

Exhibition and book

The evolution of a great mind: the life and work of Darwin

In 1966, an American graduate student was supervising my live-trapping of rats in a grain warehouse in Calcutta. A few years my senior, he was doing field work for his doctorate in ecology from a leading American research university. We recorded the numbers of fleas on each rat as part of a study of the transmission of plague. Some rats had far more fleas, and other rats had far fewer, than would have been expected from a random (Poisson) distribution of fleas. I began speculating to the graduate student that this over-dispersed frequency distribution had evolutionary implications. In that cramped, hot room stacked high with bags of grain, he said to me: "You know, I don't think I could ever believe in evolution." Uncharacteristically—because I was stunned speechless, not because of any great self-control—I kept my mouth shut. I learned then, and have never forgotten, that evolution's roots on my home continent may have penetrated the topsoil but have not yet breached the bedrock. Only in 1987, in *Edwards v Arkansas*, did the US Supreme Court proscribe the teaching of creation science in all American public schools.

40 years too late for my Calcutta adventure, the exhibition *Darwin* would have been my best response to the mental fog in the minds of that then-young man and the 57% of today's Americans who, according to a public opinion poll, say they believe in, or lean toward, creationism. This exhibition and the accompanying book by the curator Niles Eldredge could not be more timely or more needed.

The exhibition approaches the facts and the theory of evolution by natural selection from a historical perspective. It starts with ideas of species and views of evolution that preceded Charles Darwin, and then focuses on Darwin's life and work—his privileged family background, his unpromising boyhood and youth (he dropped out of

medical school), his total addiction to natural history, botany, and geology at Cambridge University, his 5 years on *HMS Beagle*, and the rest of his long, extraordinarily productive, and richly recognised life and career.

The exhibition documents and illustrates what Darwin saw on the *Beagle* and how his observations raised doubts about the constancy of species and the

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adequacy of biblical time scales to account for major changes in evolution. The viewer learns how Darwin transformed these observations and doubts into a triumphant theory of a mechanism of biological evolution.

Darwin's theory is triumphant because it has been corroborated by direct observations of evolution in laboratories, hospitals, and agricultural fields around the world (notwithstanding his erroneous genetics and his omissions of punctuated equilibrium and lateral or horizontal transfers of gene fragments, genes, and genomes). Only Darwin's theory accounts for antibiotic resistance and pesticide resistance. And Darwin's triumph is a theory, a rational way of organising observations, ideas, and mechanisms to guide future observations, thought, and action. The exhibition includes a wise and important video in which scientists discuss what theory means in science as opposed to casual speech. In the video, Eugenie Scott asserts: "Theories explain laws and facts. They're the most important thing we do in science."

The words and images on display at the exhibition are available to anyone

with an internet connection. They tell a coherent, comprehensive, and intellectually insightful story of the growth of evolutionary ideas and explanations in Darwin's mind. All the exhibit labels, many illustrations, pictures of many of the objects, and much of the video content can be downloaded for free.

Then why, when I went to the exhibition on a Sunday morning just after the museum opened, was there a large crowd waiting to enter? Because the objects on display are simply thrilling. I found Darwin's handwritten notes especially affecting. In one notebook, Darwin wrote: "for such facts undermine the stability of species" and then, with prudence, he inserted a carat after "facts" and wrote "would" above the line to make it read: "for such facts would undermine the stability of species". The manuscript makes it clear what he really thought in a way no printed transcription could.

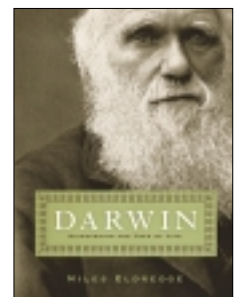
Some of the objects assembled have not been together since they left the *Beagle* on Darwin's return to England in 1836. Darwin's study in Down House is reconstructed, and a first edition of *On the Origin of Species* lies on his work table. His walking stick leans against his rolling easy chair. One can imagine that Darwin has just stepped into the other room for a moment.

For me, the biggest excitement was seeing the original B notebook of 1837–38 opened to the page on which Darwin wrote, "I think", and then drew a tree of life branching from a common origin. I have used a reproduction of that figure in lectures, and Eldredge uses an excellent photograph of it as the frontispiece of his beautifully illustrated and perceptively written book. Nothing matches seeing the original.

The exhibition does not, however, idealise Darwin. We see, for example, how he failed to label some birds he collected in the Galápagos by their island of origin and had to rely



Darwin
An exhibition curated by Niles Eldredge at the American Museum of Natural History, New York, USA, showing until May 29, 2006. It will then travel in the USA to the Museum of Science, Boston, and The Field Museum, Chicago, before going to the Royal Ontario Museum, Toronto, Canada and the Natural History Museum, London, UK.
<http://www.amnh.org/exhibitions/darwin>



Darwin: Discovering the Tree of Life
Niles Eldredge, W W Norton & Company, 2006. Pp 288. £23.00. ISBN 0-393-05966-9.

on Captain FitzRoy's more precisely labelled specimens. Darwin later wrote: "It is the fate of every voyager, when he has just discovered what object in any place is more particularly worthy of his attention, to be hurried from it."

As I left the exhibition, I imagined what would happen if Darwin, funded lifelong by his family's wealth, were alive today and tried to get government grants to support his decades of empirical and theoretical research on evolution. That research has undoubtedly changed the way we understand the world. Darwin showed that the variation among individuals of a species is the essential raw material on which natural selection acts. Darwin put chance variation at the heart of the dynamics of evolution, and the science of chance variation in all branches of science is,

without doubt, the major conceptual advance of the last 150 years. Sorry, Einstein.

Evolution in the USA these days is associated with good and bad news. The good news is a ruling on Dec 20, 2005, by US Federal Judge John E Jones III—nominated by President Bush in 2002 and reportedly a Republican—that the Dover Area School Board's requirement that intelligent design be introduced before the teaching of evolution violated the separation of church and state required by the Constitutions of the USA and Pennsylvania. The school board that imposed this crypto-creationist requirement was voted out of office. That is good news.

The bad news is that this magnificent exhibition—the most detailed and inclusive exhibition ever assembled anywhere of Darwin's personal

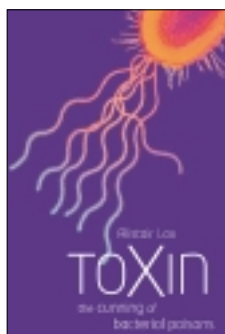
effects, collected specimens, letters, manuscripts, and notebooks—has no corporate sponsor. Foundations and individuals helped fund the exhibition. The American Museum of Natural History's earlier exhibitions *Petra: Lost City of Stone* and *Einstein* found corporate sponsors. Why not Darwin?

After *Darwin* closes in New York it will travel to other venues. If it comes to a museum near you, don't miss it. If it does not, look at the website and read the book. The exhibition tells the story of Darwin's life and his intellectual journey in evolution with such beauty and accuracy that it is essential viewing, especially in a country where Darwin's ideas have not yet breached the bedrock.

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Side Effects
Money Talks: Profits Before Patient Safety
A film and documentary by Kathleen Slattery-Moschkau. Order DVD from <http://www.sideeffectsthemovie.com>



Toxin: the Cunning of Bacterial Poisons
Alistair Lax. Oxford University Press, 2005. Pp 208. £14.99. ISBN 0-19-860558-7.

In brief

Film: Pill pusher recants

A coming-of-age film whose main character is a drug company sales rep? I was intrigued. Karly Hert (Katherine Heigl) is conflicted. She loves the perks of the job, but feels guilty that she is forced to hide concerns about certain drugs when she makes her sales pitches. Despite her conscience, she is seduced by the huge cheques and becomes the company's new darling. On the eve of the launch of the company's blockbuster drug, however, some potentially deadly side-effects surface. The data are squelched, but not before Karly finds out. Will she blow the whistle during a meeting, where she will be honoured as rep of the year?

Producer/director Kathleen Slattery-Moschkau worked as a sales rep for a large drug company for 10 years. She wrote the script for *Side Effects*, then left the industry. Rather than succumbing to Hollywood pressures to "dumb down" the script, she produced

it herself, releasing it in theatres that play independent films in various cities in the USA (plans for a UK release are underway). At the same time, she produced a chilling documentary, *Money Talks: Profits Before Patient Safety*, in which physicians, a medical journalist, and others familiar with the drug industry talk candidly about selling drugs, rewarding prescribers, courting physicians with gifts, the impact of direct-to-consumer advertising, and ghostwriting of journal articles. Both film and documentary push the message that "most-of-what-they-do-is-profit-driven", but in a quirky and engaging way.

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Book Toxic tales

Alistair Lax is captivated by toxicology, and in *Toxin: the Cunning of Bacterial Poisons* he champions the importance of modern microbiology. From the

societal upheavals caused by plague to the death of a Bulgarian dissident assassinated by a toxic pellet shot out of an umbrella, Lax argues that toxins have changed the world.

Lax documents the collaborations and rivalries between scientific factions that led to the emergence of modern microbiology, and provides an intriguing insight into the nature of scientific advancement. He also reminds us that although this new understanding has been beneficial, it has also led to the development of biological weapons.

But what of the future? Lax argues that his discipline will continue to yield medical benefits, most likely through new cancer treatments. Although *Toxin* does, at times, suffer from a little too much detail, it offers an entertaining insight into the ubiquity of toxins in our lives.

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