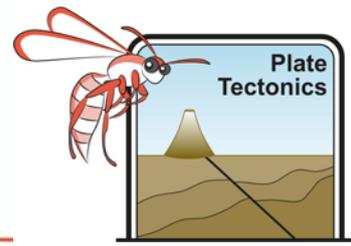


Tectonics History – Teachers Notes

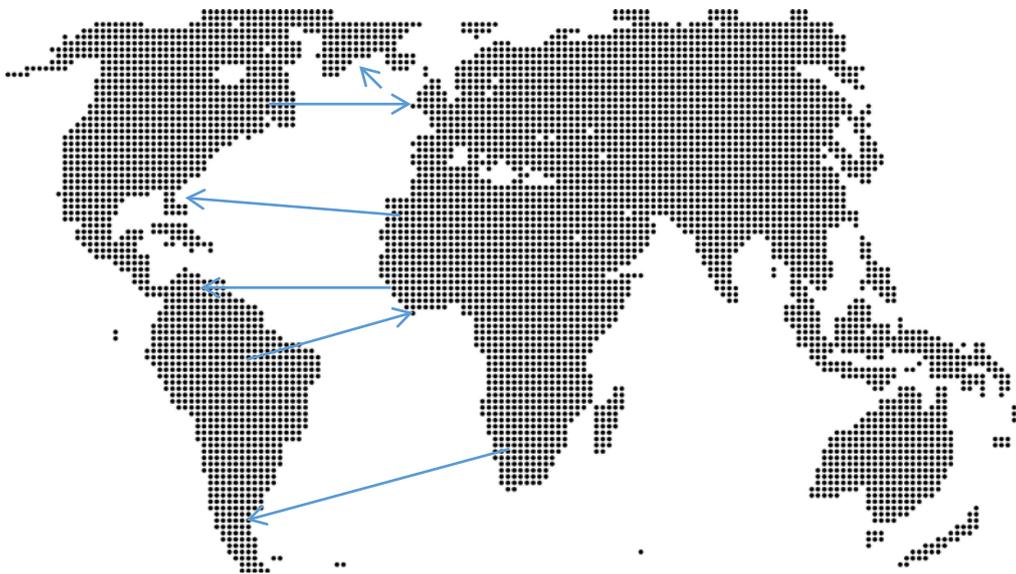


Modern scientists try to explain Earth processes by interpreting data that is observable, measurable and repeatable. From this data they develop theories to help explain what has happened. As time passes technology improves and these theories become refined to better explain what is happening.

Many ancient observers noticed that while some parts of Earth's surface seemed to be sinking into the sea other parts were rising out of it. They suggested that mythical bulls roared under the Earth and their movement caused volcanoes to erupt and cities to sink under the sea. Volcanoes were also thought to be forges where gods who were metal-smiths made weapons and agricultural instruments.

People were particularly interested in how mountains were formed. They called this science "TECTONICS" meaning "mountain building". In time this study came to encompass how continental plates came together and moved apart, creating continents, mountains and oceans.

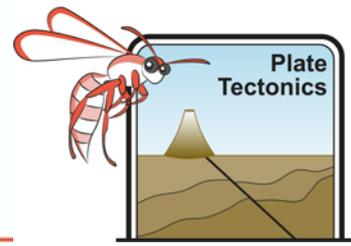
Early sailors and geographers had already noticed that the east and west coasts of continents bordering the Atlantic Ocean seemed to fit together like a jigsaw. Draw arrows into the map below to connect areas of possible fit.



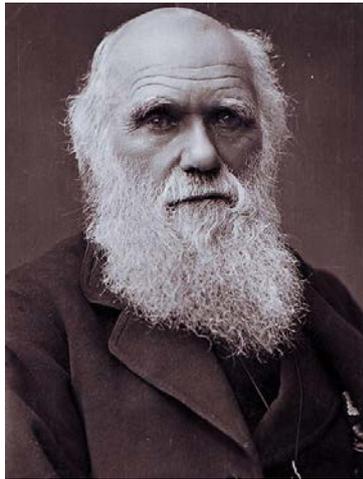
We now have undersea surveys that demonstrate the fit is even better if the edges of the continental shelves are used.

Select the most appropriate word in the list below and you will have made a useful revision sheet.

Tectonics History – Teachers Notes



An early geologist called [Charles Lyell](#) noted, in 1830, that the temple of Seraphis was slowly sinking into the Mediterranean Sea. He took measurements of high tide levels over many years and could map the slow rise of the sea or sinking of the land. This was the start of using a modern scientific approach to understanding tectonics.

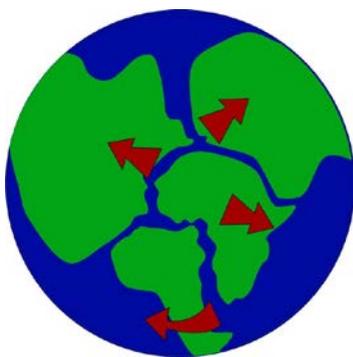


[Charles Darwin](#) (1809-1882) on his voyage on the “Beagle” noted that thousands of feet above sea level in the Andes Mountain Range lay obvious fossil beaches. He collected specimens from the mountains and compared them with those at present day beaches. They were very similar, suggesting land rise had been recent. He suggested that some natural force had caused the mountains to rise. This evidence was further supported on his second voyage where he found that a severe earthquake had caused the seabed in the port of Valdivia to rise and become dry land. This convinced him that land could move [vertically](#) in a short period of time.

Edward Suess (1831-1913) noted similarities in geology and plant fossils found in rocks in South America, South Africa, Australia, and India and used this [primary](#) data (data he had collected himself) to suggest that at one time all these continents had been together and formed the southern super-continent of [Gondwana](#).



He also noted that movement in rift valleys, such as the Africa Rift Valley, had caused continental crust to move apart [horizontally](#).

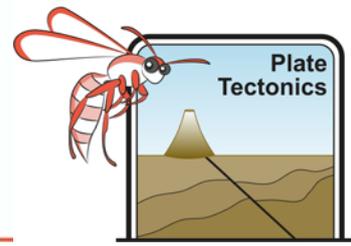


In 1915 a meteorologist called [Alfred Wegner](#) brought together observations by other scientists ([secondary](#) data) and suggested that there were patterns in geology, continental margin fit, fossils and climatic banding that supported the concept that all the present continents on Earth had at one time been joined together as the supercontinent of [Pangea](#). He named his idea “[Continental Drift](#)”. But what Earth process was responsible for these changes? Wegner suggested gravity and magnetism but these suggestions were not acceptable as was the idea that a mere meteorologist could understand geology.

The idea went out of favour for some time.

Data from submarine oceanic investigations in the middle of the twentieth century suggested that a line of volcanism along the middle of the Atlantic Ocean was causing [divergence](#) or extension. This was supported by measuring magnetic striping data and by age dating lavas. The newest flows being on the ridge and increasing in age as you moved away from it.

Tectonics History – Teachers Notes



Slightly later, gravity surveys confirmed that some tectonic plates were sinking under others causing mountain building and volcanism. Earthquake foci were located along these dipping zones of [subduction](#).

We are still not completely sure what mechanism or mechanisms cause tectonic movement. It is thought that heat driven [convection currents](#) within the [Asthenosphere](#) are created by hot, less dense mantle material rising and colder denser materials descending. It is also thought that descending cold, dense plates drag the rest of the plate downward in a process called [slab pull](#), while [ridge push](#) at the mid-oceanic ridges is the result of new volcanic flows erupted there pushing apart earlier rocks.