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Carbon dating and its importance

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Carbon dating is one of the scientific methods that has revolutionised man’s understanding not only of his present but also of the past. It is a concept that has itched our curiosity from little kids to young adults but we hardly know the backstory to such a marvellous discovery. Carbon dating is a form of radiometric dating, measuring the decay of carbon-14 atoms found in a once-living organism to determine when it was last alive. The upper atmosphere of the earth has a lot of nitrogen-14 atoms, which get bombarded by cosmic rays knocking of their neutrons and protons and forming new unstable carbon-14 atoms that are radioactive. The upper atmosphere also has carbon-12 atoms, which are much more abundant and also more stable. Carbon-14 atoms are formed at a reliable steady rate, which makes them very predictable, i.e. at any given time, we have a pretty good idea of the ratio of carbon-12 atoms to carbon-14 atoms in the atmosphere. Plants breathe in CO2, animals feed these plants, and we consume both plants and animals. Basically, carbon-12 and carbon-14 atoms get in everything. The ratio is the same in these living organisms as in the atmosphere, i.e. predictable.

Some smart scientists found a formula to statistically predict this rate of decay. Like all radioactive particles, carbon-14 also has something called a half-life. Half-life is the time it takes for the number of radioactive particles in a sample to decrease in half. Carbon-14 has a half-life of 5,730 years. Using this concept, tracing back time takes us back to a point where there is no carbon-14 left. And now we would not know whether this took place a day before or 100,000 years before. This means that the time limit that we can date things using carbon-14 is roughly 50,000 years. We do that by measuring the rate of decay of carbon-14 atoms compared to the slow and steady carbon-12 atoms. It gets more interesting when we realise that future archaeologists are going to have a tough time using carbon-14 dating. Our industrial activities have been pumping CO2 into the atmosphere and messing with the ratio of carbon-12 to carbon-14 atoms, and even more astounding is, all of the nuclear bombs that we set off are in the mid-20th century. Nevertheless, we can still be very grateful for the concept as its application is existing not only in the archaeology field but also in geology, sedimentology, and lake studies.

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