Travel as Exploration:
Science, the Unknown, and Personal Discovery

The explorer Christopher Columbus landing in the Caribbean. This picture, by Gergio Deluci, is from a nineteenth century textbook. (L. Prang Co., Boston [Public domain])

Introduction

Exploration is often understood as discovery: travelling to places, or acquiring knowledge, that is new to us. Historian Paul Fussell conceives exploration this way, distinguishing exploration from other kinds of travel by the way explorers seek out 'the undiscovered', moving 'towards the formless and the unknown'.[1] For Fussell, exploration is a heroic, athletic, paramilitary activity. He conjures up images of buccaneering explorers, travelling across seas and continents to reach distant lands. Christopher Columbus. Francis Drake. Scott of the Antarctic. Others conceive exploration more broadly. For example, historian William Goetzmann argues that exploration is 'something more' than adventure or discovery. He describes exploration as a kind of purposeful seeking, and argues it is the process of seeking that matters - for discoveries can be produced by accident.[2]

This chapter considers human exploration, and what it can tell us about the motivations underlying human travel. The first part briefly describes the history of exploration, focusing on the European 'Age of Discovery'. It asks why people explored, and explains the increasing role that science came to play, driven by the work of philosopher Francis Bacon. The second part looks at possibilities for explorative travel today. It argues grand journeys of discovery are still feasible, especially in the shape of undersea or space travel. Further, personal journeys of exploration are available to all of us - there are always more places to see, more world to understand.

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[1] Fussell, Paul (1980). *Abroad: British Literary Travelling between the Wars*. Oxford University Press: New York.
[2] William Goetzmann, *Exploration and Empire: The Explorer and the Scientist in the Winning of the American West* (New York: 1966) p. xi.

A very brief history of human exploration

Humans have been exploring for a very long time. Over the course of our history as a species, we've settled on continents all over the planet (**see chapter *Biology***). Historian Felipe Fernández-Armesto argues that the chronicle of our species has two major stories to tell. The first is one of 'divergence'. This occupies most of our pre-history, extending from the emergence of *Homo sapiens* around 150,000 years ago to the past few thousand years. During this period early human cultures formed, grew more disparate and dissimilar, migrating across continents. The second story is one of 'convergence'. This occupies the most recent 10,000 years and tells how humankind has gradually reconnected, starting to come together globally.[3] Both stories are tales of exploration, but this chapter will focus on the second.

Written records from antiquity provide insights into the purposes and experiences of early explorers. Some of the earliest accounts come from voyages of exploration commissioned by the ancient Egyptian Pharoahs. These often had a commercial motive: finding new trading routes or natural resources. One prominent Egyptian explorer was Harkhuf, a nobleman dispatched by the Pharoah around 2300 BCE, to seek the mystical African kingdom of Yam. Harkhuf's testimony, recorded on his tomb at Aswan, reveals how he returned from this expedition with '300 donkeys, laden with incense, ebony, heknu, ivory, panthers… and every good product'. Given the opportunities for disaster on such expeditions, it is little wonder that Harkhuf described himself as 'more excellent and vigilant' than any traveller who had previously ventured to discover Yam.[4]

Commerce continued to motivate explorative travel in the ancient and medieval worlds. In the second century BCE, Chinese Emperor Wu of Han was especially active amongst ancient leaders in sponsoring expeditions to find new trade routes and alliances. At his request, diplomat Zhang Qian undertook several missions to discover more about the lands west and south of China. This resulted in the development of trade missions and the eventual establishment of what is now known as the Silk Road. For seafaring peoples such as the Vikings, voyages of exploration were also motivated by the desire to find new lands to settle. Through such missions, Iceland was discovered and settled in 860 CE, and Greenland settled in 982 CE by Erik Thorvaldsson. His son, Leif Erikson, continued the family tradition of exploration, venturing even further west and founding the settlement of Vinland (probably in Newfoundland). By the medieval period, improvements in shipbuilding had permitted the expansion of trading routes even farther. Merchant explorers such as the Venetian Marco Polo and the Chinese Wang Dayuan in the thirteenth and fourteenth centuries made extraordinary journeys to the boundaries of their known worlds, returning to their rulers with fabulous tales of strange customs, goods and products.

The European Age of Discovery

The 'Age of Discovery' is a slice of European history, running from the fifteenth century to the seventeenth. It was an extension of the wider thirst for commercial knowledge and international trade that began flowering in the middle ages. By the 1400s, progress in shipbuilding and navigation techniques made long oceanic voyages more feasible. At the same time, European rulers were becoming increasingly competitive in their search for new trading routes to Asia and Africa.

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[3] Fernández-Armesto (2006). Pathfinders: A Global History of Exploration. Oxford University Press: Oxford. p1-4.
[4] Hans Goedicke 'Harkhuf's Travels', in *Journal of Near Eastern Studies*, Vol. 40, No. 1 (Jan., 1981), pp. 1-20

They were particularly interested in sea routes that bypassed overland routes from ports in the Eastern Mediterranean, over which the Republic of Venice and Ottoman Empire held monopolies.

Portuguese, French, Spanish, Dutch and British sailors led the charge. Within a few decades, this environment of competitive exploration resulted in discoveries of lands and civilisations previously unknown to Europeans. The Portuguese monarchy sponsored sailors to find a maritime route to India around the coast of Africa; Vasco da Gama achieved this in 1498. Prior to this, the Italian mariner Christopher Columbus, having had his proposal rejected by the Portuguese king, was sponsored by the Spanish monarchs Ferdinand and Isabella to find a western trade route to India. Columbus' encounter with the Caribbean in 1492 sparked a plethora of further expeditions, inspired by tales he heard from indigenous peoples about lands laden with gold and spices. In the space of a few years, Columbus made further discoveries in central and northern South America. Meanwhile, on behalf of the English King Henry VII, John Cabot landed in Newfoundland and North America. Acting for the Portugeuese king, Pedro Alvares Cabral sailed further south-west than intended and landed in Brazil. The search for a western trade route to East Asia culminated in the voyage of Portuguese sailor Ferdinand Magellan. Sponsored by the Spanish King Charles I, Magellan left Seville in 1519 with a fleet of five ships, on what was expected to be a two-year voyage. Magellan was killed after reaching the Philippines, but one ship returned in 1522, having completed the first recorded circumnavigation of the globe. Along the way, its sailors became the first Europeans to visit Patagonia, Guam, the Philippines; and sail (what are now known as) the Magellan Straits across the southern tip of South America.

Expeditions were also launched to discover new trade routes across the Arctic. In 1550s London, the Company of Merchant Adventurers to New Lands was founded, and sponsored an expedition by Sir Hugh Willoughby to find a northeast trade route to China. Willoughby reached as far as Novaya Zemlya in the Russian Arctic. A few years later, Sir Martin Frobisher explored the northern coasts of the Canadian Arctic, vainly attempting to find the elusive northwest passage to Asia. Around the same time, Sir Francis Drake completed the second circumnavigation of the earth - although this Crown-commissioned expedition was aimed less at new trading routes, and more at piracy against Spanish vessels in the Pacific. Nonetheless, these new routes resulted in successful trade. In 1704, one writer lists the products flooding into Europe:

> Gums, Drugs, Spices, Silks and Cottons, precious Stones, Sulphur, Gold, Saltpeter, Rice, Tea, *China* Ware, Coffee, *Japan* Varnish'd Works, all sorts of Dyes, of Cordials, and Perfumes, Pearls, Ivory, Ostrich-Feathers, Parrots, Monkeys, and an endless number of Ncessaries, Conveniences, Curiousities, and other Comforts and Supports of Human Life.[5]

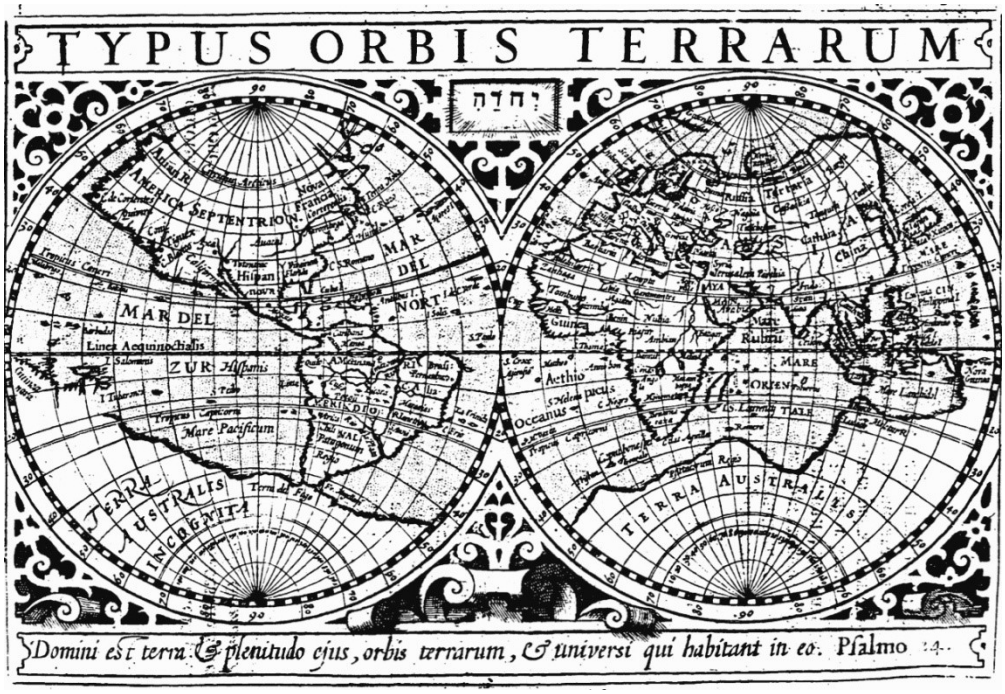
Despite their rewards, these early modern trans-oceanic voyages were phenomenally risky. Ever present dangers included shipwreck, lethal diseases such as scurvy, and dehydration. There were mutinies: both Magellan and Drake executed fellow sailors for rebelling against their authority. There was also the possibility of conflict with unknown peoples. These mariners painted exploration as a predominantly male, swashbuckling activity. Yet many of these sailors did not return home. What could motivate their risk-taking?

The principal reasons were economic. The financial gains from securing control over new international trade routes drove European monarchs, and merchant later trading companies, to invest in the huge expense of such voyages. If successful, the explorers themselves stood to gain

[5] Anon, cited in Churchill, Awnsham (ed.) (1704). *A Collection of Voyages and Travels, Vol. I.* London. (lxxiii).

vast wealth, fame, and high status. For example, Columbus negotiated a contract with the Spanish crown that allowed him 10% of any revenues from the lands he found. Frobisher petitioned Queen Elizabeth for 5% of all profits from any new routes he opened. The anarchic nature of early modern exploration also meant that riches were freely available from piracy and looting, the proceeds from which were sometimes shared amongst the crew. The prospect of troves of bullion in newly discovered lands encouraged further journeys of exploration and conquest. This drove the conquistador Francisco de Orellana, who sought the 'Land of Cinnamon' in the South American jungle, and became the first European to sail the length of the Amazon.

As travel increased, conquest and exploration required and enabled improvements in cartographical knowledge. By the seventeenth century, the shape of the world's continents were roughly outlined. Consider this world map, published in 1635 but derived from 1590s plates made by the Flemish cartographer Gerardus Mercator.



Mercator's 1635 World Map, outlining the 'known' continents of the period.

The rough shapes of the Americas, Africa and Asia are all present. Of the continents, only Antarctica and Australia are missing, both blanketed under the legend *Terra Australis Incognita* (unknown southern land).
Slowly, the possibilities offered by travel were recognised by intellectuals. The English philosopher Francis Bacon saw, further than anyone, the potential *scientific* uses of travel. Explaining how requires a bit of background.

Natural philosophy and Francis Bacon

In the seventeenth century, the discipline that we label 'science' did not exist as a distinct kind of enquiry. The closest thing was 'natural philosophy'. At its broadest, philosophy is the study of reality and our relationships with it. Philosophy has always included many different kinds of

enquiries, such as ethics. Historically, philosophy also included 'natural philosophy', enquiries into the physical nature of our world that we would now consider scientific. Although natural philosophy covers biology, chemistry, physics and geology, it also covers topics that we would not now consider scientific, such as God's workings in nature.

During this period, philosophical and scientific enquiry were entwined. Descartes' pioneering theory of ocean tides was grounded on his philosophical understanding of matter. Newton tied his groundbreaking account of gravity and the heavenly motions with his understanding of God. Nonetheless, the natural sciences were beginning to emerge as distinct disciplines from philosophy and theology. In part, this was due to fresh emphasis on 'experimentalism'.

The material or physical world is the world that surrounds us, the world of tables and human beings, birds and hills, rocks and stars. Traditionally, the material world was investigated using logical principles or *a priori* reasoning. In contrast, an 'experimentalist' would gather data about the world through observation and experiment. Experimentalists include well known figures such as Newton, and lesser known figures such as William Gilbert (who, amongst other things, developed the word 'electricity'). However, preeminent amongst them is Francis Bacon.

Bacon enjoyed a tumultuous political career, and wrote on many subjects: the nature of religion, ethics, law, and society. He even produced a utopian novel. However, he devoted the last years of his life to detailing his vision of natural philosophy. He argued the medieval approach to science was foolish, comparing it to the way spiders spin webs out of themselves. In place of this traditional approach, Bacon argued for experimentalism. He compares experimentalists to bumblebees. They collect the products of nature, 'flowers of garden and field', and transform them into the honey of real knowledge[6].
Bacon gradually developed a new philosophy of science, arguing that information about the world should be collected through observation and experiment. Scientists could use that information to create axioms, which would be tested through further observation and experiment, ultimately leading to more general axioms.

Bacon set out this scientific method in his 1620 *The Great Instauration (Instauratio Magna)*. Bacon planned that humankind should create nothing less than a complete *historia naturalis*: natural history, or history of nature. The archaic word 'instauration' literally means renewal or restoration, implying that Bacon is looking to renew the sciences. He described the work involved as 'royal': it cannot be executed without great labour and expense, and requires many people to help[7]. Consider the knowledge within The National History Museums in London or Washington. They hold information on everything from volcanoes to dinosaurs, yet this is only a fraction of the total Bacon envisaged.

Just a few of the things Bacon requested information on included histories of the heavens, the seas, the history of flames 'and things ignited', fish, mountains, and fog. These myriad enquiries could not be made wholly in laboratories or observatories. They required people to venture out into the world and bring back information about it.

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6 Bacon, Francis (1964). The Philosophy of Francis Bacon. Edited by B. Farrington. University of Chicago Press: Chicago.(97).

7 Bacon, Francis (1900). The Works of Francis Bacon, Vol. VIII. Houghton Mifflin: Boston. p144.

The frontispiece to Bacon's *The Great Instauration* depicts ships sailing beyond the pillars of the known world in order to expand human knowledge. For Bacon, exploration and knowledge were entwined.

This is why travel, and oral or written testimonies of travel, were central to Bacon's enterprise. This is emphasised in the original frontispiece illustration of *The Great Instauration,* which depicts one ship is sailing away into a boundless ocean, and another returning, riding low in the water with wealth. The ships sit between the Pillars of Hercules, the rocks flanking the Strait of Gibraltar. In Graeco-Roman mythology, Hercules, the adventurous son of the God Jupiter, traveled as far as these pillars, and they came to represent the limits of the known world. The pillars were inscribed 'nothing more beyond' (*nec plus ultra*), a warning that ships should sail no further.

In Bacon's frontispiece, the ships are sailing to and from seas *beyond* the pillars, symbolising his view that we should expand the limits of our knowledge. Just as Columbus went beyond Europe, philosophers should go beyond medieval knowledge. Later illustrations of the Pillars sometimes changed the inscription to 'go farther still' (*plus ultra*), echoing the motto of Charles V, Holy Roman Emperor in the early sixteenth century, who often sponsored conquistadores' exploration in the Americas. Beneath the ships, a line reads, 'Many shall go to and fro, and knowledge shall increase', a line borrowed from a Biblical prophecy (*Daniel* 12:1-4). For Bacon, science and travel were deeply linked through divine prophesy.[8]

Although Bacon aimed to show that scientific curiosity would contribute to the glorification of God, not everyone agreed. Some worried that scientific curiosity might transgress the limits God imposed on humankind. Worldly curiosity was sometimes associated with vanity, pride, and disobedience[9]. When Adam in Milton's *Paradise Lost* expresses curiosity about the motions of the heavenly bodies, the angel Raphael replies, 'Think only what concerns thee and thy being; Dream not of

[8] McKnight, Stephen A. (2006). *The Religious Foundations of Francis Bacon's Thought.* University of Missouri Press: Columbia. On the links Bacon draws between travel, science and philosophy more generally, see Thomas, Emily (2020) *The Meaning of Travel: Philosophers Abroad.* Oxford University Press: Oxford.

[9] For more on this, see Hayden (2012, 16-7), from whom I have borrowed the Milton example. Hayden, Judy (2012). "Intersections and Cross-Fertilization", in *Travel Narratives, the New Science, and Literary Discourse 1569-1750*. Edited by Judy Hayden. Routledge: London.

other worlds'[10]. Despite its critics, Bacon's new philosophy of science would have a huge impact on exploration.

Science and the Age of Discovery

In 1606, Sir Thomas 'the Travailer' Palmer produced a taxonomy of travellers[11]. It includes ambassadors, spies, soldiers, exiles and private traders. It does *not* include natural philosophers. But that soon changed. After Bacon's death, a group of British natural philosophers established the Royal Society. It aimed to further Bacon's vision of developing a complete natural history. Like Bacon, members of the Royal Society were deeply concerned with gathering data about far-flung lands. They met regularly and discussed the latest travel narratives, as well as 'curiosities' brought back by travellers, such as animal bones or plant seeds.

In addition, the Royal Society began publishing calls for information. Robert Boyle, the founding father of chemistry, authored one such request, titled *General Heads for a Natural History of a Countrey, Great or small.* It asked for details on longitude and latitude, temperature, meteors and the 'Store, Bigness, Goodness, Seasons, Haunts, Pecularities of any kind' of local fish[12].

The view that travel could be a form of data collection was taking shape. Later sets of instructions to travellers followed similar patterns. For example, Edward Leigh's 1671 'diatribe' on travel provides a long list of things to observe whilst surveying a country, including its latitude, climate, the 'goodness or barrenness of the Ground', the populousness of the people, its commodities, herbs, beasts, birds, fishes, and insects'[13].

All of this led to a new kind of explorer: the natural philosopher. Two of the earliest travelling scientists were the friends and colleagues John Ray and Francis Willoughby. They travelled to the west coast of England to study seabirds, toured through Europe collecting animals and plants, and published natural histories of plants and birds based on their findings.

Expeditions began to include natural philosophers amongst their crew. Louis-Antoine de Bougainville's 1767-68 voyage took a botanist, an astronomer and a naturalist. (Unbeknownst to Bougainville, the naturalist's assistant was Jeanne Baret, an exploration-minded woman who disguised herself as a man.) On his first circumnavigation of the globe, Cook outdid Bougainville by taking an astronomer, a botanist, and *two* naturalists[14]. At the start of the 19th century, Alexander von Humboldt followed in this tradition, taking the botanist Aimé Bonpland on his voyages to the Americas. Almost 300 plants and more than 100 animals are named after Humboldt, and more places are named after him than any other person: the state of Nevada was almost called Humboldt, and an area on the moon is called Mare Humboldtianum[15].

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[10] Milton (2005, 8.2.72–178). Milton, John (2005). *Paradise Lost.* Edited by David Scott Kastan. Hackett Publishing: Indianapolis.
[11] See Palmer (1606). Palmer, Thomas (1606). An essay of the meanes how to make our trauailes, into forraine countries, the more profitable and honourable. London.
[12] Boyle, Robert (1665-1666). *Philosophical Transactions* 1: 186-189.
[13] Leigh, Edward (1671). *Three Diatribes or Discourses.* London.
(7-9).
[14] Leed, Eric J. (1991). *The Mind of the Traveller*. Basic Books: United States.
(194).
[15] http://www.independent.co.uk/news/people/profiles/alexander-von-humboldt-the-eccentric-explorer-was-the-most-famous-man-in-the-world-after-napoleon-a6703346.html

Many other kinds of travellers also contributed to the Royal Society's project, including navy captains, colonial governors, ambassadors and merchants (their salaries helpfully paid by other sources)[16]. For example, in 1664 the Royal Society fellow Henry Oldenburg wrote to John Winthrop the Younger, a governor of the Connecticut Colony, asking for information on cosmography, astronomy, navigation, mines, tides and the making of salt. His request produced a rattlesnake, some Indian corn, butternuts, various kinds of fish, and a humming bird. All were exhibited at a Royal Society meeting.

Bacon's natural philosophy project was blossoming. Its successes led to immense public interest, and people became fascinated as never before with travel books, maps, atlases, geography, geology and botany. Many works ran through multiple editions and reprinting, including Duval's 1662 *A Geographical Dictionary*, Meriton's 1671 *Geographical Description of the World*, and Bohun's 1688 *A Geographical Dictionary*[17]. The mapmaker John Sellers built a business out of printing atlases, coasting pilots, charts, navigation handbooks, and almanacs[18].

In 1704, the Churchill brothers published *A Collection of Voyages and Travels*, bringing together a variety of new (or newly translated) travelogues which covered places such as Chile, Japan, Greenland, and the Congo. The travelogues are prefaced by an "Account of the Progress of Navigation", part of which details the advantages of travel:

> Astronomy has receiv'd the Addition of many Constellations never seen before. Natural and Moral History is embellished with the most beneficial Increase of so many thousands of Plants it had never before received, so many Drugs and Spices, such variety of Beasts, Birds and Fishes, such varieties in Minerals, Mountains and Waters, such unaccountable diversity of Climates and Men[19].

The Age of Discovery was literally expanding European knowledge. As von Humboldt put it, this period 'doubled the works of the Creation'. The discovery of Australia, New Zealand and the South Sea islands brought around one third of the Earth's surface into the 'known world'. Once James Cook's eighteenth-century voyages had laid to rest the long-held belief in the existence of a vast land mass in the southern hemisphere (*Terra Australis Incognita*), there remained no new continents to be discovered.

Exploration during the long nineteenth century

Once the Age of Discovery passed in the mid-1700s, the outlines of the continents had been largely sketched – even if their interiors were not yet filled in. European trading posts and settlements had been established in many parts of the world. Yet the connection between exploration and science persisted, especially within British travel history. The following few examples hint at the many characters who ventured forth from British soil in search of new knowledge during the long nineteenth century.

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[16] Carey, Daniel (1997). "Compiling Nature's History: Travellers and Travel Narratives in the early Royal Society", *Annals of Science* 54: 269-92.

[17] Swann, Marjorie (2001). *Curiosities and Texts: Culture of Collecting in Early Modern England.* University of Pennsylvania Press: Philadelphia;.and Hayden, Judy (ed) (2012)*Travel Narratives, the New Science, and Literary Discourse 1569-1750*. Routledge: London. (16).

[18] Worms, Laurence (2008). "Seller, John (*bap.* 1632, *d.* 1697)", *Oxford Dictionary of National Biography.* [http://www.oxforddnb.com/view/article/25058]

[19] Anon, cited in Churchill, Awnsham (ed.) (1704). *A Collection of Voyages and Travels, Vol. I.* London. (lxxiii).

In 1831, Charles Darwin boarded the *Beagle.* He embarked on a voyage that would last over four years, sailing around the coast of South America, the Falkland Islands, Tahiti, New Zealand and Australia. The Admiralty had commissioned the *Beagle* with the primary purpose of conducting hydrographic surveys, to improve navigational information for the navy and commerce. The collection of natural history knowledge and specimens was also deemed important, hence the inclusion of Darwin as a gentleman naturalist on board. Darwin's work on the *Beagle* would eventually contribute to his groundbreaking theory of evolution by natural selection. Darwin himself noted the benefits of travel to scientific endeavour, stating 'nothing can be more improving to a young naturalist, than a journey in distant countries.'[20] In his autobiography, Darwin claimed that he owed to that voyage the first real education of his mind. 'I worked on true Baconian principles, and without any theory collected facts on a wholesale scale.'[21]

In the mid-nineteenth century, the English scientist Francis Galton undertook a difficult journey into (what is now known as) Namibia, partly to map it. His cartographic efforts were rewarded by medals from the British and French Geographical Societies, and by having a genus of southern African plant named after him: Galtonia. In 1855 he published *The Art of Travel,* a handbook of practical advice for travellers needing to 'rough it' in 'wild countries'. A flavour of Galton's explorations are conveyed by its chapter titles, which include 'Rafts and Boats', 'Shooting, hints on' and 'Savages, Management of'.

In the 1890s, Mary Kingsley explored uncharted parts of West Africa. Upon the death of her parents, Kingsley was freed from domestic responsibilities, and she become one of the few female explorers of her time. She wrote that her motive for travelling 'was study…of native ideas and practices in religion and law'.[22] She contributed to European understanding of African cultures; became the first European to climb Mount Cameroon; and collected fish, insects and reptiles for the British Museum of Natural History. Some of these were new to science and later named after her, including the fish species Brycinus kingsleyae and the Ctenopoma kingsleyae.

Kingsley's 1897 *Travels in West Africa* describes an African forest goddess, who teaches the solitary wayfarer what herbs are good for eating and curing disease. She laments:

> I often wish I knew this lady, for the grim, grand African forests are like a great library, in which, so far, I can do little more than look at the pictures, although I am now busily learning the alphabet of their language, so that I may someday read what these pictures mean.[23]

Perhaps this description echoes Kingsley's first explorations in her father's library, where as a child she is said to have educated herself, discovering travel and science. Kingsley died in her late thirties, working as a nurse in South Africa during the Boer War.

The early twentieth century saw the 'Race for the Poles': explorers aimed to win renown for themselves and their country by being *first* at the Arctic and Antarctic poles. Along the way, they

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[20] Darwin, Charles (2008). *The Voyage of the Beagle.* Cosimo Classics: New York. (507-8).
[21] Darwin, Charles (1958). *The Autobiography of Charles Darwin 1809-1882*. Edited by Nora Barlow. Collins: London. (119).
[22] Kingsley, Mary (1901) West African Studies (Second, expanded ed.). London: MacMillan.
[23] Kingsley, Mary (2003). *Travels in West Africa*. Dover Publications, Inc: Mineola, NY. (512).

would obtain cartographic and scientific information. In 1910, the race for the Antarctic pole gripped the public imagination, and two parties started off. One was led by the Norwegian explorer Roald Amundsen. The other, larger party was led by the British explorer Robert Falcon Scott. Scott's expedition included geologists, biologists and physicists. Many histories claim that Amundsen was 'only' interested in reaching the Pole, whereas Scott was equally interested in Antarctic research. More charitably, Amundsen was prepared to postpone scientific work in favour of winning the race to the pole[24]. In British histories especially, Scott's scientific aims are discussed with approval – the search for knowledge seen as more commendable than personal or national glory alone.

Scott's team certainly suffered considerable hardships in the pursuit of science. To illustrate, one of the British scientific aims was to further understanding of the evolutionary links between reptiles and birds, by studying Emperor Penguin embryos. These penguins are native to Antarctica, and are the largest living penguin species. They breed during the Antarctic winter, trekking tens of miles over the ice to breeding colonies. In July 1911, three men left the team's base camp: Edward Wilson, Apsley Cherry-Garrard, and 'Birdie' Bowers. They trekked across the Ross Ice Shelf to the only known Emperor Penguin breeding colony. Their journey took five weeks in almost continual darkness, in temperatures that would freeze mercury. Cherry-Garrard describes its 'horror':

> it would be so easy to die… The trouble is to go on… It was the darkness that did it. I don't believe minus seventy temperatures would be bad in daylight, not comparatively bad, when you could see where you were going, where you were stepping, where the sledge straps were[25].

Despite immense difficulties, they succeeded in obtaining three eggs - later returned to Britain for study.
The following Antarctic summer, the race for the South Pole really began. Amundsen reached it first, in late 1911. In early 1912, Scott and four companions also reached it, only to die on the return journey from starvation and cold. In one of his last letters, Scott wrote, 'I may not have proved a great explorer, but we have done the greatest march ever made and come very near to great success.'[26] Despite this tragedy, Scott's expedition was hailed a scientific triumph. After his death, the geographer and explorer Clements Robert Markham wrote that 'the principal aim of this great man… was the advancement of knowledge', and Scott's scientific results were 'extensive and important'[27]. This view is still held today. [28]

We shouldn't forget that all these nineteenth century journeys - and many others - were pushed through not just by intrepid explorers, but by large teams of people and animals. Historians have recently started to uncover the hidden role of local guides and workers, including many women, in nineteenth century European expeditions. Through this research, historian Felix Driver argues that the story of exploration 'becomes a genuinely human story, less about the exceptional qualities of eccentric individuals, more about working relationships and intersecting lives.'[29] In the middle of extreme difficulty, many explorers have found it is their team that gets them through, physically and

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[24] Fernández-Armesto (2006, (1-4).
[25] Cherry-Garrard, Apsley (1937, 258-9). Cherry-Garrard, Apsley (1937). *The Worst Journey in the World*. Penguin: London.
[26] Scott, Robert Falcon (2005). *Journal: Captain Scott's Last Expedition*. Oxford University Press: Oxford. (416).
[27] Markham, preface to Scott (2005, 4).
[28] https://www.bbc.co.uk/news/science-environment-16530953
[29] https://www.theguardian.com/education/2009/dec/08/nineteenth-century-explorers-local-guides

emotionally. Spanish mountaineer Edurne Pasaban argued you succeed at such things by having ‘good people’ around you: a team who ‘support’ and ‘love’ you[30].

What motivates travel?

We’ve seen that large-scale drivers such as the economics, politics and science of nations has driven and funded many expeditions. Yet these expeditions could not have take place without the explorers and their teams, who often undertook great hardships. What lies behind their exploratory urge?

For some there has been the lure of wealth and power, fame and glory: discovering riches in far off lands or being the first to navigate a new sea route. The thrill of adventure, of overcoming challenges, has also motivated people to leave behind the routine and restrictions of home. When explorers push themselves to their physical and psychological limits, to discover the unknown world, they also often with to discover more about themselves. They want to know their limits, and push beyond. ‘We find out more about ourselves in adversity than in comfort’, says adventure travel writer Andrew Mazibrada.[31]

But not all explorers seek adrenalin. ‘I think we often confuse thrill-seeking with exploration,’ says deep-sea cave diver Kenny Broad, a National Geographic ‘Explorer of the Year’. He explains that many explorers undertaking high risk activities are ‘meticulous’ risk managers: ‘It's about keeping your adrenaline down... you don't want to be overcome with the emotions.’

Some find thrill in encountering the unknown, gaining new knowledge. From seventeenth century natural philosophers working to Baconian principles, to twenty-first century oceanographers exploring the deep sea, countless explorers have been motivated by the thirst for knowledge. This is often accompanied by a desire to benefit others through their discoveries. High-altitude archaeologist Constanza Ceruti explains that although fear is constant, they try to leave it behind, because ‘we are so aware that the archaeology work is important… you are helping to preserve this heritage for future generations’[32].

When asked what keeps him going through difficult challenges, the renowned explorer Sir Ranulph Fiennes offers a personal motivation: "I often conjured up the image of my father, my grandfather and long lines of Fiennes watching my flagging efforts, and I pressed on because I didn't want to let them down."[33]

Is exploration still possible today?

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[30] https://floratheexplorer.com/ranulph-fiennes-an-explorers-motivation/
[31] https://www.sidetracked.com/why-explore/
[32] https://www npr.org/2011/09/20/140637118/explorers-push-the-limits-despite-the-risks?t=1566341984665
[33] https://www.telegraph.co.uk/women/mother-tongue/familyhistory/6359868/Ranulph-Fiennes-the-chilling-and-thrilling-truth-about-my-family html

peaks are over 8,000m ave become common in recent years, prompting some to wonder 'Is exploration possible anymore?' Image credit: shutterstock.

You might think that the polar regions were the last unexplored places on Earth, so Scott and Amundsen's achievements marked the end of human exploration. In this vein, travel writer Malcolm Jones claimed, 'There remain almost no undiscovered corners on the planet'. However, I argue explorative travel is still possible. Here are just a few twenty-first century stories of exploration.

In 2009, one of the world's largest underground caves was explored in Vietnam. Son Doong was found to contain an underground forest, complete with species unknown to science[34]. The same year, the mountains lying under the two-mile thick Antarctic ice sheet were mapped for the first time. To examine the buried mountains, the team flew aeroplanes fitted with radar, magnetic and gravity sensors over the ice. The measurements allowed them to 'see' the rock beneath, and found mountains higher than the Alps[35].

Our planet contains as many as a hundred peoples who have not had significant contact with wider modern society, [36] mostly living in the dense forests of the Amazon and New Guinea. Although indigenous rights organizations warn against making contact with these peoples, in 2014 first contact was made with another tribe living in the Amazon[37]. In 2016, a photographer accidentally flew over an additional as-yet-uncontacted tribe, and took some stunning photographs[38].
Some of these discoveries are discoveries for *all* humans. In the future, most exploration stories will be of this kind, because we'll be venturing into places that are not currently habitable for humans. There may be many more caves under the Earth, some of which do not have passages leading to the surface. We've explored very little of the Earth's seas: according to the US National Oceanic and Atmospheric Administration , 'more than eighty percent of this vast, underwater realm remains

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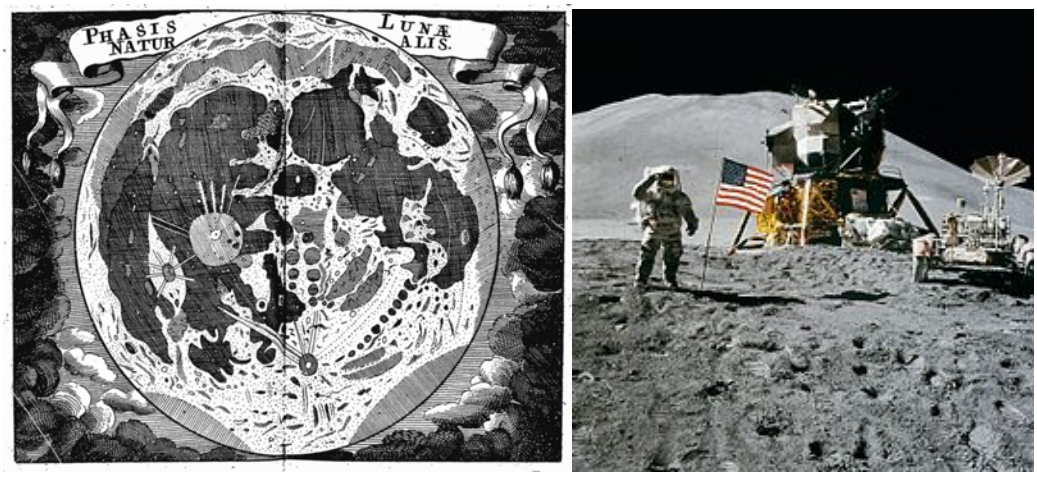
[34] You can even visit it virtually. See http://news.nationalgeographic.com/2015/05/150520-infinity-cave-son-doong-vietnam-virtual-tour-photography-conservation/
[35] https://www.theguardian.com/environment/2009/feb/24/antarctica-mountains
[36] http://www.survivalinternational.org/tribes/uncontacted-brazil
[37] https://www.theguardian.com/world/2014/aug/01/amazon-tribe-makes-first-contact-with-outside-world
[38] https://www.theguardian.com/world/2016/dec/22/photographer-shows-first-images-of-uncontacted-amazon-tribe

unmapped, unobserved, and unexplored.'[39] This lack of knowledge was highlighted in the search for Malaysian Airlines Flight 370, which disappeared mid-flight in March 2014; its wreckage has not been recovered, despite extensive searches. Oceanic exploration will improve our knowledge of the sea floor, weather systems, and environmental change. It will almost certainly uncover more creatures new to science[40].

Finally, looking up, we've explored only a fraction of outer space. Humans have long been fascinated with celestial bodies. Some of our earliest surviving stories are about interplanetary travel, described by one literary theorist as the 'ur' (earliest or original) form of science fiction[41]. Some seeds of modern space travel were planted during the Age of Discovery. In the early seventeenth century, Galileo used his telescope to study the moon, and found mountains there. In 1665, the natural philosopher Robert Hooke gleefully wrote:

> *By the means of* Telescopes, *there is nothing so* far distant *but may be represented to our view; and by the help of* Microscopes*, there is nothing so* small, *as to escape our inquiry; hence there is a new visible World discovered to the understanding. By this means the Heavens are open'd, and a vast number of new Stars.*[42]

John Seller's 1700 *Atlas Caelestis*, atlas of the heavens, dwells on the moon. He notes that, like our own planet, it is composed of solid and liquid parts, which is why many astronomers have conceived the moon 'as it were another Earth'.[43]



Map of the moon (left) from John Seller's 1700 *Atlas Caelestis*. Humans first visited the moon 269 years later. James Irwin (right) can be seen there saluting the US flag, during the 1971 Apollo 15 mission.

In the twentieth century, humans took this fascination further, sending robots, animals and humans into space. In 1969 we set foot on the Moon. As so often in stories of exploration, the search for new knowledge went hand-in-hand with political and economic concerns. The 'Space Race' of the Cold War was inspired, fuelled and funded by the rivalry of two political superpowers, driven by their ambitions for economic and political dominance.

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[39] https://oceanservice.noaa.gov/facts/exploration.html
[40] http://www.scientificamerican.com/article/just-how-little-do-we-know-about-the-ocean-floor/
[41] Roberts, Adam (2006). *The History of Science Fiction*. Palgrave Macmillan: London. (vii).
[42] Hooke, Robert (1665). *Micrographia*. London. (preface).
[43] Seller (1700, 12). Seller, John (1700). *Atlas Caelestis.* London.

We can't yet explore the whole heavens, but we're trying. Voyager 1, one of NASA's unmanned spacecraft, has travelled further than any other manmade object. Launched in 1977, it has since left our solar system. Voyager 1 is now travelling through interstellar space, and will drift close to a star in the constellation of Camelopardalis in around 40,000 years (unfortunately, it will stop transmitting information over the next decade or so)[44]. In 2016, humans launched a satellite into orbit around Jupiter, and a programme was announced that will build nano-spaceships with the aim of reaching the star system nearest to us.[45] In 2017, Vice President Mike Pence stated that the United States is 'at the dawn of a new era of space exploration.' Pence is a key supporter of establishing a US military Space Force[46]. He has called for a return to the Moon, and 'American boots on the face of Mars.'[47] In addition to US efforts, a number of national space agencies and private companies are now actively working on sending crewed missions to Mars. This includes billionaire Elon Musk's company SpaceX, which aims to create a Martian colony.[48]

Although some question the benefits of investing time and resources in space travel, outer space has captured the human imagination for centuries, and shows no signs of waning. Space programs have also led to unexpected scientific discoveries with widespread commercial and humanitarian uses, such as mobile phones, surgical technologies, and the memory foam mattress. The political, military and economic ambitions of governments and companies, combined perhaps with the personal desires of key figures for glory or thrill, are driving a new era of space travel. The urge to journey beyond our world, to discover more great unknowns, looks set to continue the story of human exploration well into the future.

More personal journeys of exploration

The introduction to this chapter explained that exploration is usually understood as travelling to places, or acquiring knowledge, that is new to *us*. Who is 'us'?

'Us' might mean all humans. In this sense, exploring Mars will be new to us. But the 'us' can also be more specific. For Viking explorers, the 'us' are the Vikings. For Chinese explorers, the 'us' are the Chinese. Exploration is often only considered from the viewpoint of the explorer, who defines what is unknown and what remains to be discovered. For early modern European explorers, discoveries reshaped their understanding of the world. As historian Anthony Pagden explains: 'A new world of European moral and social understanding had begun with the discovery of the New World of America'.[49] But at the same time, the indigenous peoples who were subjected, often in a very damaging way, to the consequences of such 'discoveries' also had their worldviews transformed. Europeans labelled America the 'new world', but it wasn't new - America and its peoples were already there. The only newness lay in peoples' fresh understanding of the world.

The meaning of 'us' can change across time, as well as geography. Take the 'discovery' of lost cities. The great temple complex of Borobudur in Indonesia was rediscovered in the early nineteenth century. In the same period, Mayan ruins were found in the Mexican jungles - including Machu Picchu. In the early twentieth century, archeologists discovered the tomb of Tutankhamun in

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[44] https://voyager.jpl.nasa.gov/mission/interstellar.html
[45] https://breakthroughinitiatives.org/News/4
[46] https://www.washingtonpost.com/opinions/mike-pence-its-time-for-congress-to-establish-the-space-force/2019/03/01/50820a58-3c4e-11e9-a06c-3ec8ed509d15_story.html?noredirect=on
[47] https://www.scientificamerican.com/article/pence-calls-for-ldquo-new-era-of-space-exploration-rdquo-at-nasa/
[48] https://www.theguardian.com/science/2018/nov/19/space-how-far-have-we-gone-and-where-are-we-going
[49] Pagden, Anthony (1993) *European Encounters with the New World*. Yale University Press. (111)

Egypt. In 2016, archeologists discovered an enormous Mayan tomb in Belize[50]. Many ruins are likely still out there, and all will be new to 'us', twenty-first century humans.

'Us' can also be personal. Just as the voyages of Columbus and Humboldt counted as exploration because they were exploring places new to European knowledge, we can each explore places that are new to *us* personally. That feeling of discovery, of newness, of expanding horizons, is open to us all. We just have to go somewhere we haven't been before. The Swiss adventurer and travel writer Ella Maillard recognised this:

> Travel can also be the spirit of adventure somewhat tamed for those who are no Frobishers ready to find new straits, but who would desire to do something they are a bit afraid of - you can feel as brave as Columbus starting for the Unknown the first time you decide to enter a Chinese lane full of boys laughing at you, when you risk climbing down into a Tibetan pub for a meal smelling of rotten meat, or simply when addressing a witty taxi-driver in Paris[51].

I argue the difference between a 'Club Med' trip to France, and a traveller's journey across China, doesn't lie in the distance, but in how much of the place we visit is new to us. The travel writer Paul Theroux touches on this when he describes the phenomenon of 'Travelling-to-China-or-Peru-Without-Leaving-America', where travellers surround themselves in a Western cocoon. He writes:

> I am calling attention to the phenomenon because it is so far from the traditional notion of travel as going away… The interest in travel today, which is passionate, arises out of the fact that there is a form of travel prevalent that is now very easy - people want to find an antidote for the immobility that mass tourism has produced; people want to believe that somewhere, somehow, it is still very dangerous, bizarre, anxiety-making and exotic to travel, that one can still make discoveries in a glorious solitary way.[52]

Theroux argues this urge to leave the Western cocoon drives people to people ride by donkey across Ethiopia, or sail slowly down the Ganges.

It is becoming ever easier to travel without *exploring*: to travel without coming into contact with the unknown. Yet exploring is still possible for each of us. We don't have to travel under the sea, or ride rockets to Mars, to make discoveries. We just need to challenge ourselves to encounter the unfamiliar, to step into the unknown. Ride mules through the Horn of Africa, or stick our thumbs out by the side of a road in Uttar Pradesh.

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[50] https://www.theguardian.com/science/2016/aug/06/maya-snake-dynasty-tomb-belize-ruins

[51] Maillart, Ella (1950). "My Philosophy of Travel" in *Traveller's Quest: Original Contributions Towards a Philosophy of Travel*, pp. 114-26. Edited by M. A. Michael. William Hodge: London. (115).

[52] Theroux, Paul (1985). *Sunrise with Seamonsters: Travels and Discoveries 1964-1984.* Penguin: London. (134-5).