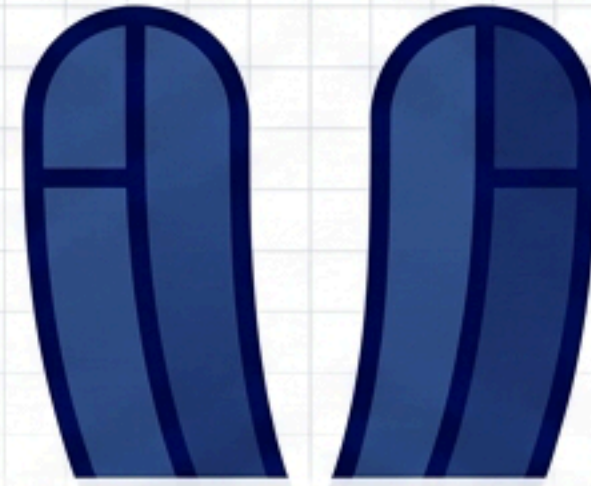




M PHASE: PROPHASE

Chromosomes Become Visible

The First Stage of Karyokinesis in Mitosis



Following the S and G2 phases of interphase, prophase marks the initiation of the most dramatic period of the cell cycle: the reorganisation of virtually all cellular components.

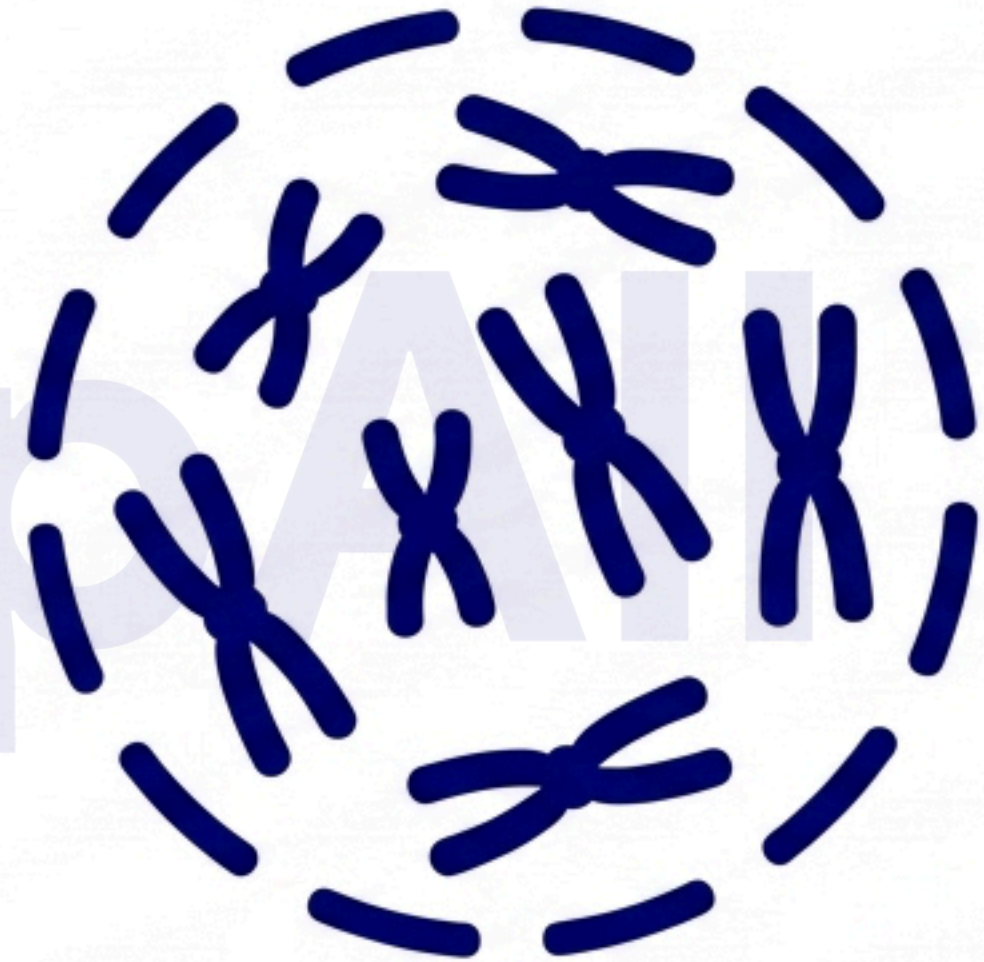
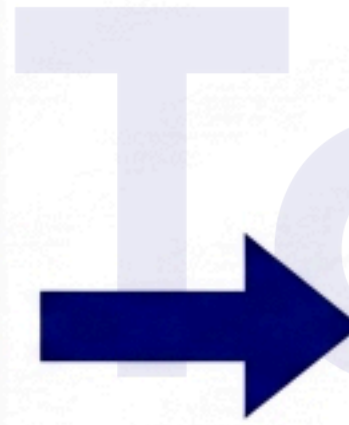
Early vs. Late Prophase

Visualizing the transition of chromosomal material



STATE: EARLY PROPHASE

DNA molecules formed during the S and G2 phases are not distinct but intertwined.



STATE: LATE PROPHASE

Chromosomal material becomes untangled and compact, forming distinct structures.

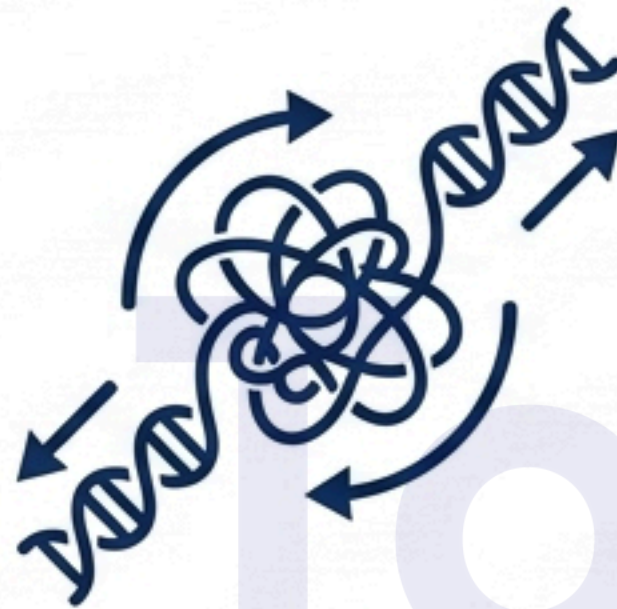
Chromatin Condensation

The mechanism of untangling and compacting DNA



PHASE 1: S & G2

Newly formed DNA molecules are intertwined and physically entangled.



PHASE 2: INITIATION

The chromosomal material initiates condensation, actively untangling the web.



PHASE 3: COMPACTION

Chromatin fully condenses into compact, highly structured elements ready for division.



Note: Condensation is an essential prerequisite to ensure DNA can be safely, cleanly, and accurately moved without breaking during cell division.



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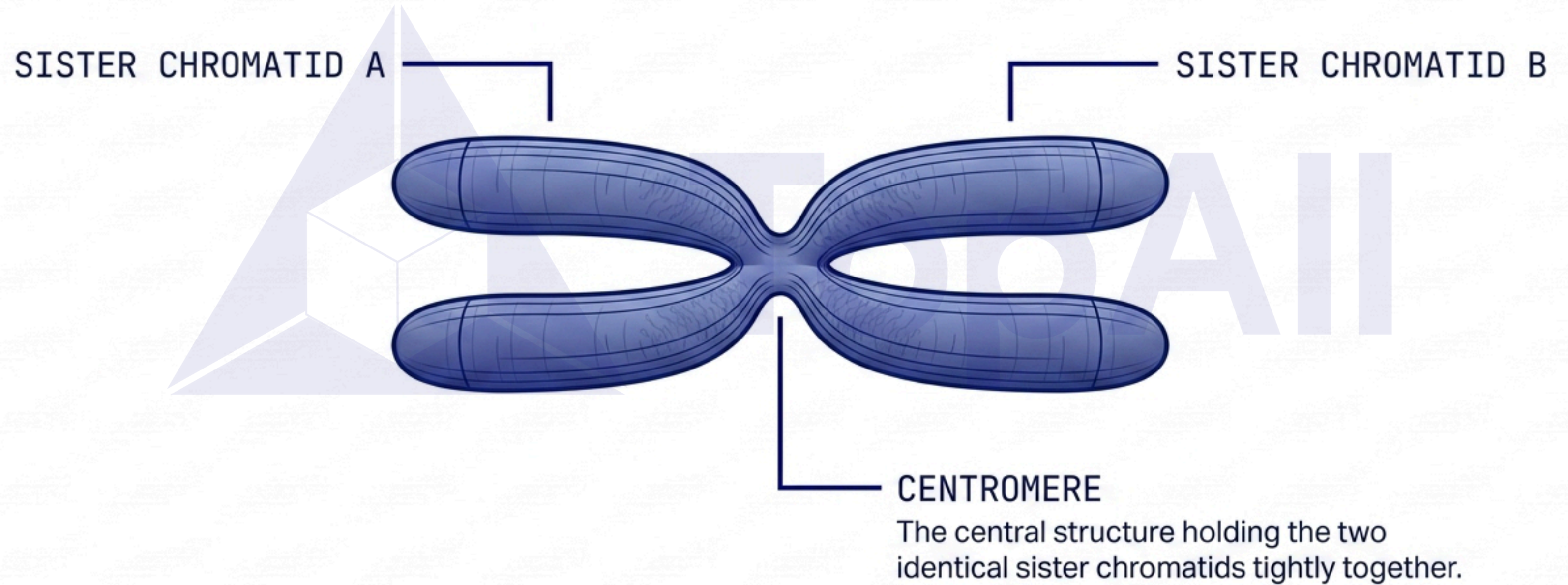
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Anatomy of a Mitotic Chromosome

Two distinct chromatids anchored at a central point

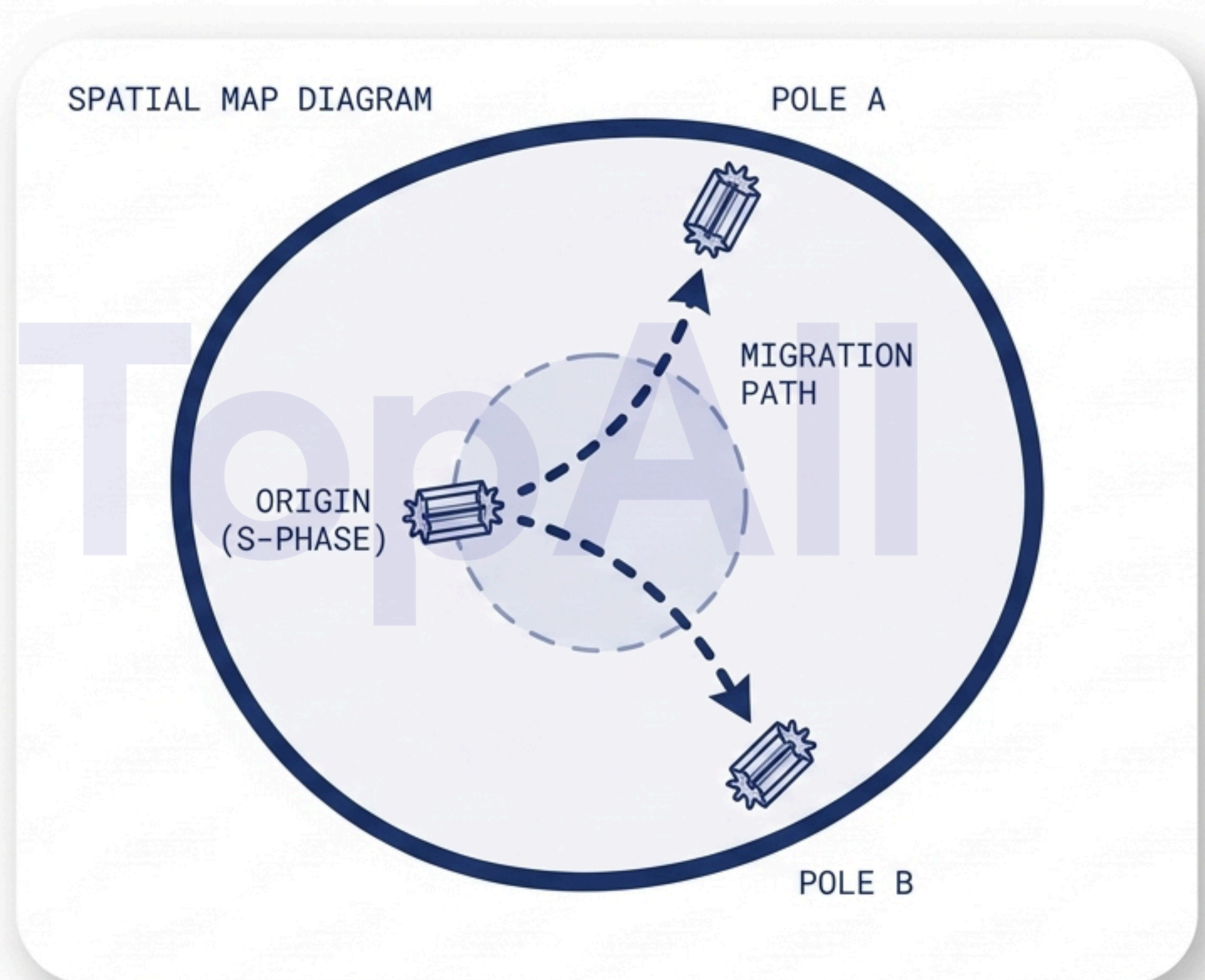


Centrosome Movement

Establishing the polar axis of the dividing cell

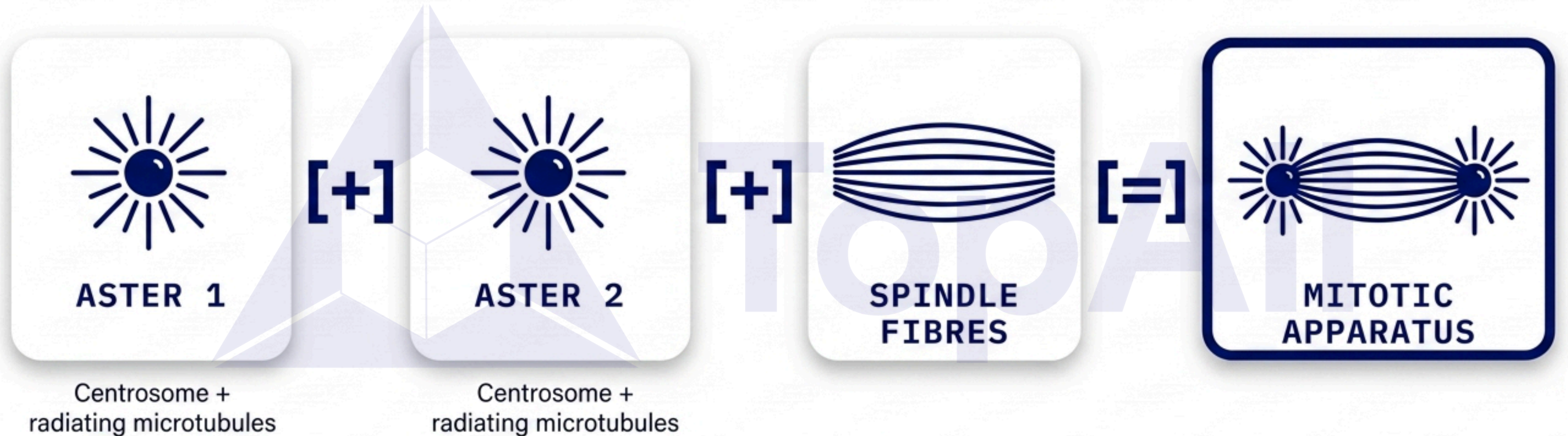
INTERPHASE DUPLICATION

- During the S phase of interphase, the centrosome undergoes duplication.
- As prophase begins, these two duplicated centrosomes initiate a crucial migration.
- They move away from each other towards the opposite poles of the cell, establishing the spatial anchors required for the upcoming cellular division.



Assembling the Spindle Network

The components of the mitotic apparatus



Each migrating centrosome radiates out microtubules known as asters. Together with the connecting spindle fibres, these asters form the complete mitotic apparatus necessary to pull chromosomes apart in later stages.

The Completion of Prophase

Final conditions for transitioning to Metaphase



Assembly & Condensation

Prophase officially concludes when chromosomal material has fully condensed into compact structures (two chromatids joined at a centromere) and the complete mitotic apparatus is assembled at opposite poles.



MICROSCOPIC VIEW UPDATE

At the end of prophase, the cell undergoes major structural dismantling. When viewed under a microscope, the following structures disappear to make way for the spindle network:

- ☒ Golgi complexes
- ☒ Endoplasmic reticulum (ER)
- ☒ Nucleolus
- ☒ Nuclear envelope



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