ExCiteS Extreme Citizen Science

UCL

History, Trends and an overview

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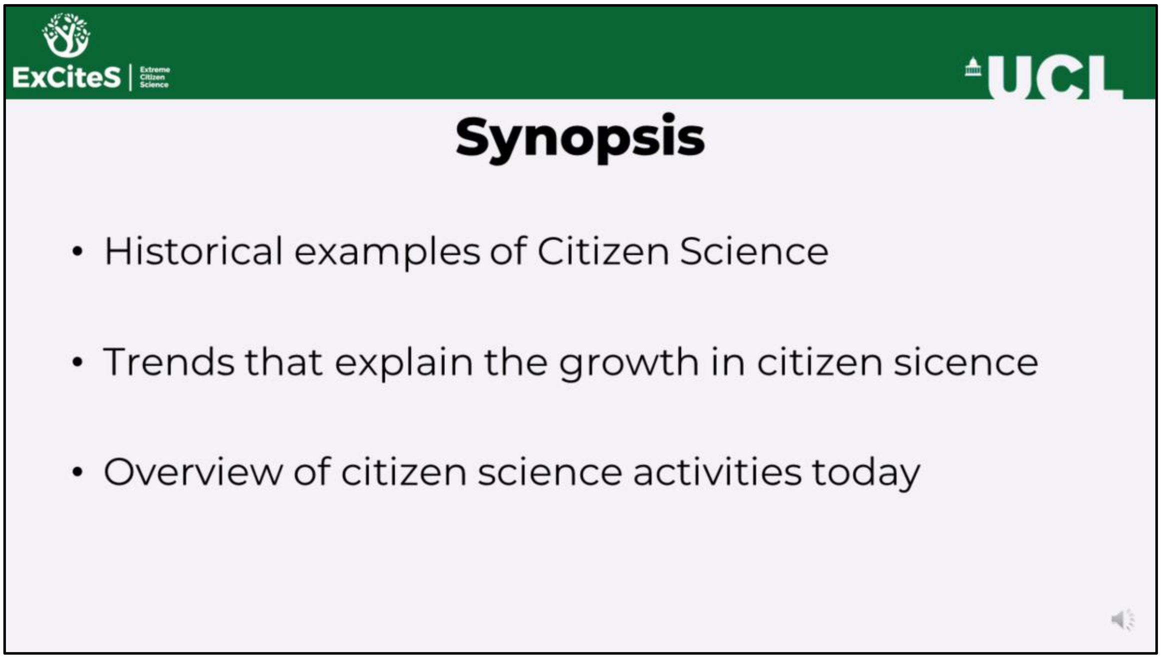
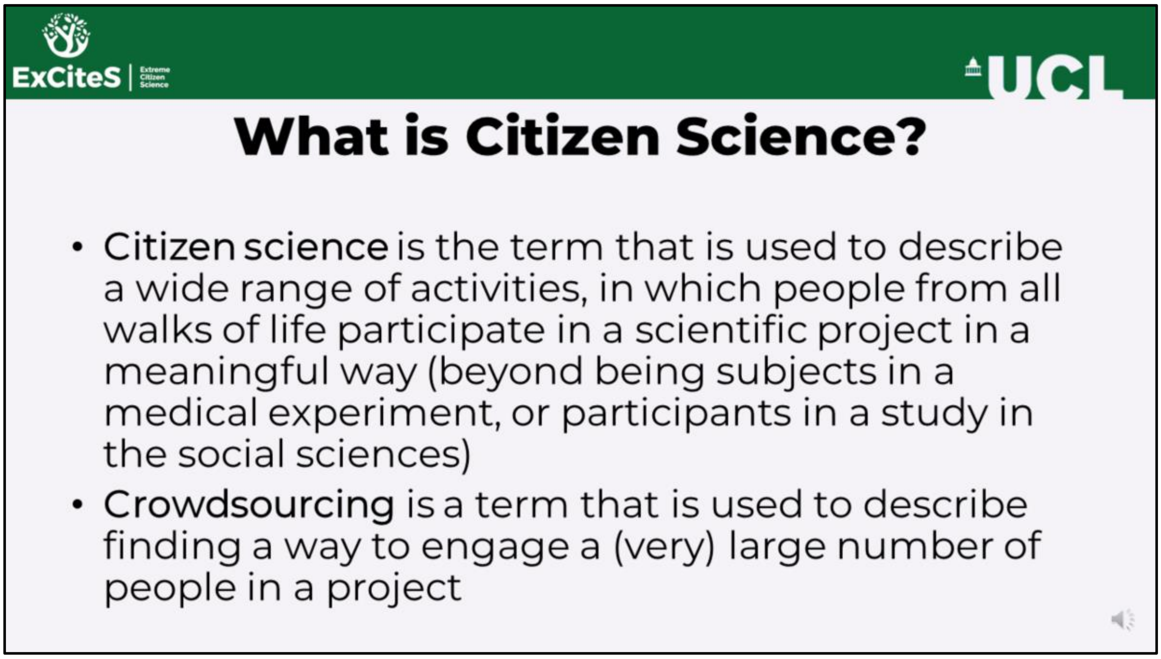


In today's lecture, we will cover the following things, we will look at historical examples of citizen science to provide some context and to start noticing that different flavours of citizen science are not new.
We will briefly notice how during the 20th century the role of the volunteer, amateur, and non-professionals diminished, and then explore the trends that help us make sense of citizen science today.



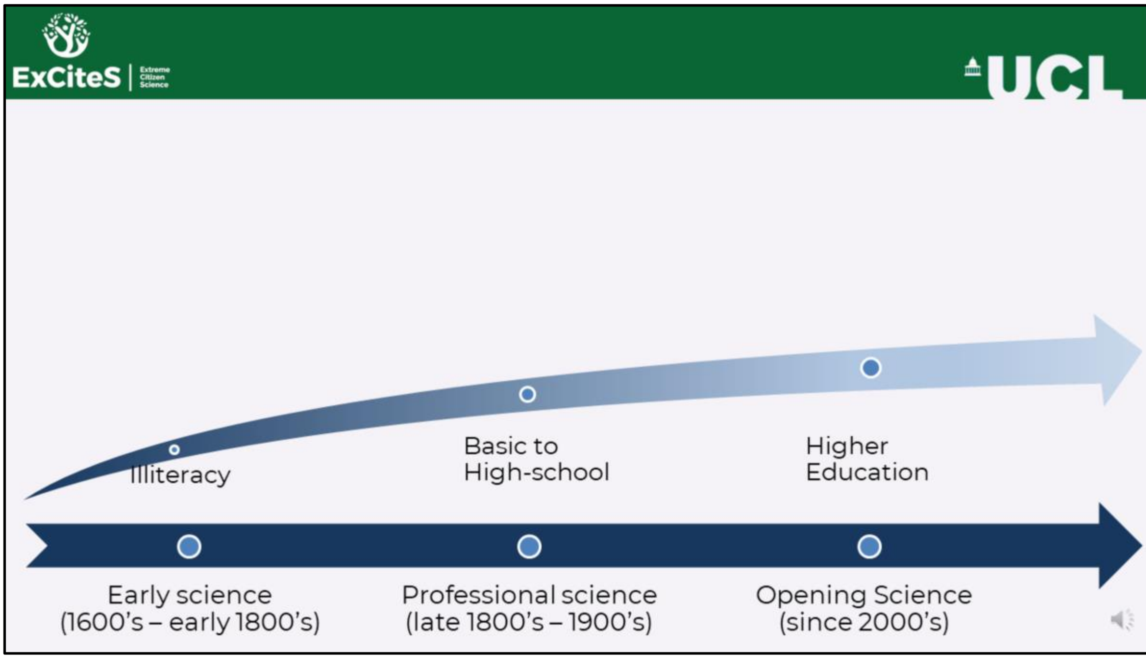
To start the course, we need to look at the definition of the issue that we're covering Here we start with a deliberately vague and generalised definition of citizen science and crowdsourcing. We will have a better definition and an understanding of these areas over the course, but for now, we start with these. For our purpose, we will note that there are many activities, in which people participate in a scientific project in a meaningful way. We will see the challenges of defining exactly who are these people and what is meaningful. Within the context of citizen science, we should pay attention to the concept of crowdsourcing, a term that is used to describe the engagement of many people - sometimes a very large number of people - in a project.

From Wikipedia article on the topic: "A cherry blossom (or commonly known in Japan as sakura) is the flower of any of several trees of genus Prunus, particularly the Japanese cherry, Prunus serrulata (桜 or 櫻; さくら).

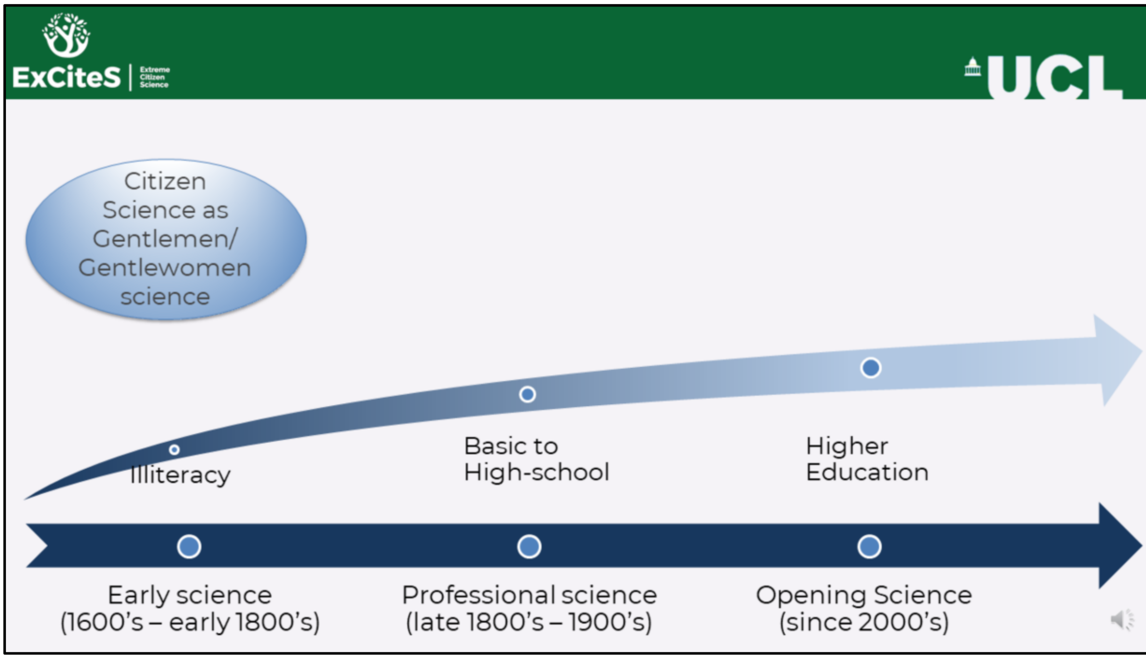
… the cherry blossom is considered the national flower of Japan. … "Hanami" is the centuries-old practice of picnicking under a blooming sakura or ume tree. The custom is said to have started during the Nara period (710–794), when it was ume blossoms that people admired in the beginning, but by the Heian period (794–1185) cherry blossoms came to attract more attention, and hanami was synonymous with sakura. … The custom was originally limited to the elite of the Imperial Court, but soon spread to samurai society and, by the Edo period, to the common people as well… Every year the Japanese Meteorological Agency and the public track the sakura zensen (cherry blossom front) as it moves northward up the archipelago with the approach of warmer weather via nightly forecasts following the weather segment of news programs."

Because of this cultural significance, court diarists in Kyoto started recording the date around 850, so we have nearly 1200 years of recording of the date of this natural phenomenon

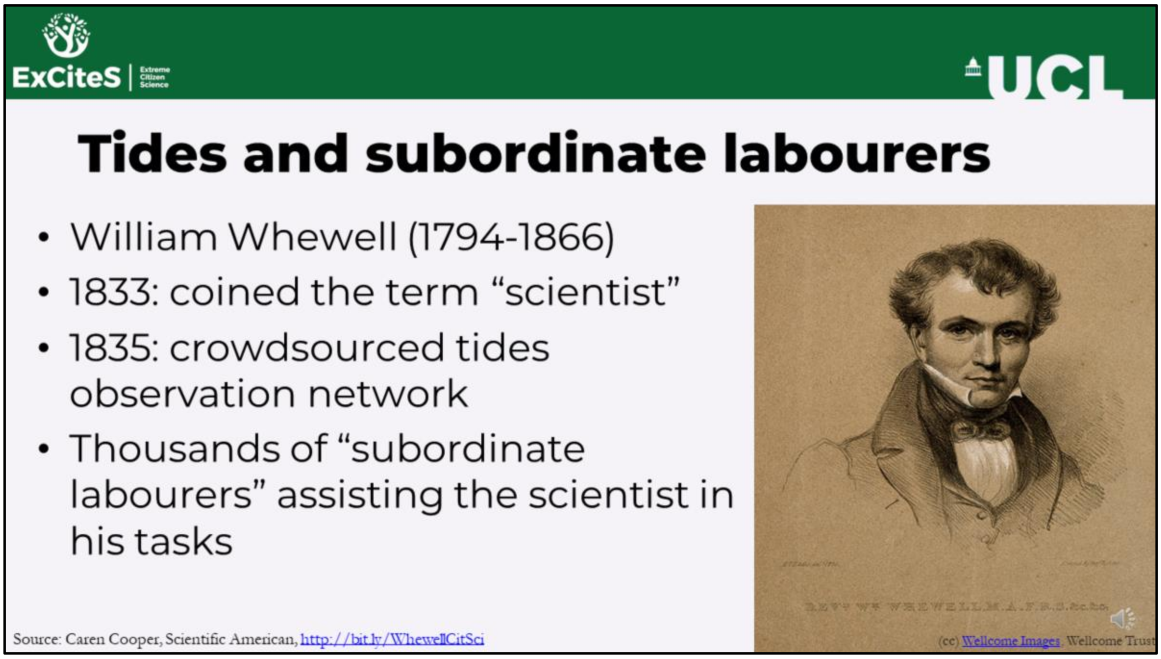
To think about the historical context of citizen science, let's consider 3 periods in the history of modern science – the early, formative period of developing methods, establishing scientific societies, etc. This was followed by a period that science became increasingly professional (especially after World War II and for the most part of the 20th century). Science is now entering a new period, in which it is reopening to a wide range of people.



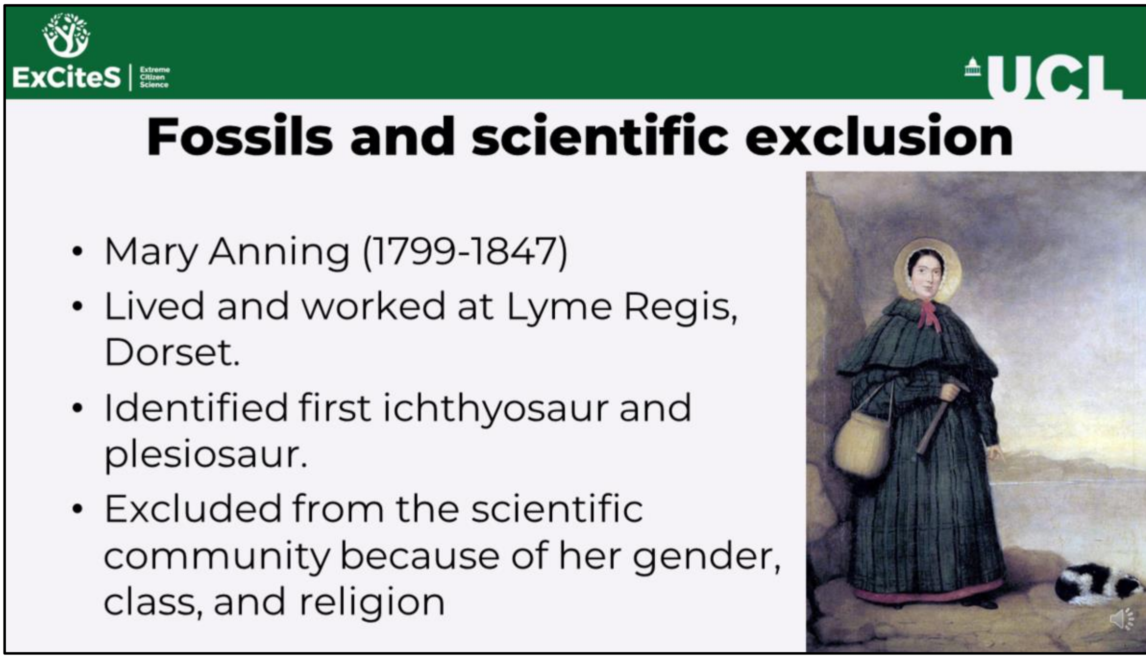
Because we are discussing public engagement in science, we should add to the picture the level of literacy outside scientific circles (in this case we show the in Western societies), we can see that in the wider population, when science started, it was indeed the preserve of the educated elite –no surprise that people couldn't join –most of the population was illiterate. In 1650 – 50% men, 10% women were illiterate (the Royal Society was established in 1660). As we shall see, the outside society became more educated – during the 19th and 20th century is started with basic schooling, and eventually, education for a period of 10-12 years became widespread.



In the first period, there is lack of clarity of what is a scientist (or natural philosopher, or a gentlemen of science) is, and in a way, all scientists are citizen scientists as they operate outside scientific institutions, But some examples can help us understand the nature of citizen science during this period

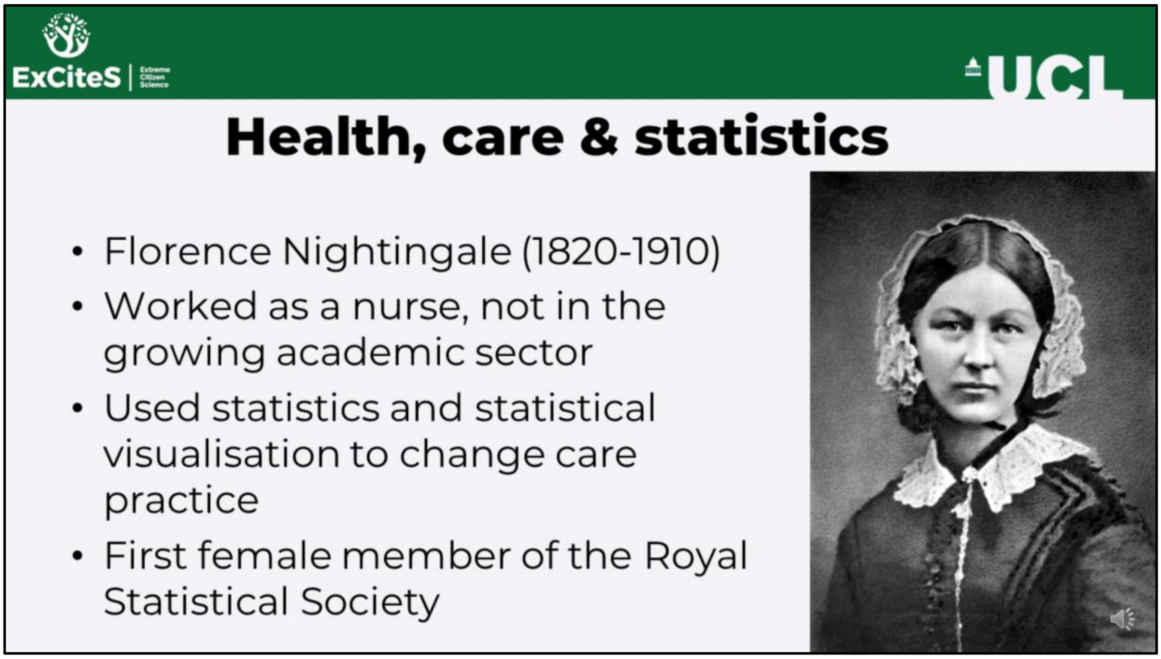


From Cooper's blogpost:
"William Whewell, an elite scholar who engaged the public to understand the tides, but in so doing helped to solidify the distinction between amateur and professional scientists. Trinity College, Cambridge
With the consent of the British Admiralty, Whewell coordinated thousands of people in nine nations and colonies on both sides of the Atlantic in the synchronized measurement of tides. At over 650 tidal stations, volunteers followed Whewell's instructions for measuring tides every 15 minutes, around the clock, during the same two week period in June 1835. Volunteers in the "great tide experiment" included dockyard officials, sailors, harbormasters, local tide table markers, coastal surveyors, professional military men, and amateur observers. Many participants did more than measure the tides; they also tabulated, graphed, and charted the data. Whewell brought it all together into maps illustrating how the tides progressed across the Atlantic Ocean and onto shores, inlets, ports, and into rivers and estuaries. In 1837, the oldest learned society of science, the Royal Society, awarded Whewell a Royal Medal for his work on tides.
As early as 1833, Whewell coined the term scientist: before it caught on, such an individual was called "man of science" or "natural philosopher" and they were more likely pursuing science in their leisure, not as a profession.
Whewell viewed observations as pearls, and induction as the rational mental processes by which minds can string the pearls together to form a necklace. In the context of Whewell's citizen science project, thousands gathered the pearls (he referred to the thousands of collaborators as his "subordinate labourers"), and he, the scientist, assembled the necklace. His choice of the words "subordinate labourers" illustrates the class systems which structured his thinking."



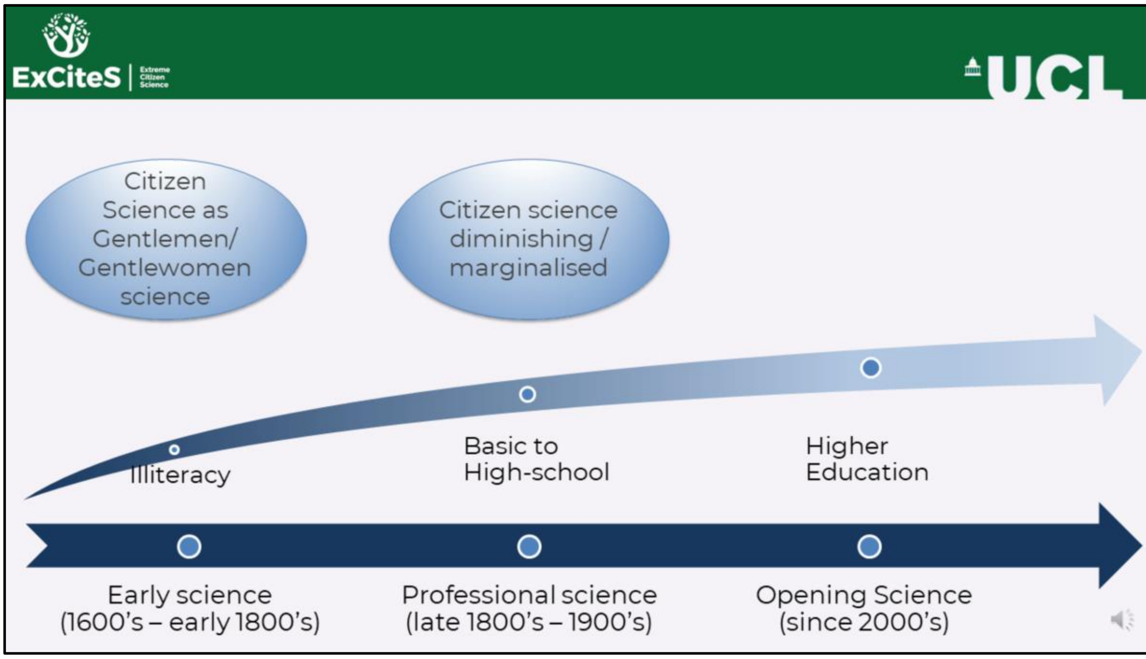
From Wilkipedia: “Mary Anning (21 May 1799 – 9 March 1847) was an English fossil collector, dealer, and paleontologist who became known around the world for important finds she made in Jurassic marine fossil beds in the cliffs along the English Channel at Lyme Regis in the county of Dorset in Southwest England. Her findings contributed to important changes in scientific thinking about prehistoric life and the history of the Earth.
Anning did not fully participate in the scientific community of 19th-century Britain, who were mostly Anglican gentlemen. She struggled financially for much of her life. Her family was poor, and her father, a cabinetmaker, died when she was eleven.

She became well known in geological circles in Britain, Europe, and America, and was consulted on issues of anatomy as well as about collecting fossils. Nonetheless, as a woman, she was not eligible to join the Geological Society of London and she did not always receive full credit for her scientific contributions. Indeed, she wrote in a letter: "The world has used me so unkindly, I fear it has made me suspicious of everyone.“ The only scientific writing of hers that was published in her lifetime appeared in the Magazine of Natural History in 1839, an extract from a letter that Anning had written to the magazine's editor questioning one of its claims.



From Wikipedia “Florence Nightingale, OM, RRC, DStJ 12 May 1820 – 13 August 1910) was an English social reformer and statistician, and the founder of modern nursing.

Nightingale came to prominence while serving as a manager of nurses trained by her during the Crimean War, where she organised the tending to wounded soldiers. She gave nursing a highly favourable reputation and became an icon of Victorian culture, especially in the persona of "The Lady with the Lamp" making rounds of wounded soldiers at night.”
“Florence Nightingale exhibited a gift for mathematics from an early age and excelled in the subject under the tutelage of her father. Later, Nightingale became a pioneer in the visual presentation of information and statistical graphics. She used methods such as the pie chart, which had first been developed by William Playfair in 1801. While taken for granted now, it was at the time a relatively novel method of presenting data.[55]
Indeed, Nightingale is described as "a true pioneer in the graphical representation of statistics", and is credited with developing a form of the pie chart now known as the polar area diagram,[56] or occasionally the Nightingale rose diagram, equivalent to a modern circular histogram, to illustrate seasonal sources of patient mortality in the military field hospital she managed. Nightingale called a compilation of such diagrams a "coxcomb", but later that term would frequently be used for the individual diagrams. She made extensive use of coxcombs to present reports on the nature and magnitude of the conditions of medical care in the Crimean War to Members of Parliament and civil servants who would have been unlikely to read or understand traditional statistical reports. In 1859, Nightingale was elected the first female member of the Royal Statistical Society. In 1874 she became an honorary member of the American Statistical Association.”



During the late 19th century, science became professionalised. This accelerated especially after the World Wars, as the investment in science was seen as part of economic and military development. In particular, after the Second World War, from the 1940s onward, started an era of "Big Science" – major projects, with significant financial investment, running in research institutes and research universities. Science became more professional, with specialised skills, laboratories, methodologies, and tools (that were usually expensive because they were produced in small batches or aimed at bodies that can afford the costs). As a result, the ability of non-professionals to participate in scientific research has been diminished and while it survived in certain areas, as we will see soon, in many parts of science they all but disappear.

The International Geophysical Year (IGY 1957–1958) is Big Science as it get – it included many activities that set in motion geosciences and other areas. The IGY saw the launch of Sputnik, the first human-made satellite, and the opening of the 'Space Age'.

Thousands of amateur scientists participated in tracking these very early satellites (McCray 2006). Under the leadership of Fred Whipple, the then head of the Smithsonian Astrophysical Observatory, amateurs were engaged in identifying satellite locations in close collaboration with professional scientists. The Moonwatch project, which continued to run until 1975, involved participants in optical observation of satellites as they orbit the Earth. The programme faced obstacles and scepticism from other scientists and administrators of the IGY, as they did not trust the volunteers to provide sufficiently high-quality information and observations. Eventually, though, it was a group of Moonwatch volunteers who first observed the Sputnik (McCray 2006).