

WEEDS







LEAVES AND SEEDS



AN OVERVIEW OF FORENSIC BOTANY FOR INVESTIGATORS

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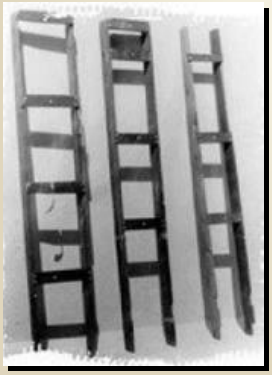
Plants can play a significant role in helping solve crime, although sometimes their significance may be overlooked. They are found nearly everywhere (natural environment, indoor landscaping, food, and even in some manufactured items) and can be transferred in various ways to persons-of-interest or objects, such as vehicle bumpers and body bags.

They possess numerous features, both macroscopic and microscopic, that can be useful in identification. Hairiness, marginal serrations, vein patterns, glands, and other features provide diagnostic characteristics even when only a small portion of the leaf or flower is available as evidence. Cellular anatomy, particularly that of wood, may also provide important identifying characteristics. One of the earliest uses of plant evidence in the U.S. was in the Lindbergh baby kidnapping. Wood, from the ladder used to climb to the bedroom, was identified by its anatomical structure. Milling nicks on the lumber were traced back to the mill, lumberyard, and finally to the suspect, Bruno Hauptmann.



Bruno Hauptmann

Once the plant material is identified, further information may be possible, providing significant clues for the investigator to pursue.



For example, plant evidence may be useful in tying a person-of-interest to a particular locality. Some plants are highly restrictive in their distribution (the dwarf trout-lily only grows in Goodhue and Rice counties in Minnesota) or environmental preference (bog-laurel is found primarily in peat bogs). This can help in narrowing down the geographic aspects of a crime. Widely distributed plants may still be useful when crime scenes are compared with localities frequented by the person-of-interest or when the plant's "growth behavior" is considered. One of my earliest cases hinged on the fact that aspen catkins (the hanging flower/seed clusters) fall to the ground before disintegrating and, thus, are not blown into areas by the wind. The presence of catkin particles on one of the suspects helped tie him to the site where weapons were found (under aspen trees). And, if necessary, once plant evidence has been identified, molecular techniques (DNA analysis) may be utilized to then compare the plant evidence to specific plants at the crime scene(s).

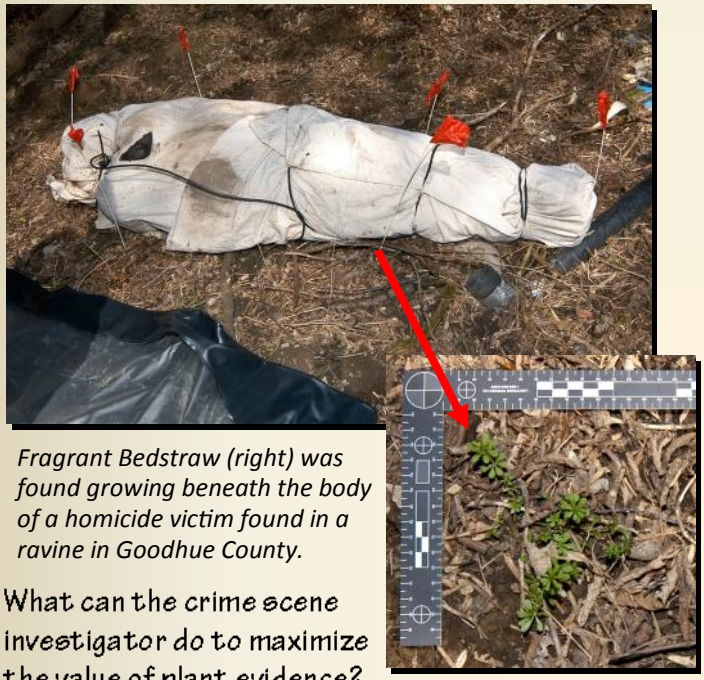
Knowing when a particular plant species produces flowers or when the leaves are fully matured may help to time an event seasonally. However, because plants do not produce growth in measured stages, as in insects, they cannot be used to precisely time a death or other event, but they may be useful in providing a time period. In one case, a baby's blanket was examined to see if it could be determined whether the baby was tossed in the river the previous fall or spring. Also, plants require sunlight to convert energy into food. They do this through the chlorophyll molecule, which provides plants their green color. When starved for sunlight, the plant tissues will lose that green color. How much of the plant has lost color can be useful in approximating how long a plant may have been covered by a body or by



Comparing the loss of chlorophyll in the grasses under the sand piles around a clandestine grave, and the levels in grasses not covered, confirmed that this grave was dug prior to the murder.

the soil from a burial pit (as in a case from Wabash County, Minnesota). Woody plants in temperate regions produce annual growth rings in the wood and winter buds leave scars when the leaves burst forth each spring, both of which may be useful in approximating longer time periods (how many years did that body lie tangled in the shrubbery).

And, of course, gastric analysis may yield seeds or undigested plant material that points to poisoning or last meals. A recent case of mine used the blueberry seed in vomit found inside a suspect's pants to help convict a child abuser.



Fragrant Bedstraw (right) was found growing beneath the body of a homicide victim found in a ravine in Goodhue County.

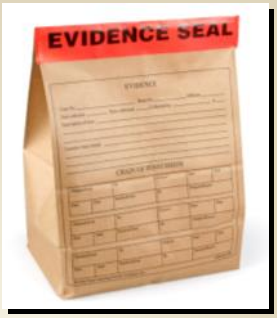
What can the crime scene investigator do to maximize the value of plant evidence? Implementation of the following protocol will aid in the collection and proper storage of plant related evidence.

1. Plant particles should be picked, brushed, or carefully scraped from clothing or other objects and stored in appropriately-sized paper envelopes or bags until they can be dried. Whole plants or large twigs or branches can be handled in a similar fashion. Envelopes are better than bags since envelopes have fewer seams than bags where seeds or small particles can settle and be missed; however, the large grocery-style bags are certainly adequate in the initial collection stage.

2. Do not attempt to flatten curled material as this will simply cause breakage. The material can be rehydrated and uncurled later as necessary by the forensic botanist.

3. Never use plastic bags.

4. Plants in paper bags or envelopes should then be dried in an evidence dryer. Drying should occur at a temperature of 30-50°C (95-150°F) for several hours (total time depends on the nature of the material and how much wet matter is initially present).



5. Once material has been dried it can be stored indefinitely in the envelopes/bags, or standard evidence jars at room temperature. Refrigerators are not suitable for long-term storage but may be acceptable for overnight temporary storage.

6. Pollen (produced by flowering and cone-bearing plants) and spores (from ferns and relatives) can also be collected and analyzed. However, since these structures are microscopic, they require expert handling and techniques for extraction and identification. Unfortunately only one lab (at Texas A&M University, Dept. of Anthropology) is qualified in forensic palynology. The use of packaging similar to that for other microscopic evidence would help to prevent the loss of pollen and spores.

Photographic documentation can be extremely useful, particularly if the forensic botanist will not be examining the material at the time of discovery. Photographs of the scene (short and long distances) from various angles as well as isolated close-up images of the plant material (flowers, leaves, and stems) with a ruler may be helpful in later identification of the material (flower color, for example, will be lost in the drying process but often is necessary for specific identification). Photos of nearby trees and understory can further aid in identifying plants that prefer to live near other types of plants and trees. A GPS reading will help to pinpoint the area on topographical maps.





DRUGGIST'S FOLD INSIDE OF PROPER PACKAGING. SEAL EVERY CRACK & EVERY OPENING ON THE OUTSIDE ENVELOPE TO CONTAIN THE EVIDENCE WITHIN.