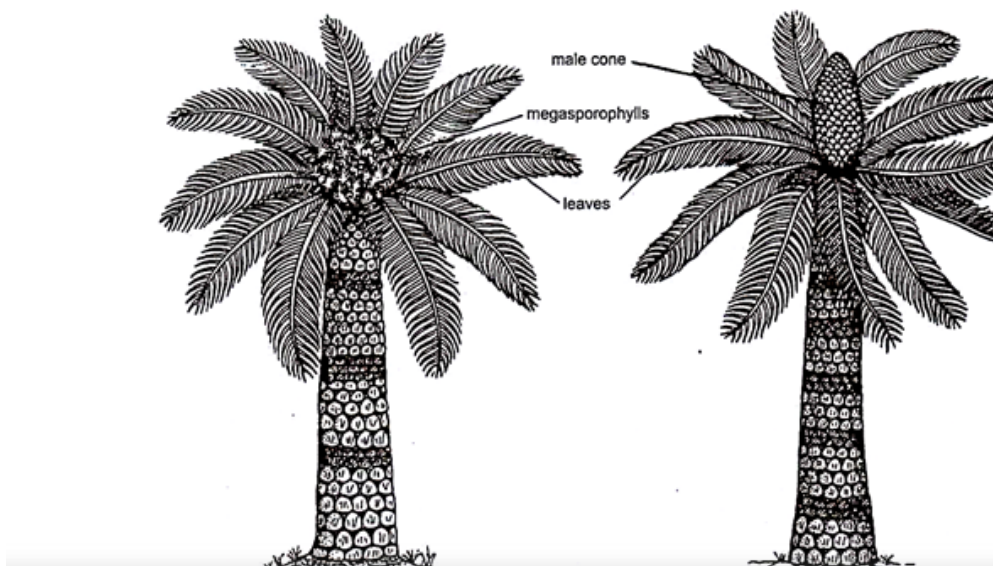


Morphological Features of Cycas:

Cycas is perennial, slow growing evergreen plant and is referred as living fossil because it occurs as a fossil e.g., *C. fusiana*. It looks like a **palm tree**. Its main plant body is sporophytic, diploid, dominant and can be differentiated into three parts – roots, stem and leaves. Tallest species of Cycas is *C. media* with 20 feet height.

Roots are of two types – normal and coralloid roots.

1. Normal roots grow deep into the soil and form tap root system. Later it is replaced by adventitious roots. The function of these roots is to fix the plant in the soil and to absorb water and other minerals.



From the normal roots develop some small lateral apogeotropic branches near the ground surface. These lateral roots get infected with bacteria, fungi as well as algae. The entry of these organisms is said to be responsible for the characteristic, swollen, knob like or coral like appearance and hence, these roots are called as **coralloid roots** or corallorhiza. These roots have minute pores (lenticels like) which are respiratory in function (aeration). Root cap and root hairs are absent in coralloid roots (Fig. 2).



Fig. 2. *Cycas*. Coraloid roots.

Stem----

It is thick, erect, woody, aerial and usually unbranched (caudex). Branching is rare and it is due to injury or development of adventitious buds. Surface of the stem is rough due to the presence of persistent woody leaf bases (Fig. 4). These leaf bases form thick armour around the stem.

In the armour are distinctly visible the alternating bands of large and small rhomboidal leaf bases. Larger ones are of foliage leaves and smaller ones are of scaly leaves and megasporophylls in the female plant. The leaf bases are spirally and compactly arranged with each other (Fig. 4).

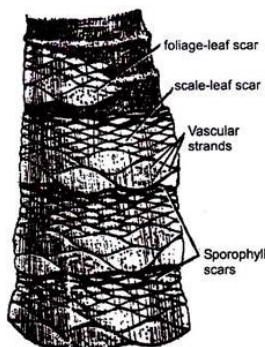


Fig. Alternate Bands showing alternate bands of larger foliage leaf bases and smaller scaly leaves and megasporophyll bases.

3. Leaves:

Leaves are dimorphic i.e., of two types – scale leaves and foliage leaves. Both these types of leaves form a crown at the top of the stem.

(a) Scale leaves:

These are small, dry, brown, triangular structures with a thick covering of brown hairs or rameta. These leaves alternate with green foliage leaves. These leaves protect the shoot apex and reproductive structures (Fig. 3).

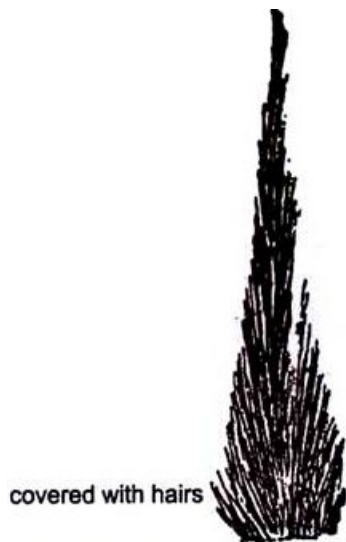


Fig. 3. *Cycas*. A scale leaf

(b) Foliage leaves: These leaves are also produced in a crown at the apex of the stem. According to Coulter and Chamberlain (1910) one crown of foliage leaves is formed yearly while D.D. Pant (1953) observed the formation of two crowns per year in *C. circinalis*. In case of *C. revoluta* the leaves are 30 to 150 cm long but in case of *C. circinalis* they are up to 270 cm long.

A single foliage leaf is pinnately compound. It is unipinnate and paripinnate. Each leaf has 80-100 pairs of leaflets which are arranged on both the sides of adaxial groove of the rachis in opposite or alternate manner. The rachis is spiny below with the sheathing leaf base (Fig. 6A). these spines are modified leaflets. Each leaflet is leathery in texture, sessile elongated, ovate or lanceolate in shape and has entire margin with acute apex. Each pinna or leaflet contains a midrib without lateral veins.

In *C. micholitzii* the leaflet is repeatedly and deeply dichotomised (Fig. 5).

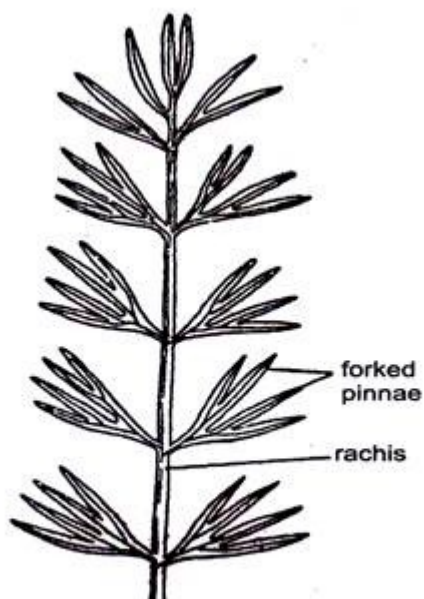


Fig. 5. *C. micholitzii*. A part of leaf showing dichotomised pinnae.

Margins of the pinnae are flat (Fig. 6B) but sometimes they are curved downwards and inwards (revolute) (Fig. 6C) which give the plant a specific name *C. revoluta*. Young leaves have circinately coiled leaflets which are also covered by hairs or ramenta like those of ferns (Fig. 6 D, E).

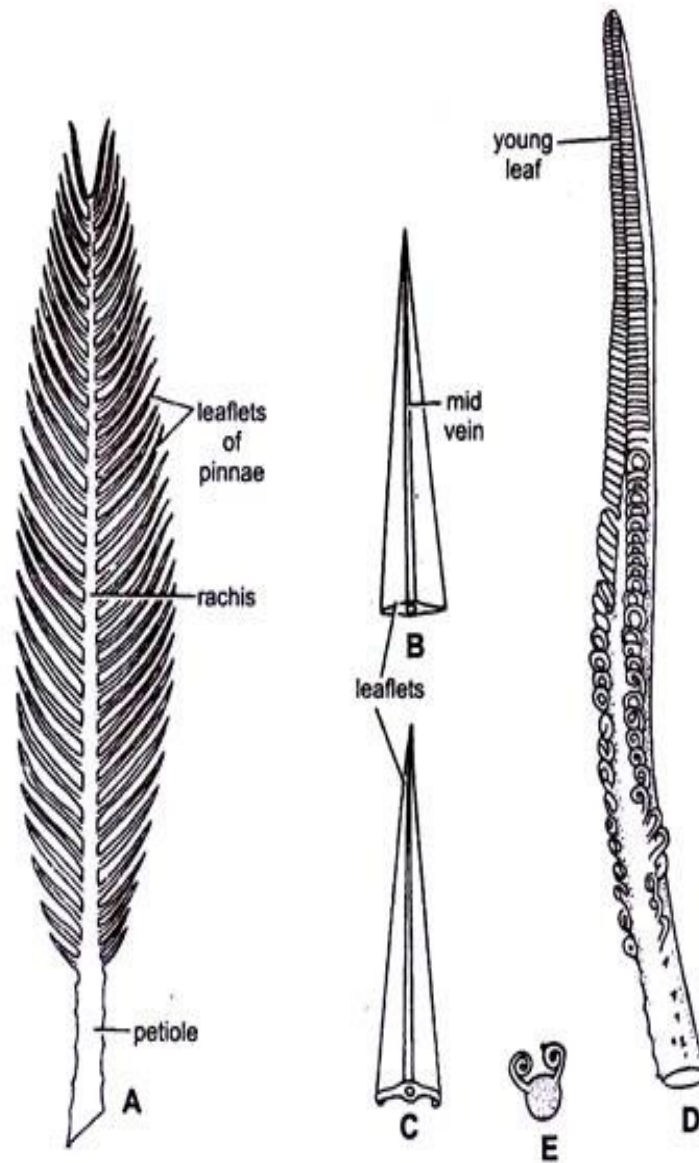


Fig. 6. (A-E) *Cycas*. (A) External features of a normal foliage leaf; (B) Flat leaflet of *C. rumphii*, (C) Revolute leaflet of *C. revoluta*, (D, E) Young foliage leaf showing circinate vernation of leaflets.