The Class of Science

PLANTS Lesson. 3
DICHOTOMOUS KEY

Dichotomous Key in Plant Identification

Introduction

- A dichotomous key is a biological tool used for identifying unknown organisms up to some taxonomic level.
- The word dichotomous means separating or brunching into two.
- The key is constructed as a series of couplets each consisting of two constructing statements describing characteristics of a particular organism in question..
- The choices are based on observable physical characteristics of the plant, such as leaf shape, arrangement, flower structure, or growth habits.

Importance of Dichotomous Keys

- **Identification:** Helps in identifying unknown plants or organisms using observable features.
- **Simplifies Classification:** Organizes plants into smaller, more specific groups based on key traits.
- **Field Use:** Provides a practical way for students, researchers, or nature enthusiasts to identify plants in their natural habitat.

Structure of a Dichotomous Key

- The key is arranged as a series of steps.
- Each step contains two contrasting statements (hence the term *dichotomous*), describing characteristics of the plant.
- The user selects the statement that applies to their specimen and follows the instructions to the next step.
- Eventually, the user will be directed to the correct plant identification.

Characteristics Used in a Dichotomous Key

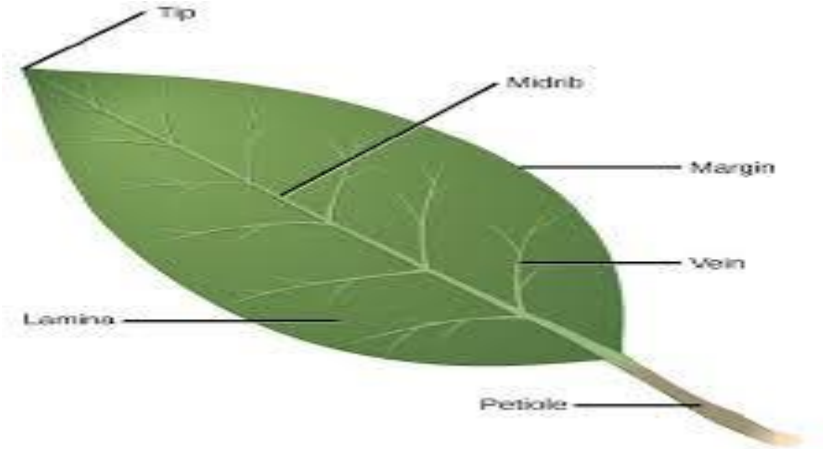
When using a dichotomous key to identify plants, focus on the following traits:

1. **Leaf Characteristics**
    - **Shape**: Simple, compound, needle-like, or broad.
    - **Arrangement**: Alternate, opposite, or whorled on the stem.
    - **Vein Patterns**: Parallel (e.g., monocots) or branched/netted (e.g., dicots).

- **Leaf Margins**: Smooth, serrated, lobed, or wavy.

2. **Stem Characteristics**
   - **Woody or Herbaceous**: Plants with hard stems (woody) like trees or soft stems (herbaceous) like grasses.
   - **Growth Form**: Climbing, trailing, upright, or prostrate.
3. **Flower Characteristics**
   - **Number of Petals**: Identify whether petals are distinct, fused, or absent.
   - **Flower Symmetry**: Radial symmetry (e.g., sunflower) or bilateral symmetry (e.g., orchid).
4. **Fruit Characteristics**
   - **Type of Fruit**: Fleshy fruits like berries, dry fruits like nuts or pods.
5. **Other Features**
   - **Presence or absence of Spines or Thorns**
   - **Texture of the Leaf Surface**: Smooth, hairy, or waxy.

Simple leaf

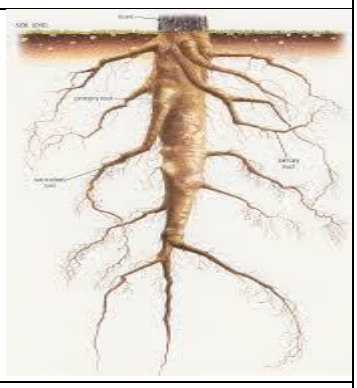


Types of compound leaves

		
Trifoliate	Palmate	Pinnate
		
Bipinnate		

Phyllotaxy (leaf arrangement)

		
Alternate	Whorled	Opposite

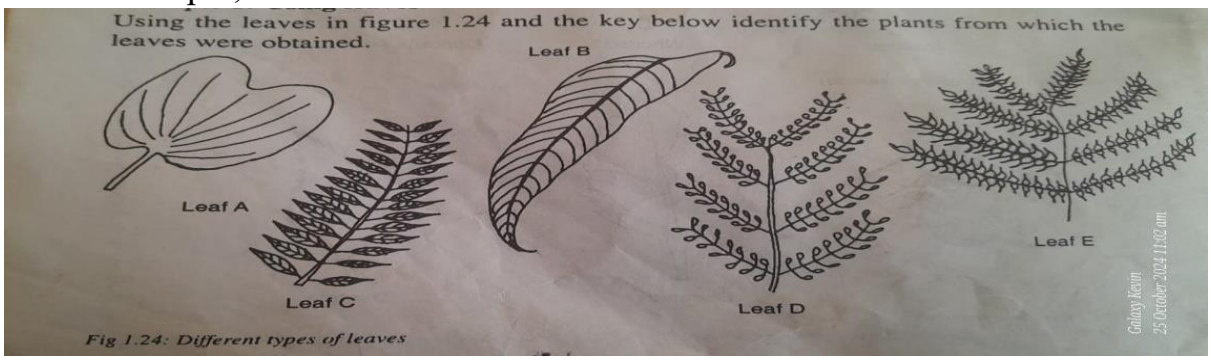
		
Thorns	Needle-like leaves	Network veins
		
Parallel veins	Fibrous root	Tap root

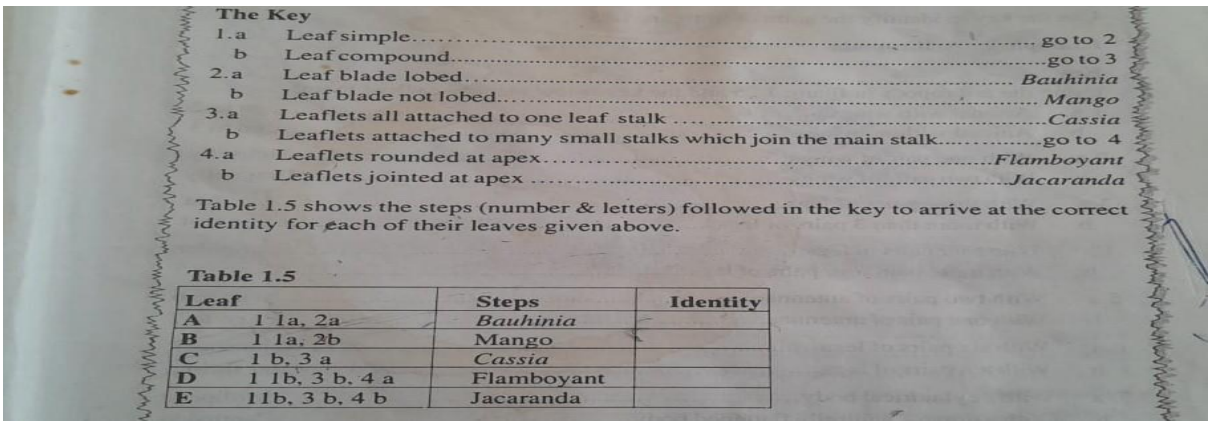
Guidelines for Using a Dichotomous Key

1. **Observe carefully**: Examine the plant closely, taking note of characteristics such as the leaves, stem, and flowers.
2. **Start from the first pair of choices**: Always begin from the first set of options provided in the key.
3. **Follow the key step by step**: Make decisions based on observable features and proceed to the next set of alternatives.
4. **Be precise in your observation**: Small details can make a difference in proper identification.
5. **Repeat if necessary**: If you reach an incorrect identification, review your choices to ensure you selected the right alternatives.

Types of Dichotomous Keys

- **Written (Indented) Key**: The most common type, where each choice is followed by a number leading to the next step.
- **Graphical Key**: Presented in a tree-like branching diagram.
  Example,





The Key

1.a	Leaf simple	go to 2
b	Leaf compound	go to 3
2.a	Leaf blade lobed	*Bauhinia*
b	Leaf blade not lobed	*Mango*
3.a	Leaflets all attached to one leaf stalk	*Cassia*
b	Leaflets attached to many small stalks which join the main stalk	go to 4
4.a	Leaflets rounded at apex	*Flamboyant*
b	Leaflets jointed at apex	*Jacaranda*

Table 1.5 shows the steps (number & letters) followed in the key to arrive at the correct identity for each of their leaves given above.

Table 1.5

Leaf	Steps	Identity
A	1 1a, 2a	*Bauhinia*
B	1 1a, 2b	Mango
C	1 b, 3 a	*Cassia*
D	1 1b, 3 b, 4 a	Flamboyant
E	11b, 3 b, 4 b	Jacaranda

Graphical Key Example

A graphical key uses a branching tree diagram to show the steps, making it easy to visualize the identification process.

Benefits of a Dichotomous Key in Biology Studies

- **Develops Analytical Skills**: Encourages detailed observation and critical thinking.
- **Enhances Knowledge of Taxonomy**: Helps students learn the scientific classification of plants.
- **Aids in Field Work**: Useful in the identification of local plant species during biology practicals or field studies.

Challenges in Using a Dichotomous Key

- **Requires Accuracy**: Misinterpreting a characteristic can lead to incorrect identification.
- **Variation in Plant Species**: Some species may show variation in traits, making them difficult to identify using a standard key.
- **Environmental Factors**: Plants growing in different environments may exhibit slightly different characteristics.

Conclusion

A dichotomous key is an essential tool in plant taxonomy and identification. Mastering its use helps students enhance their fieldwork skills and deepen their understanding of plant biodiversity. With practice, students can quickly identify plants by following logical steps based on observable features.