



Goldin, Ian & Kutarna, Chris: *Age of Discovery. Navigating the Risks and Rewards of our New Renaissance*. London, Bloomsbury Publishing, 2016. 328 pp.

The twenty-first century has seen many historians turning to world history, as this gives us the best background to understanding the world in which we live. A splendid example is Peter Frankopan's *The Silk Roads*, which shows that, for most of world history, Europe was of little importance. After the fall of the Roman Empire, it was a backwater and did not begin to drag itself slowly out of this position until 1500. Until this time, most ideas and peoples did not spread from the West to East but from East to West. All the major world religions we see today, Buddhism, Christianity and Islam, began in the East.

Goldin and Kutarna (henceforth referred to as 'the authors') choose two periods, which they regard as pivotal in bringing about significant changes in global history: the Renaissance and the modern world from 1990. These are not treated as separate blocks but references to both are found in each chapter, as different topics are discussed. The term Renaissance is notoriously vague but the authors regard it as useful to cover 1450 to 1550, a rebirth in Europe of the knowledge and values of ancient Greece and Rome, and yet, elastic enough to include the Reformation which divided the Christian Church in Europe for the first time in a thousand years, a division which still persists in the Catholic and Protestant Churches.

Why then was the Renaissance important? In 1450, global history and trade were impossible, as much of the world (both landmasses and oceans) were unknown. The far-reaching voyages of the Portuguese and Spanish in the late 15th and early 16th centuries to Africa, Asia and the Americas provided the information which enabled Mercator to produce an accurate world map in 1569, which remains the basic model for maps today, though it did not include Australia, unknown then.

These voyages are very important not only because they give an accurate geographical knowledge of the world but also because the huge continent of America was eventually occupied by Europeans. In 1521, Cortés conquered the Aztec Empire in Mexico for Spain and in 1533 Pizarro took control of the Inca Empire in Peru. North America was later settled by Britain and France, so the whole vast continent was occupied by Europeans and helped bring about European world hegemony.

Another major event in the Renaissance was the invention of the printing press by Gutenberg in Germany about 1450. Now knowledge could be spread quickly and cheaply: it also encouraged the spread of literacy. The Renaissance was therefore very important in world history but there is a great leap of over four hundred years to the authors' second pivotal moment in 1990. During this time, there were other turning points in world history: the Scientific Revolution of the seventeenth century, which has continued ever since and has brought profound changes in physics, chemistry and biology; the European Enlightenment of the eighteenth century; the

Industrial Revolution, which raised the standard of living of most people in a sustainable way for the first time. None of these events is discussed.

These omissions are unfortunate but they do not detract from the importance of what the Age of Discovery has to say about the modern world from 1990. This is dealt with brilliantly. Unlike in the Renaissance, science is the basis for the most significant changes since 1990. The authors are writing for the general reader, whose understanding of complex scientific advances, and the mathematics which lies behind them, is minimal. They therefore avoid mathematical equations and explain the changes in an exemplary way, in clear prose which is intelligible to the non-specialist. If you want to know what a nanometre is, they will tell you (it is a billionth of a metre).

Digitalization is the means of acquiring, transmitting, storing and reiterating information today. Computers compute via a collection of switches, which from the 1960s were transistors etched into silicon. Today you can incredibly fit five million onto the dot at the end of a sentence. Digitalization has led to blogs, video channels, tweets, apps, eBooks, and enabled people to act as groups, as in the Arab Spring and the Occupy movement in the United States.

At 10 nanometres normal physics falls apart, so new rules, quantum mechanics, take over. 'In little over 30 years quantum mechanics has become the most successfully tested theory in the history of science: what it predicts is what we find', the authors tell us. About the year 2000, the first commercial application of nanotechnology began to appear: by 2015, thousands of such products were sold in a one billion dollar market. The problem for scientists now is too much data. The Large Hadron Collider in Geneva produces a gigabyte of new material every second.

Another turning point has occurred in manufacturing and trade, where developing countries have taken a great leap forward. In 1990, trade was mainly confined to the developing world: the rich countries exported to each other. Deng Xiaping decided to change this by opening up China to pro-market reforms and by expanding exports from a Special Economic Zone on the South coast. The result was that for over 30 years the economy grew at 8% a year, average incomes vastly increased and 500 million people were lifted out of poverty. China can now compete effectively with the developed countries. In 2012, China overtook the US as the world's largest manufacturer. The vast increase in global trade in goods from \$3.5 trillion in 1990 to \$19 trillion in 2014 is largely due to developing countries.

Much has happened since 1990, which is positive and has benefitted millions of people but there have also been very serious negative effects, which the authors discuss at length. Some of these are unintended consequences of what have brought benefits to our lives. Fossil fuels made the Industrial Revolution possible but the resulting carbon emissions have contributed to global warming. Nuclear power can give us limitless supplies of electricity but also a weapon of mass destruction, the atom bomb. The Internet has made communication fast and easy but it can be used to trade in illicit drugs and to train terrorists by giving them video instructions in how to construct mobile phone detonators. Scientific advances can be used in bioterrorism. 'We might soon enter an era when, for the first time, a single individual could hold in his hand the power to kill hundreds of millions of people', the authors write. Cybercrimes are another threat everywhere: on the web, social media and mobile devices. Are scientific advances creating a world without jobs? As machines replace industrial workers, the latter move into the service sector, where most people now work, many of them in jobs which are poorly paid and not secure. Even this is chan-

ging with artificial intelligence. What will we do with large numbers of people who are permanently out of work?

One of the greatest negative changes has been the collapse of the financial system in 2007-8. Capitalism may be the best economic system overall, but when uncontrolled, it can be both predatory and self-destructive. The controls the state had over capitalism began to be dismantled by Thatcher in Britain and Reagan in the US, in the belief that the market was efficient and would regulate itself. Banks grew enormously after deregulation and became 'too big to fail', as they knew governments would not allow them to collapse, because of the chaos that would follow. They therefore took excessive risks, knowing that if they failed taxpayers would bail them out, as they did in 2007-8. The bankers, who had caused the crisis, did not suffer from it and continued to receive enormous bonuses from banks which had been bailed out. The sufferers from the collapse were the ordinary workers, nine million of whom lost their jobs in the US from 2008-13. In September 2011, Zuccotti Park in New York was occupied by those protesting that 'We are the 99%'. Within a month, such protests spread to 82 countries. Those responsible for the reckless lending now demanded that governments privatize state assets, cut public salaries and pensions and reduce public services, so that international creditors could be repaid. This increased discontent everywhere, especially in countries such as Greece, Spain and Portugal, where youth unemployment was over 40%.

Mass disillusionment brought major political shifts, which benefitted both the extreme left and right, as the National Front made gains in France and in Spain *Podememos* rose from nowhere. Discontent spread rapidly through Facebook, Twitter and Whatsapp. Anger was directed not only against leading politicians and trade unionists, but against a corrupt system. These were to lead to the Brexit vote in Britain and the election of Donald Trump as US President, though these events took place after *Age of Discovery* was written. All the issues mentioned above are discussed, with an astonishingly wide range of references, in *Age of Discovery*. Anyone who wants to understand the world now should read this outstanding and exciting book.

Duncan Townson
Independent scholar
wdtownson@gmail.com