

## CAVES JUNIOR

We can delight in a walk inside the Earth under the ground. Equipped with a luminous helmet, waterproof clothing and a good pair of shoes, and possibly accompanied by a speleologist, it is possible to make our way into the mysterious world of the caves! A cave is a cavity in the rock where man can more or less easily enter. Most caves are not isolated cavities, but consist of horizontal galleries, vertical wells, halls and underground tunnels of various sizes, which often communicate with each other. These spaces can be occupied by air, underground rivers, lakes or they may be constantly flooded with fresh or sea water. All this is known as the karst system.

Some caves can be found in the coral reefs and are known by scuba divers, others were formed in the lava flowing out of erupting volcanoes, many form along the coasts due to the action of the sea and the wind, others are still tied to movements along faults, however most of the longest and deepest caves were formed as a consequence of chemical processes. In order to understand how this takes place, let us look at what happens when we clean the white limescale incrustations on the taps in the bathroom. In order to remove these incrustations, we use detergents that contain acid substances such as hydrochloric acid or acetic acid, that make it easy to dissolve the calcite (that forms the limescale) and increase the speed of this process. In fact, when some of the detergent is poured on the limescale, you can see small white bubbles forming.

Also water, in nature, is never pure, but is a solution of different substances that can increase its capacity to dissolve a rock. Among the substances that can increase the corrosive power of natural water, the most important is carbon dioxide, while calcite and dolomite are the minerals that form sedimentary rocks such as the limestone and dolomite stone, where the karst systems form. The natural waters corrode the rocks like the rain on lime, behaving in the same way as the detergents utilised on the limescale incrustations, with a difference: in nature the processes take place more slowly, thus forming spectacular underground landscapes!

Besides forming caves, the chemical processes create the most surprising “natural decorations”. Stalactites and stalagmites, white twinkling covering, cave pearls or pisolites, pillars... the stalactites descend from above, from the vaults of the caves, and the stalagmites rise from the ground, from the “floor”. Drops of water containing previously dissolved limestone run down the stalactite and slowly make it grow, depositing the limestone on the tip of the stalactite. And when the drops fall to the ground they contribute to the formation of the stalagmites. Cave explorers are called speleologists, and speleology is the science, born in the second half of '800, that studies these particular environments.

For example the systematic exploration of the Grotta di Frasassi caves in Frasassi, began in 1948, but it was only in September 1971 that the entrance to an underground passage, leading to a large underground cave, was found. Here the currents of air that were present convinced the explorers to continue and the majestic caves that we can all admire today, were discovered. Often speleologists carry out real scientific studies. The caves are an environment that has formed in very long geological times, and they are constantly evolving: their history depends on many factors, among which the amount of water, that depends greatly on the climate. For this reason, caves are an important archive of precious geological data, and the study of the sediments transported into the caves enables the reconstruction of the variations in the environment, and of the Earth's climate in the past.

But not only this, we have spoken of karst systems that can be crossed by rivers or invaded by water. Karst aquifers are a very important water resource in many regions of the Earth: karst land, by its own nature, is characterized by absence of water on the surface, and all the water circulation takes place deep underground. These are very delicate resources to use and protect, because they are particularly vulnerable to pollution and excessive exploitation carried out by human.