, it too gives readers a quick and relatively easy insight into the biochemical basis of disease.

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