BAMBOO MORPHOLOGY

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BAMBOO CHARACTERS

Bamboo is a **woody, evergreen, perennial tall grass** belongs to the family **Poaceae,** sub family **Bambusoidae**

Bamboo is a **flowering plant**

1600 species in **tropical and subtropical** regions of the world

Bamboo has a unique, **dense rhizome structure** that helps in accelerating the growth rate of bamboo shoots and culms annually. when a bamboo culm is harvested, the bamboo rhizome system is still alive and continues to produce shoots.

Bamboo **matures in 3-5 years**

it can be **harvested annually** up to flowering (20 to 120 Years)

BAMBOOS-ECOLOGICAL USES

Bamboos supply life-giving **oxygen** and help purify the air.

They provide **shade** and add **beauty** to the landscape.

They serve as **protective barriers** for crops and animals against destructive winds.

The roots and rhizomes of the bamboo clump holds the soil together and help **minimize erosion**.

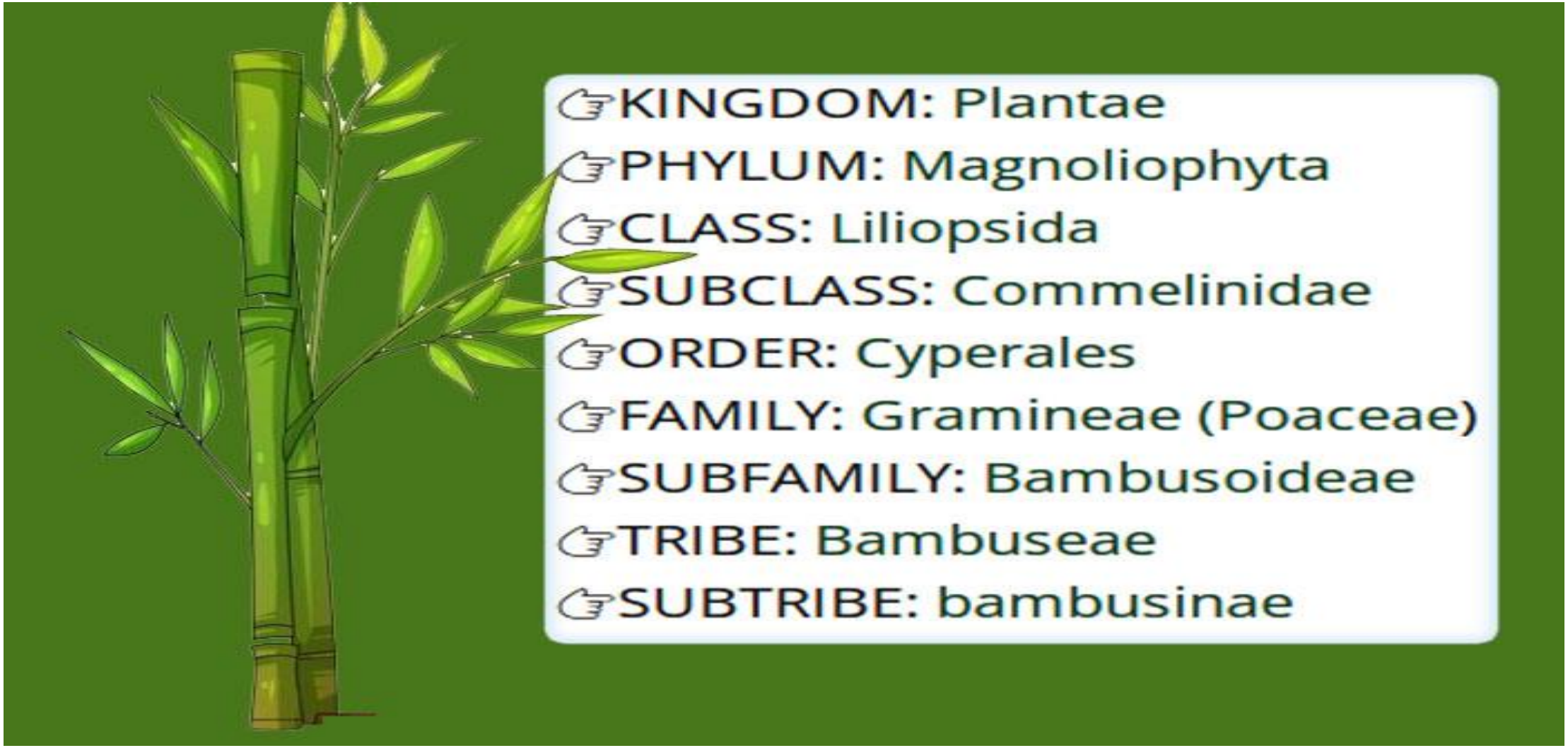
Bamboo leaves, including fallen leaves piled as duff on the forest floor, increase the **absorption of water into underground aquifers and reduce the runoff** of precious rainwater into rivers, reducing the incidence of flood in the rainy season.

Groundwater from recharged aquifers is **released slowly** throughout the year and made available for a longer time during the dry season to humans, river life, trees and croplands.

HUMAN BEINGS

- **Kingdom**: Animalia
- **Phylum**: Chordata
- **Class**: Mammalia
- **Order**: Primates
- **Suborder**: Haplorhini
- **Family**: Hominidae
- **Subfamily**: Homininae
- **Genus**: Homo
- **Species**: Homo sapiens

TAXONOMY (CLASSIFICATION) OF BAMBOO



SOME UNIQUE FEATURES OF BAMBOO

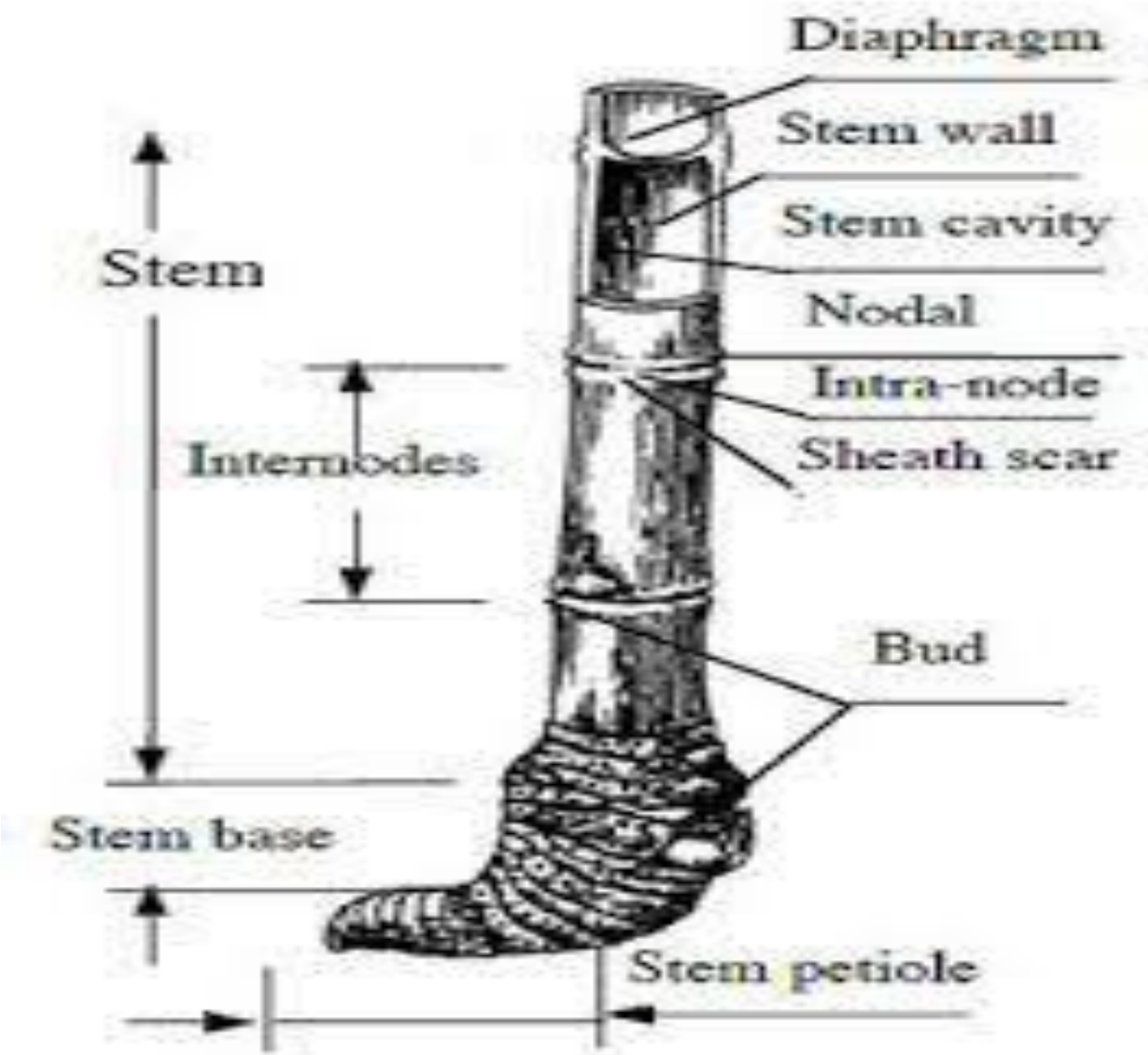
Bamboo is a **perennial plant** that **easily adapts** to different site conditions.

It can **grow in a wide variety of soil types**, ranging from organic-poor to mineral-rich and from drought to flooding conditions where many plants cannot grow.

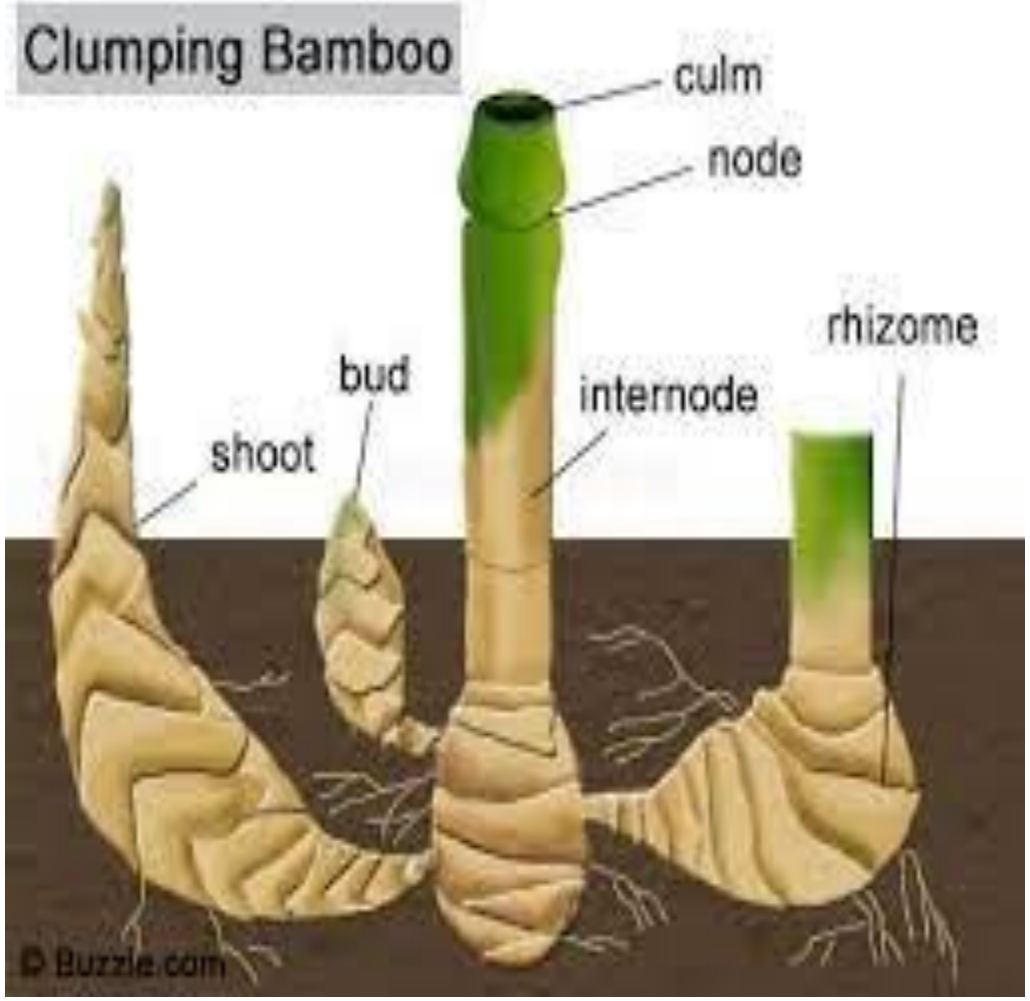
Bamboo can **grow rapidly** in hot and humid rainforests and even in cold climates with temperatures around −20°C.

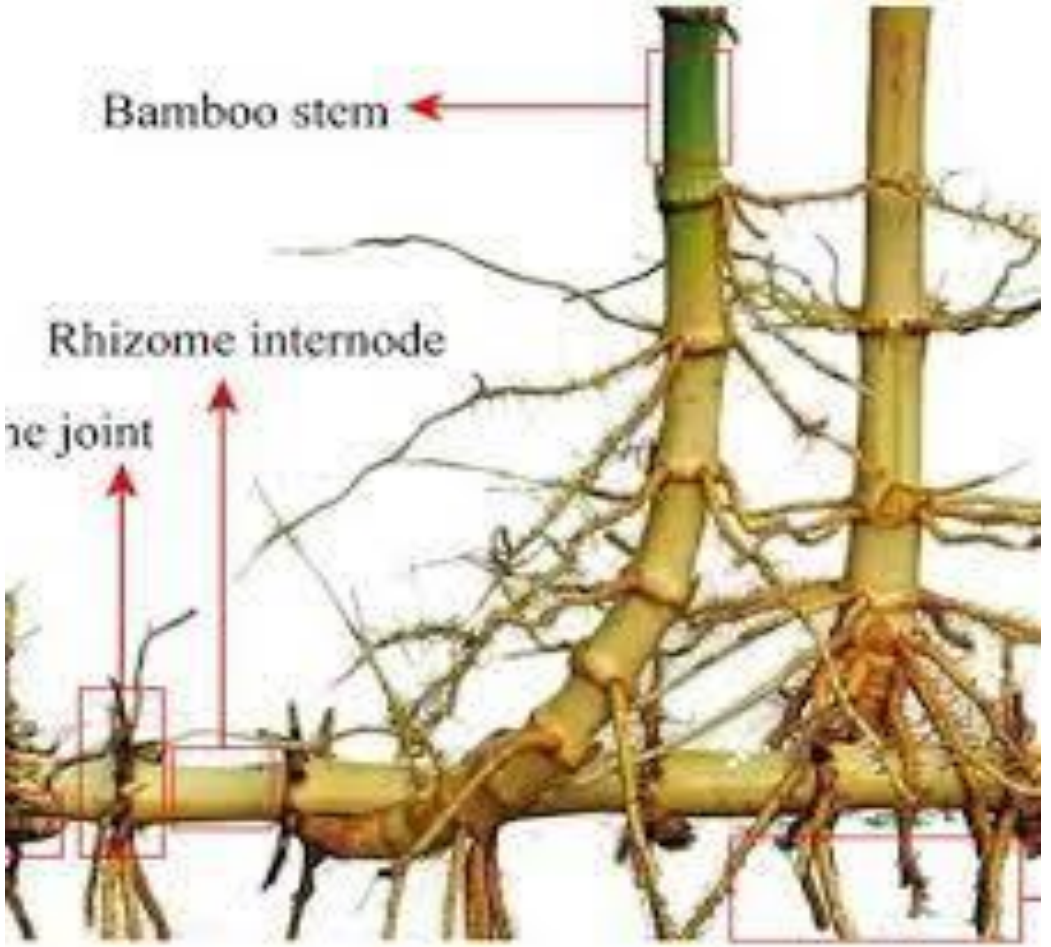
It has an **extensive rhizome and root system** that makes it capable of stabilising loose soil to prevent soil erosion.

BAMBOO STEM ANATOMY



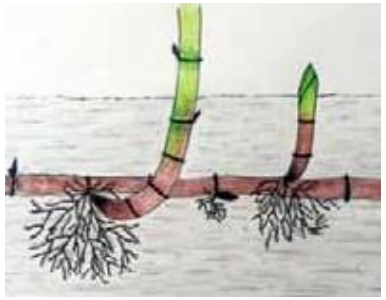
RHIZOMES OF SYMPODIAL AND MONOPODIAL BAMBOOS



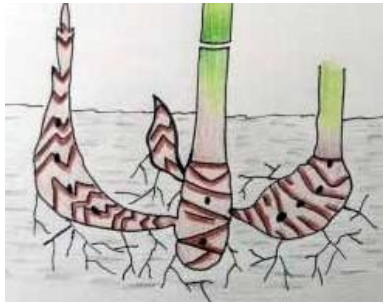


TYPES OF RHIZOMES IN BAMBOOS

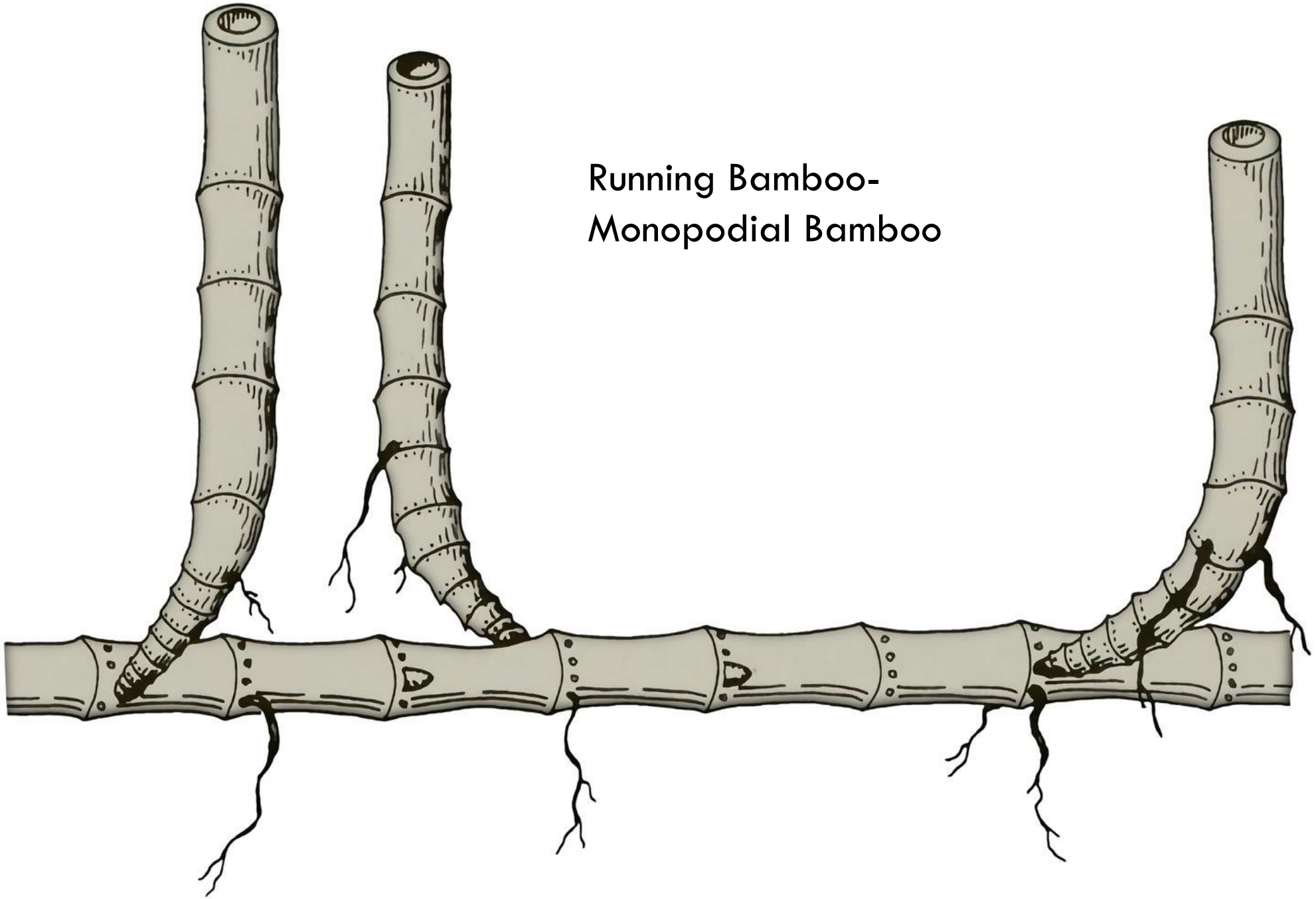
(a) Monopodial (running): Running bamboo has a rhizome that spreads horizontally and forms dispersed bamboo culms. Running bamboo can spread quickly. Harvesting running bamboo is easy.



(**b) Sympodial (clumping):** whereas clumping bamboo has a shorter rhizome, is formed together and generates bamboo clumps. clumping bamboo stays together in its cluster. This means that harvesting clumping bamboo is more difficult especially because in clumping bamboo, most of the mature culms are located in the centre of the clump.

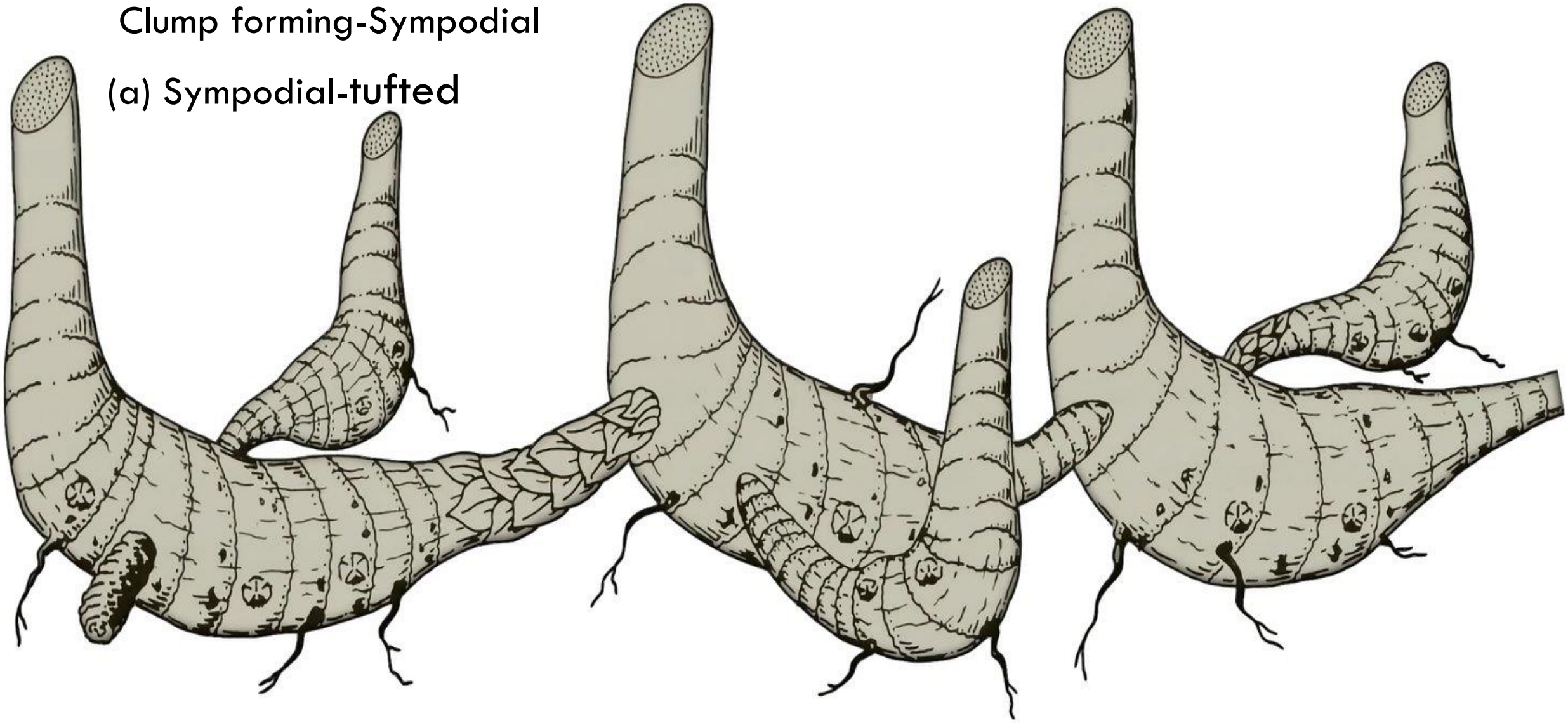


Running Bamboo-
Monopodial Bamboo

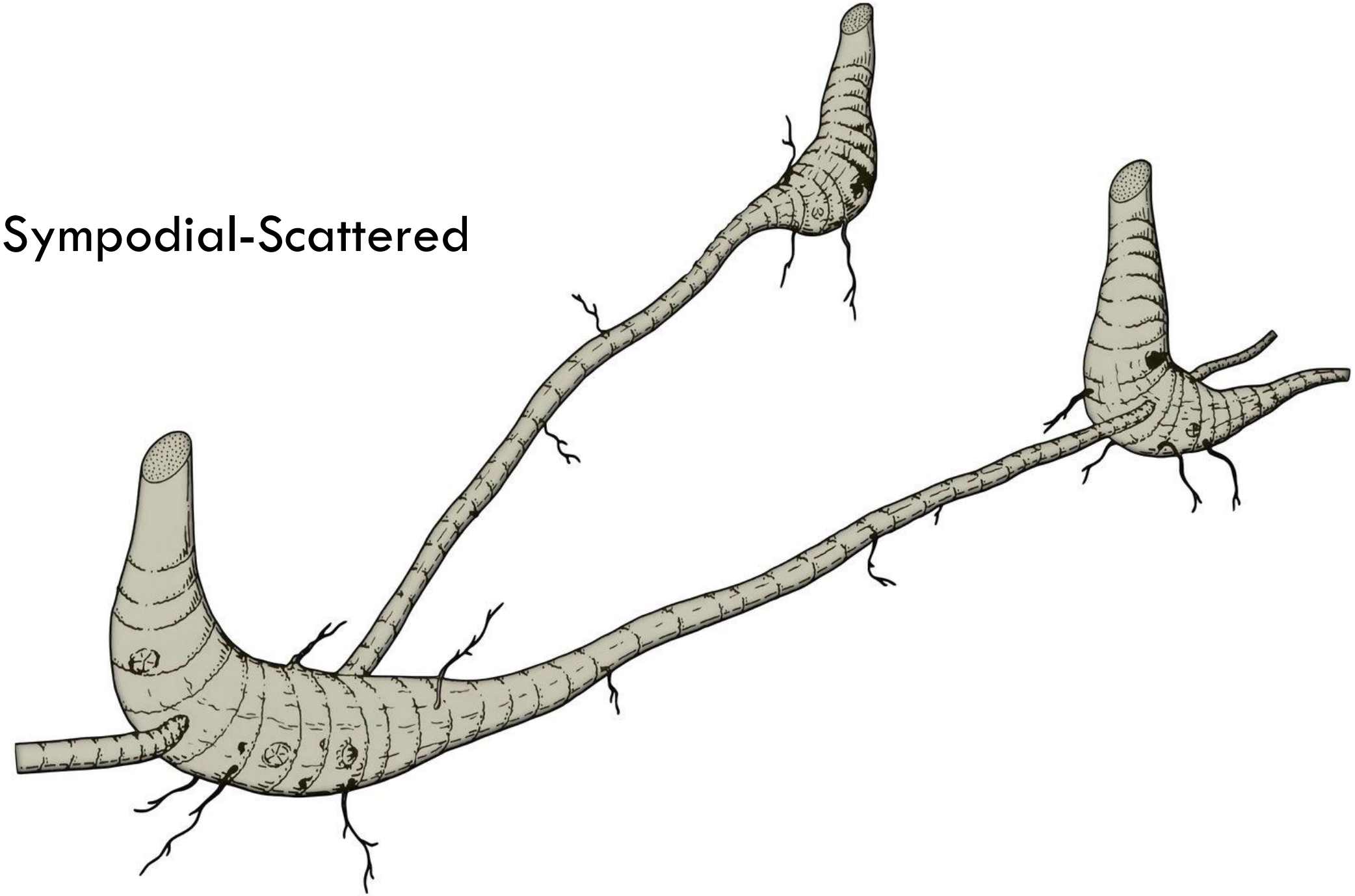


Clump forming-Sympodial

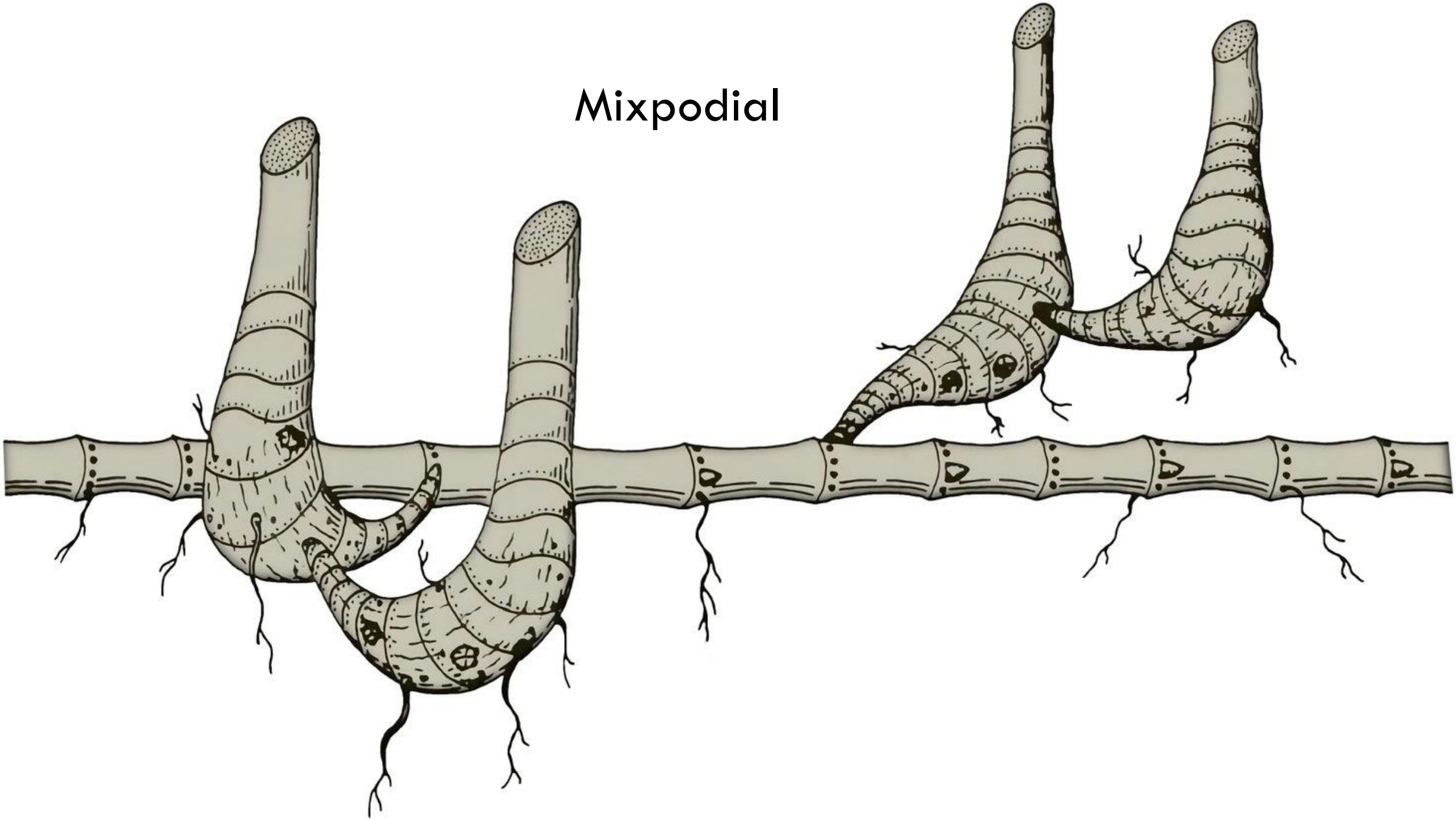
(a) Sympodial-tufted



Sympodial-Scattered



Mixpodial



SOME UNIQUE FEATURES OF BAMBOO

Bamboo is a versatile multipurpose plant, with over 10,000 products and applications ranging from timber substitute, construction materials, food and beverages, bio-energy, pulp and paper, fibre composites, textiles, lifestyle products and traditional sustenance use products.

With recent technological innovations, a wide range of high end industrial products have been produced and traded globally.

Annual bamboo trade was estimated at a value of USD 60 billion in 2017, half of which was conducted in China.

SOME TERMINOLOGY OF BAMBOOS:

Clump: A cluster of bamboo poles that are interconnected or belong to a single bamboo plant.

Culm or stem: An individual bamboo pole; hollow cylinder or main stem above the ground.

Node: Projected or joining portion of two inter-nodes. This is the **growth point of the vegetative axis**. Nodes have a cross or interwoven fibre structure (horizontal and vertical).

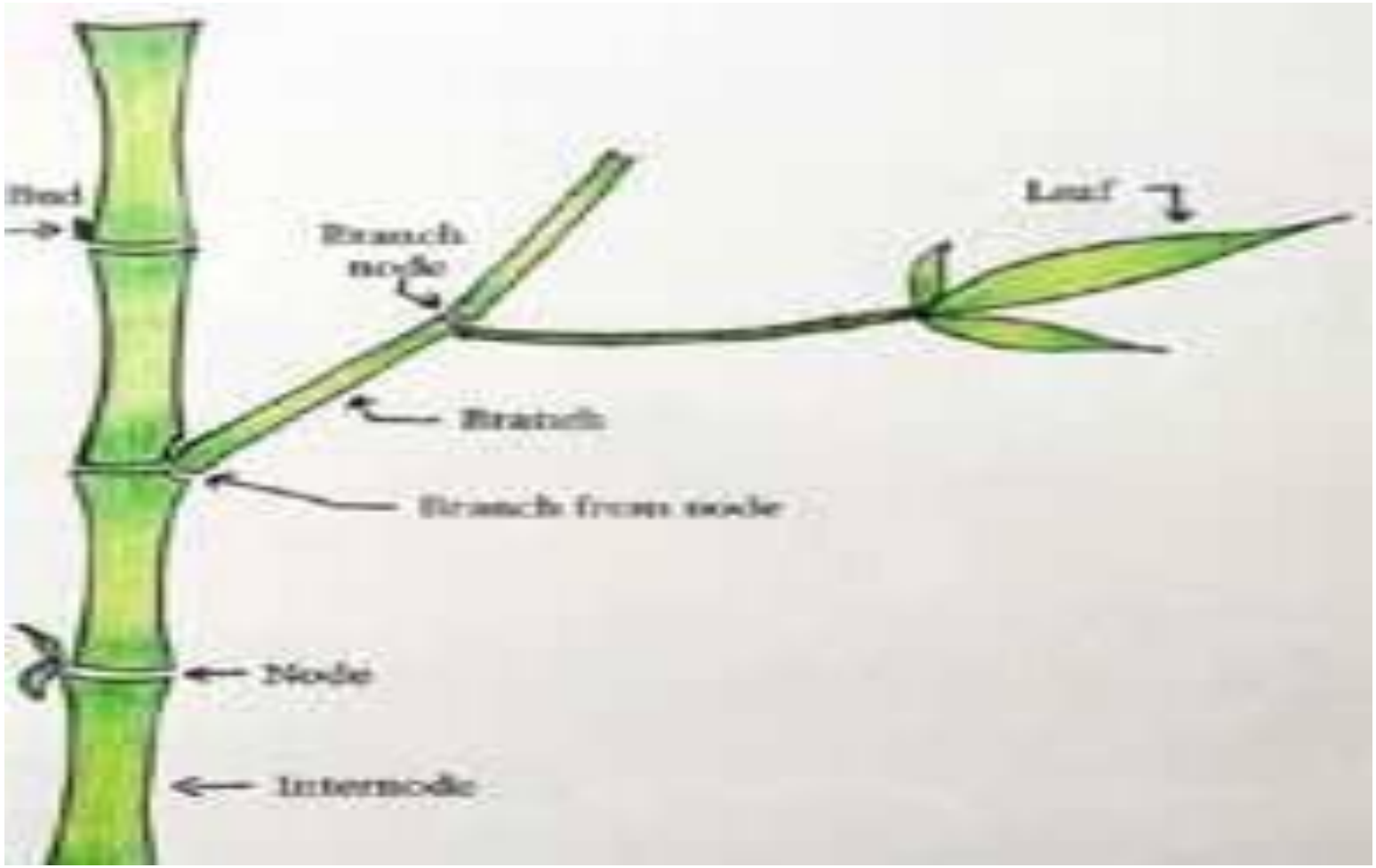
Shoot: New emerging culm.

Bud: Eyelike formation located on a culm node or rhizome node

Rhizome: Underground portion of bamboo.

Sheath: Protective covering of the New Growth

TERMINOLOGY



RHIZOME

A rhizome is a modified underground plant stem that stores nutrients and allows plants to survive unfavorable seasons. It also enables plants to reproduce asexually. The rhizome is a vital organ for bamboo, and it can be thought of as an underground factory that produces n

PACHYMORPH (SYMPODIAL RHIZOME):

1. Solid type, usually short and thick curved and sub-fusiform structures with sympodial branching. Bamboos with this type of rhizome are clump-forming. In sympodial rhizome, internodes are broader than long, solid and lateral buds solitary. Roots originate from the lower portion. Pachymorph can be classified into two categories, short-necked and long-necked based on the length of the rhizome neck. The short-necked pachymorph rhizomes show a caespitose clump habit and in bamboos, with long-necked pachymorph rhizomes the culms grow in a diffuse manner. Commonly, the genera like *Bambusa, Dendrocalamus, Arundinaria, Ochlandra, oxytenanthera* etc., represent pachymorph rhizome.

LEPTOMORPH (MONOPODIAL RHIZOME):

1. Thin with monopodial and its lateral buds give rise to new culms directly, and it is long and slender,
2. diameter is usually less than the culms originating from it. It may be cylindrical, or subcylindrical,
3. the internodes are longer than broad, relatively uniform in length, typically hollow, and rarely solid. Bamboos with this type of rhizome continue their horizontal growth without forming clumps and culms that develop from the lateral buds. Some of the lateral buds give rise to rhizomes also.
4. Phyllostachys aurea (Golden Bamboo) and Pseudosasa japonica (Arrow Bamboo)

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METAMORPH RHIZOME

A metamorph rhizome is a type of rhizome in bamboo that is a transition between a leptomorph and a pachymorph rhizome. It is neither fully leptomorph nor pachymorph.ew shoots each year

BAMBOO CULMS

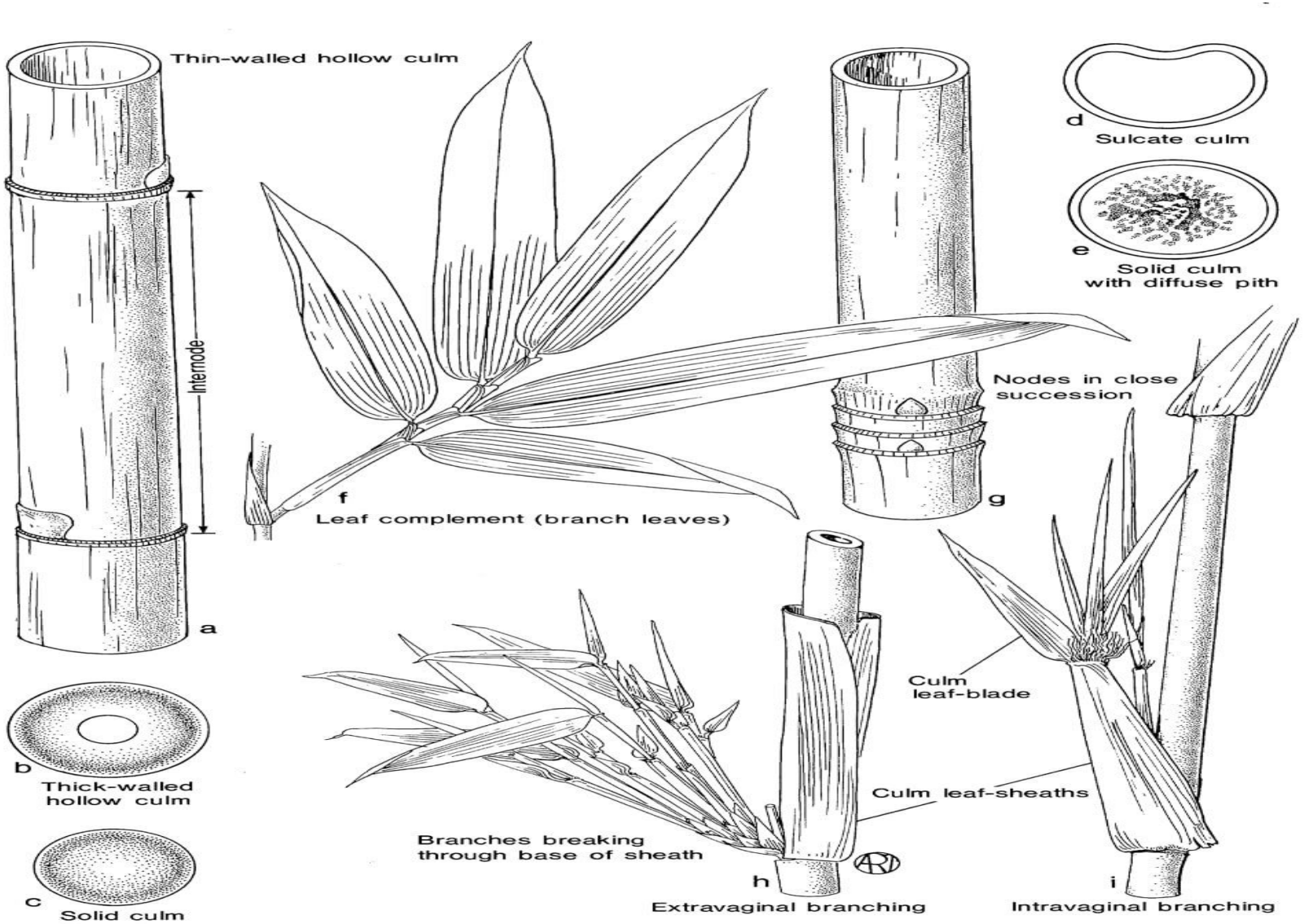


FIGURE 1. Culms, branching and branch leaves.

ARCHITECTURE OF THE NODES

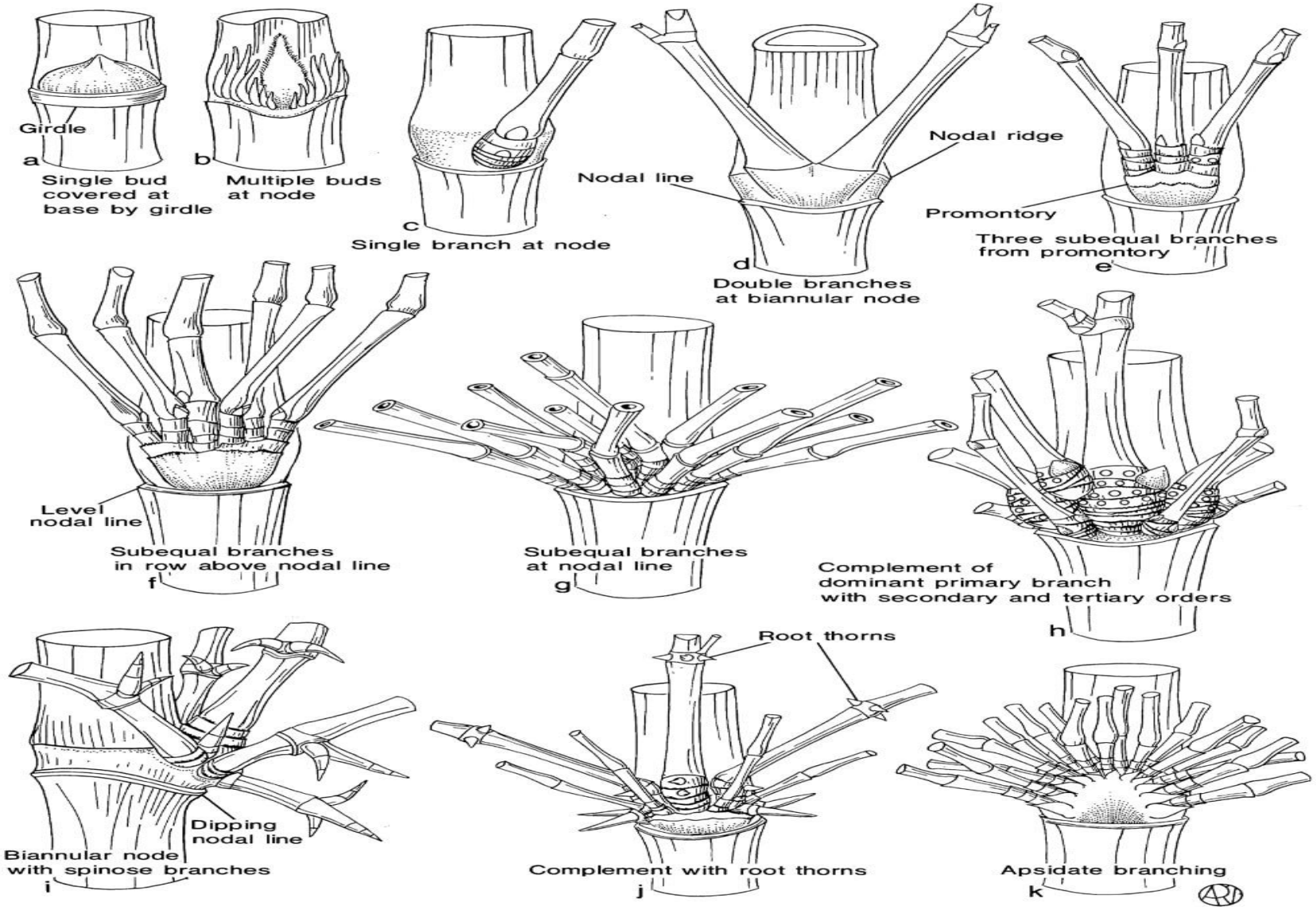
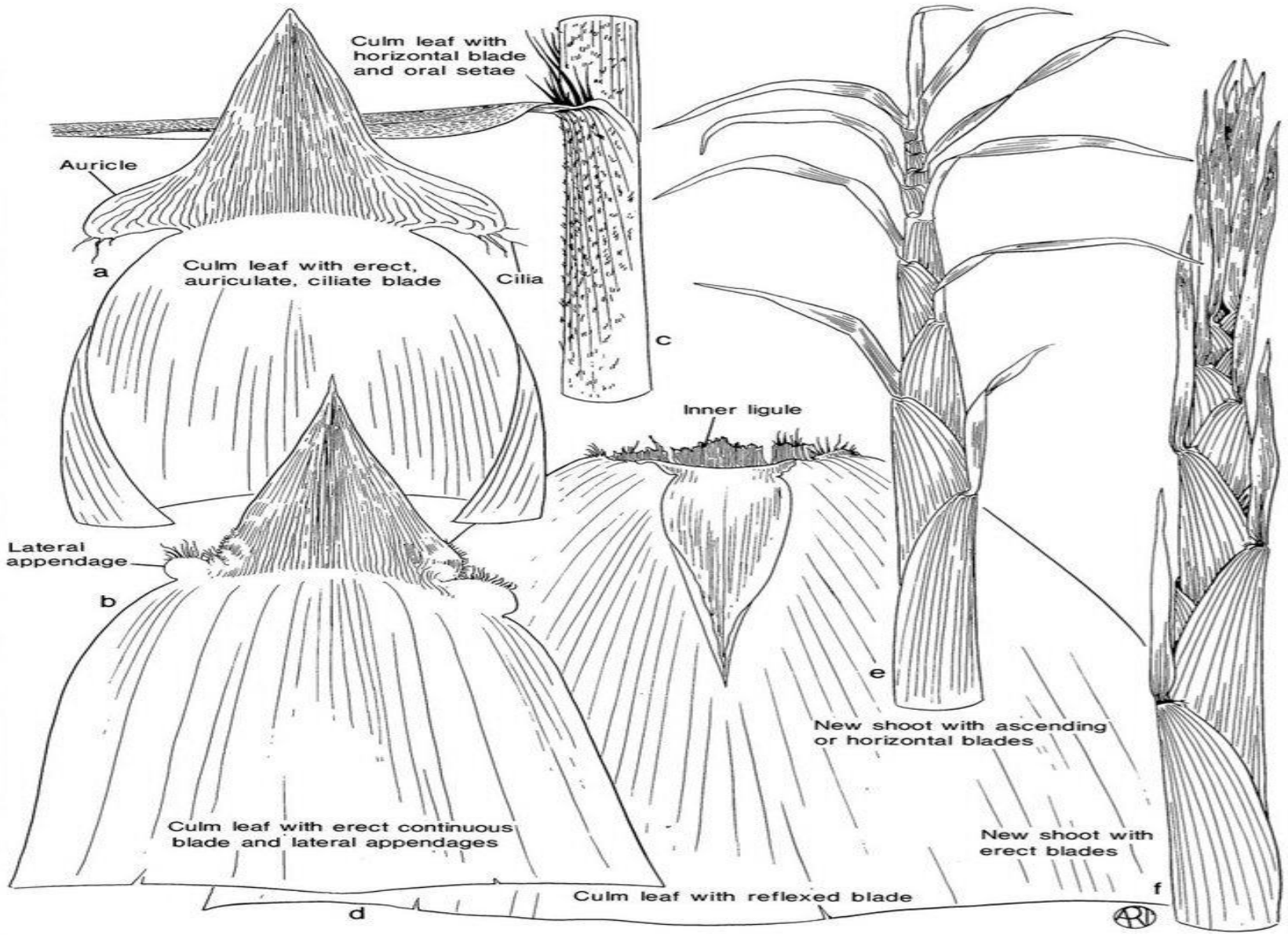


FIGURE 3. Nodes, buds, and branching.

CULM SHEATHS



BAMBOO LEAVES

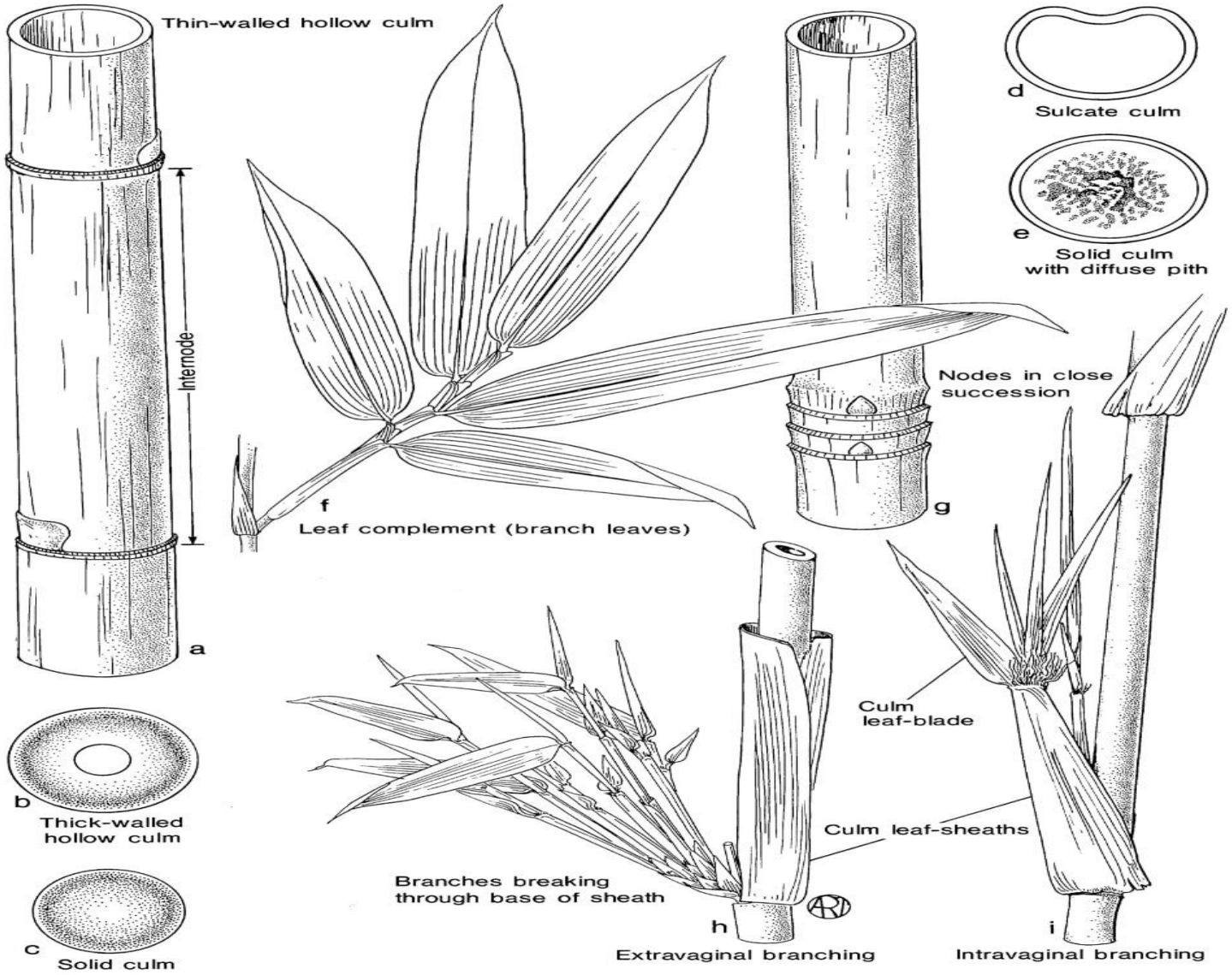
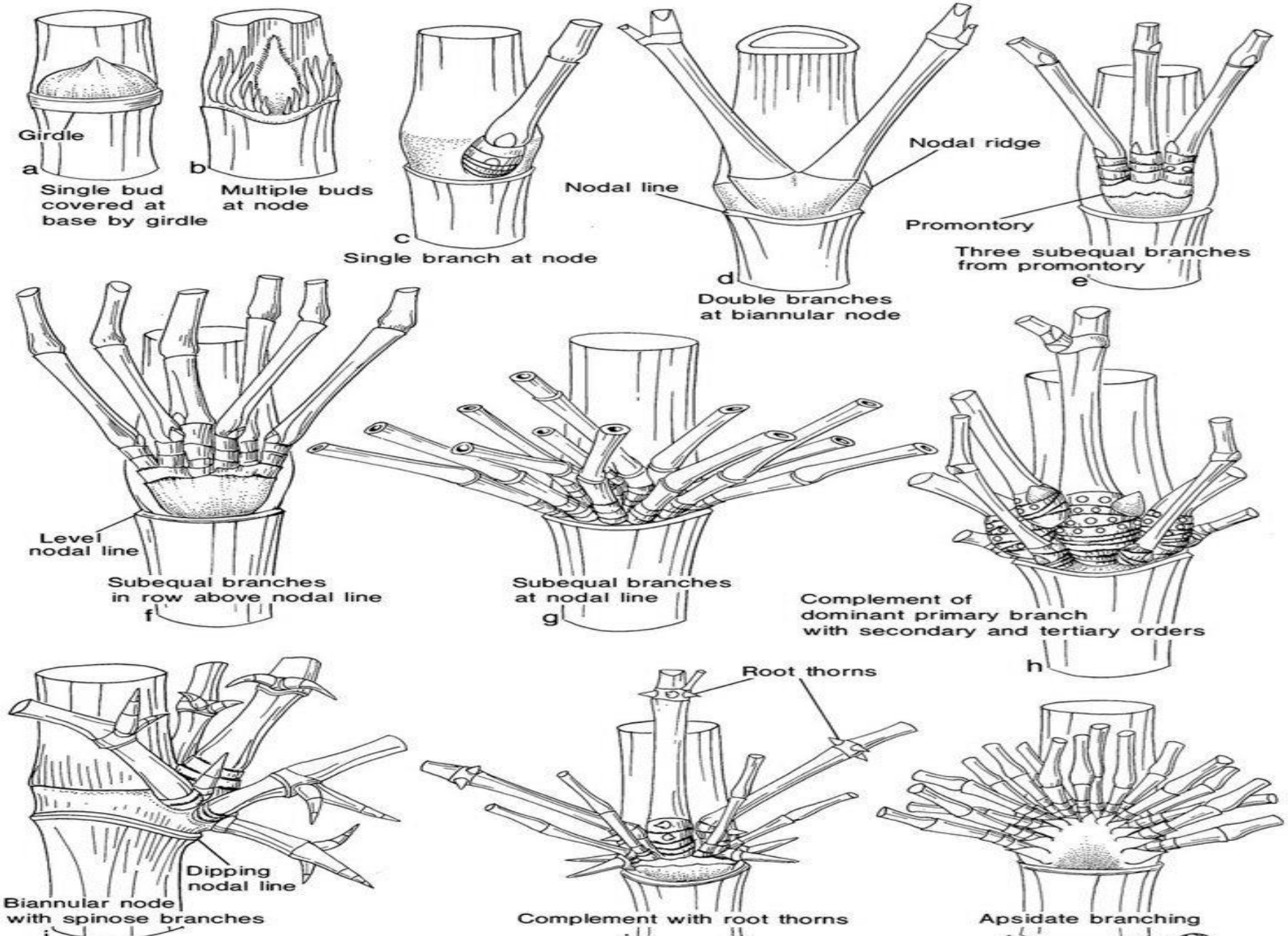


FIGURE 1. Culms, branching and branch leaves.

BAMBOO BRANCHES



BAMBOO LEAVES

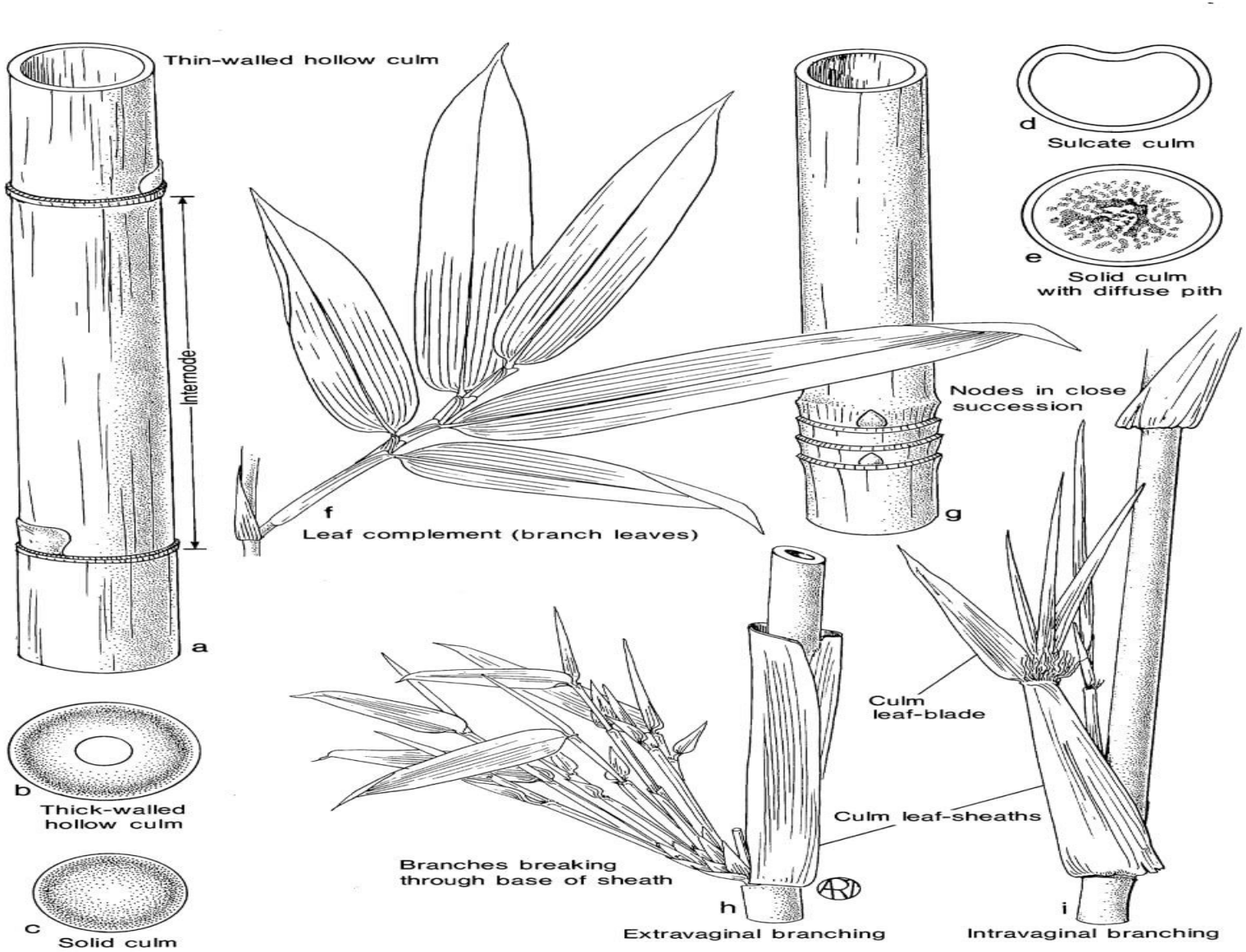
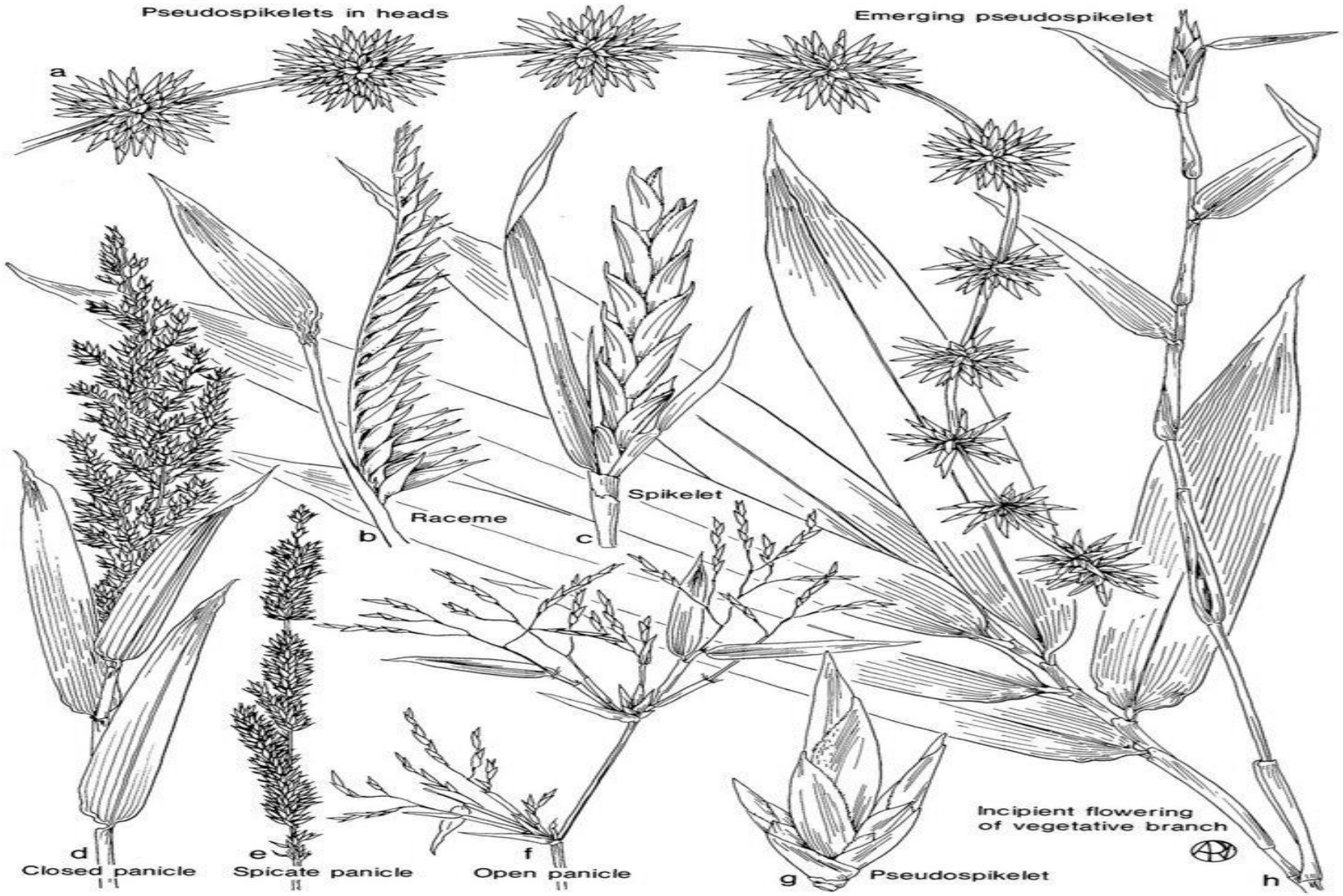
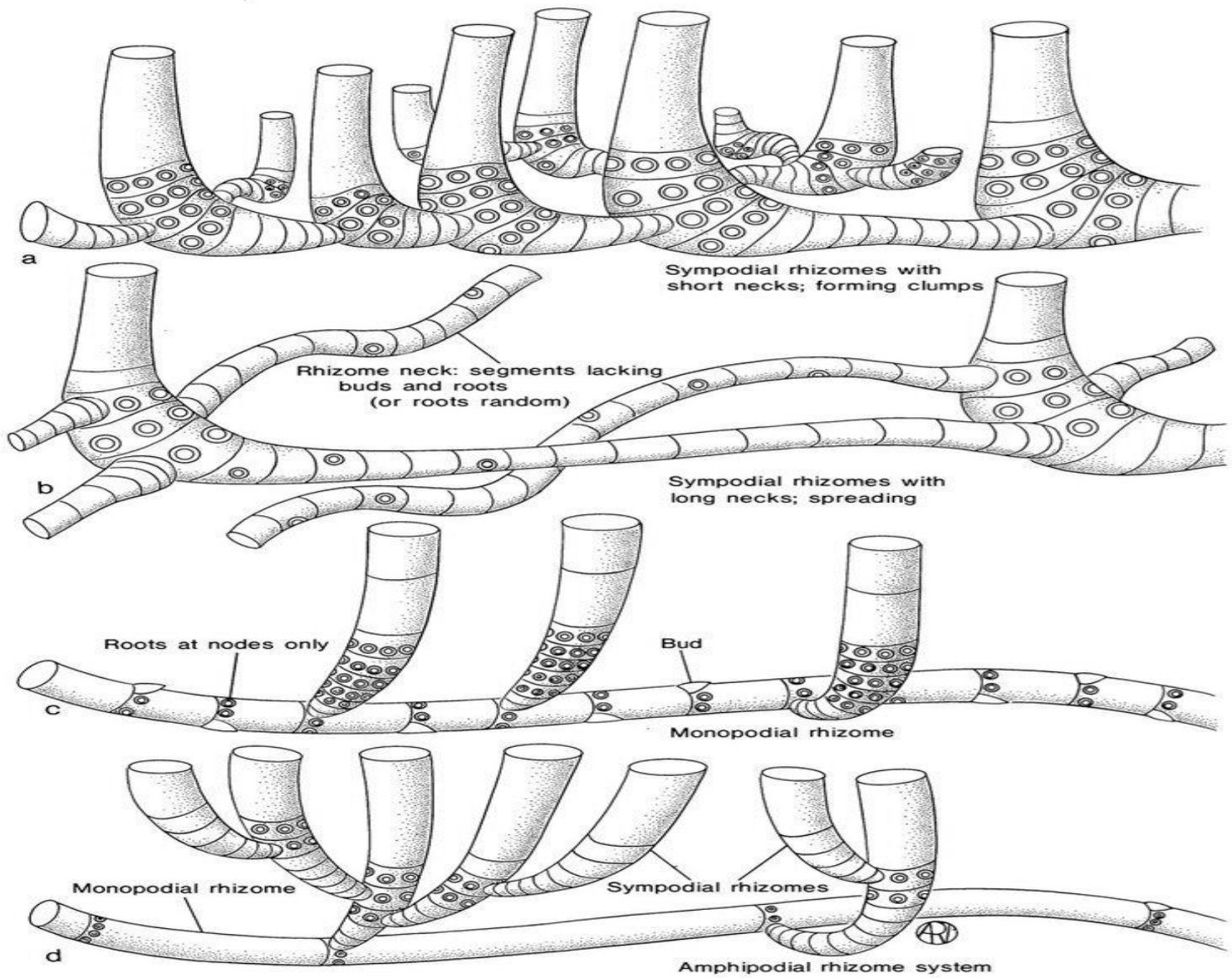


FIGURE 1. Culms, branching and branch leaves.

BAMBOO INFLORESCENCE



BAMBOO RHIZOME



DIVERSITY OF BAMBOOS

The North East region of India has over 50% of the country's bamboo species, and is a center of genetic diversity for several genera. Some of the bamboo species found in the region include:

- **Bambusa balcooa:** Also known as Bhaluka bamboo, this is a commonly cultivated species.
- **Bambusa tulda**: Also known as Jati bamboo, this is a commonly cultivated
- **Dendrocalamus hamiltonii:** Also known as Koko bamboo, this is a commonly cultivated species.
- **Dendrocalamus giganteus:** Also known as Mokalm bamboo, this is a commonly cultivated species.
- **Dendrocalamus strictus**: An important clump forming species.
- **Bambusa arundinacea:** An important clump forming species.
- **Bambusa pallida:** An important clump forming species.
- **Melocanna bambusoides:** An important non-clump forming species

BAMBOO INFLORESCENCE

The inflorescence of a bamboo plant is a collection of flowers that is made up of spikelets and pseudospikelets. The inflorescence can appear in a few different forms, including:

- **Spicate**: The stalk of the spikelet is either absent or very short
- **Racemose**: The spikelets have stalks
- **Paniculate**: The spikelets have stalks and more than one order of branching
- **Capitate**: Similar to paniculate, but the internodes are short, forming dense heads

OTHER CHARACTERISTICS OF BAMBOO INFLORESCENCES

- They can appear on leafy branches or as large panicles that cover the entire culm
- A single branch can have multiple inflorescences
- Young inflorescences are covered by the leaf sheath of the flag leaf
- Bamboo inflorescences are similar to those of rice and maize, but differ in position and organization

Bamboo flowers are tiny and borne on compound inflorescences. After pollination and fertilization, seeds are formed. Bamboo plants exhibit monocarpic flowering behavior, meaning they die after flowering.