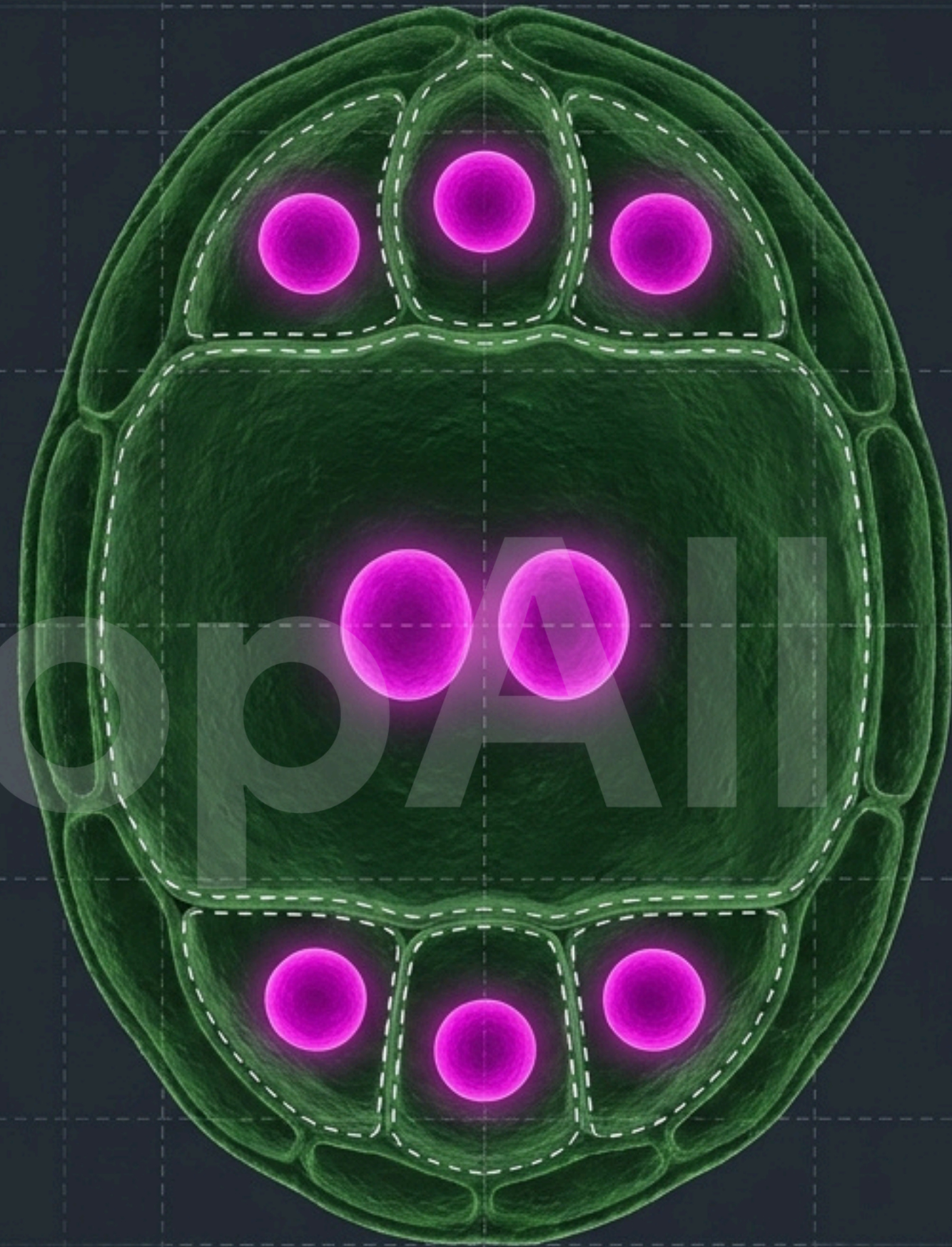


7-Celled, 8-Nucleate Embryo Sac

The architectural paradox
of the angiosperm female
gametophyte.

Microscopic Blueprint:
Anatomy & Development



Monosporic Development

Out of a tetrad of four megaspores produced by meiosis, three degenerate. Only one functional megaspore survives to develop into the entire female gametophyte (embryo sac).

Ploidy Shift:
Megaspore Mother Cell ($2n$) →
Functional Megaspore (n)

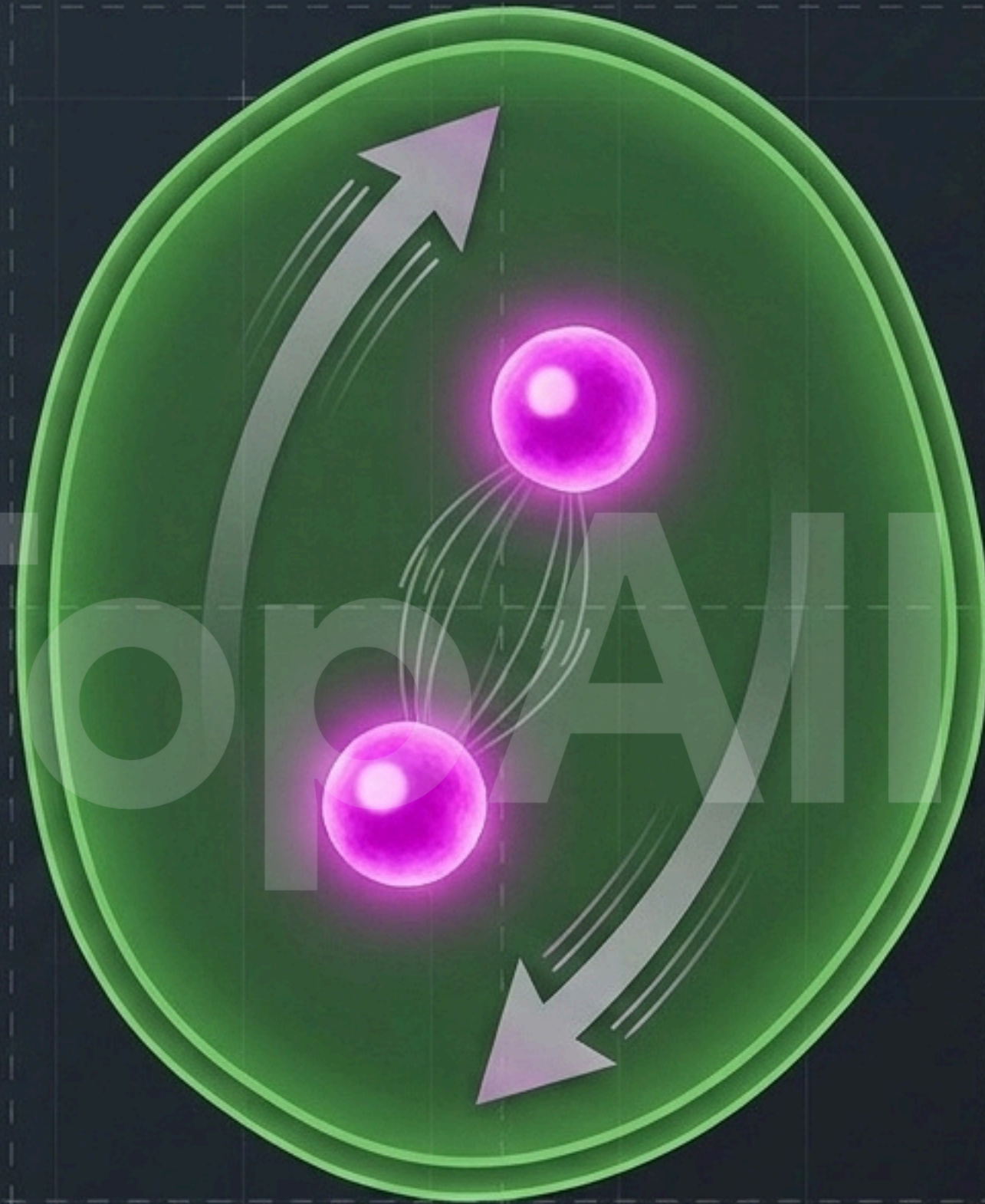


The 2-Nucleate Stage

Strictly Free-Nuclear

The nucleus of the functional megaspore divides mitotically, but cell wall formation does not immediately follow. The nuclei migrate to establish the opposite poles of the sac.

Stage:	First Mitosis
Nuclei:	2
Cell Walls:	0





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

$$E=mc^2$$



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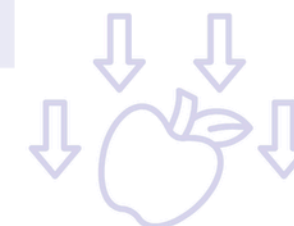
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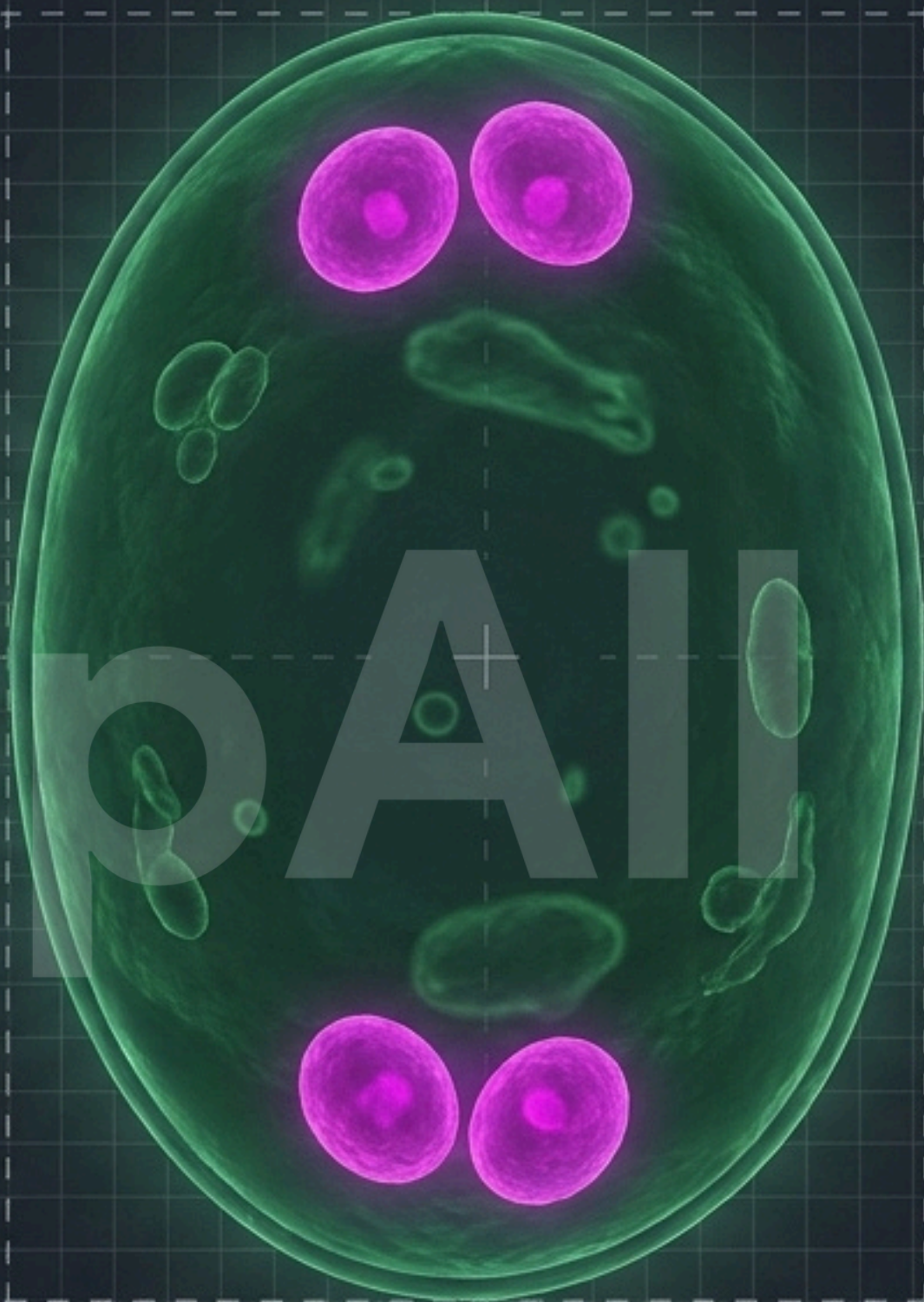
The 4-Nucleate Stage

Diagnostic

Strictly Free-Nuclear

A second sequential mitotic division occurs at each pole. The embryo sac expands in volume, acting as a single large incubator for the replicating genetic material.

1	Stage:	Second Mitosis
2	Nuclei:	4
3	Cell Walls:	0



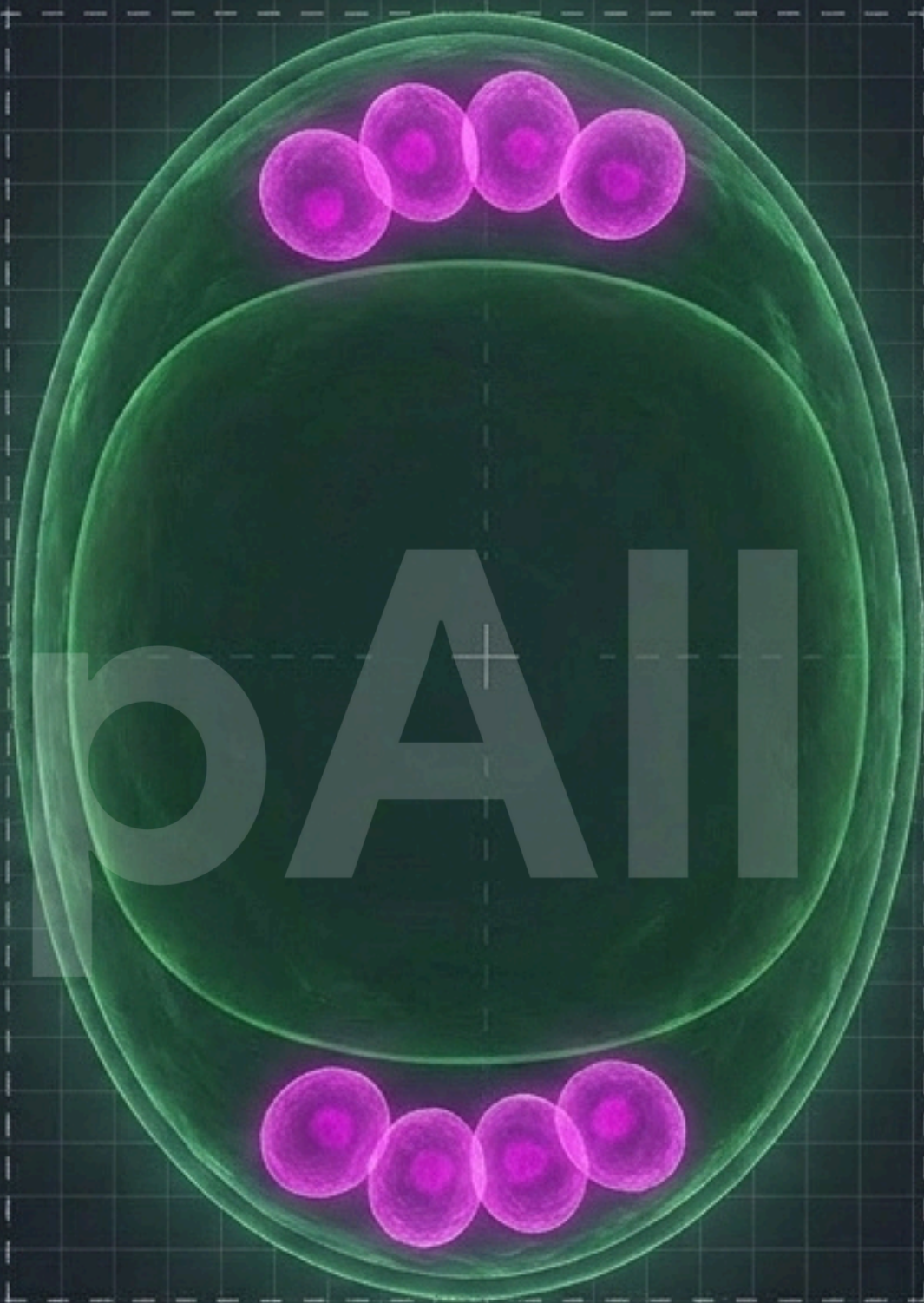
The 8-Nucleate Stage

Diagnostic

Strictly Free-Nuclear

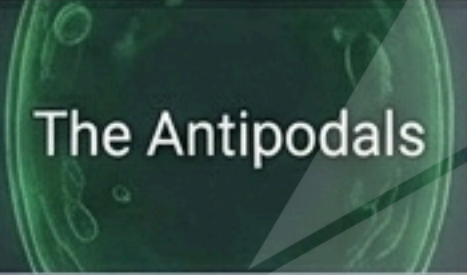
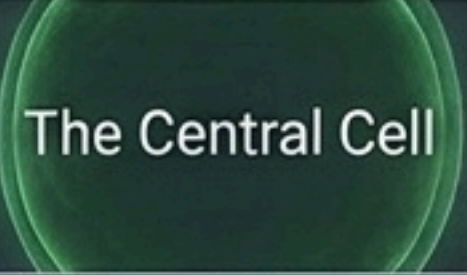
The third and final mitotic division completes the set. Eight distinct haploid nuclei now exist within a single continuous plasma membrane. This is the tipping point before cellular organization finally begins.

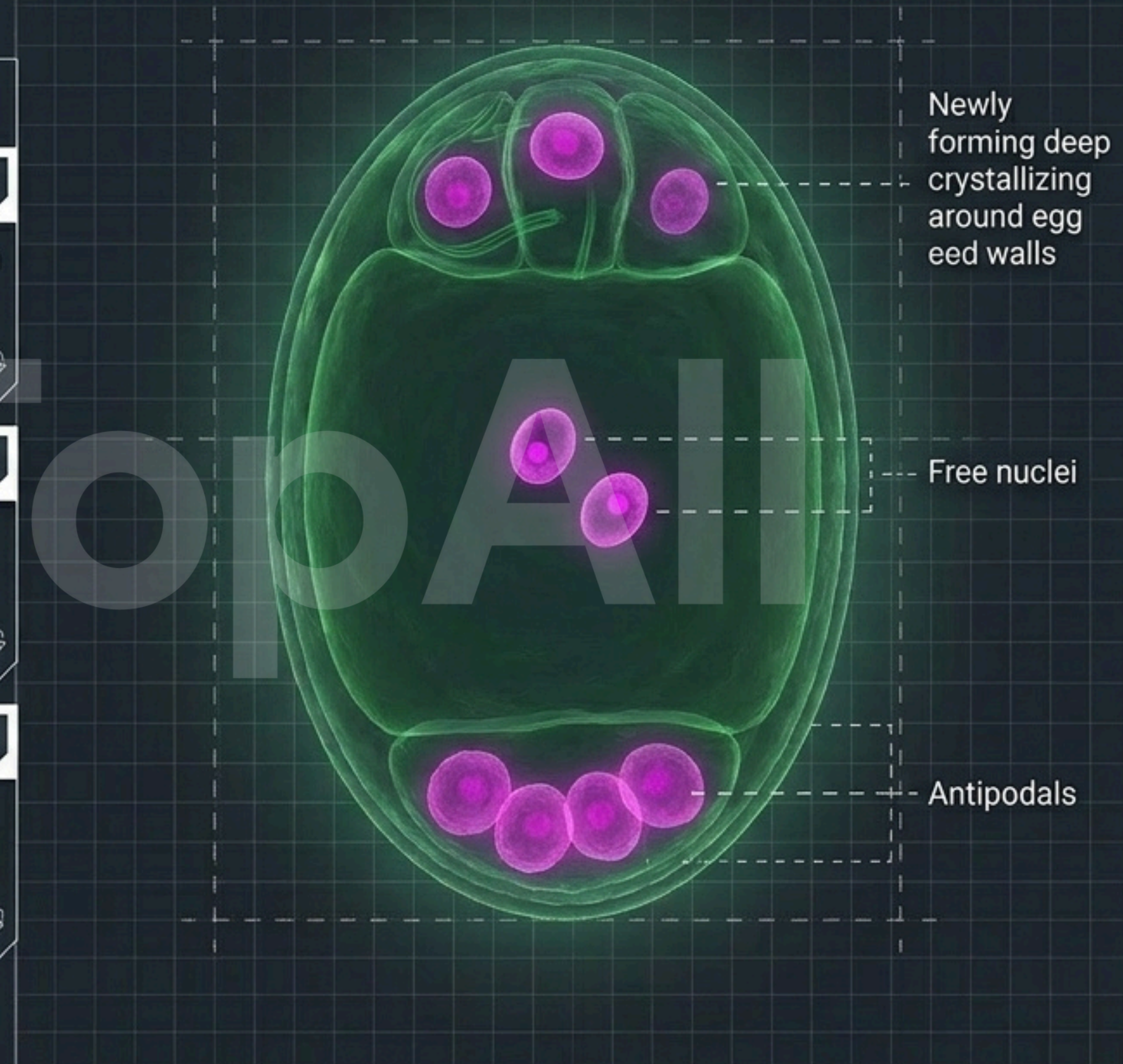
1	Stage:	Third Mitosis
2	Nuclei:	8
3	Cell Walls:	0

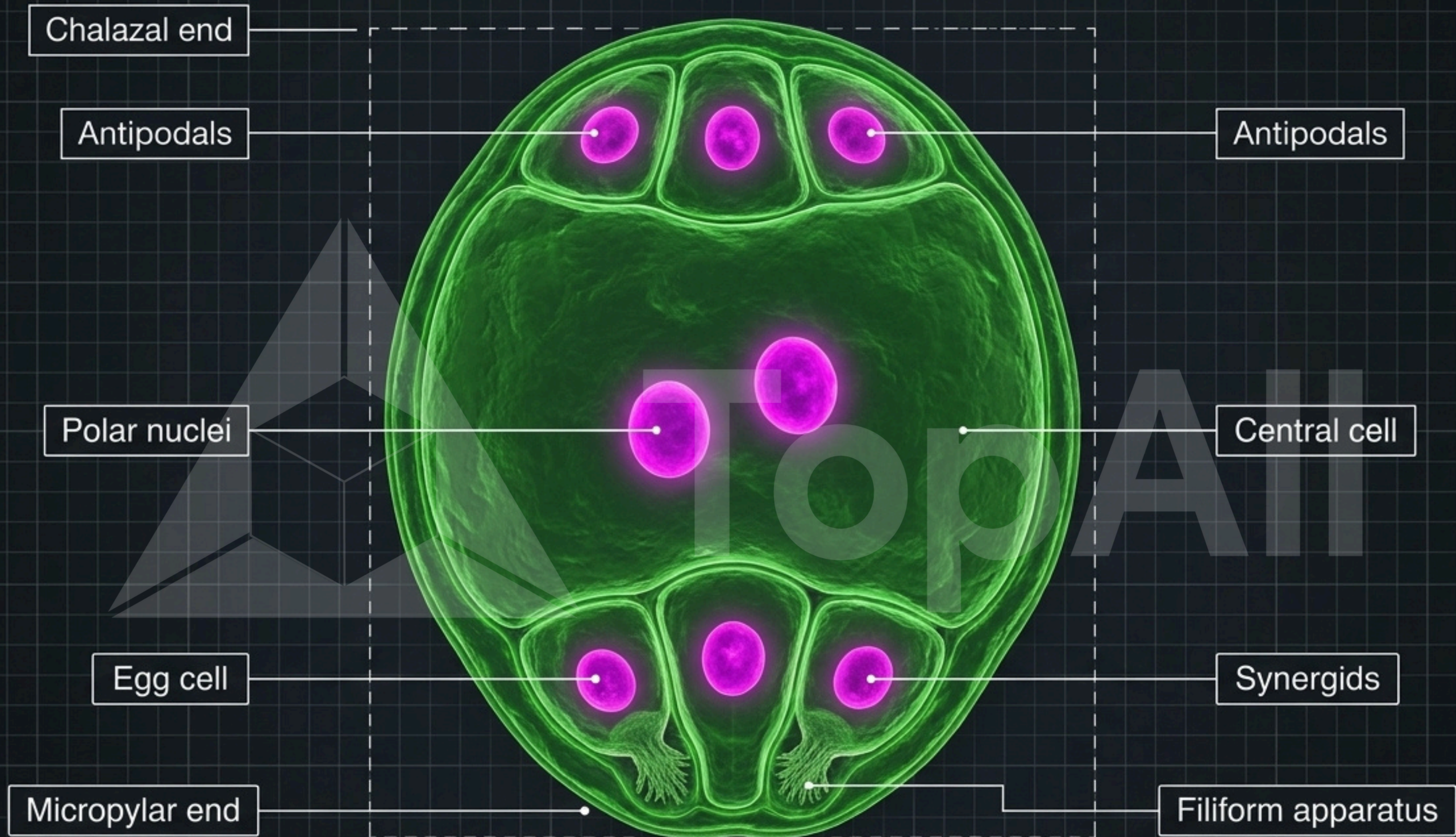


Organizing the Neighborhoods: Walls Finally Form



Cellular Neighborhood Matrix			
Micropylar End (Top)			Diagnostic
1	 The Egg Apparatus	3 Cells (1 Egg Cell + 2 Synergids)	Feature: Synergids contain the filiform apparatus (cellular thickenings) to guide pollen tubes.
Chalazal End (Bottom)			Diagnostic
2	 The Antipodals	3 Cells	Feature: Situated directly opposite the micropyle.
The Core (Center)			Diagnostic
3	 The Central Cell	1 Massive Cell	Feature: Contains the 2 remaining polar nuclei situated below the egg apparatus.





Key Takeaway: The Architectural Paradox Solved

Block 1: The Cell Count

3 (Micropylar) + 3 (Chalazal) + 1 (Central Cell) = **7 Cells**



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Block 2: The Nucleus Count

3 (Micropylar) + 3 (Chalazal) + 2 (Polar Nuclei) = **8 Nuclei**



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The result is a highly specialized, functionally ready female gametophyte, perfectly staged for the angiosperm's unique process of double fertilization.



You've Learned the Theory.

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