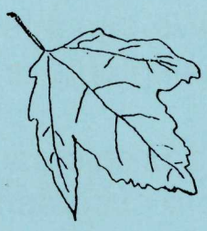
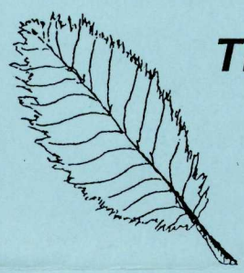
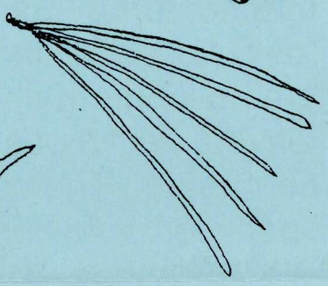
Painted Hills Unit ...

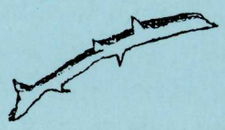
LEAF HILL STUDIES

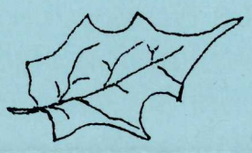




The Present is the Key to the Past!







"Wonderful!" "Amazing!" "Awesome!" "Remarkable!" Whether scientist or layperson comments like these about fossils are common. Yet our curiosity demands answers to the questions inspired by fossils, the evidence of past life preserved by geologic processes.

The "scientific method" is used by paleontologists to answer these questions. This necessitates gathering *observable* information, and developing a hypothesis (a testable explanation). Continued gathering of information supports or may refute the hypothesis. The scientific method is thus self-correcting as research continues.

Scientists have discovered incredible things about life and the world we live in. One discovery is that everything works according to specific processes, sometimes called "principles of nature." A fundamental assumption is that these principles of nature have been uniform through time, over hundreds of millions of years. This assumption is based upon observations of current processes and the remnants of earth's history all around us.

Another way of stating this postulate of uniformity is that "the present is the key to the past." By studying how things work today, we can infer the natural workings of the past.

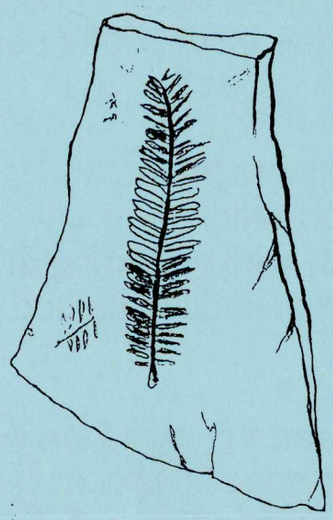
So ... if we want to learn about fossilized leaves found at this site, we should start by studying living plants. Today's botanist will look at such things as leaf size, shape, venation, lobes, smooth or toothed leaf edges, and tooth spacing. These characteristics vary with climate. For example, plants with soft, water-rich tissues and large, unprotected buds are susceptible to freezing. In colder climates many leaves tend be smaller and have toothed edges. Smooth leaf margins suggest a milder climate.

Observations show that the form (structure) of a plant follows its function. Function is dependent on the need to operate in given conditions, such as various degrees of moisture, temperature, and light. These conditions may vary greatly over the course of a year. Similar form between leaves of different plants suggest they function in similar conditions.

Botanists also study living plant communities worldwide. Key factors in these studies are the plant types and relative numbers in the community (a census), and the climatic conditions in which they live. The specific census, climatic, and "form and function" information is useful when conducting

comparisons. We can infer what a pre-historic climate was like if we acquire a census of fossil plants and closely match it to a modern plant community.

We have such a prehistoric census within Leaf Hill and other nearby sites. Certain hill layers of shale are abundant with plant fossils. The shale was formed about 33 million years ago from lake-deposited volcanic ash. The fossil collection includes 35 species, most of which belong to genera that are no longer native to the Pacific Northwest. It is dominated by broad-leaved, deciduous types such as alder, maple, beech, and an extinct hornbeam. The collection also includes rose, oak, grape, elm, one fern specimen, and conifers such as "dawn" redwood and pine.



Metasequoia (Dawn Redwood) in shale

From studies of the fossils collected from these shales it can be determined that the ancient plant community compares most closely to two modern forests, the **Mixed Northern Hardwood Forest** and the **Mixed Mesophytic Forest.** Both forests exist on mainland China. They have similar climates, but of the two, the Mixed Mesophytic Forest lives in a narrower range of climatic conditions. From this comparison scientists infer that the ancient environment at the Leaf Hill site had higher moisture levels (about 40 inches of rain per year), less severe temperature extremes and seasonal variation, and an over-all warmer climate than the present.

Leaf Hill's environment today is much different. Seasonal temperature extremes are broad with a cooler climate on average. The lower elevations of the near-desert environment (12-15 inches of rain per year) consists of shrub-steppe and savanna vegetation dominated by grasses, sagebrush, and juniper. The wetter, high elevations of the surrounding mountains support coniferous forests with ponderosa pine, Douglas and grand fir.

The information gathered at Leaf Hill is impressive. More information is added with each new study. Curiosity is not the only reason we study the past. An understanding of earth's history helps us define the development of current conditions, and may enable us to predict the future of our environment and our species.

We state that the present is the key to understanding the past. Using that key may help us unlock the past and reveal what our future may hold. For as Mark Twain once said … "The past may not repeat itself, but it does rhyme."

John Day Fossil Beds National Monument
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