

# EUPHORBIACEAE

Spurge Family

Presented by  
Kshitij Saxena

# Introduction

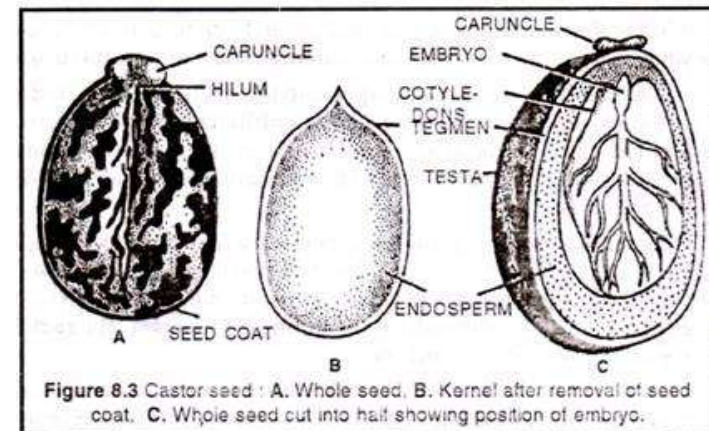
- 5<sup>th</sup> largest flowering plant family
- 7500 species organized into 300 genera
- 442 species in India
- Euphorbia – 2<sup>nd</sup> largest plant genus (2000 species)
  - Found on all continents except Antarctica

# Taxonomic Hierarchy

- Kingdom – Plantae
- Sub-kingdom – Phanerogams
- Class – Dicotyledons
- Division – Monochlamydae (either calyx or corolla)
- Series – Unisexuales
- Order – Malphigiales
- Family - Euphorbiaceae

# Notable Examples

- ❖ *Croton bonplandianum* (Ban Tulsi)
  - ❖ grown abundantly in the rural areas of Malda, West Bengal
  - ❖ Used as fuel and detergent
  - ❖ Stems, branches and ash
- ❖ *Manihot esculentus* (Tapioca/cassava)
  - ❖ 'Fusiform' roots (tuberos, containing starch)
  - ❖ Food security – source of carbohydrates (3<sup>rd</sup> largest)
  - ❖ Resistant to harsh climate
  - ❖ Sabudana, maida
- ❖ *Emblica officinalis* (Amla or Indian Gooseberry)
  - ❖ Tree
  - ❖ Treatment of Scurvy
- ❖ *Ricinus communis* – castor plant
  - ❖ Castor oil from fruit (regma) – laxative
  - ❖ Regma – '3 cooci'
  - ❖ Caruncle – present over the seed (sponge type)
    - ❖ Significance (birds)
  - ❖ 5 stamens – branched filaments





- ❖ *Acalypha indica* – Muripinda
  - ❖ Whorled phyllotaxy
  - ❖ Domestic cats
- ❖ *Euphorbia milii* – crown of thorns
  - ❖ Jesus Christ
  - ❖ Pliable stems
- ❖ *E. tirucalli* – milk bush
  - ❖ phyllode – stem performs photosynthesis, leaves absent
- ❖ *Phyllanthus amarus* – Nela Usiri
  - ❖ Leaves, fruits and roots used in treatment of jaundice
- ❖ *Jatropha curcas* – biodiesel
  - ❖ Fruit contains hydrocarbon
  - ❖ Catcin inflorescence
- ❖ *Mallotus philippensis* – kumkuma chattu
  - ❖ Red colour pigment kumkuma is present on top of fruit
  - ❖ Use in Hindu culture
- ❖ *Hevea brasiliensis* – 98% of rubber
  - ❖ Latiferous resins (latex ducts)
  - ❖ Costly rubber



- ❖ *Cleistanthus collinus* (Vadisaku)
  - ❖ Native of Chile
  - ❖ Poisonous fruit
  - ❖ Death row prisoners
- ❖ *Codiaeum variegatum*
  - ❖ Croton
  - ❖ Ornamental plant
- ❖ *Jatropha gossyfolia* – Seema nepalam
  - ❖ Treatment of leprosy
  - ❖ Antidote for snakebite
- ❖ *Tragia involucrata* – forget me not
  - ❖ Indian stinging nettle
  - ❖ Toxins on hairs present on leaf – skin irritant
  - ❖ Climber
- ❖ *Manihot glazovit* – cheap rubber
- ❖ *Givotia moluccana* – Tella puniki
  - ❖ Blood red latex
  - ❖ Very light weight soft wood
  - ❖ Used in making idols



# Habitat

- ❖ Most are mesophytes
- ❖ Some are xerophytes (Euphorbia)

# Habit

- ❖ Herbs – *E. sikkimensis*
- ❖ Shrubs
- ❖ Some trees – Amla

All secrete latex





# Vegetative Characters

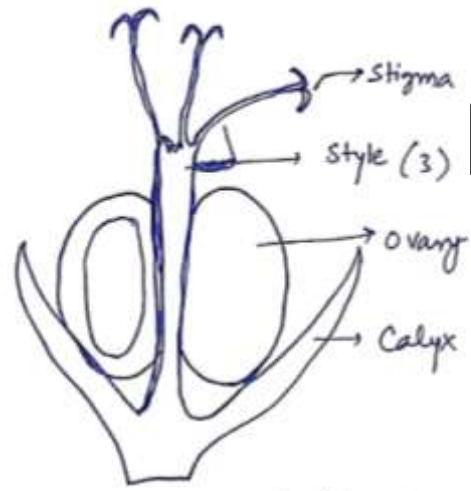
- Root
  - Tap root (since Dicots)
  - Cassava has 'fusiform roots'
- Stem
  - Aerial stems
  - In resinous Castor – stem is fistular
    - Hollow internodes
    - Xylem
- Leaf
  - Simple
  - Reticulate venation
  - Opposite, Alternate or whorled phyllotaxy (murrpinda)
  - Castor – alternate, whorled or paired beneath the inflorescence



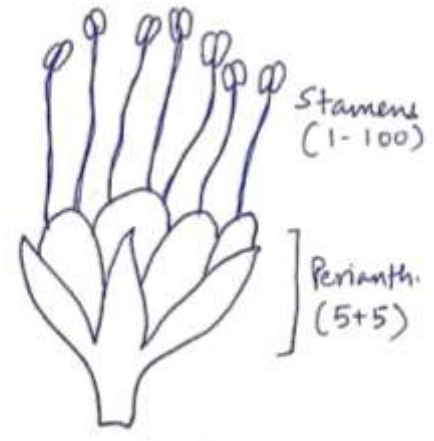
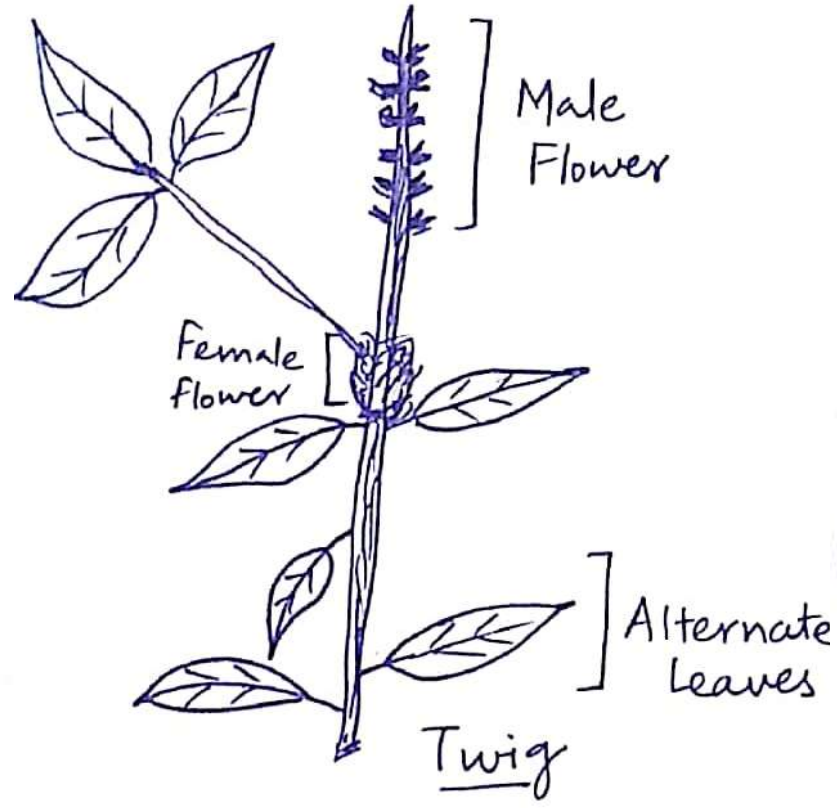
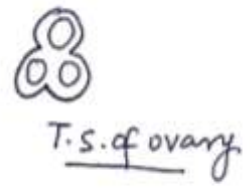
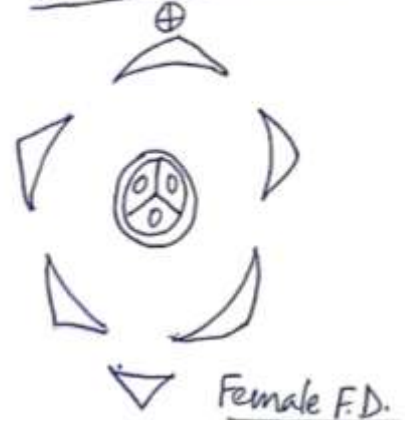
# Inflorescence

- Panicle – Castor, Croton
- Solitary – Phyllanthus (axillary at backside of leaflets)
  - ‘Inflorescence with solitary flower’
- Catkin – Jatropha
- Cyathium – Euphorbia
  - Looks like a single flower
  - Perianth is absent

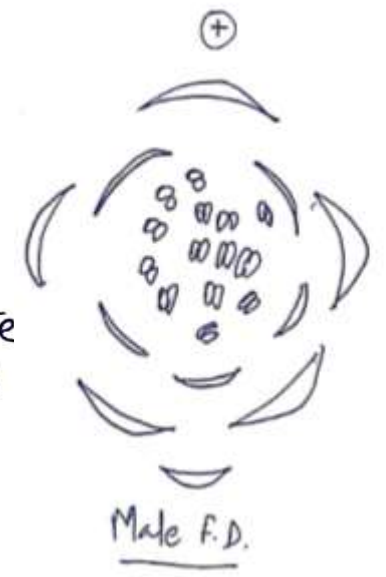
# Panicle Inflorescence



L.S. of female flower



L.S. of male flower



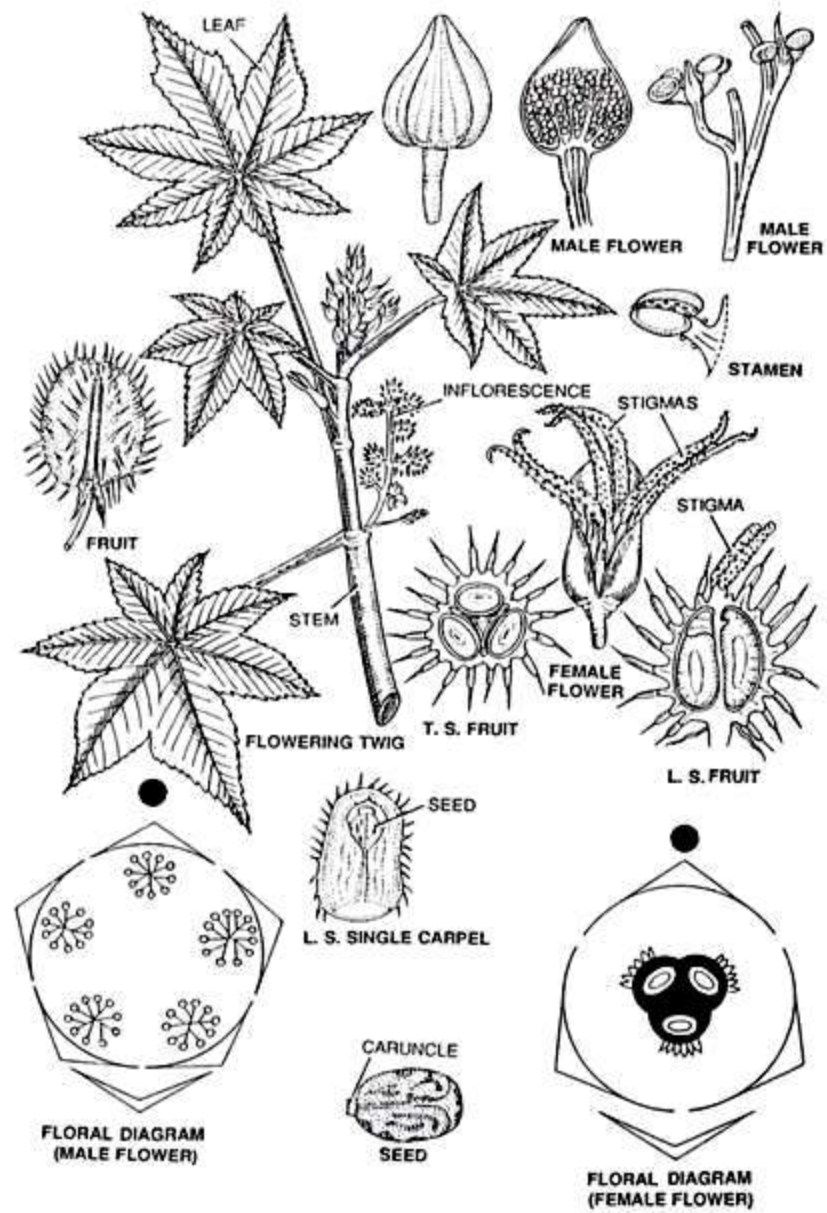
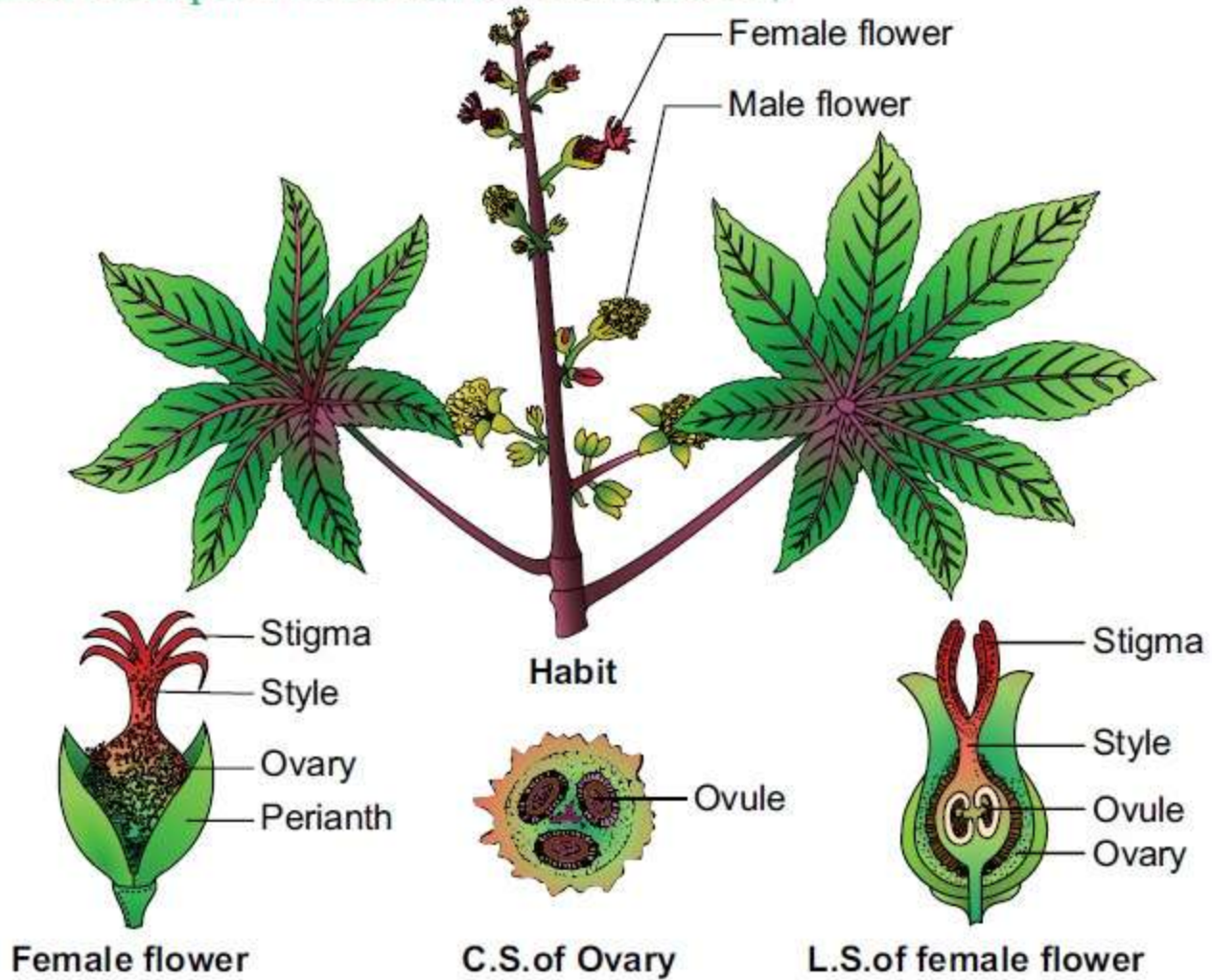


Fig. 17.2. Euphorbiaceae—*Ricinus communis* Linn., Eng., Castor oil plant; Verna. Arand.

## Botanical Description Of *Ricinus communis* (Castor)



# Flower

Male

Br  $\sigma^{\rightarrow} \oplus$  P<sub>5+5</sub> A<sub>1-100</sub> G<sub>0</sub>

- Bracteate
- Actinomorphic
- Unisexual
- Perianth – 5 (Pentamerous)
- Hypogynous (superior Ovary)

Female

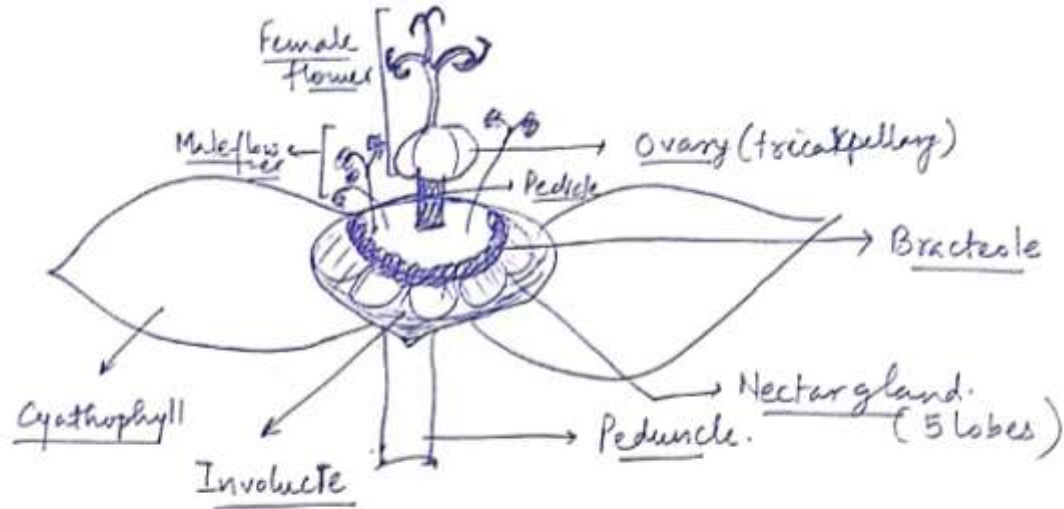
Br  $\text{♀} \oplus$  P<sub>5</sub> A<sub>0</sub> G<sub>1(3)</sub>

⇒ Tricarpellary  
Syncarpus  
Tri locular  
Axile placentation  
Superior Ovary

Croton  
Inflorescence



# Cyathium



Neither ♀ nor ♂ have any Perianth  
Involucre - many bracts are united, forming a cup shaped structure  
- has 5 lobes.

Nectar gland - each lobe of involucre has a nectar gland



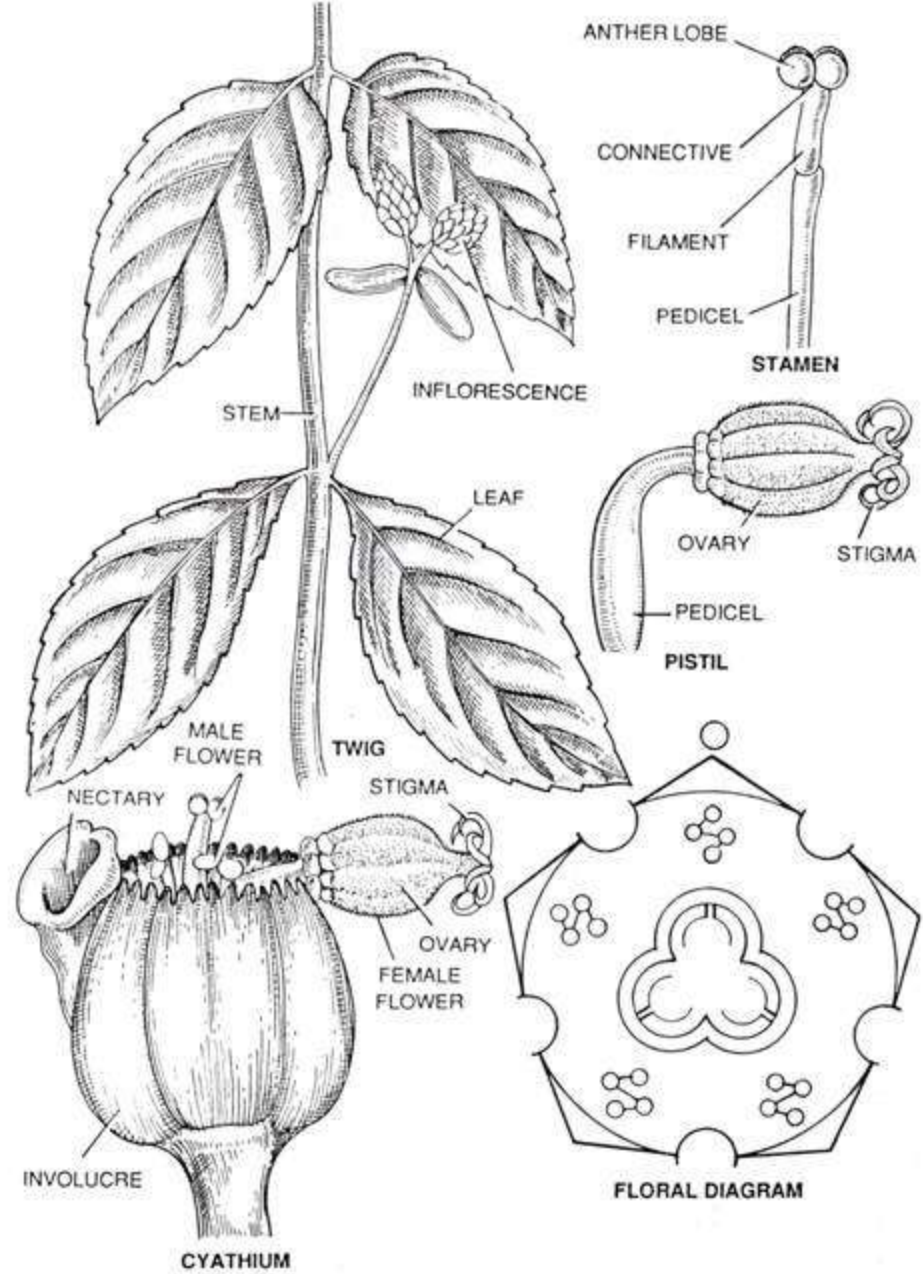
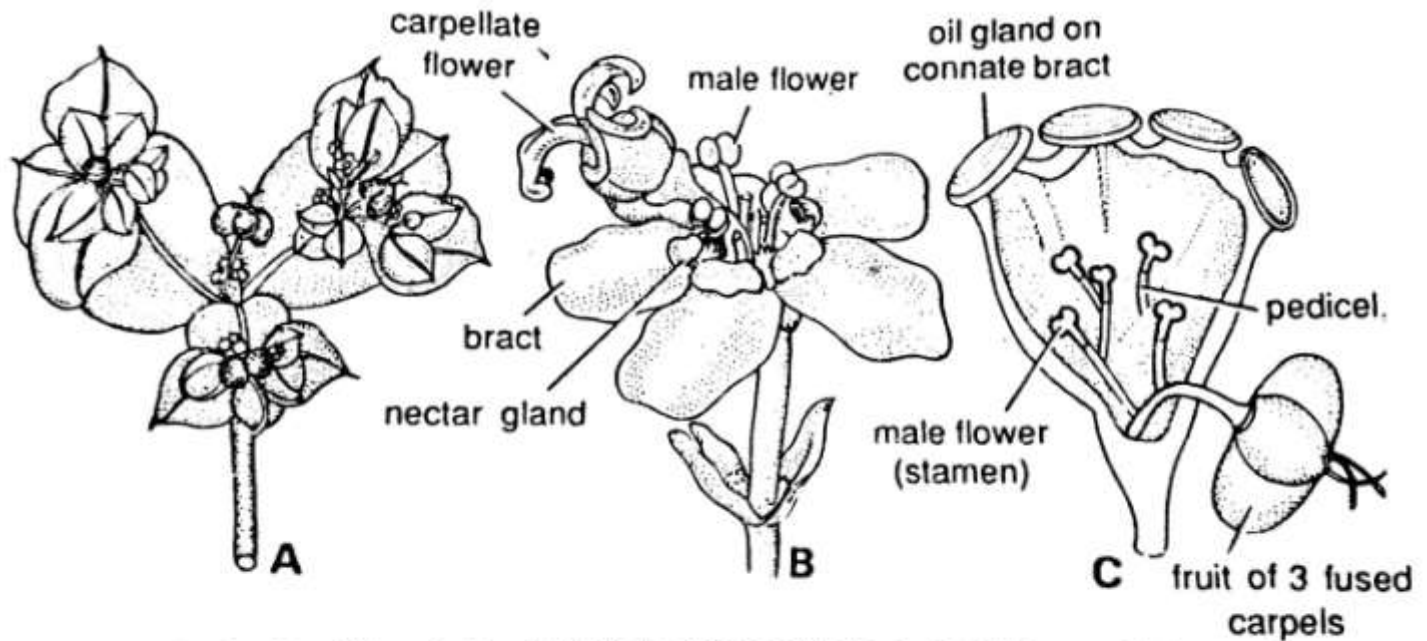
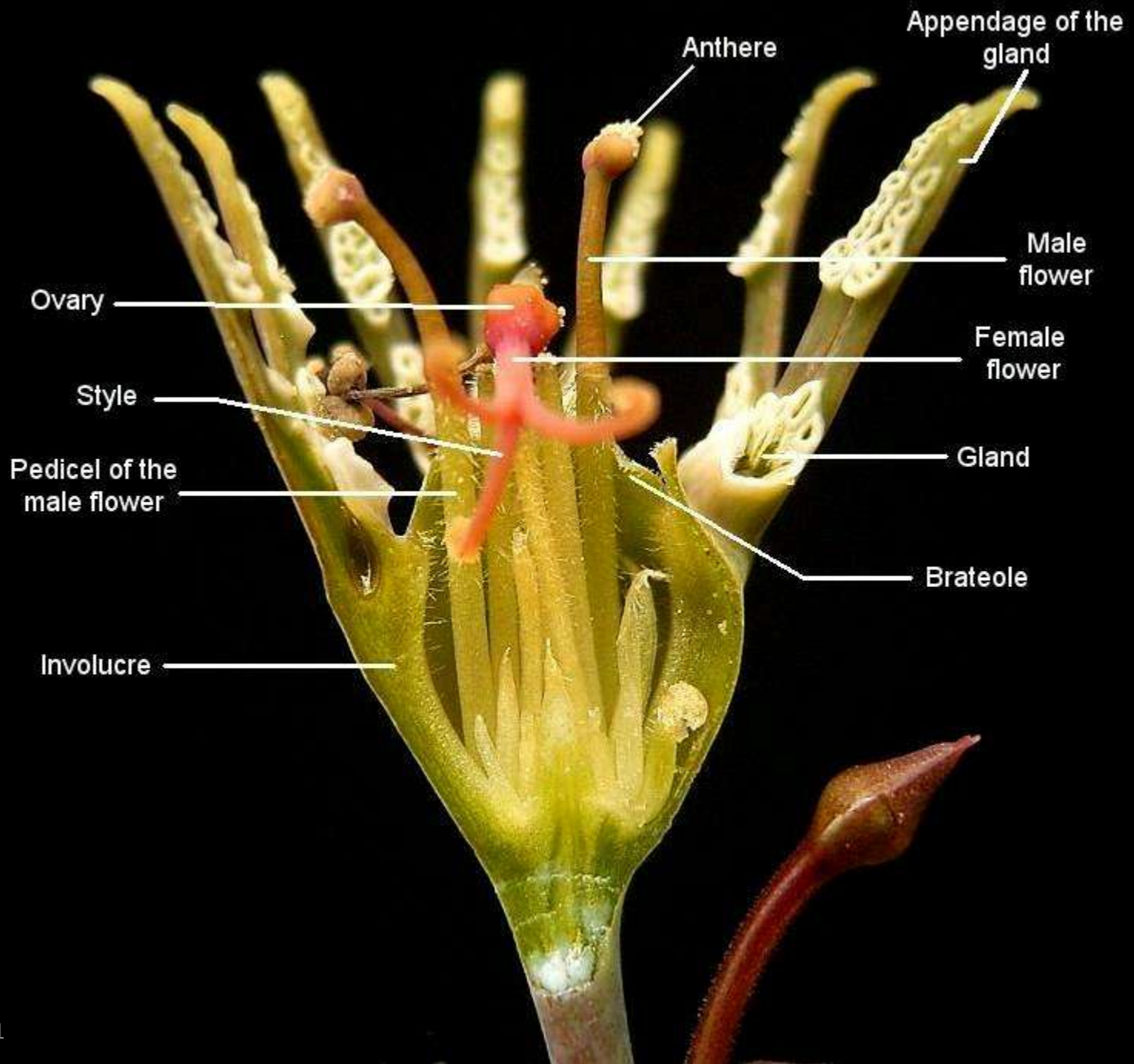


Fig.17.1. Euphorbiaceae. *Euphorbia* spp., plant with latex and cyathium inflorescence



**Fig. 18.95** A: Cyathia of *Euphorbia helioscopia*; B: A cyathium of *E. corollata*, and C: L.S. cyathium of *E. helioscopia*.





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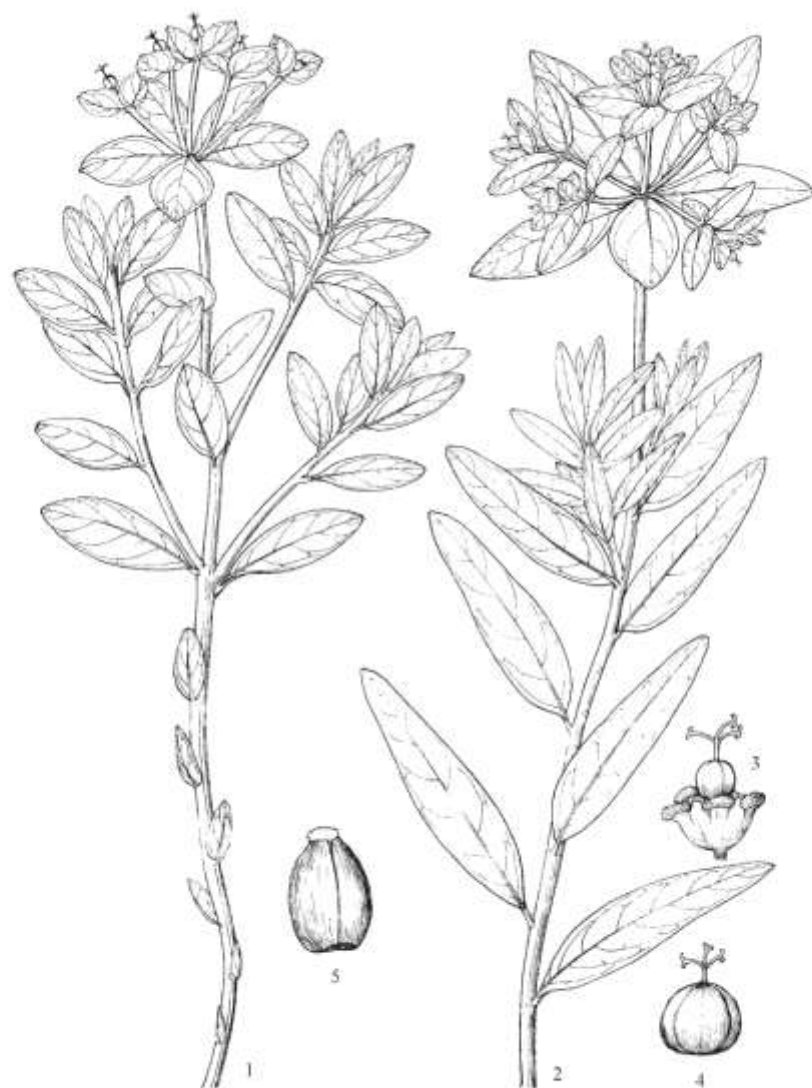


Figure 356. 1-5. *Euphorbia sikkimensis* Boissier, 黄苞大戟 *huang bao da ji*. —1, 2. Plants. —3. Inflorescence. —4. Capsule. —5. Seed. (FOC 303, FRPS 44(3): 76, pl. 21. 1997. —何冬泉 & 刘全備 *He Dongquan & Liu Quanru*).



HERB. K. W. B  
A 1 2 3 4 5 6 M 8 9 10 11 12 13 14 15 16 B 17 18 19

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ROYAL BOTANIC GARDENS KEW  
K00024603

KEW NEGATIVE  
No. 18289  
AUG 1978

Black  
Cyan  
Green  
Yellow  
Red  
Magenta  
White  
Grey

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*Handwritten notes on a small label at bottom right*

ROYAL BOTANIC GARDENS KEW

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copyright reserved  
ROYAL BOTANIC GARDENS KEW

# Euphorbia sikkimensis

- Herbs, 20-80 cm tall.
- Meadow steppes to alpine meadows, sparse forests, scrub; 600-4500 m.
- The root is used medicinally.

56 species of Euphorbiaceae family are documented as having medicinal value under Siddha, Unani, Ayurveda, and folk systems of medicine

- ENVIS, Sikkim





*Euphorbia pulcherrima* (Poinsettia), Jemi, South Sikkim  
07 .01.16

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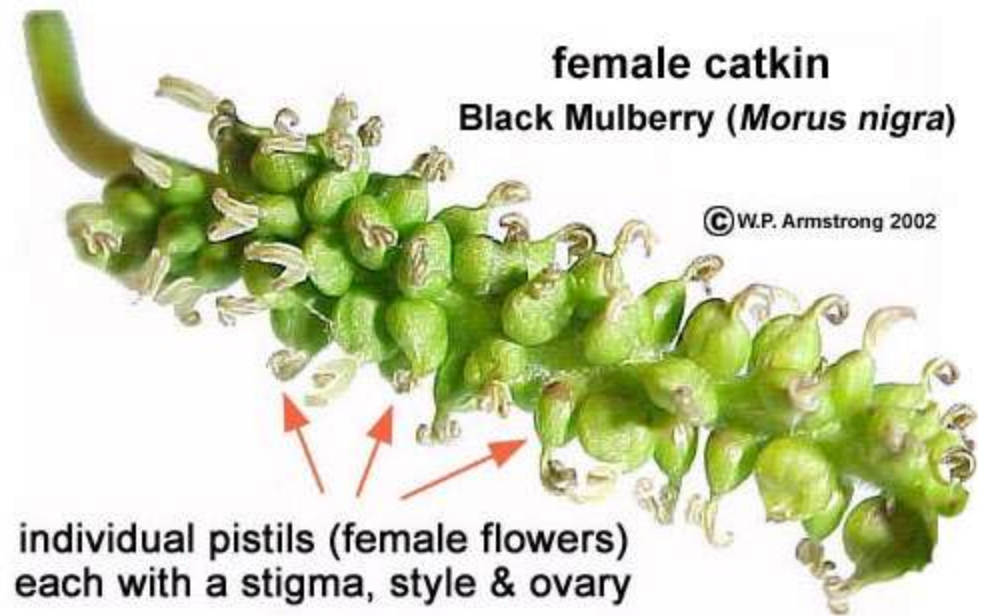
@ Shital Pradhan

# E. pulcherrima

- The colored bracts—which are most often flaming red but can be orange, pale green, cream, pink, white, or marbled—are often mistaken for flower petals because of their groupings and colors, but are actually leaves



# Catkin Inflorescence



# Fruit

- Schizocarpic
  - Any dry fruit composed of multiple carpels that separate
  - Any fruit that separates into indehiscent one-seeded segments
- Ricinus – Regma (3 mericarps, each called cocci)

## Regma

From trilobular ovary,  
3-chambered with  
seeds in axile  
placentation.  
Each chamber with  
single seed separates,  
Remains attached to  
the central  
carpophore.  
**Ex. Castor**



Cremocarp (Coriander)



Carcerulus (*Abutilon*)



Lomentum (*Mimosa*)

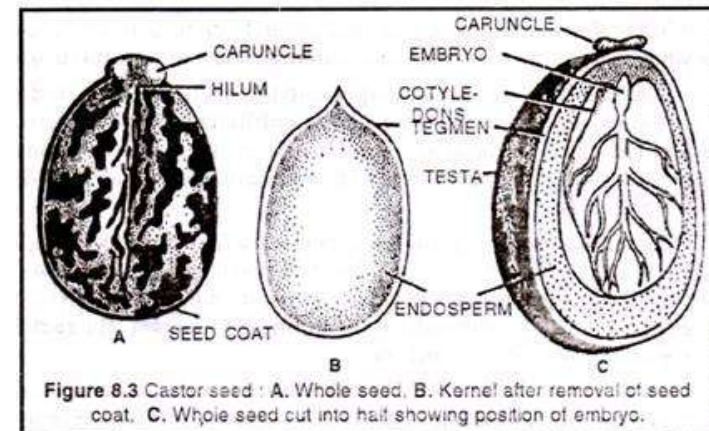
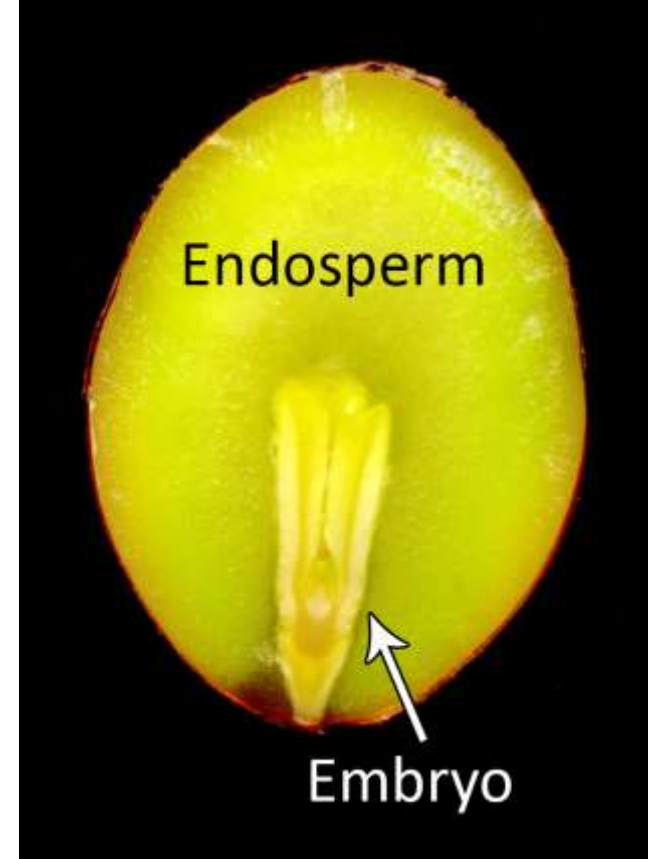


Regma (*Castor*)

Figure 4.43: Schizocarpic Fruit

# Seed

- Endospermic
  - Endosperm is a tissue produced inside the seeds of most of the flowering plants following fertilization.
  - It surrounds the embryo and provides nutrition in the form of starch, though it can also contain oils and protein.
  - Role of Ants
- Caruncle
  - Absorbs water
  - Role in pollination



# Identification Hints

- Plants with milky sap/juice/latex
- Sepals and Petals either similar or absent altogether
- Ovary is superior and tricarpeled

# Pollination

- Varied, Unspecialized
- *Acalypha hispida* (cat's tail) – wind, insects
- *Dalechampia* spp. – oil is produced to attract insects
- Benefits of cross pollination
  - Diversity



# Economic Importance

- Medicinal value
- Castor (*Ricinus communis*)
- Jatropha – Barbados Nut
- Casava (Tapioca) – *Manihot esculenta*
  - Can be grown in very hard conditions
  - Farmers prefer bitter varieties
- Rubber – *Hevea brasiliensis*

Some plants are toxic e.g. *Cleistanthus collinus*

# Extra Information

- Mostly shrubs and trees (*Bischopia emblica*, *Acalypha*)
- Few are herbs (*Acalypha*, *Euphorbia*, *Phyllanthus urinaria*, *P. amara* etc.), herbs are annual or perennial, erect or prostrate
- Spiny succulents (*E. horrida*) – often mistaken for cactii
- Laticiferous (*Euphorbioideae*), or non-laticiferous, without coloured juice (e.g. *Phyllanthoideae*), or with coloured juice (rarely)
  - Laticifers
  - Defensive function against grazers
- Some are climbers (*Tragia*)
- Family exudes acrid juice or latex (exceptions – *Phyllanthus*, *Emblica*, *Sarcococcoa* etc.)
- ‘Normal’ plants, or switch-plants; often with the principal photosynthesizing function transferred to stems, or phyllodineous, or ‘cactoid’, with succulent, photosynthetic stems (often).
- Stems are fleshy or spiny and occasionally modified into cladodes or phylloclades (*E. royleana*)
- Leaves – opposite, alternate or whorled
  - Most leaves have stipules at the base of leaves
  - Stipules can be spines or glands
- Roots – commonly thick, brittle and fleshy
- Flowers – simple and not showy
  - Generally unisexual
  - Flowers can occur among colourful, modified leaves which are called ‘false flowers’

- Leaves well developed, or much reduced.
- Plants succulent, or non-succulent; green and photosynthesizing. Self supporting, or climbing.
- Mesophytic, or xerophytic.
- Leaves minute to large; alternate (usually), or opposite to whorled (rarely); spiral, or distichous; 'herbaceous', or leathery, or fleshy, or membranous, or modified into spines; petiolate to sessile; non-sheathing; gland-dotted, or not gland-dotted; simple (usually), or compound; not peltate; when compound, palmate.
- Lamina entire; pinnately veined, or palmately veined.
- Leaves stipulate (nearly always, but the stipules sometimes reduced to branched hairlike structures, or to glands).
- Stipules scaly, or leafy, or spiny, or represented by glands; caducous, or persistent. Leaf development not 'graminaceous'. Domatia occurring in the family (known from 7 genera); manifested as pits, or pockets, or hair tufts (rarely).

# Acknowledgement

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Thank you