BASIC BOOKS

TOMORROW'S IDEAS – TODAY.

AUTUMN 2023

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Tomorrow's ideas – today.

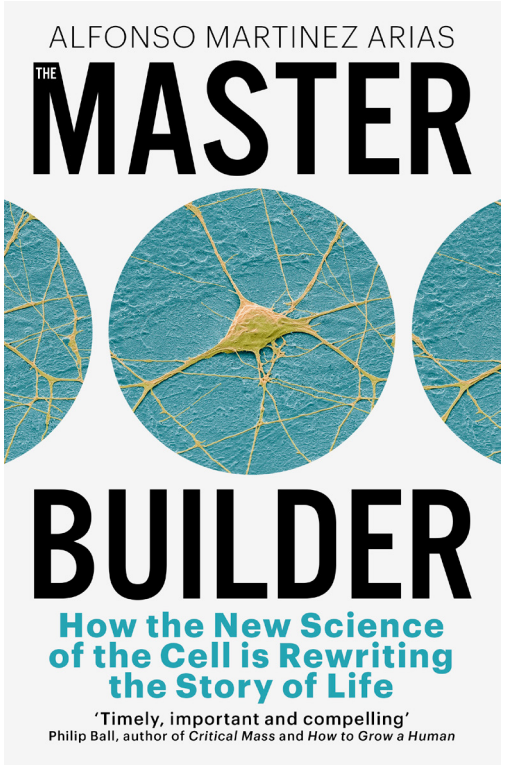
September 2023 will mark the second full year of publishing for Basic Books and we hope, dear reader, that you will agree there is much to celebrate – in stark contrast with much of the other news that surrounds us in these uncertain times.

August marks the publication of *The Master Builder* (the ultimate beach reading) in which one of the world's leading developmental biologists reveals through a series of individual stories and cutting-edge research that the secret of life lies not in our selfish genes but our wonderfully cooperative cells. September continues our journey towards a greater understanding of ourselves and our world with *A Theory of Everyone,* a blueprint for a better future that argues it is only by understanding and applying the laws of life – the need for energy, innovation, cooperation and evolution – that we can solve the practical and existential challenges we face as a species. *Justinian: Emperor, Soldier, Saint* tells the thoroughly modern story of a ruler who faced many of the same challenges we face today – climate change, plague, war and fierce debates over national and individual identity yet remained essentially a man of his times.

And in October we are also excited to be publishing shadow chancellor Rachel Reeves's powerful call to recognise the contributions of the women who have not only helped us understand the economy better but have actively shaped, and are still shaping, the world around us. Reaching for the stars has never been more within the grasp of the next generation of women economists but in *Starborn* a celebrated cosmologist asks us to stop and consider what we owe to the stars and how very different our world would have been without them.

Finally, last but never least, a clutch of new paperbacks awaits you covering everything from the Mongol storm to the power of mathematical models. Enjoy!

Sarah Caro
Publishing Director
Basic Books UK



THE MASTER BUILDER

How the New Science of the Cell is Rewriting the Story of Life

Alfonso Martinez Arias

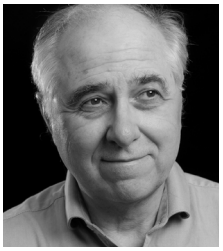
What defines who we are?

Until now, the biological answer has been our genes. Leading biologist Alfonso Martinez Arias breaks with popular tradition to make a bold argument: what defines us is our cells.

Drawing on groundbreaking research, he reveals that we are composed of a thrillingly complex, constantly rearranging symphony of cells that know how to count, feel, and give form to our bodies. While DNA is important, nothing in your genes explains why your heart is on the left, why you have five fingers and not ten, why genetically identical twins have different sets of fingerprints, or why it's possible for a mother to apparently share no DNA with the children she gave birth to!

At the heart of it all is a powerful new conception of the essence of life. Our identities are shaped by the interconnections between cells, working cooperatively, creating something greater than its parts – the unbroken lineage that connects us to the fertilized egg from which we developed and back through the billions of years of our planet's history, to the very first cell of all life on Earth.

A sweeping revision of both the present and the history of life, *The Master Builder* puts forward a new paradigm for understanding biology, transforming our approach to where we come from, what shapes us, and where we are going – as individuals, a species, and the community of life itself.



Alfonso Martinez Arias is ICREA Research Professor in the department of systems bioengineering at the Universitat Pompeu Fabra in Barcelona. The recipient of numerous awards, he is co-author of the biology textbook *Principles of Development*, which was awarded the Royal Society of Biology book prize. He lives in Barcelona, Spain.

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'A timely, important and compelling case for why an understanding of living organisms must start with the cell. He offers a vision of life that shows it to be much more interesting and ingenious than any simplistic notion of genetic blueprints can provide'

Philip Ball, author of *Critical Mass* and *The Book Of Minds*

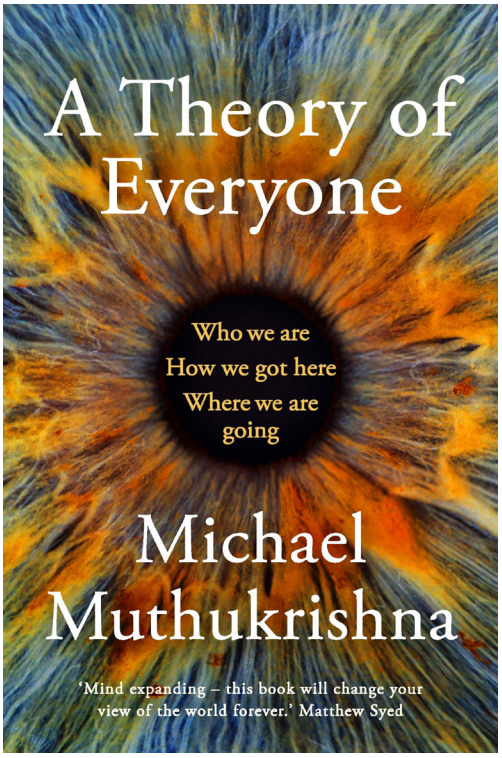
'This book makes a new and stunning argument, not so much that we should put DNA in its place, but that we can see the grandeur of life as it truly is'

Azra Raza, author of *The First Cell*

Research into the capacity of embryonic stem cells to create other types of cells continued to uncover remarkable findings. In 2012 Yoshiki Sasai, a scientist extraordinaire with a keen interest in the development of the nervous system, began to tinker with mouse embryonic stem cells in the hope of learning how the mammalian brain develops. One day, as he checked cells in an experiment being performed by one of his colleagues, he came across quite a spectacle: an optical cup, or embryonic eye, had emerged in one of the dishes, along with some pieces of brain. Eyes are complicated structures, with many different kinds of cells arranged in specific geometries and densities. It was therefore quite a shock to see them emerging in a dish. He tried the same culture and conditions with some human embryonic stem cells and again obtained an eyelike structure and associated brain tissues, this time in an even bigger, three-dimensional version. The cells seemed to know their species of origin and scaled their architecture accordingly! Where previous scientists had discovered miniguts, a new crop of researchers now unveiled the minibrain. A year after Sasai's discovery, a duo of researchers at the Institute of Molecular Biotechnology in Vienna, Madeline Lancaster and Jürgen Knoblich, unveiled the first so- called cerebral organoid. The small, layered assembly of cells, a mix of neural stem cells, neurons, and other brain cells, had been grown in a culture from induced pluripotent stem cells and had an uncanny resemblance to the folds and ridges of the human cortex. It didn't work like a brain — at least not in any sense we'd commonly recognize — because it wasn't connected to a body. Lacking sensory organs feeding it information to react to and learn from, without feedback loops from the heart or lungs to regulate the release of hormones, and possessing no muscles to control, it wasn't much of a brain at all. However, the minibrain was not without its charms, offering a means of studying the effects of disease on human brains.

The cerebral organoid model was put to a major test after 2015 and 2016, when doctors began to see an unusually high number of babies being born with microcephaly — small heads and a large loss of brain tissue. The vast majority of the cases were traced to infection of the mother and developing child with the Zika virus, which is transmitted to humans by mosquitoes. Health authorities responded swiftly so that the spread of the virus was controlled, but Zika virus was not eradicated, and no treatments for infection exist.

If there were another outbreak, it would be useful to understand why brains failed to develop properly in some, but not all, babies born to mothers infected with the Zika virus during pregnancy. Experiments on human brains are usually made impossible by ethical and practical issues. Naturally, experimenting with Zika virus infection on living human brains is amoral in the extreme. And unlike with other organs and tissues, using other animals to do the experiment isn't an option. This is because the cortex in the human brain is larger, relative to other parts of the brain, than it is in any other animal. The way our neurons and neural circuits process information similarly appears unique to humans, involving a very large expansion in the number of progenitor cells to brain cells early in development, before they've specialized. The combination of numbers and circuitry seems to bestow us with cognitive powers not matched by any other species but also makes human brains incomparable for scientific purposes. To study how the human brain develops and what stops it from developing and operating normally, you simply need to use human or at least primate tissue. Fortunately, minibrains allow us to do this ethically for the first time. By infecting minibrains with Zika virus at different stages of the structures' growth in culture, Guo-li Ming and Hongjun Son, then based at Johns Hopkins University, were able to demonstrate that the virus had a strong affinity for attacking progenitor cells of the brain. When the virus infected these cells, it curtailed their expansion; the meager progeny they generated often died too, so that the minibrain was much smaller than uninfected minibrains grown from similar seeds cells. This is not a cure for microcephaly but instead a step toward understanding the causes of the disease.



A THEORY OF EVERYONE

Who We Are, How We Got Here, and Where We're Going

Michael Muthukrishna

A blueprint for a better future.

Playing on the phrase "a theory of everything" in physics, Michael Muthukrishna offers a unified theory of human behavior, culture, and society – a theory of everyone.

Drawing on the most recent research across the sciences, humanities, and the emerging field of cultural evolution, he paints a panoramic picture of who we are and exactly what makes human beings different from all other forms of life on the planet.

Muthukrishna argues that it is our unique ability to create culture, a shared body of knowledge, skills, and experience passed on from generation to generation that has enabled our current dominance. But it is only by understanding and applying the laws of life – the need for energy, innovation, cooperation and evolution – that we can solve the practical and existential challenges we face as a species.

A Theory of Everyone attempts to provide solutions for how to solve the most pressing problems of our collective future, such as polarization, inequality, the "great stagnation" in productivity, and the energy crisis. Casting a bold and ambitious net, this is a must-read for anyone interested in a better future for ourselves and generations to come.

Michael Muthukrishna is an Associate Professor of Economic Psychology at LSE. He has been awarded a C IFAR Azrieli Global Scholarship for outstanding early career research, and is a board member of the One Pencil Project which combines academic research with philanthropy. He uses a combination of mathematical and computational modelling, experimental research and data methods from psychology and economics to understand the psychological and evolutionary processes underlying culture and social change.

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'Mind expanding — this book will change your view of the world. Michael Muthukrishna is one of our greatest and most creative thinkers'

Matthew Syed, broadcaster and author of *Rebel Ideas* and *Black Box Thinking*

We all face trade-offs in how much time to allocate to work, to our families, to our friends, and to ourselves. In tackling this trade-off, I personally am obsessed with efficiency. I've spent years figuring out how to maximize my use of the 24 hours I have each day, the 52 weeks I have each year, and the 80 or so years the average Western male gets for a lifetime. That obsession includes how to efficiently distribute my cognition in a way that prevents my to-do lists and project prioritization tools from getting in the way of focused deep work; how to hack my psychological limitations by doing things like leaving work unfinished at the end of a day to make it easier to restart the next (an application of the *Zeigarnik effect*); accepting that it is inevitable that I will procrastinate, but it is not inevitable what I procrastinate on — I can procrastinate by working on low priority things that do actually need to get done — *productive procrastination*; and even how much time to spend on optimization itself and how much free time I need to ensure there's space for spontaneity.

My obsession even extends to how to efficiently be a better parent to my three children, efficiently be a better partner to my spouse, and how to efficiently relax . . .

But here's the rub. No matter what weird psychology or ceremonies I use, there is a limit to my efficiency. At the end of the day, I still have only 24 hours, of which continued efficiency requires 8 dedicated to sleep — efficient sleep of course, optimized for letting ideas ruminate. Imagine how much more you or I could do if we had more than 24 hours?

There are ways to get more than 24 hours. One way is to supplement what we do with machines. We multiply our time by harnessing energy to do work for us . . .

Energy is required for everything. Even the food we eat. Long before I cook pasta on a stove or warm up leftovers in a microwave in minutes, the wheat in my pasta was fertilized by ammonia synthesized by combining the nitrogen in the air and hydrogen from natural gas in the Haber-Bosch process, pests were killed with crude oil derived pesticides, the ground was plowed by fossil-fueled tractors, and then delivered to me by refrigerated trucks, ships, trains, and airplanes.

As Vaclav Smil points out, half the planet — nearly 4 billion people — would not have been alive without synthetic ammonia fertilizer that led to the Green Revolution in agriculture, a second agricultural revolution that rivals the first agricultural revolution 12,000 years ago.

Energy is everywhere.

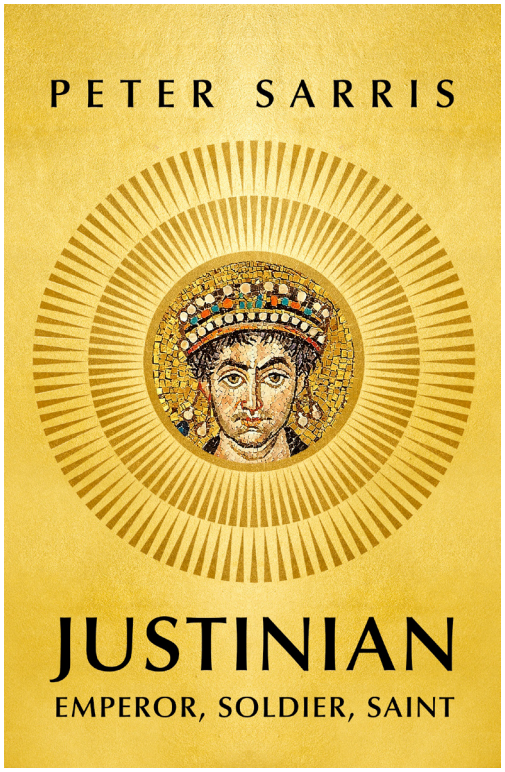
Our civilization's control of energy is a product of the laws of energy and innovation creating the space of the possible in which we all live. Efficient, energy-powered technologies have shrunk the globe and effectively extended our time. But there's one more way that I can extend my 24 hours. I can also cooperate with other people.

I can build a better company, write better books and papers, and engineer better products by not doing everything myself. When I work with others, the synergies of our different expertise further extend the effective time we all have. I can pass onto my collaborators in data science or AI tasks that they can do faster than I can. Indeed, we also need to cooperate just to harness energy — I can't mine, process, and convert coal to electricity all on my own.

I'm telling you all of this, because I want you to see that the decisions, tradeoffs, and competition we face as individuals are part of a broader system. The challenges in our everyday lives and the challenges we face as a society today are not new. They are as ancient as life on Earth. They are governed by the same underlying laws.

Energy, innovation, and cooperation are shaped by technologies and ways of working that are themselves shaped by genetic and cultural evolutionary forces. These four factors — energy, innovation, cooperation, and evolution — also affect my everyday life; a microcosm of the way in which they affect our society and the evolution of life itself.

These laws weave our story into the larger story of life on this planet. All life had to solve energy crises and overcome sudden shocks just as we do today. To see these laws at play, let's go back to the very beginning . . .



JUSTINIAN

Emperor, Soldier, Saint

Peter Sarris

In this groundbreaking new biography of Justinian, Peter Sarris gives us an intimate insight into both the Emperor and his times. We meet a man who from the humblest beginnings, rose to become ruler of much of the known world achieving an almost god-like status.

An emperor who infused even the most mundane tasks with spiritual and religious significance. A gifted administrator obsessed with detail. A middle aged lover who fell for a dancing girl and changed the law so he could marry her, ruling with Empress Theodora by his side for over twenty years. A brilliant military strategist who was never on the frontline.

The challenges he faced — climate change, battles over culture and identity, the first recorded global pandemic — and many of the solutions he found to address them still resonate with us today. And his legacy remains all around us, in the massive building programme of which the most beautiful manifestation is surely Hagia Sophia; in our legal systems through the codification of the *Corpus juris civilis*; and in our culture and history by making a fundamental contribution to both the formation of Christendom and the emergence of Islam.

In this tour de force Peter Sarris shows us that in all his complexity and contradictions Justinian was, in many ways, a very modern Emperor.

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'Magnificent. A vivid and authoritative biography of one of Rome's most fascinating rulers, *Justinian* is also a vibrant portrait of an entire world — a resurgent Roman Empire suddenly devastated by tragedy'

Kyle Harper, author of *The Fate of Rome*

'In a stunning tour de force, Sarris brings one of history's most momentous dramas back to life'

Walter Scheidel, author of *The Great Leveler*

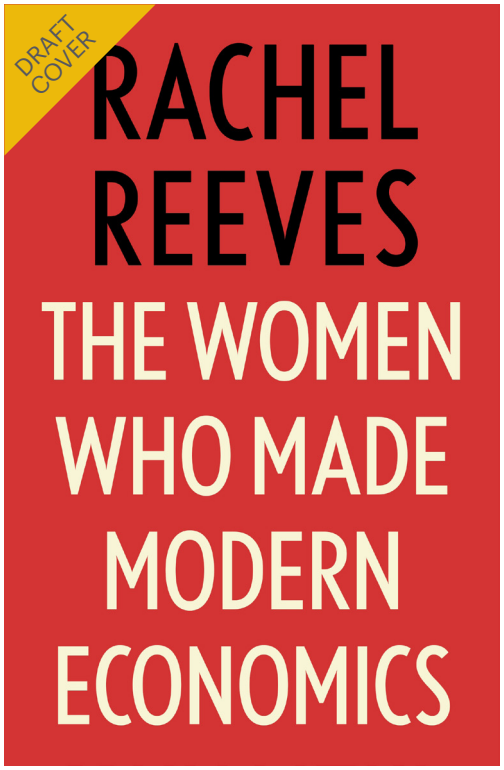
Peter Sarris is Professor of Late Antique, Medieval and Byzantine Studies in the University of Cambridge, and a Fellow of Trinity College, Cambridge. He has published numerous books and articles on Justinian and his other publications include *Byzantium — A Very Short Introduction* (Oxford, 2015), which is currently being translated into Chinese, Greek and Polish. In addition to academic journals, he has written for *The Times*, *Literary Review*, and *History Today*.

Fortunately, we have a near-contemporary description of what Justinian looked like by the 520s. According to the mid-sixth century chronicle written by an author known as John Malalas, who was broadly sympathetic to the regime, he had 'a good chest, a good nose, was fair-skinned, curly-haired, round-faced, handsome, with receding hair, a florid complexion, with his hair and beard greying'. He was also, he added, 'magnanimous' and 'Christian'. By the end of his period as consul in 522, Justinian would have been around forty years of age, and would have had every reason to feel good about the world and his place within it. He was now the son of an emperor, a high-ranking general, and a political figure of demonstrable influence and growing popularity. His chief political rival for the throne — on which he clearly had his eye — had been done away with. Those of whom he disapproved theologically — and he clearly took matters of religion very seriously — were in a state of disarray, even if the pope in Rome had not listened to him and engaged to quite the extent that he might have liked. And he had met the woman he loved.

For it would seem that, along with his good looks, another feature that Petrus Sabbatius Justinianus shared with his uncle Justin was a romantic streak, and, like Justin, he would marry for love rather than out of political calculation. It was not, however, when in his full pomp as a young army officer that Justinian first encountered and forged a bond with the great love of his life, but rather when he was already approaching middle age. By around 521 Justinian was sharing the Palace of Hormisdas with a woman possibly some ten to fifteen years younger than himself by the name of Theodora . . .

In April 527, the now obviously ailing emperor ordered that a new gold coin be minted and distributed throughout the empire. Such coinage was the basis of the empire's monetary system, in which taxes were paid, wages and prices reckoned, and commodities bought and sold. At the same time, the imperial government used the images placed on such coins to convey clear political messages to the emperor's subjects. The portraits and names of new emperors were emblazoned on the coins to advertise their accession to power; images of barbarians being speared, or the ancient Roman personification of Victory, were sometimes also included to help raise morale and strengthen resolve. The message that Justin now wished to convey through the new coinage would have been immediately apparent to the bankers and money-changers who were obliged to release it to the public. A copy of the coin survives to this day in the collection of the Dumbarton Oaks Museum in Washington, DC: on one side, the emperor Justin sits enthroned, facing forward, with a golden 'nimbus', or halo, around his head, holding in his left hand a globe, symbolizing his universal authority. Alongside him, unlike on his previous coinage, there now sits his nephew, Justinian, similarly enthroned, haloed, and globe-bearing. Around the imperial portrait, we read the abbreviated Latin inscription 'DN IVSTIN ET IVSTINIAN PP AVG' (Our Lords Justin and Justinian: Pious Rulers and Emperors). On the reverse side of the coin is depicted a winged angel, carrying a long cross and another cross mounted on a globe, surrounded by the words 'VICTORIA AVGGG' (Victory to the Emperors!). The newly issued coins were designed to announce the fact that Justinian had finally been made co-emperor to rule alongside, and succeed, his uncle. Whatever doubts the old man may previously have harboured with respect to his adopted son, he had evidently either set them aside or forgotten them. Revealingly, the coins were produced and distributed with unusual haste . . .

The emperor Justin died on 1 August 527. A modest man and a reluctant emperor, he chose not to be buried in the company of Constantine and his other distinguished predecessors in the Church of the Holy Apostles, a location he had probably marched past as an awe-struck military recruit back in the 470s. Rather, he was laid to rest in a monastery alongside his beloved wife, Euphemia. Justin would have been about seventy-seven years of age at the time of his death, whilst Justinian was in his mid-forties. By virtue of the careful efforts that had been made to ensure that Justinian succeeded his uncle, the new ruler was able to consolidate his hold on power as sole emperor in the face of only muted opposition. Justinian would go out of his way to convey to his subjects a clear sense that, with his accession, a new age had dawned.



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Praise for Rachel Reeves:

'Reeves' account is full of gems'
Sunday Times

'A glorious compendium'

Cathy Newman

THE WOMEN WHO MADE MODERN ECONOMICS

Rachel Reeves

The Women Who Made Modern Economics tells the story of the women who for too many years have been locked out of the economy with negative consequences for them and for society as a whole. Economic thinking has also largely ignored what women have to offer, marginalising the work of female economists or simply not recognising their achievements.

As a woman and economist who is herself challenging those barriers, Rachel Reeves has written a passionate, powerful and inspiring book dedicated to the women who have gone before and to those who will change the future. Drawing on her personal experiences and relating them to the work of women past and present who are often overlooked, Reeves explores the ideas of theorists such as Harriet Martineau, Mary Paley Marshall and Joan Robinson but also the contributions of policy makers such as Janet Yellen, Gita Gopinath and Christine Lagarde.

Throughout, she outlines her vision for the future of the economy if she does become the first female Chancellor of the UK, a future in which productivity is enhanced, growth is sustainable and there are opportunities for all, not just a privileged elite.

Rachel Reeves is the Shadow Chancellor of the Exchequer and has served as the Labour Member of Parliament for Leeds West since 2010. Before becoming an MP she spent a decade working as an economist — first for the Bank of England in London and Washington D.C., and later for HBOS in Halifax. From 2017-2020, she was Chair of the House of Commons Business, Energy and Industrial Strategy Select Committee. When Keir Starmer was appointed Labour leader in May 2020, Rachel took up the role of Shadow Chancellor of the Duchy of Lancaster and Shadow Minister for the Cabinet Office before being appointed Shadow Chancellor in May 2021.

Extract

I joined the Labour party in 1996 aged 17 when Tony Blair was leader. My school, the local comprehensive where I lived in south east London had for its sixth form block, two pre-fab huts – freezing cold in winter and baking hot in summer. Our library was turned in to a classroom as there were more students than there was space. And as for text books, there were never enough to go round. I felt very strongly that the government of the time was not interested in schools like mine, or indeed communities like mine. I wanted to do something about it, and for me that something was joining the Labour party. I joined the Fabian Society, a research group closely connected with the Labour Party, shortly after because I was interested in the specific policy ideas for how we could change the country and make it fairer and more equal and enact the change we all strived for in the Labour party. I was active in both, becoming Secretary of the Young Fabians in the early 2000s and writing regularly for their magazine.

Fabianism plays an important role in the history of the Labour party. In 1900 The Fabians came together with a number of other socialist and left wing organisations including the trade unions to form the Labour Representation Committee and after winning a number of seats in the 1906 parliamentary elections it became the Labour Party. The Fabian Society provided much of the intellectual framework for the fledgling party, publishing pamphlets and organising committees to take forward policy ideas. And the Fabians are almost synonymous with two people: Beatrice and Sidney Webb.

When I was secretary of the society we used to meet at the Fabian offices, then on Dartmouth Street in Westminster where the Webbs once gathered with George Bernard Shaw, Bertrand Russell, Margaret and GDH Cole, Edith Nesbit and others. I always felt it was very special to be in that building where so much Labour history had unfolded.

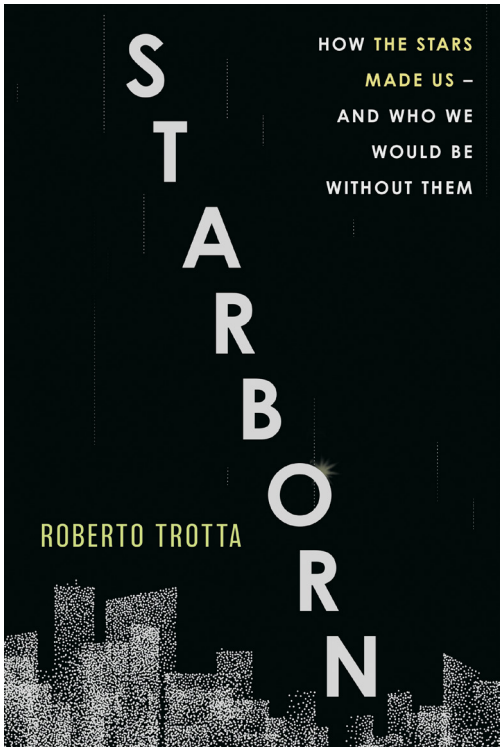
At university I read Carole Seymour Jones's biography of Beatrice Webb, describing a woman from a privileged background who gave up society life and an on-off romance with the charismatic but controlling Joseph Chamberlain to live among the poor in Lancashire and London's East End and then marry 'a Cockney hairdressers son in a brave act of class rebellion'. I instantly became, and remain to this day, a huge fan of Beatrice Webb's intellect and her bravery.

Beatrice Webb was a political campaigner, social reformer and economist. For her, these issues were inextricably linked and like many of the women in this book she dedicated her life to promoting political and economic change based on her work and her beliefs.

Her brand of socialism was driven by reason and argument, and a conviction that through persuasion and campaigning in a parliamentary democracy you can bring people to your cause. Her economic principles were rooted in analysis based on her first hand experiences as a social researcher in the slums, and an understanding of the institutions that shaped the lives of the working classes, including trade unions and welfare provision. She argued powerfully in public meetings and in pamphlets that inequality and poverty were the result of an economic and social system stacked up against the poor and working classes. She challenged those in power to abolish the workhouse and tackle inequality, unemployment and low pay. While Prime Ministers Asquith and Lloyd George did not follow her advice, Beatrice Webb built a political and economic movement around the causes she believed in which she brought with her when she joined the Labour party . . .

It was not until after she died that there was a majority Labour government, but in 1945 Labour Prime Minister Clement Attlee's government did finally create a welfare state that owed much to Beatrice Webb and the Minority Report on the Poor Law that she had written two decades previously.

Webb's influence in the Labour movement and the country are all around us today – from the world renowned London School of Economics she founded with her husband and others and the Fabian Society that she helped to create, to the modern welfare state itself, even though the modern welfare state is world's away from what Webb both envisaged and desired. Webb is one of the most important figures in the history of the Labour movement and one of the most significant women involved in shaping economics in the twentieth century.



STARBORN

How the Stars Made Us – and Who We Would Be Without Them

Roberto Trotta

A sweeping inquiry into how the night sky has shaped what it means to be human.

One of our species' most enduring and universal relationships has been with the night sky itself. Yet in the glow of today's artificial lighting, we have lost our intimacy with the cosmos.

In *Starborn*, cosmologist Roberto Trotta reveals how stargazing has shaped the course of civilisation. Origin myths made the Sun into a life-giving creator and the Milky Way a gateway for departed souls. The motion of celestial bodies sustained the illusion that the Earth was at the centre of the cosmos – until looking at them more closely sparked the Scientific Revolution. Across the ages, the stars have served as clocks, maps, compasses, muses, and gods, defining our laws of reality and our dreams of the sublime. How radically different would we be if we looked to the night sky and saw . . . nothing? Trotta also offers a dramatic alternate history, imagining how a world without stars would change our understanding of science, art, and ourselves.

Revealing the fundamental connections between astronomy and the story of civilisation, *Starborn* summons us to lose ourselves in the starry vastness above – and will change how you think of the night sky forever.

Roberto Trotta is Professor of Theoretical Physics at the International School for Advanced Study in Trieste, Italy, and a visiting professor of astrostatistics at Imperial College London. The award-winning author of *The Edge of the Sky*, he lives under dark skies near Trieste.

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Praise for Roberto Trotta:

'A delightful, poetic, and informative read about all there is in the Universe'

Edward Frenkel, author of *Love and Math*

'Elegant, even poetic . . . in Trotta's hands, this beautifully written book . . . soars'

Publishers Weekly

Our early survival, cognition, language and culture were all tended by the stars, perhaps decisively so. Two hundred million years ago, "the weight of a petal . . . changed the face of the world", as anthropologist Loren Eiseley has put it, when the angiosperms covered the Earth with flowers, fruit, grass and herds of animals that would one day feed the calories-hungry brain of Sapiens. Fifty thousand years ago, the weight of starlight lifted the human mind upwards.

It is plausible that the night sky was for our ancestors both a cognitive gym and a mnemonic device. A cognitive gym, as the mental stretch required to grasp the abstract notion that a group of stars could be a representation of something else, say a hunter pursuing seven sisters, or that their appearance would announce another event, without any evident causal connection, elevated our ancestors' thought from the material (a dark cloud is coming; rain will follow) to the symbolic (the Pleiades are rising at dawn; turtle, freshwater snakes and yams will soon be plentiful). Perhaps the need to keep track of celestial cycles and in particular of the Moon phases, as they were so central both as markers of natural phenomena and of the burgeoning social life of the tribe, even sparked that most useful of ideas: numbers.

It certainly was the basis for the first recorded calendars, as we saw earlier. After the observations of lunar phases provided a shared measure of time, most cultures devised their own peculiar way of coming to terms with the 11 and a quarter days discrepancy between 12 Moon cycles and a solar year and thus harmonize their lunar calendar with the recurring of seasons, which follows the Sun. The Babylonian, Egyptian, Jewish, Chinese and Greek calendars were all lunar, and so was the ancient Roman calendar. Politicians colluded with priests to insert intercalary days (to bring the lunar calendar back into step with the solar year) whenever it was convenient for them, a practice that Julius Caesar nipped with his reform of 45 BC, which fixed the civil year to 365 days, plus a leap year every four . . .

The Egyptians played a game similar to Snakes and Ladders, called senet, where a board was divided in 30 squares that followed the lunar phases. The price at the end was resurrection from the dead. In Mesoamerica, the time-obsessed Maya came up with a complex calendrical system that could determine heavenly cycles with the equivalent of five digits precision. Among contemporary hunter-gatherers, Australian Aboriginals use digging sticks carved with notches representing their age in lunar months, while the Inuit calendar, featuring up to thirteen named Moons, was the regulator of virtually all aspects of their traditional way of life before modernity set in. Many religious festivals today remain tied to the lunar calendar in all the major monotheistic religions: the Jewish festivities calendar follows lunar months (with adjustments to avoid it getting too much out of sync with the solar year), and so do Muslims, for whom the period of Ramadan starts and ends with the sighting of the first lunar crescent of the ninth month of their calendar. Christian Easter falls on the first Sunday after the first full Moon following the Spring equinox.

The night sky has also long served as a mnemonic device, as with the Aboriginal songlines. Once a name, a story, a song or the association with an important natural event became embedded with a star or constellation, its persistence beyond the life of the individual required it to be passed on to new generations — and culture was born. I imagine prehistoric Sapiens, from Greece to Australia, gathered around the fire, just like we do while camping today, awaiting the Pleaides' rise so they could tell each other, and their children, the story of how the seventh sister got lost from the blue necklace of stars.

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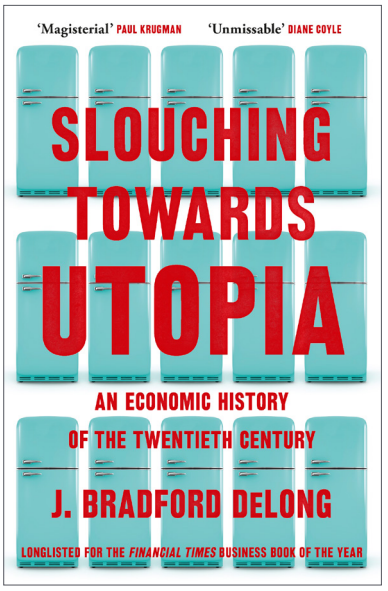

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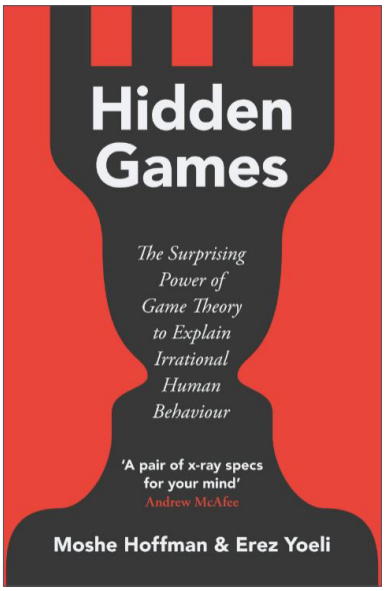

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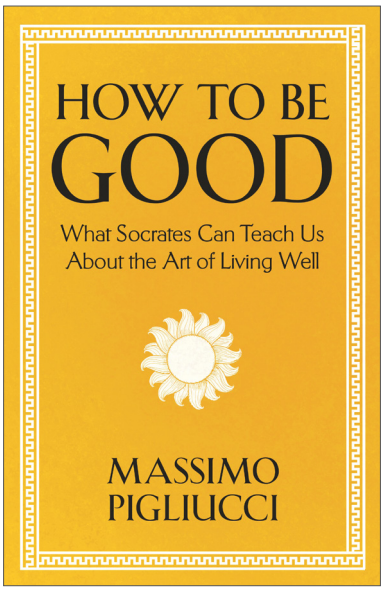

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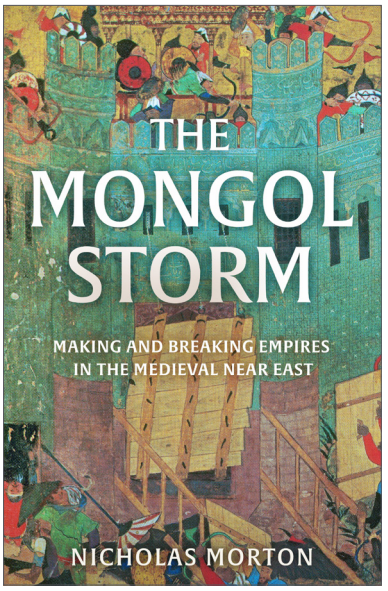

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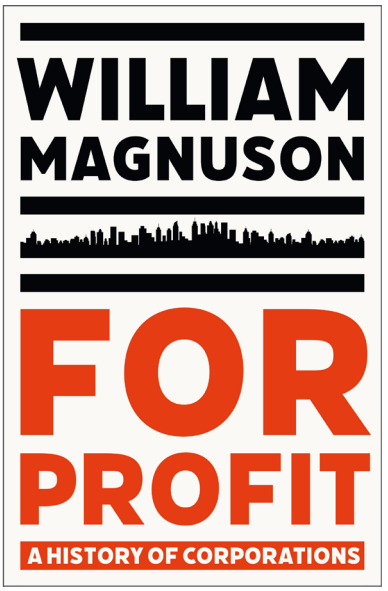

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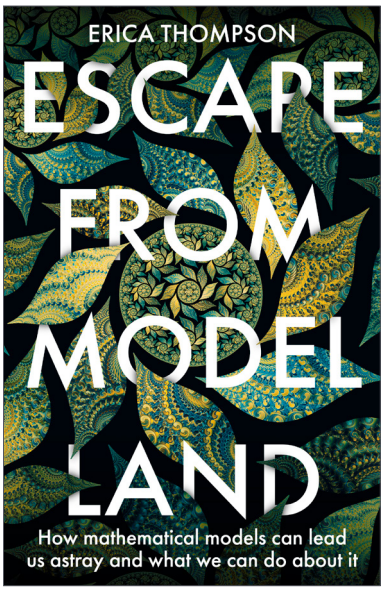

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