HIPDAD: A New Set of Tools for Identifying Plants

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Have you ever tried to identify a plant without a handy expert or an herbarium close by? Have you ever made a tentative identification only to learn later you were missing a key piece of information and made a big mistake? If so, HIPDAD is for you. It can help a plant enthusiast or novice botanist confirm a tentative plant identification. With a good identification, a plant enthusiast can go on to discover a world of information about that species—the plant explorers who discovered it, its medicinal or food uses, its use in art and literature, and much more.

No, HIPDAD is *not* the newest slang term for the coolest dude in the room. HIPDAD is an acronym I coined for a set of steps or tools that can be used to identify an unknown plant. H is for Habitat; I for Illustration (or image); P is for Phenology, usually flowering and fruiting time; D is for Distribution (or range); A is for Abundance; and D is for description. I developed HIPDAD to help plant enthusiasts and budding botanists identify an unknown plant. Many botanists and plant enthusiasts have informally used parts of the process to make a plant determination or ID, but not necessarily as a set collectively.

There are four steps to plant identification with HIPDAD. These are:

1. Pick a representative or average specimen, preferably one with flowers and/or fruits present. Remember, an average specimen is often not the first specimen you encounter. Look at the whole plant or at several individuals before picking your specimen.

2. Analyze the plant (or your specimen) for vegetative and reproductive features. For example, are the leaves opposite or alternate? Are the petals separate or fused into a tube? How many petals and sepals are there? What color are the petals and sepals?

3. Make an initial attempt to identify the plant using field guides or photographs and descriptions from the internet. Familiarization with major plant families will eventually make this step easier.

4. Apply the HIPDAD steps detailed below.

Many of us already unwittingly "do" some parts of HIPDAD, but, especially early in our quest for botanical competence, do not have much self-confidence. This self-doubt is often due to lack of experience with reading and understanding a plant description or with interpreting range maps. The key to the HIPDAD process is to use as many parts of it as you can collectively. By collectively, I mean applying all of the HIPDAD steps together. The average beginner naturally gravitates towards using the "I" for Illustrations, typically "picture keying" the plant. Oftentimes the results can be potentially embarrassing, as this example illustrates.

A plant enthusiast finds a plant in a freshwater swamp in a coastal Georgia county. The person uses illustrations in a book to correctly determine that the pink-flowered plant is a member of the Marsh Pink genus, *Sabatia*, and

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Trichostema setaceum (Narrowleaf Blue Curls)

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Trichostema dichotomum (Common Blue Curls)

makes the tentative ID of *Sabatia dodecandra*. But the investigator does not bother to use the rest of the HIPDAD tool, and relies only on the illustration. Upon looking around in the swamp, the investigator finds close by a nearly identical plant, but this one has white flowers. After more "picture keying" in books or on the internet, he/she concludes that the white-flowered plant is *Sabatia capitata*. Continuing to ignore the rest of the HIPDAD steps, he/she emails photos of both the pink- and white-flowered plants to several "experts." The experts have the somewhat delicate task of informing the plant-finder that, based on habitat and distribution, it is highly unlikely that both these species of *Sabatia* are growing together in a coastal Georgia county, especially in a swamp habitat. Though *S. dodecandra* fits those parameters nicely, they do not work for *S. capitata*. *Sabatia capitata* is known from woodlands and meadows with sandstone and shale bedrock in six northwest Georgia counties. Had the novice found and read a description of *S. dodecandra* (instead of just concentrating on pictures), he/she might have realized that white forms of *S. dodecandra* often occur with the more typical pink-flowered form. But even if he/she had overlooked that information, which might not be included in some plant descriptions, using the other parts of HIPDAD would have spared the plant-finder from jumping to an erroneous conclusion.

Habitat

Information about the habitat or natural community where a plant grows can often be used to support a tentative plant ID. Some plants are not picky about where they grow, but others have rather exacting habitat requirements. For example, there are species, both woody and herbaceous, found mostly or even exclusively in sandhills. *Trichostema setaceum* (Narrowleaf Blue Curls), a member of the mint family, is a sandhill species in the Coastal Plain of Georgia and surrounding states. In other parts of Georgia, this species is found in the dry, sandy soils around granite outcrops. The much more common and widespread relative, *T. dichotomum* (Common Blue Curls), is more indicative of disturbed habitats and dry woods especially

those undergoing secondary succession. The common species, *T. dichotomum*, has broader leaves while the sandhill species, *T. setaceum*, has narrower leaves. The Latin epithet *setaceum* means bristle-like and probably refers to its slender leaves.

Another example of how habitat can help with plant identification is with the oak genus. Members of the oak genus, *Quercus*, are notoriously difficult to distinguish and knowing their habitat is important for identification. The fact that oaks thrive in different habitats keeps them from interbreeding with one another. In other words, habitat separation or ecological isolation effectively maintains species integrity among oak species and is a classic example of an ecological reproductive isolating mechanism. When these barriers break down, hybridization often occurs making identification more difficult than usual. In Georgia, we see habitat separation in two similar looking oak species, Southern Red Oak (*Quercus falcata*) and Cherrybark Oak *(Q. pagoda*). The former occupies dry upland sites with sandy or clay loam soils while the latter inhabits well drained lowland soils in bottomland hardwood forests. Similar ecological species isolation exists for the wetland species Swamp Laurel Oak (*Q. laurifolia*) and the upland Sand Laurel Oak (*Q. hemisphaerica*). In both cases, the two species of oaks occupy different habitats or natural communities and species integrity is maintained by habitat separation.

Before we leave the topic of habitat, we should distinguish between it and the term "habit." Habitat is where the plant lives. "Habit" is the lifestyle and growth form of the plant (terrestrial, aquatic, epiphytic, woody, herbaceous, etc.). Both blue curls species mentioned above have an herbaceous (soft-tissued) habit, but live in different habitats. As for oaks, most species in our flora have a tree habit while two or three have a shrub habit.

Illustration

The most often used HIPDAD element is illustration. Most people attempting plant identification use some form of it, most often photos and line drawings. There are many sources of illustrations, some more reliable than others. Examples include technical manuals and field guides and, more recently, images found on the internet. As for the results of internet searches, it is well known that the further down the browser page one looks, the less relevant is the result. Manuals tend to be more technical and typically have line drawings. Though there are exceptions, popular field guides do not often have line drawings. They typically have pretty, but not necessarily diagnostic, photographs. Two examples of manuals are the *Manual of the Vascular Flora of the Carolinas* (Radford *et al.*1968) and the various editions of John K. Small's *Southeastern Flora*. These manuals have excellent line drawings. The advantage that line drawings offer over typical photographs is that they can show features which are overlooked in photographs. These are called distinguishing features or diagnostic characters. Such features are further discussed below under "Description."

Recently, some of the bigger herbaria have made images of their dried specimens available online. These images can be especially useful when you use your computer's zoom tool to enlarge the image. Additionally, one can view many specimens on a web page faster than in person at a herbarium with no chance of damaging the specimens.

Unfortunately many beginners attempting plant ID stop with the illustration. The result can be misleading as with the example of Marsh Pink mentioned above. Though a good place to start, illustrations are just one part of HIPDAD.

Phenology

Even in an age where global warming is changing flowering times, information about phenology can still be an aid to plant identification. One of the best examples, at least in the southeastern U.S., is the gentian family (Gentianaceae). Most members of the family, especially in the genus *Gentiana*, bloom late in the sum-

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Trillium discolor (Pale Yellow Trillium)

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Trillium discolor (Pale Yellow Trillium

mer or fall. Let's say you are trying to "picture key" a blue-flowered herb in Georgia and it is April. You can eliminate species in the gentian genus right away using flowering time alone. Other examples include the different flowering times for different members of the genus *Rhododendron*. Sometimes the flowering times are separated by one or more months, sometimes by half a year. Keep in mind that a flowering time given, for example, as April–June, may be intended to cover a spread of elevations or latitudes within the species' range, with southern populations blooming in April and higher elevation or more northern populations blooming in June.

Distribution

The natural distribution or range of the species is important as the *Sabatia* example above illustrates. In my novice days, I did not know enough to appreciate this criterion and sometimes even thought that I had found an extension of the known range of a species. In fact, I once committed a real blunder by publishing an article in the journal of the Illinois Academy of Sciences extending the range of a small weed in the carnation family (Caryophyllaceae) by about 1000 miles from the east coast to the Midwest—a would-be disjunct distribution. The plant turned out to be a look-alike species in the same family. The mistake was caught years later by Gerould Wilhelm and Floyd Swink (1994) during the revision of their book, *Plants of the Chicago Region*. My only consolation was that, during the peer review process, others including Illinois' renowned botanist Robert Mohlenbrock did not catch my error. They even agreed with me!

The point is, some plants are rather steadfastly found in certain geographical regions and no other. In fact, some are so restricted they are considered endemic to a certain region or place. One of many examples is *Trillium discolor* (Pale Yellow Trillium). Weakley (2015) says of this species, "Endemic to the Savannah River drainage of northwest South Carolina, northeast Georgia, and southwest North Carolina, occurring in the Blue Ridge and Piedmont. In North Carolina it is restricted to a few sites along the Whitewater and Thompson Rivers." (See map which shows its restricted range in Georgia). Sometimes the restricted distribution is a function of a geographically limited habitat or plant community. Endemism can also have ramifications for the abundance of a species. An endemic plant is usually uncommon or even rare within its narrow range, especially if its habitat is also uncommon. *Illicium floridanum* (Florida Anise), a plant of East Gulf Coastal Plain steepheads, is considered rare in Georgia, being found in only one county. This is likely due to the fact that steephead habitats are rare in Georgia.

Information about a species' range in a manual or field guide may take the form of a map or it may be written in narrative form or

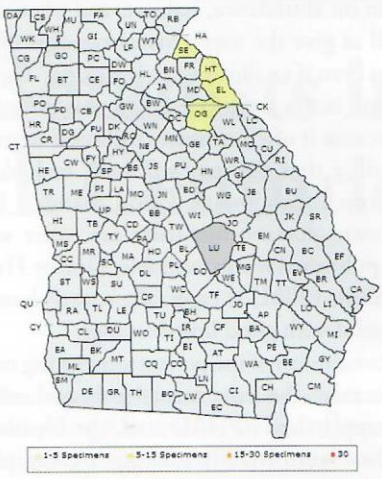
both. So called "dot" maps are a common way to show county distributions. Weakley (2015), in his constantly evolving *Flora of the Southern and Mid-Atlantic States*, has combined the dot map concept with a set of symbols that indicate abundance and nativity (whether or not the plant is native or exotic).

It is true that global warming is moderating both latitudinal and altitudinal aspects of range, but not so much as to cause tremendous range extensions over short periods of time. As one gains experience, the value of distribution information becomes more evident. If the reference has range maps that are based on herbarium specimens or peer-reviewed publications such as Weakley's flora or the USDA Plants website, the user can feel confident in its accuracy.

Abundance

Information about the degree of abundance can be useful, depending on the reference the plant finder is using. Typical adjectives are: common, occasional, uncommon, rare, extremely rare, or endemic. As implied above in the discussion of distribution, abundance is connected to range. Endemism is also connected to distribution or range of a species and can thus be an expression of rarity, i.e. the lack of abundance. Other descriptive expressions of abundance might be: scattered throughout (referring to the region treated by the reference) or locally abundant. Of all the HIPDAD tools, abundance will probably be the one that the beginner trusts the least until he/she gains more experience. Abundance is also connected to habitat. A plant found in a widespread or common habitat (such as Georgia's oak-hickory-pine forests) is going to be more abundant or common than a species that lives in an uncommon or rare habitat.

Even though a plant may have a broad range or distribution, this does not mean it is equally abundant throughout that range, especially if it has a narrow or discontinuous habitat. This is especially true near the edge of the species' distribution. For example, *Fagus grandifolia*



(American Beech) is near the edge of its range in southeastern Georgia in Bulloch County. So even though a map has a dot on it for this county, and the verbiage in the species treatment in a manual may say "common," American Beech is neither widespread nor abundant in Bulloch County.

Description

As noted in the introductory remarks, a good description not only provides useful descriptive information, it will cover the other parts of the HIPDAD process as well. Not all references have good or useful illustrations. And some, including many field guides, have aesthetically pleasing photos that do not illustrate the diagnostic features needed to distinguish the species in question from its closest relative or look-alike. Often the relative is a congener (member of the same genus). Other times it may be a case of look-alikes in related families. *Aruncus dioicus* (Goat's-beard) in the rose family is often confused with *Astilbe biternata* (Appalachian False Goat's-beard) in the saxifrage family. To tell them apart, one needs to read a description of the two species.

Of all of the components of the HIPDAD tool, the description is not only the most important, it requires the most patience to properly use. A good description will provide infor-

mation on abundance, habitat, and phenology as well as give the user a visual concept of the species even if an illustration is lacking. The description is, for most beginners, the hardest to use because it often contains technical terms so unfamiliar that the user will have to look up the terms in a glossary. Good manuals have their own glossary, but there are other separately published works available. One by Harris and Harris (2001) is especially comprehensive and useful with good line drawings.

In conclusion, if the person attempting to ID a plant takes the time to patiently and collectively apply the HIPDAD tool, the likelihood that they will correctly identify a given plant is much greater than a process that involves a technique such as "picture-keying" alone. Moreover, application of this technique will increasingly help its practitioners to build confidence in their identification skills and abilities sooner than they otherwise might have.

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Literature Cited

Harris, J. G. and M. W. Harris. *Plant Identification Terminology*, 2nd Edition. Spring Lake, Utah: Spring Lake Publishing, 2001.

Radford, A. E., H. E. Ahles, and C. R. Bell. *Manual of the Vascular Flora of the Carolinas*. Chapel Hill: University of North Carolina Press, 1968.

Small, J. K. *Manual of the Southeastern Flora*. Chapel Hill: University of North Carolina Press, 1933.

Swink, F. and G. Wilhelm. *Plants of the Chicago Region*, 4th ed. Indiana Academy of Science, 1994.

Weakley, A. S. *Flora of the Southern and Mid-Atlantic States*: Working Draft of 29 May 2015. Chapel Hill: University of North Carolina Herbarium, 2015. http://www.herbarium.unc.edu/flora.htm