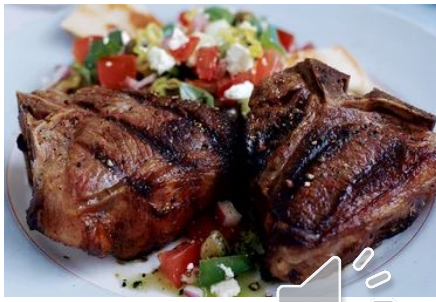
Mustard seeds and Nutmeg kernel



Mustard seed

Black mustard

- الخردل الاسود
- Origin: dried ripe seeds of ***Brassica nigra***

Family: cruciferae (Brassicaceae)

White mustard

- الخردل الابيض
- Origin: dried ripe seeds of ***Brassica alba***

Family : cruciferae (Brassicaceae)

Mustard seed

Black mustard	White mustard	
Spherical or nearly spherical		Shape
larger	Smaller	Size
yellow	Reddish brown	Color
No pungent odor even when crushed	- Dry : odorless - Crushed with H_2O : Pungent ???	Odor
Pungent	Bitter , rapidly becomes pungent	Taste
Minutely pitted	- Minutely pitted - Network reticulation	Surface

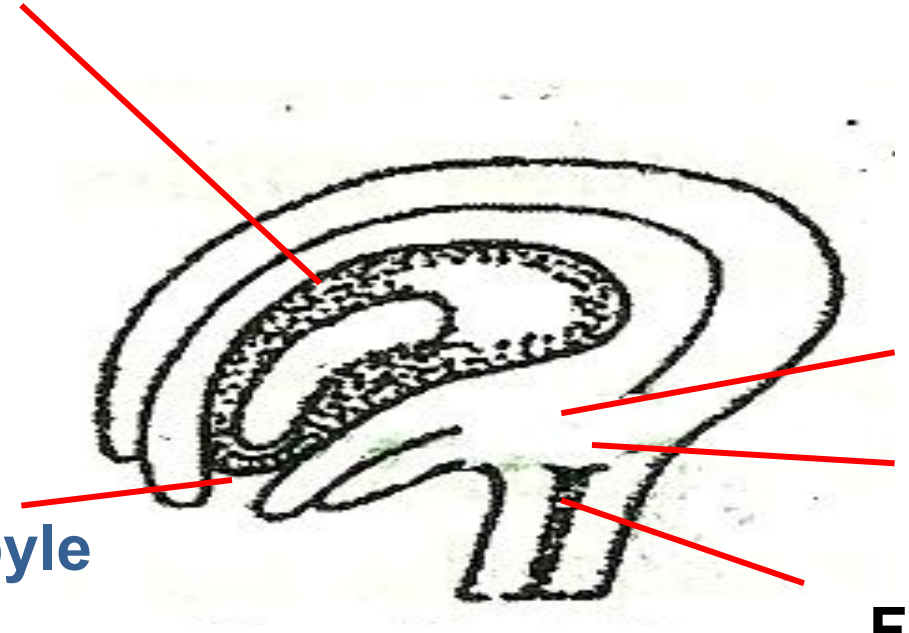
Sinigrin —(Myrsoin enzyme, water)→ Allyl isothiocyanate (volatile) + glucose + potassium acid sulphate

Sinalbin —(Myrsoin enzyme, water)→ Acrinyl isothiocyanate (non volatile) +glucose

Mustard seed

Q ? Hilum is adjacent to Micropyle and No raphe, Ovule ????

Campylotropous: ovule bent upon itself, funicle, chalaza & micropyle close to one another, no raphe & nucellus curved.

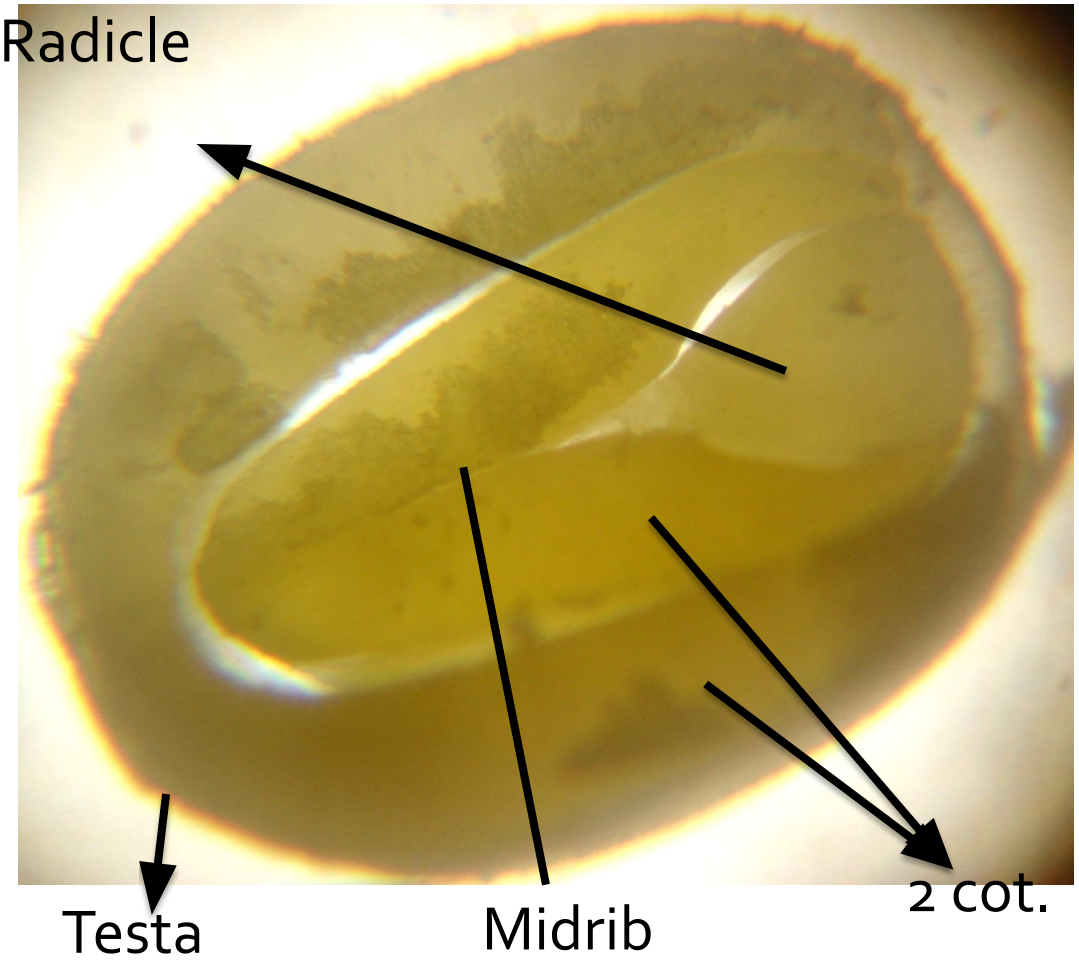


T-Cut in Black mustard

Q : Embryo ???

Orthoplocus:

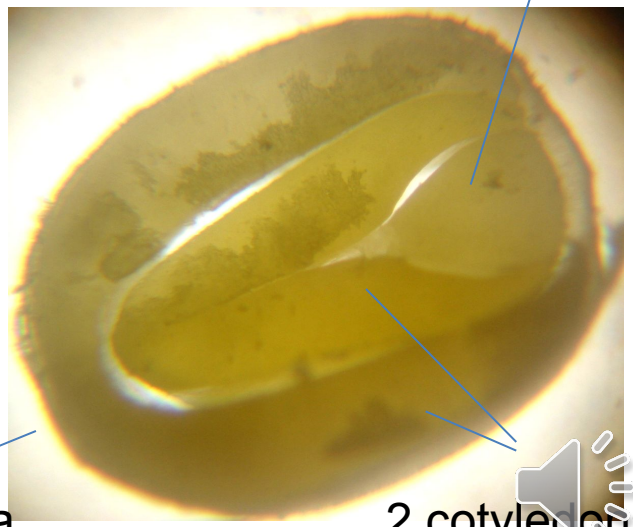
Two cotyledons are folded along their midrib and radicle is bent, facing one cotyledon.



Mustard seed

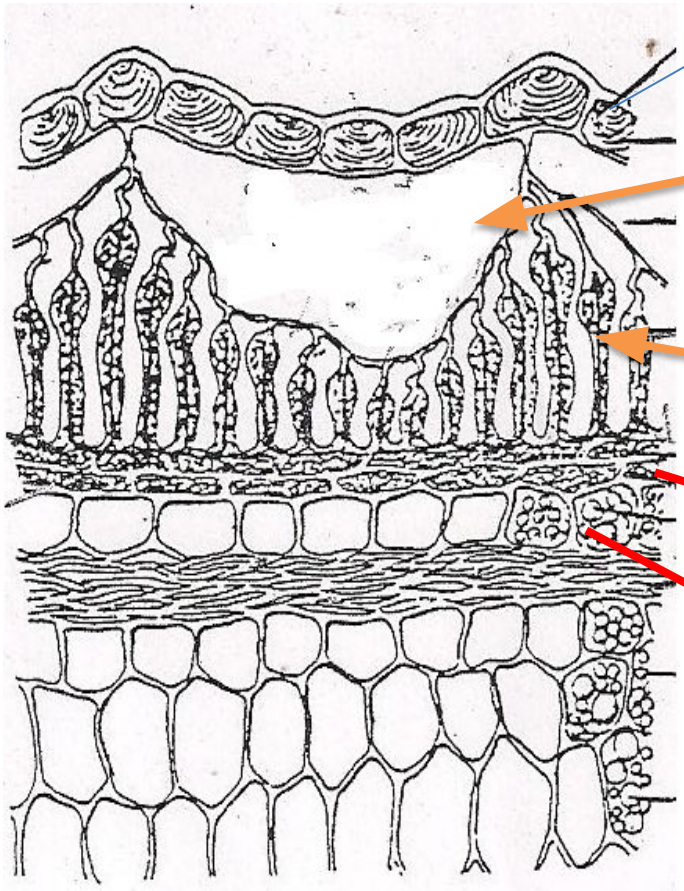
~~White & Black~~ mustard

Paler in color	**Hilum**
Adjacent to the hilum	**Micropyle**
Absent	**Raphe**
Ex-albuminous	**Kind**
Absent	Perisperm
Absent	Endosperm



Reason for polygonal reticulations

T. S.



Epidermis

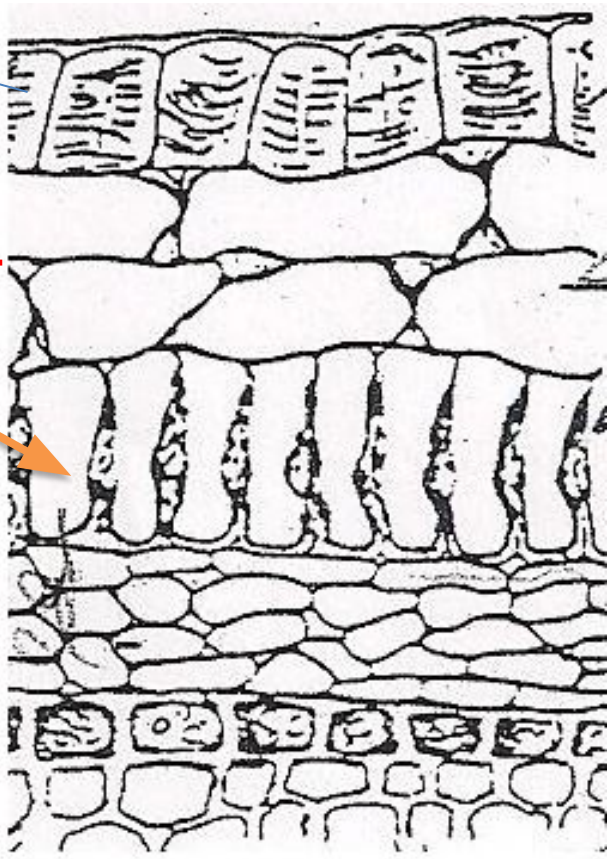
Giant cell

Collenchyma

Sclerieds

Pigment layer

Aleurone layer , aleurone grains contain globoids)



Black Mustard

White Mustard

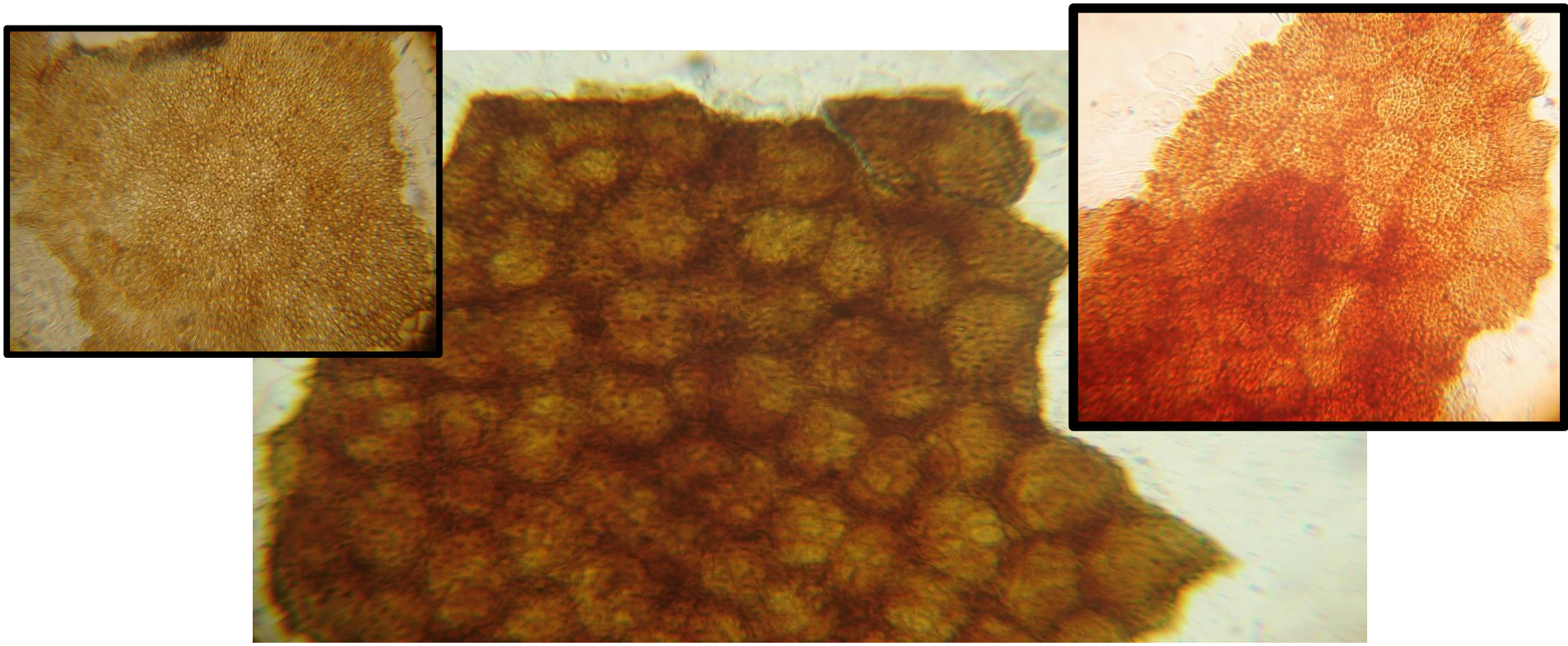
Powder of Black mustard

Color : Pale brown.

Odor : **slight odor when dry and become pungent when crushed with H_2O**

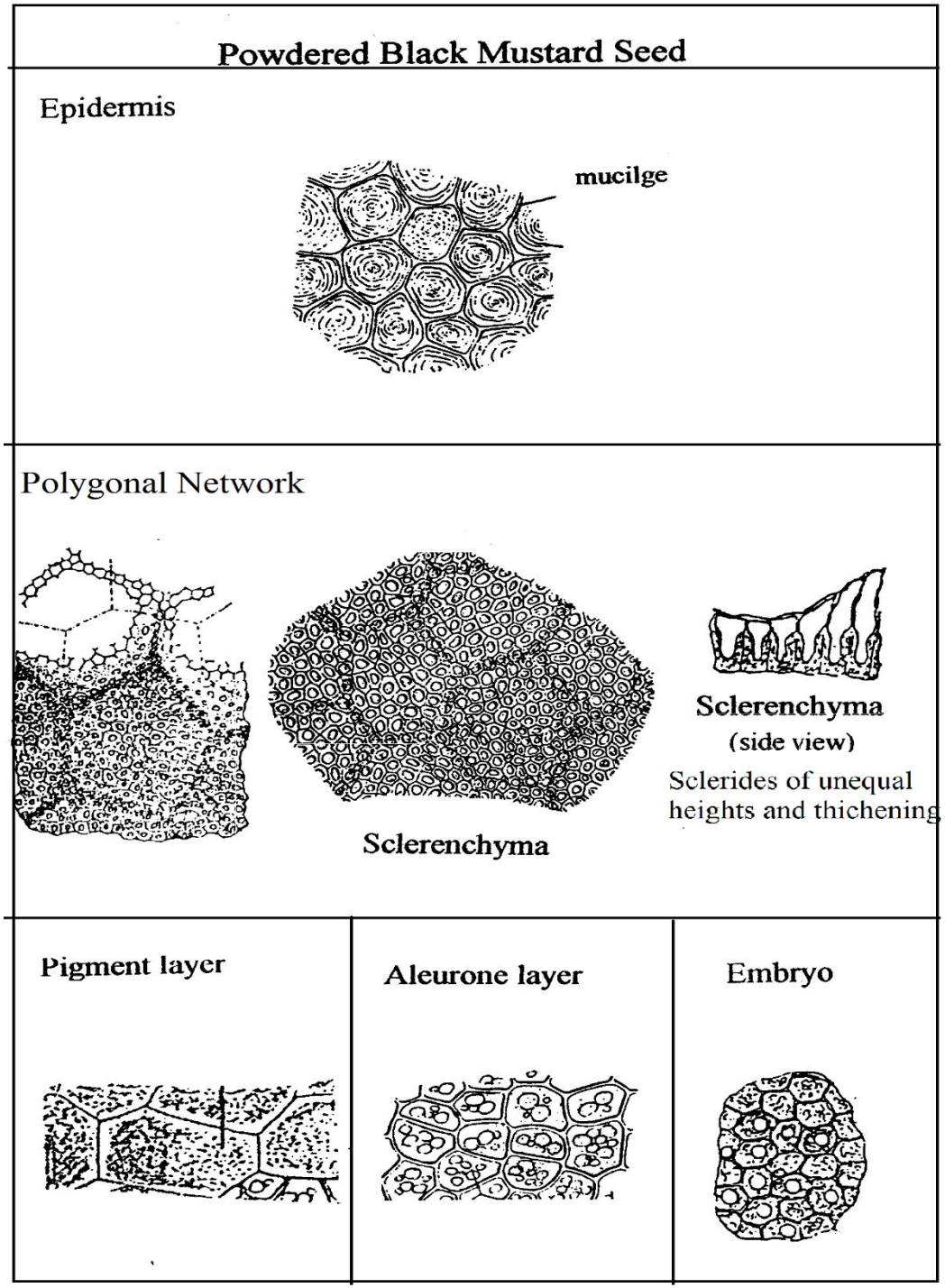
Taste : **bitter , rapidly becomes pungent**

Powder of Black mustard



Polygonal Reticulations

Fragments of seed coat showing polygonal reticulations



Family Cruciferae (Brassicaceae)

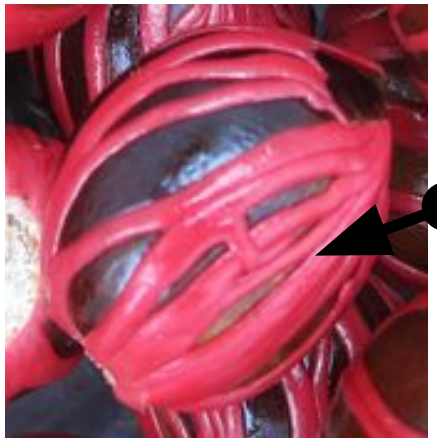
1. *Spherical* seed.
2. Orthoplocous embryo
3. Campylotropous ovule.
4. *Rich in sulfur compounds*

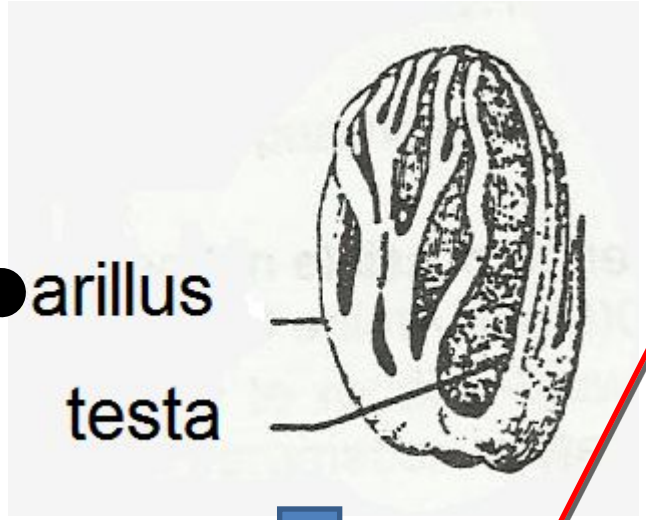
Histochemical tests of Black Mustard

- Sudan III → red (due to fixed oil in embryo)
- Picric acid → Yellow (due to protein in embryo)
- Ruthenium red → rose red (due to mucilage in epidermis)

Nutmeg seeds
بذور جوز الطيب

Dried ripe seeds of *Myristica fragrans* Houtt family Myristicaceae , ***deprived of its arillus and testa*** and with or without a thin coat of lime.





Removal of testa and arillus

Position of Chalaza

Groove
(position of raphe)

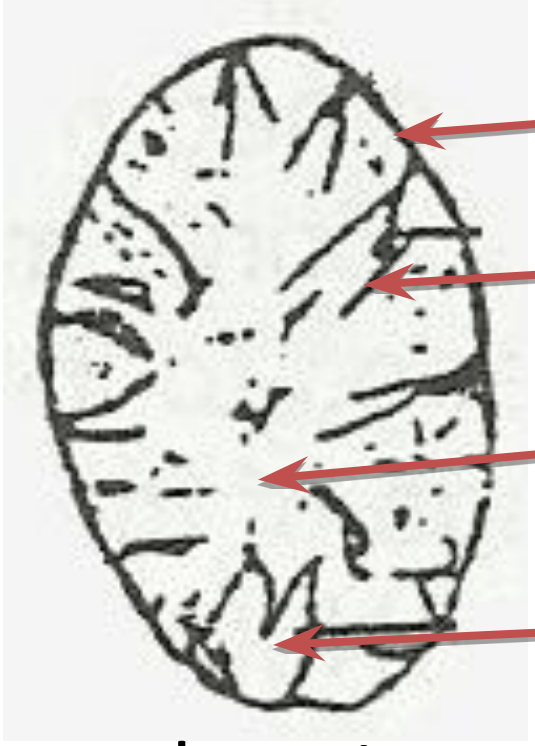
(Anatropous !!!)

Position of H. & M.

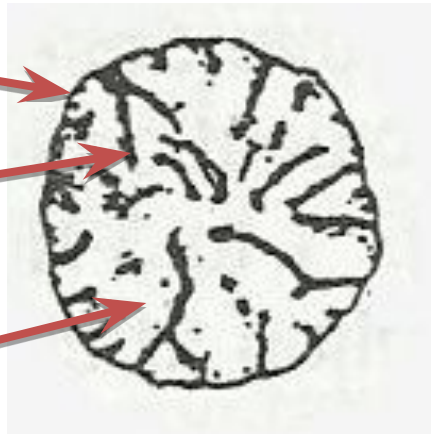
Description of the Kernel

Kernel = perisperm + endosperm + embryo.

- Ovoid with numerous small dark brown points , lines and reticulately-furrowed
- Greyish brown color.
- Strong aromatic characteristic odor.
- Aromatic pungent taste.



L - cut



T - cut

- <u>Perisperm</u> : present , thin dark brown penetrating to the endosperm giving marbelled or ruminated appearance.

- <u>Endosperm</u> : present , greyish brown

Powder Nutmeg

- Color : reddish yellow to reddish brown
- Odor : strong aromatic and characteristic
- Taste : aromatic pungent

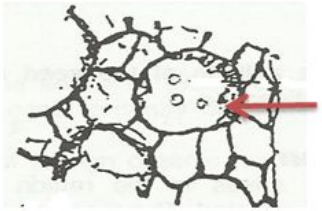
Powdered nutmeg

Perisperm

outer perisperm

K - acid tartarate

Inner perisperm

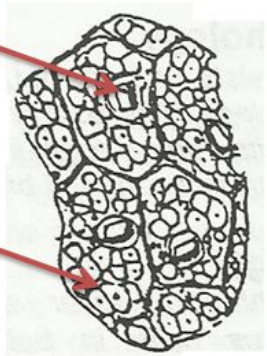


Oil cell

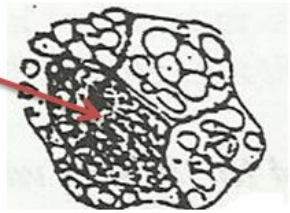
Endosperm

Aleurone grain
(crystalloid)

Starch granules



Tannin idioblast



Fat crystals **!!!!**
(50% chloral hydrate)

Fat globule

Histochemical tests of Nutmeg powder

- I_2 → blue (starch)
  - yellowish brown (protein)
- Sudan III → Red (oil globules, volatile and fixed oil)
- $FeCl_3$ → green color (tannins)