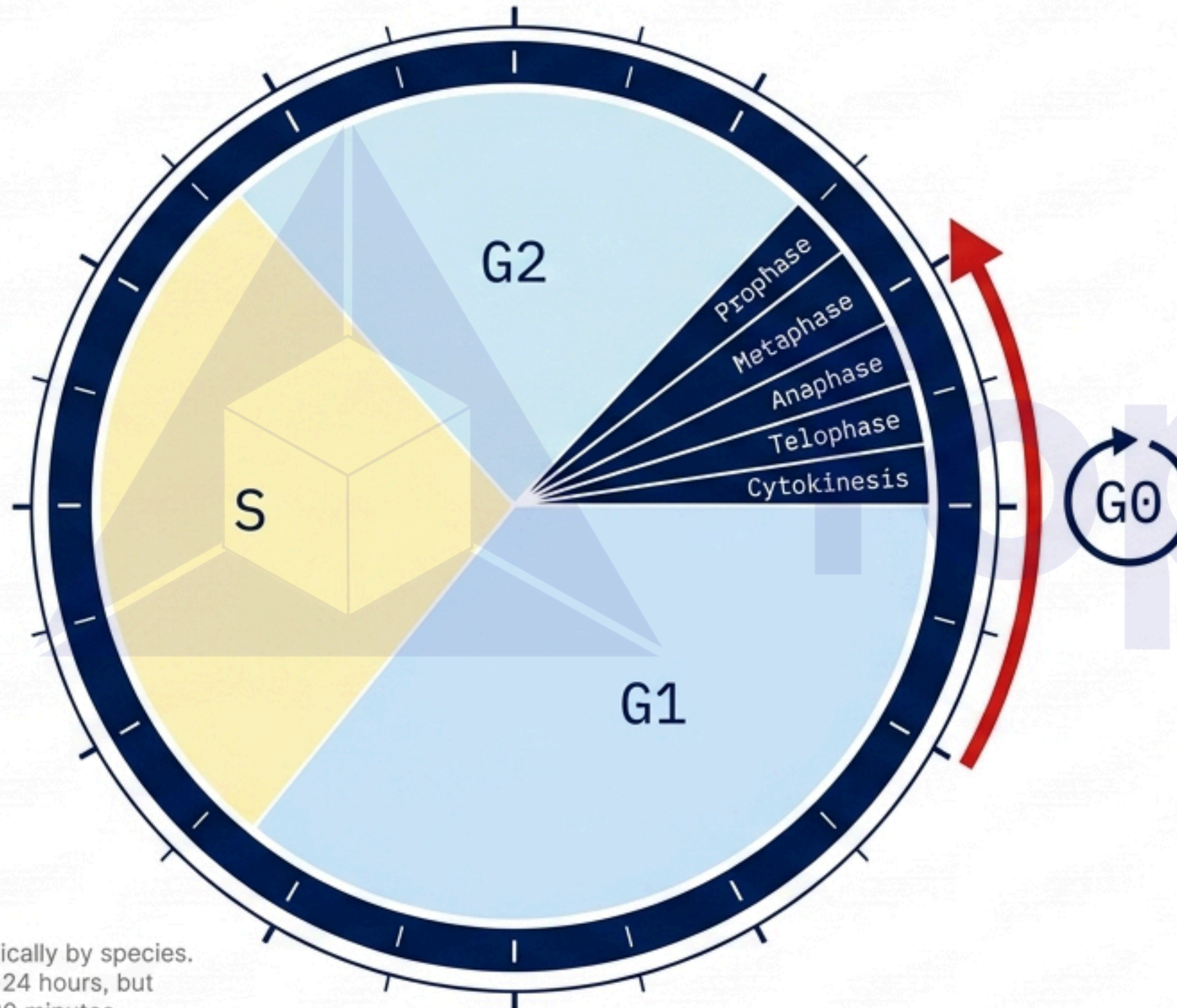


Interphase and M Phase

The Biological Blueprint of the Cell Cycle

[SYSTEM_INITIALIZATION: CELL_CYCLE_DASHBOARD]

The 24-Hour Biological Clock



>95%_DURATION

Interphase

<5%_DURATION

M Phase

~1_HOUR

Cell division proper

Timeframes vary radically by species.
A human cell takes ~24 hours, but
yeast cycles in just 90 minutes.



Quiescent Exit: Cells that do not divide further exit G1 to enter G0 (inactive stage) but remain metabolically active.

Interphase: Myth vs. Biological Reality



The 'Resting' Phase

Historically misunderstood as a dormant period between divisions.



The Preparation Phase

A period of intense metabolic activity, orderly cell growth, and crucial DNA replication.

[G1_PHASE] (Gap 1)



[S_PHASE] (Synthesis)



[G2_PHASE] (Gap 2)



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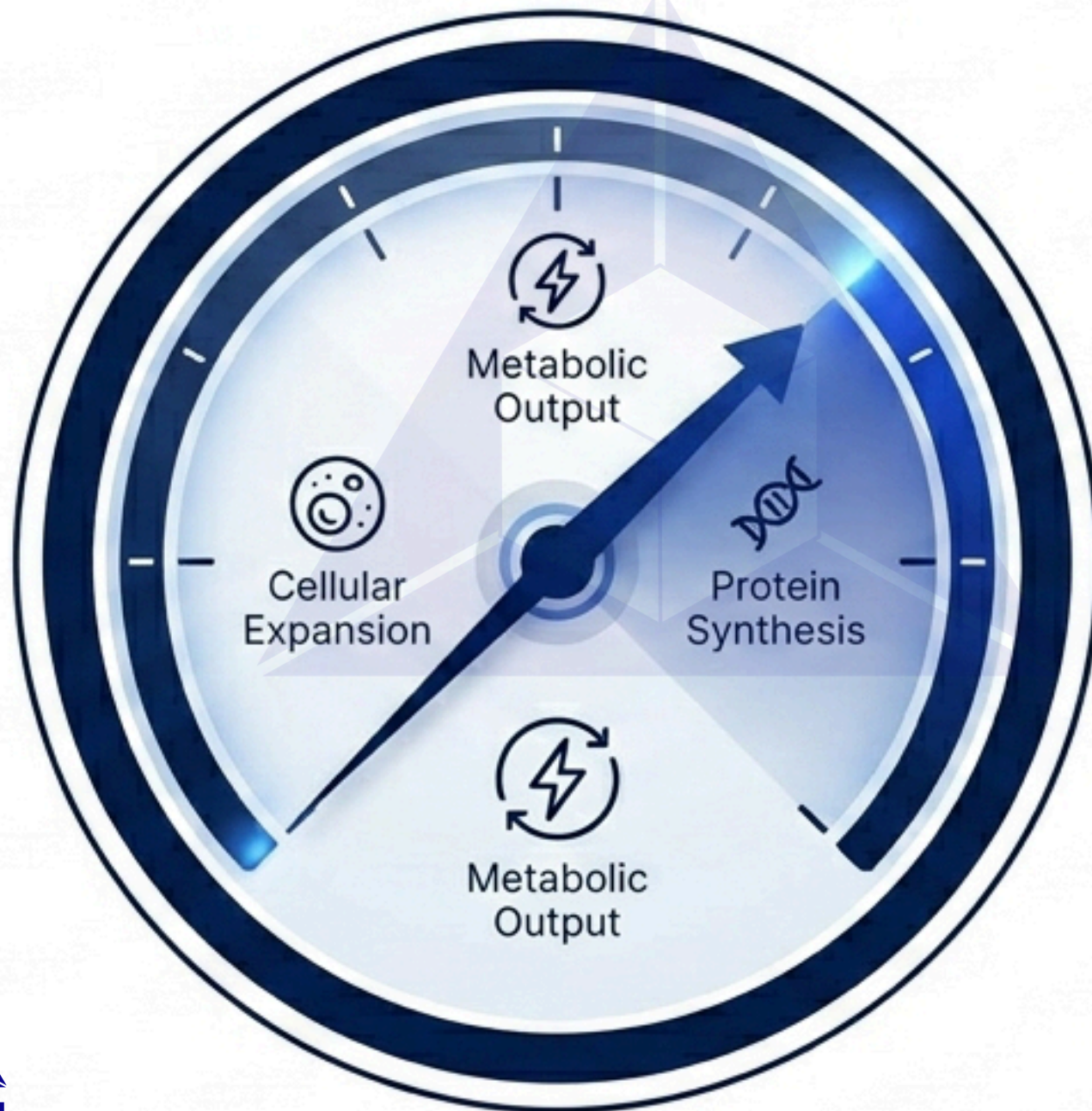
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Gap 1: Continuous Growth

[G1_PHASE]



System Checklist

- [✓] Interval between mitosis and DNA replication initiated
- [✓] Cell is metabolically active
- [✓] Cytoplasmic volume increases continuously
- [✗] DNA replication (Has NOT started)

Synthesis: Duplicating the Blueprint

[S_PHASE]



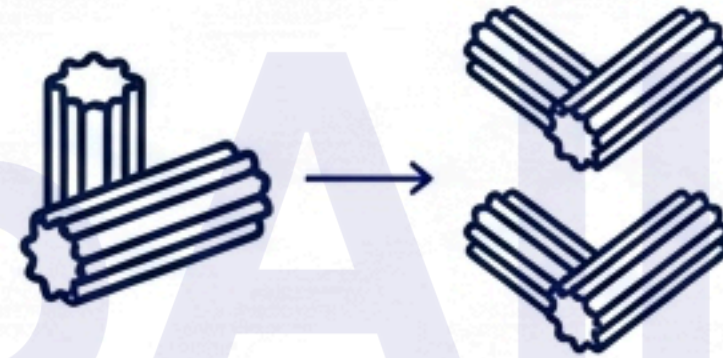
Nucleus: DNA Replication



The total amount of DNA per cell strictly doubles.

INITIAL_DNA (2C) → REPLICATED_DNA (4C)

Cytoplasm: Centriole Duplication



In animal cells, the centriole simultaneously duplicates outside the nucleus.



Critical Rule: Chromosome count does NOT increase during this phase.

Gap 2: Final Preparations

[G2_PHASE]



SYSTEM_DIAGNOSTIC: READY FOR M PHASE

99%



Protein Synthesis

Specialized proteins required for mitosis are actively synthesized.



Cell Growth

Cytoplasmic expansion continues and concludes.

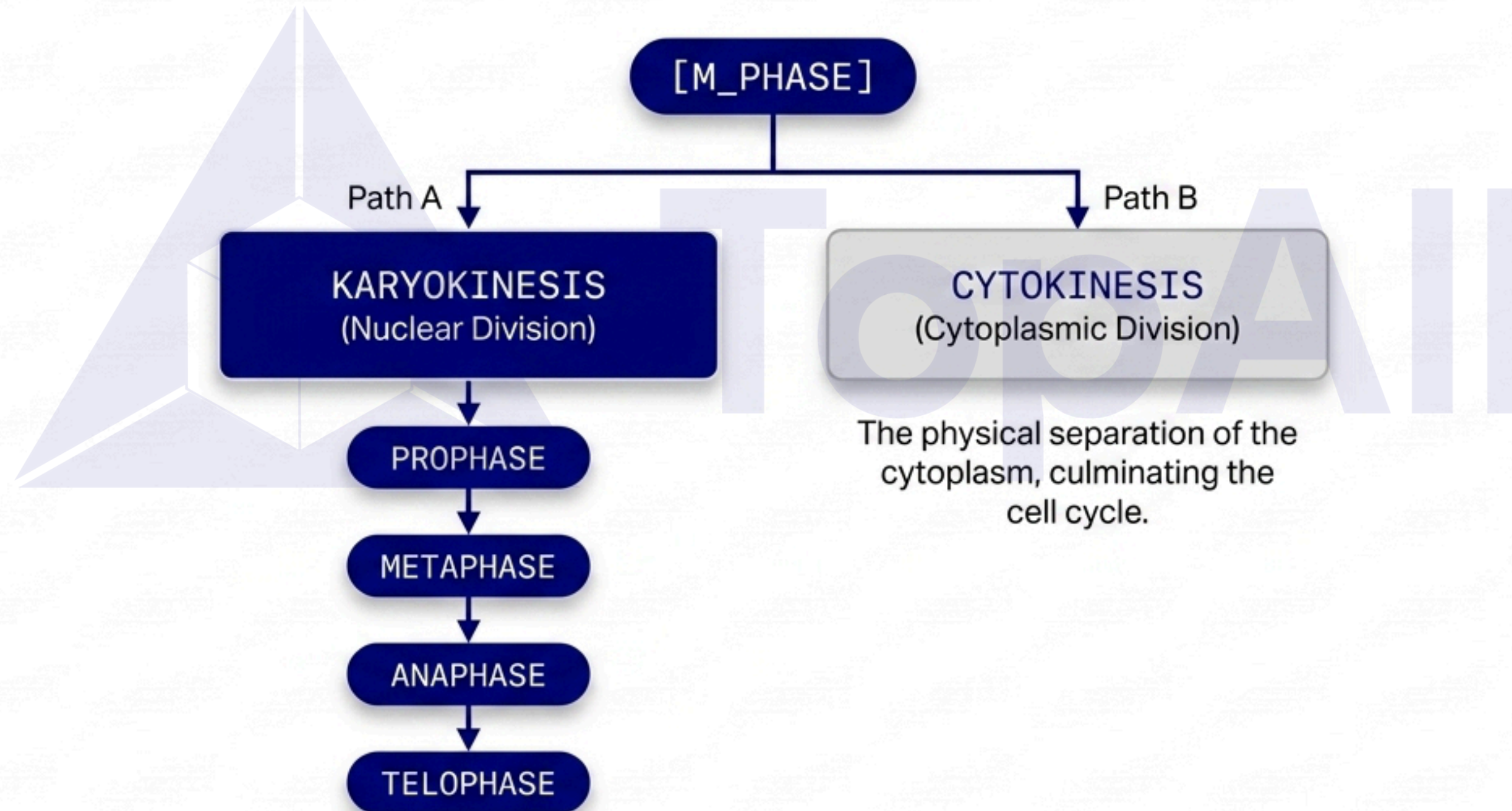


System Status

Cell is now fully primed for structural division.

M Phase: The Dramatic Reorganization

The equational division where parent and progeny chromosome numbers remain identical.



The DNA vs. Chromosome Paradox



	Before S-Phase (G1)	After S-Phase (G2)
Total DNA Content	$2C$	$4C$
Chromosome Number	$2n$	$2n$

During S-phase, the total mass of genetic material doubles, but the count of discrete chromosome structures remains completely unchanged.



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