STRATIGRAPHY

SEQUENCE OF EVENTS

(1) These layers of rock do not lie horizontally like all of the others. The principle of Original Horizontality suggests that these layers were horizontal when they were created, so they must have undergone folding, which occurs when the plates of the Earth's crust collide.

A present day example of such a collisional boundary is the boundary between the Indian and the Eurasian plates, where a collision has resulted in the creation of the great mountain ranges of central Asia.

These layers are composed of metamorphic rock, further evidence that this formation has undergone a period of extreme pressure and temperature.

(2) Boundaries between rock that was not laid down in succession are known as unconformities. Since the rock layers here are not parallel with one another, this boundary is known as an angular unconformity.

(3) Further layers of Sediment are deposited on the sea floor. The change in life forms represented in the fossil record shows that time has elapsed. This is a demonstration of the principle of Faunal Succession.

(4) The boundary between these layers is irregular, indicating that in the time between which they were laid down, sea levels fell, or the land was uplifted, leaving it exposed to subaerial erosion. This type of unconformity is known as a disconformity.

The organisms represented in the fossil record are no longer from a marine environment, showing that sea levels had risen, or the land had been uplifted.

(6) The life forms preserved in this layer are known, both through analysis of isotopic ratios and through the study of strata elsewhere in the world, to have lived long after the life forms preserved in the layers below, indicating an unconformity. Since the layers that form this boundary are parallel and do not show evidence of erosion, this type of unconformity is sometimes known as a paraconformity.

(7) Here, a large mass of igneous rock has intruded into the sedimentary and metamorphic rock. This mass, known as a batholith, is cut by a fault **(8)**, indicating that it was formed before the event which caused the fault.

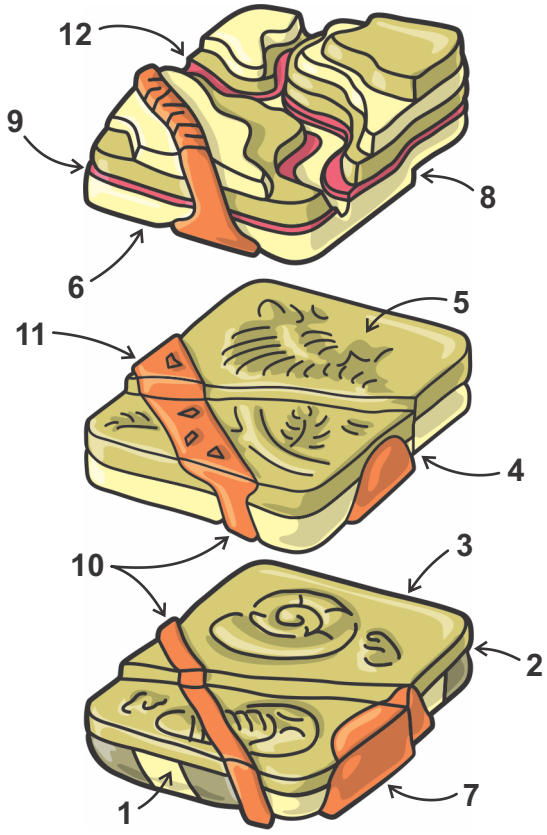
(8) The abovementioned fault (a lateral discontinuity in the layers), extends through all of the layers below, but ends at this layer, indicates that a large movement of the land occurred at about this time.

(9) Here is an unusual, and very thin layer The presence in this layer of high concentrations of Iridium, an element that is normally rare in the Earth, is evidence that a large meteorite collided with the Earth at this time.

(10) A large vein of igneous rock, known as an igneous, or magmatic dike passes through all of the rock layers, indicating that this region experienced volcanic activity sometime in the past 50 million years (the age of the topmost, and therefore youngest, layer of sedimentary rock)

(11) In this place, the igneous dike has squeezed itself between two horizontal rock layers, creating a feature known as a sill. Chunks of the surrounding rock can be seen suspended in the rock of the sill. These pieces, known as inclusions, are always composed of rock that is older than the rock in which they are found.

(12) A deep canyon has been carved by a river, indicating that the land has probably continued to experience uplift. The relative lack of weathering, other than that caused by the river, indicates that this region has been arid since the canyon began to form.



Points of Interest on the Stratigraphy Keychain

FOSSILS

(1) In among these layers, we see fossilized evidence of strange, leaf-like life forms. These life forms, known as Ediacaran life forms, are the first complex multicellular organisms that left evidence of their existence. The presence of these fossils shows that this rock was laid down in a marine environment sometime between 550 and 630 million years ago. The relationship of Ediacaran life to modern multicellular organisms remains a mystery to science.

(3) The fossil record in this layer shows evidence of marine life that is known to have lived about 400 million years ago. Along with a trilobite, and an ammonite, we can see a collection of inconspicuous tooth-like fossils, which belonged to animals known as conodonts. Conodonts are among the earliest known chordates, a group which includes the vertebrates.

Due to their hard shells, Trilobites and Ammonites are very well represented in the fossil record. Some species, whose range was very widespread, can help us to accurately determine when the rock formations which contain them were formed. Such fossils are known as index fossils.

(4) In this layer, we see organisms which lived in a swampy environment about 300 million years ago. Meganeura, related to the modern dragon fly, was among the largest flying insects ever to exist. Also present is a primitive amphibian of the group temnospondyli, one of the earliest representatives of our own group, the tetrapods (four footed organisms). The plant kingdom is represented by a fern, an early and successful group of "vascular plants", which possess xylem and phloem, the vessels for conducting water and nutrients, which allowed these plants to grow to a greater size than their predecessors.

(5) This layer contains a fossilized Dimetrodon. Although these animals are a branch of the reptile family, careful study of their skeletons shows that they are actually more closely related to mammals than they are to either modern reptiles or to other descendants of the reptiles such as the dinosaurs and the birds.

Also found here is a fossil of an early conifer. These plants were among the first to bear seeds, and produce pollen, two adaptations that allowed them to colonize a broader range of biomes than could be colonized by earlier plants.

(6) The presence of fossil dinosaurs indicates that these rock layers were laid down over 65 million years ago. Alongside the dinosaurs is a fossilized leaf from a flowering plant, a group which began to supplant the conifers at this time, and continues, to this day, to be the largest and most diverse group of land plants.