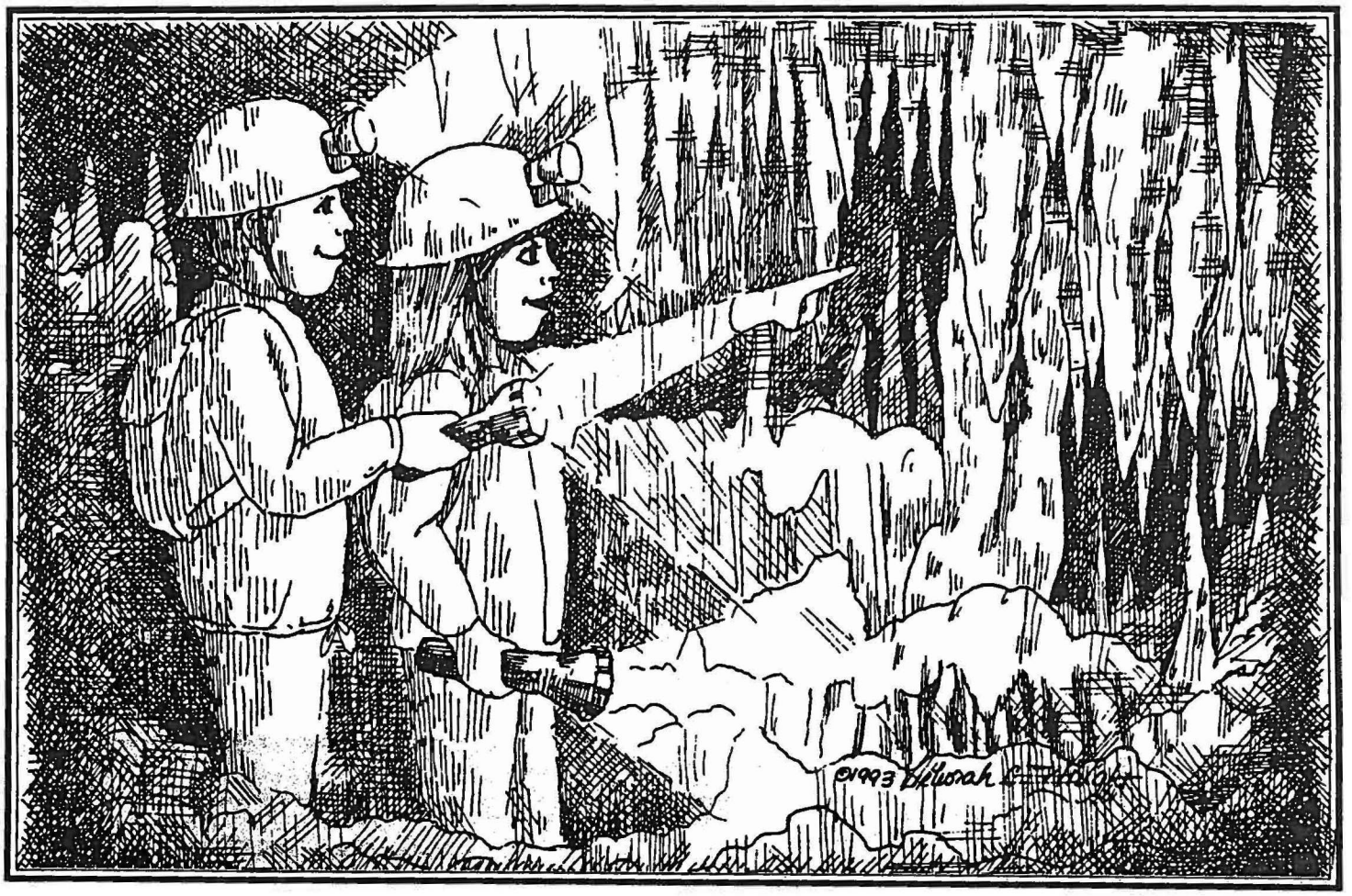
#4 - Underground Wonders



Focus Question:

How are some cave formations created?

Objective:

The students will simulate the formation of stalactites and stalagmites.

Suggested Grade Level:

Grades 5-8

Materials Needed:

- Epsom salts
- two small jars, such as baby food jars
- cotton string
- scissors
- 2 washers
- spoon
- ruler
- paper

Overview:

Most people are familiar with the unusual and often spectacular formations found in caverns– gigantic icicle-like stalactites, rising stalagmites, and wondrous flowing mounds of rocks–that seem to be of another world. Known also as dripstones or sinters, these formations are the result of the continuous dripping of water on rock for thousands and in some cases millions of years. Percolating rainwater dissolves carbon dioxide from the air and the soil forming a carbonic acid solution. It is this solution that slowly dissolves the limestone forming, in turn, a weak solution of calcium carbonate. Upon entering the unique cave atmosphere, the solution of calcium carbonate gives up some of its carbon dioxide and allows a precipitation of lime to form . This precipitation begins as a thin deposit on the cave roof or wall and drops to the floor as a ring of crystallized calcite. Speleothems, or cave formations, can be the result of a number of precipitative and crystallizing events. The names that describe these formations are very exotic. Gypsum and other sulfate minerals also form crusts, snowballs, gypsum flowers and mounds of gypsum sand. Cave "cotton," clumps of cave grass, translucent icicle stalactites, coils of cave ropes, and pincushions are the result of the particular mineralization of the groundwater as it seeps downward. As mentioned earlier, the frequently encountered calcite speleothems take on equally fascinating forms and shapes. Massive flowstone draperies, elegant "cave pearls," and cave bacon are further examples of the effects of precipitation, crystallization, and mineralization. The colors of the speleothems is caused by the mineral content of the seeping ground water. Reds and yellows are caused by iron and iron-stained clays . Black is the result of manganese dioxide, blues and greens are the result of solutions of copper minerals. There are many factors that shape and mold these fascinating formations. Some of those factors may be rate and direction of the seepage, the amount of acid in the water, the temperature and humidity content of a cave the influence of air currents, the effects of the above ground climate, the amounts of annual rainfall, and the density of the plant cover. Speleothem growth is not constant but relative to the various factors mentioned above. However, an average stalactite grows about one inch in 100 years. It should also be noted that these formations are the result of a very unusual environment and that persons should not break off or remove them as souvenirs. For no sooner is it exposed to the dryer air outside a cave than it begins to pale and lose its shape.

Procedure:

1) Fill each of the small jars with two tablespoons of Epsom salts.
2) Add an equal height of water to the Epsom salts in each jar, enough to submerge the washers.
3) Mix thoroughly.
4) Secure a washer on each end of a 1-foot piece of cotton string.
5) Lower a washer into each of the two jars.
6) Lay a piece of paper flat on the table between the two jars.
7) Move the jars so that the string hangs about one inch above the piece of paper.
8) DO NOT DISTURB THE JARS FOR ABOUT A WEEK AND KEEP OUT OF DRAFTS.

Conclusion:

This is a simulation of the slow crystallization similar to the crystal deposits found in caves.

Further Investigations:

Any number of ingredients might be tried in having the students explore the various rates of crystallization. Rock salt, sugar, and copper sulfate are some that might prove interesting and instructional.