

BIOLOGY MODULE 1.4.1

The Nutrition Bank

Unpacking the origin, development, and fate
of the endosperm in flowering plants.

SPECIMEN: ANGIOSPERM | STAGE: POST-FERTILISATION

Equation-to-Visual Map

Male Gamete

[n]

+

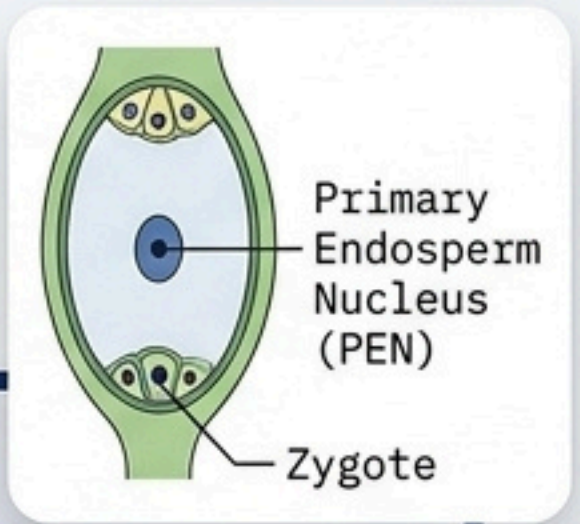
Polar Nuclei

[n+n]

=

Primary Endosperm Nucleus (PEN)

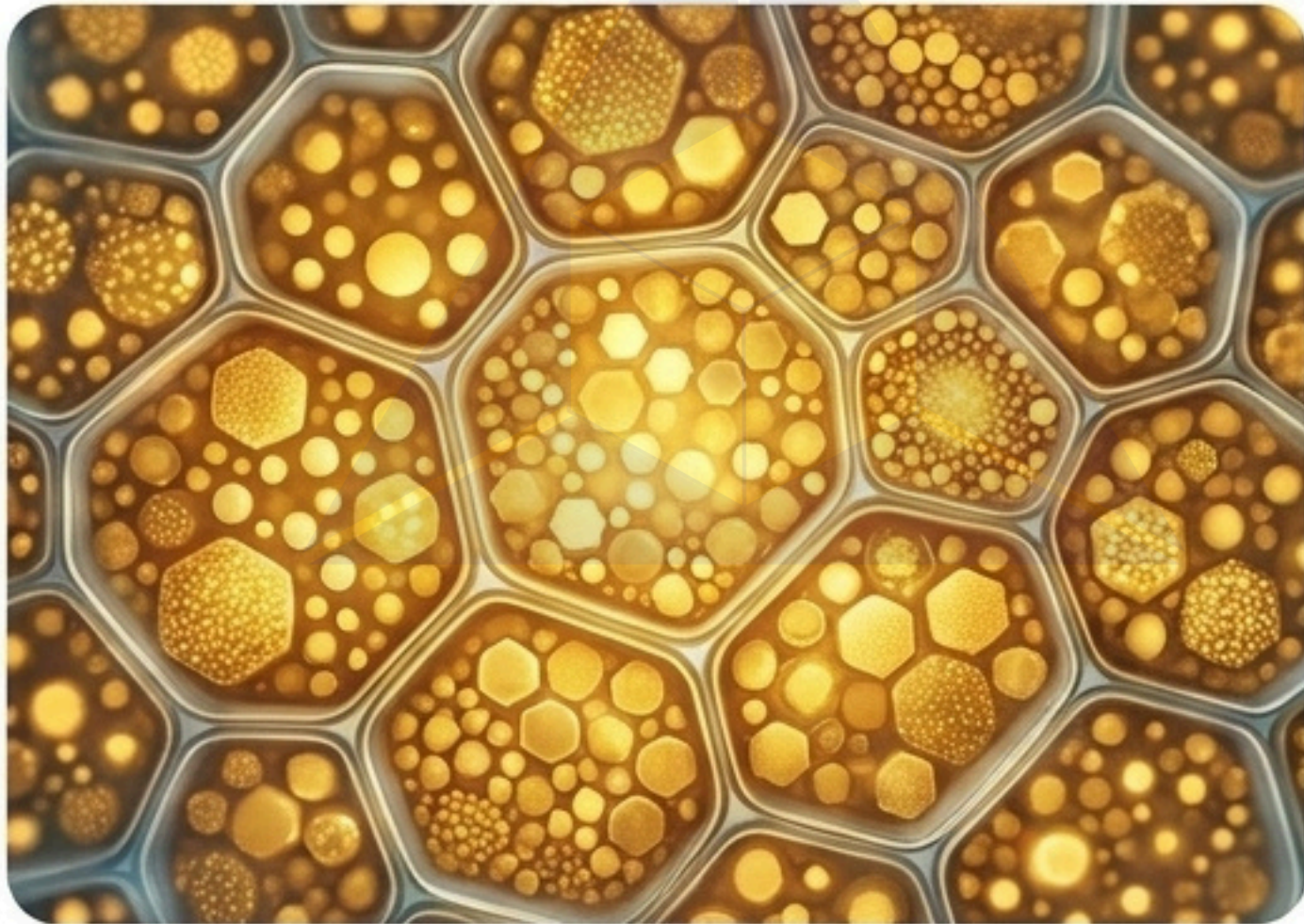
[3n]



EVOLUTIONARY ADAPTATION

Endosperm development strictly precedes embryo development. Why?
To provide assured, pre-loaded nutrition for the developing zygote.

Triploid Endosperm Tissue



GENETICS: TRIPLOID ($3n$)

The Primary Endosperm Cell (PEC) divides repeatedly to form a massive tissue structure.

FUNCTION: STORAGE

The cells of this tissue are densely packed with reserve food materials strictly dedicated to nourishing the developing embryo.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



PHASE 1: FREE-NUCLEAR

Successive Nuclear Divisions

The Primary Endosperm Nucleus (PEN) undergoes rapid, successive nuclear divisions.

**WARNING: KARYOKINESIS OCCURS
WITHOUT CYTOKINESIS.**

This creates a “free-nuclear endosperm” state characterized by hundreds of free-floating nuclei.



PHASE 2: CELLULARISATION

Cell Wall Formation

Following the free-nuclear stage, the biological blueprint commands structural division. Cell walls are laid down sequentially around the free nuclei.

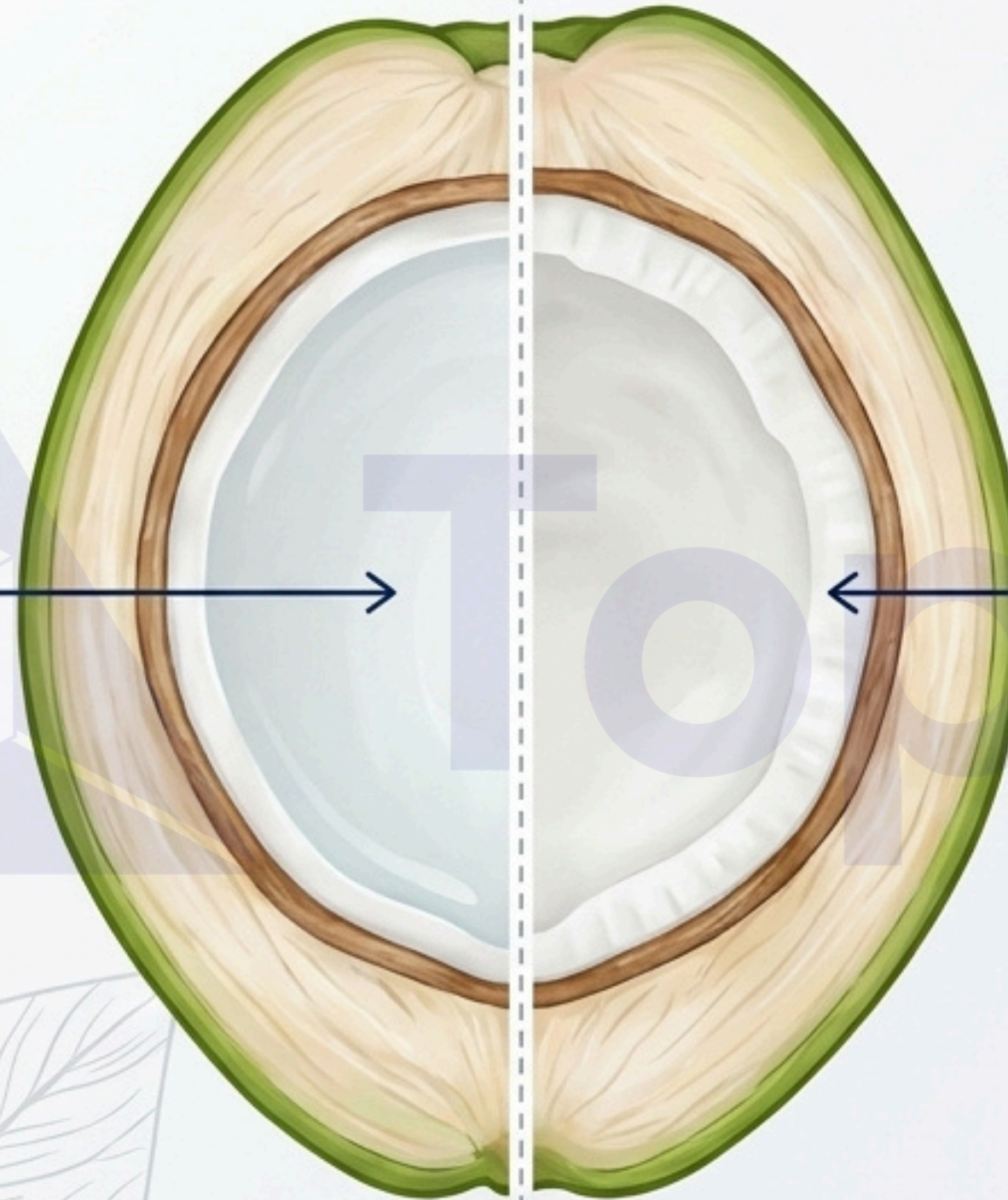
The fluid, disorganized mass transitions into a solid, structured tissue known as the cellular endosperm.



STATE: LIQUID

Coconut Water

This is pure free-nuclear endosperm. It consists of thousands of free-floating nuclei suspended in liquid.



STATE: SOLID

White Kernel

This is the cellular endosperm. Cell walls have formed, turning the nuclear fluid into solid, highly nutritious tissue.

The Ultimate Fate: Consumed vs. Persistent



Completely Consumed

The endosperm is entirely used up by the developing embryo before the seed matures.

PEA | GROUNDNUT | BEANS



Persistent

A portion of the endosperm remains in the mature seed and is stored for use during future seed germination.

CASTOR | COCONUT | CEREALS
(WHEAT, RICE, MAIZE)



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis