

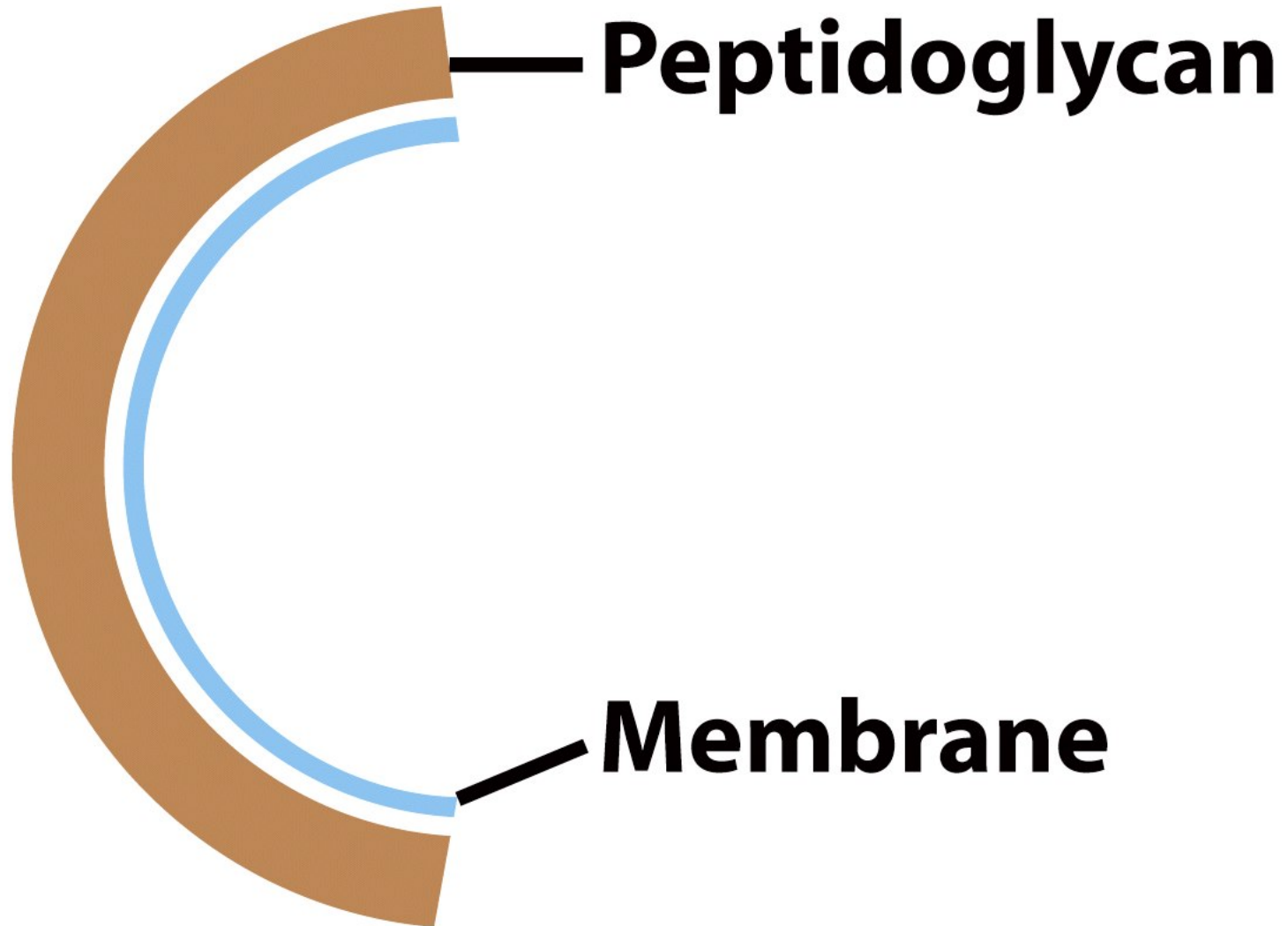
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561 MIC

Reference
BROCK
BIOLOGY OF
MICROORGANISMS
ELEVENTH EDITION

Cell Wall

- **Gram-negative** *Bacteria* have only a few layers of peptidoglycan , but **gram-positive** *Bacteria* have several layers.

Gram-positive



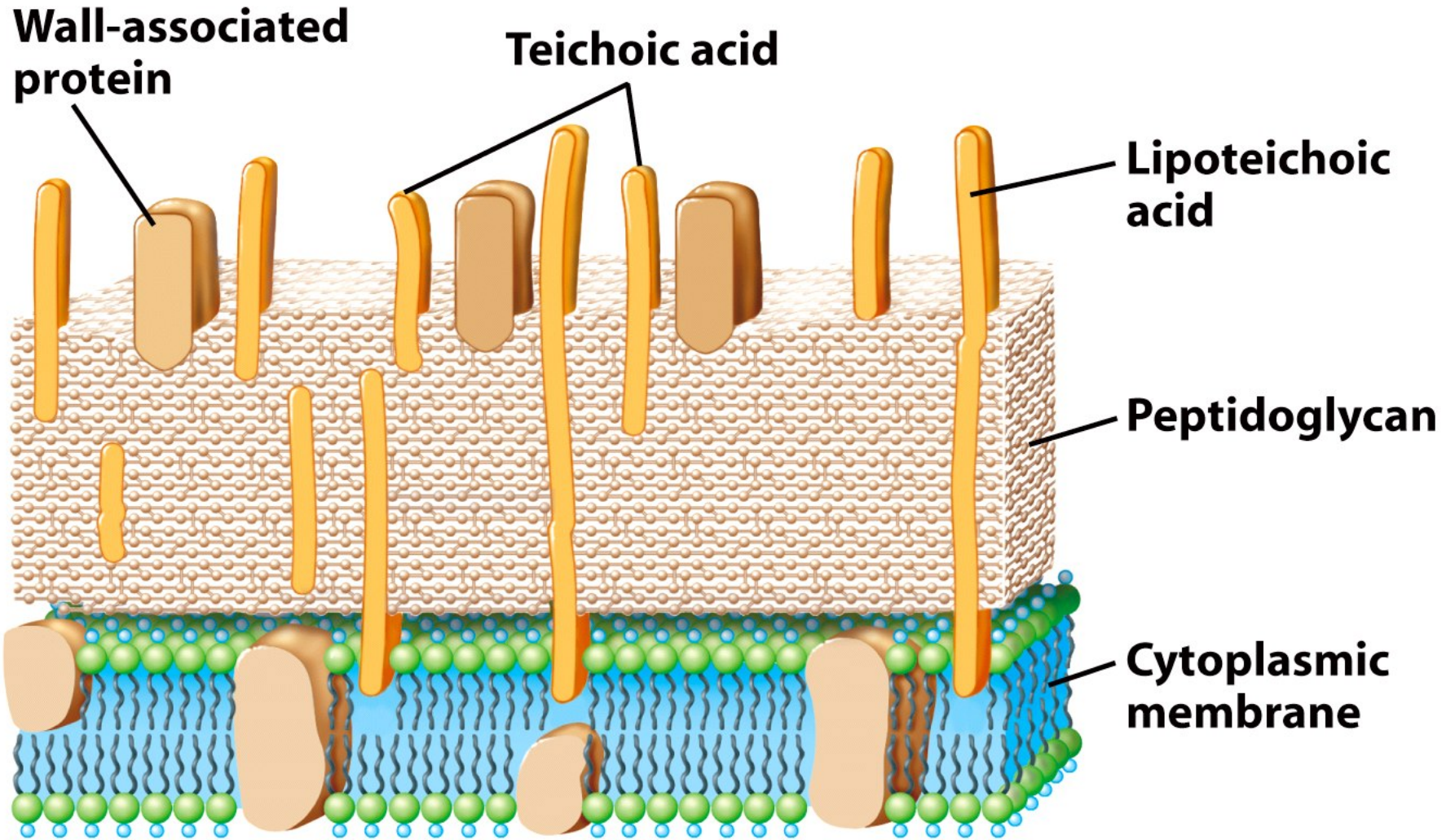


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Gram-negative

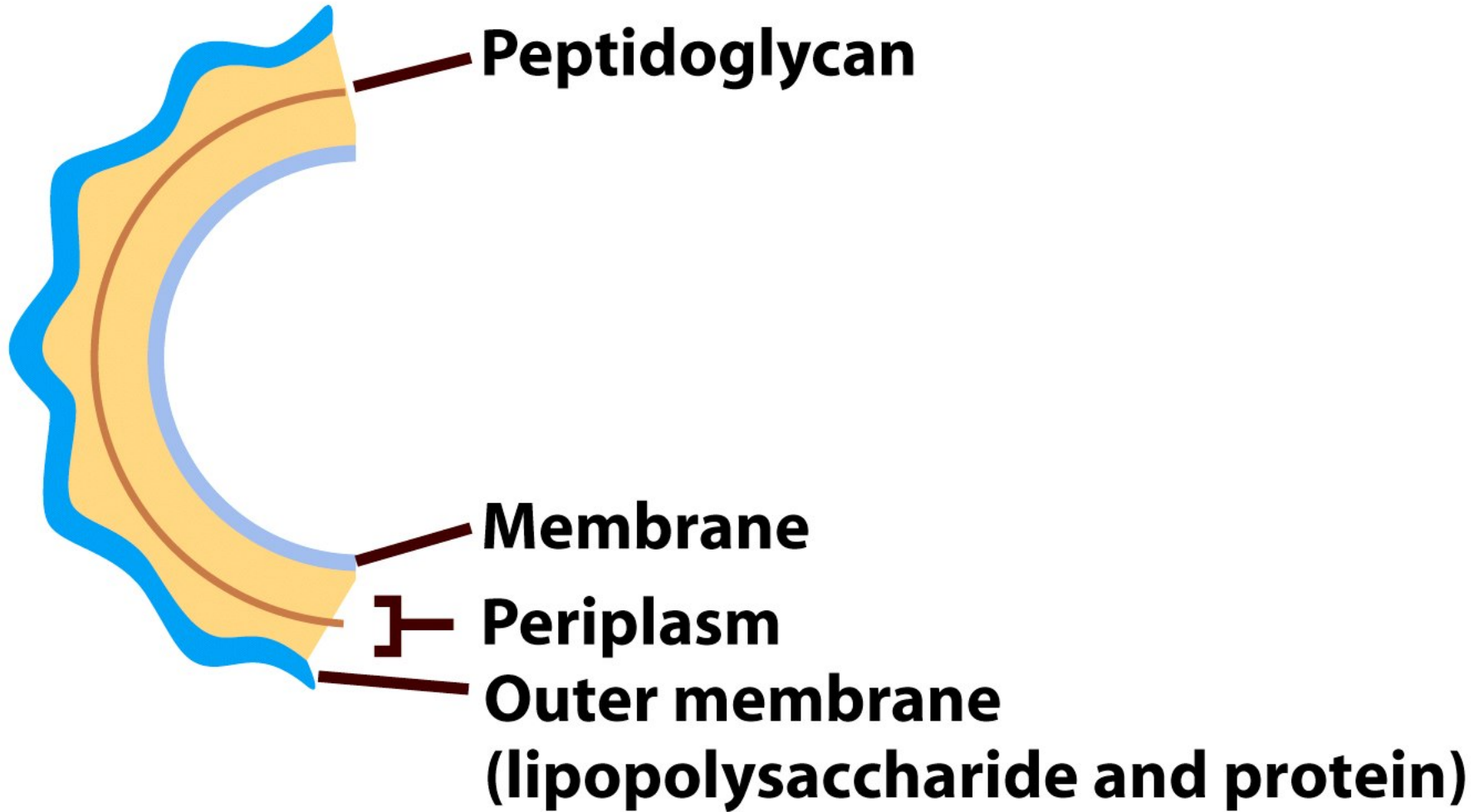


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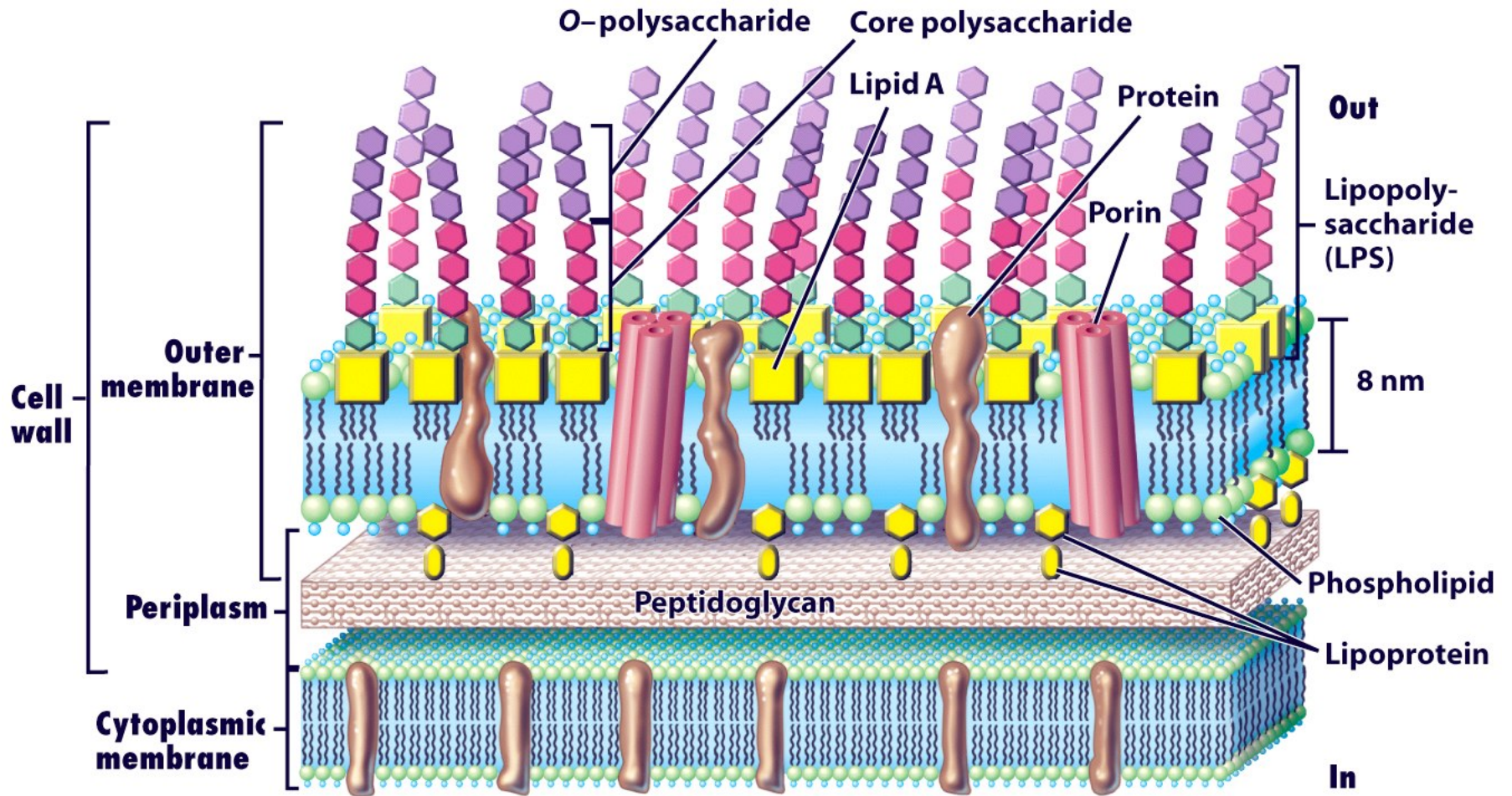


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- In addition to peptidoglycan, gram-negative *Bacteria* contain an **outer membrane** consisting of **lipopolysaccharide (LPS)**, protein, and lipoprotein.

Cell Growth

- Microbial **growth** involves an increase in the number of cells. Growth of most microorganisms occurs by the process of **binary fission**.

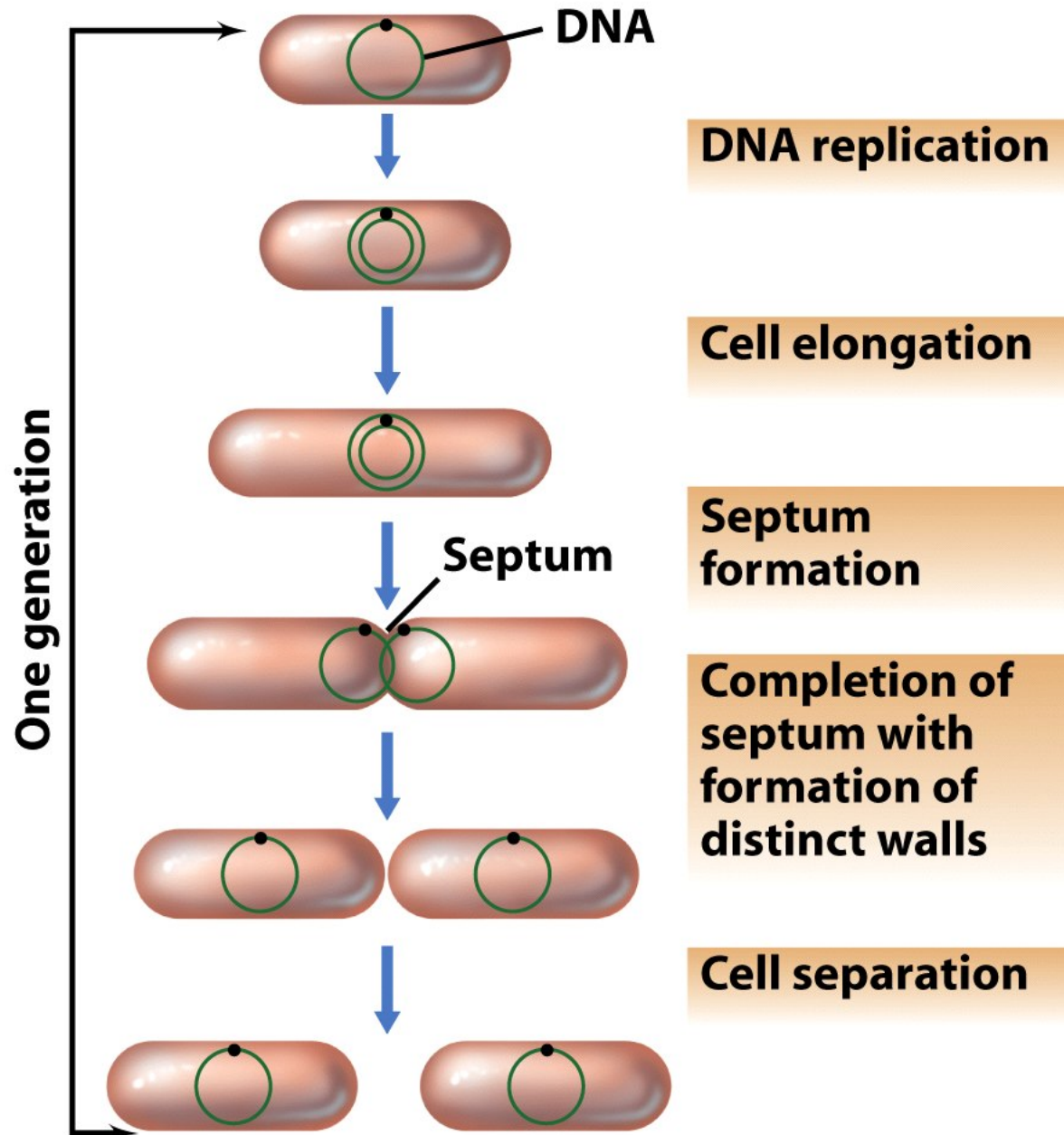


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- Microbial populations show a characteristic type of growth pattern called **exponential growth**.

Time (h)	Total number of cells	Time (h)	Total number of cells
0	1	4	256 (2^8)
0.5	2	4.5	512 (2^9)
1	4	5	1,024 (2^{10})
1.5	8	5.5	2,048 (2^{11})
2	16	6	4,096 (2^{12})
2.5	32	.	.
3	64	.	.
3.5	128	10	1,048,576 (2^{19})

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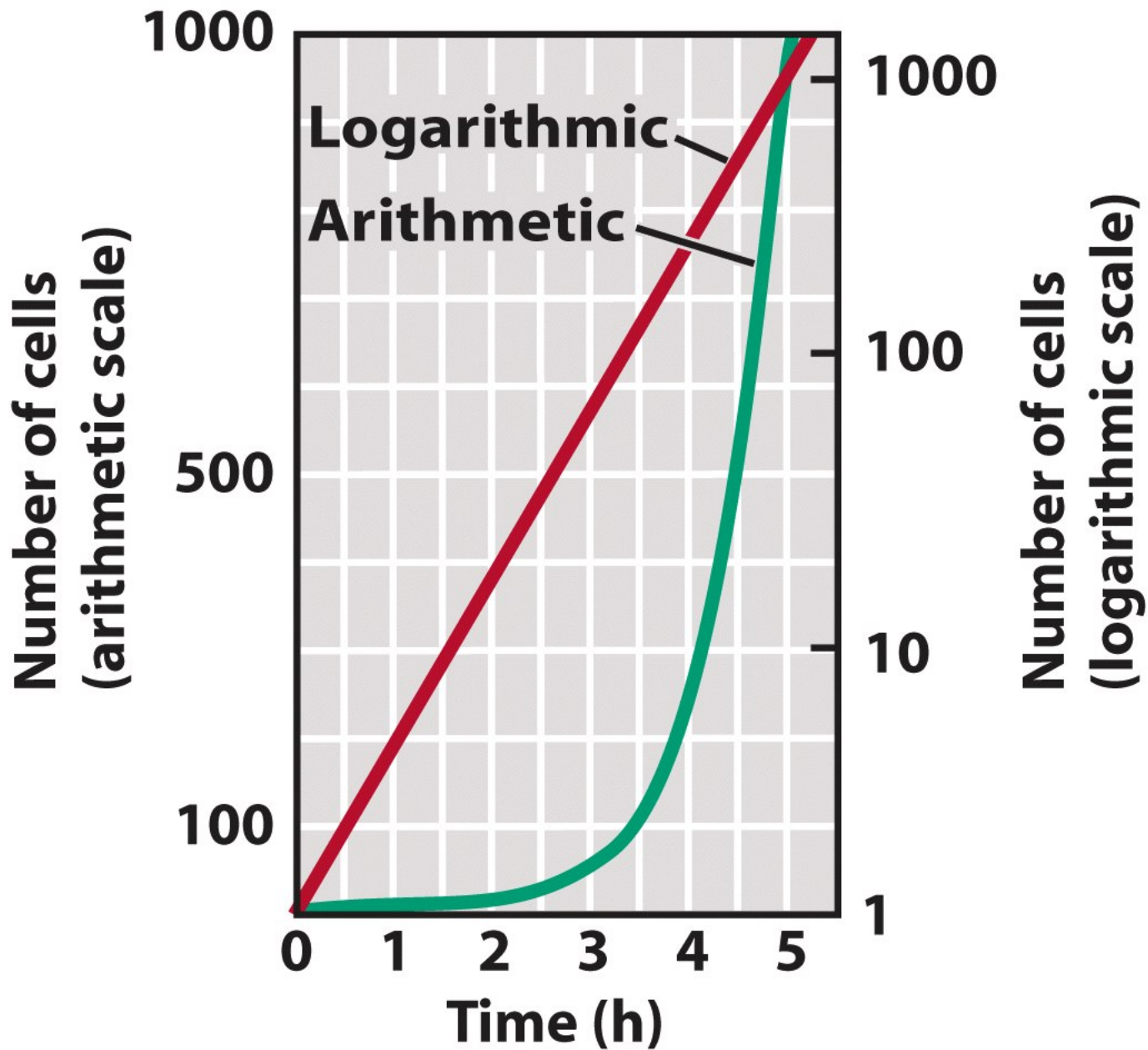
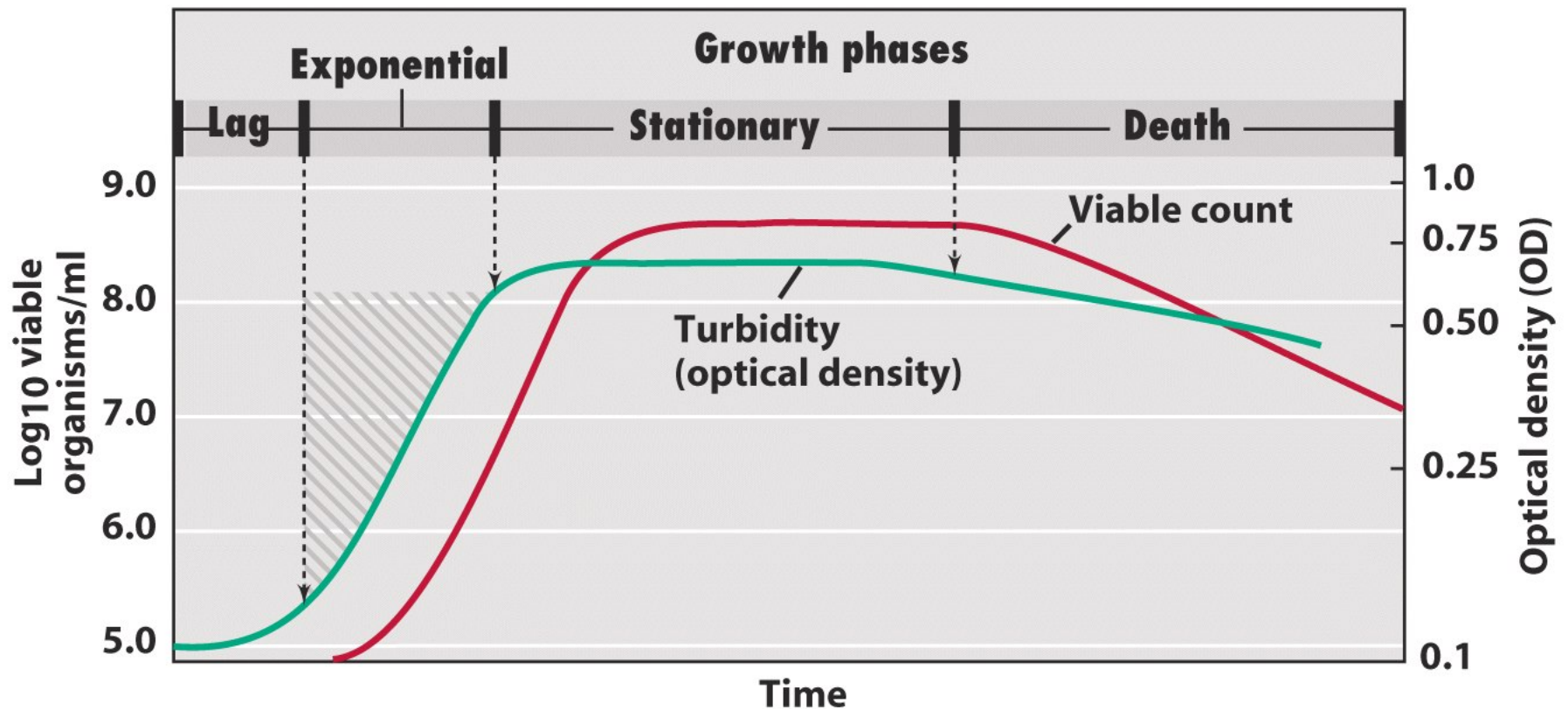


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The Growth Cycle

- Microorganisms show a characteristic growth pattern when inoculated into a fresh culture medium.



Environmental Effects on Microbial Growth

Temperature

- Temperature is a major environmental factor controlling microbial growth. The **cardinal temperatures** are the minimum, optimum, and maximum temperatures at which each organism grows.

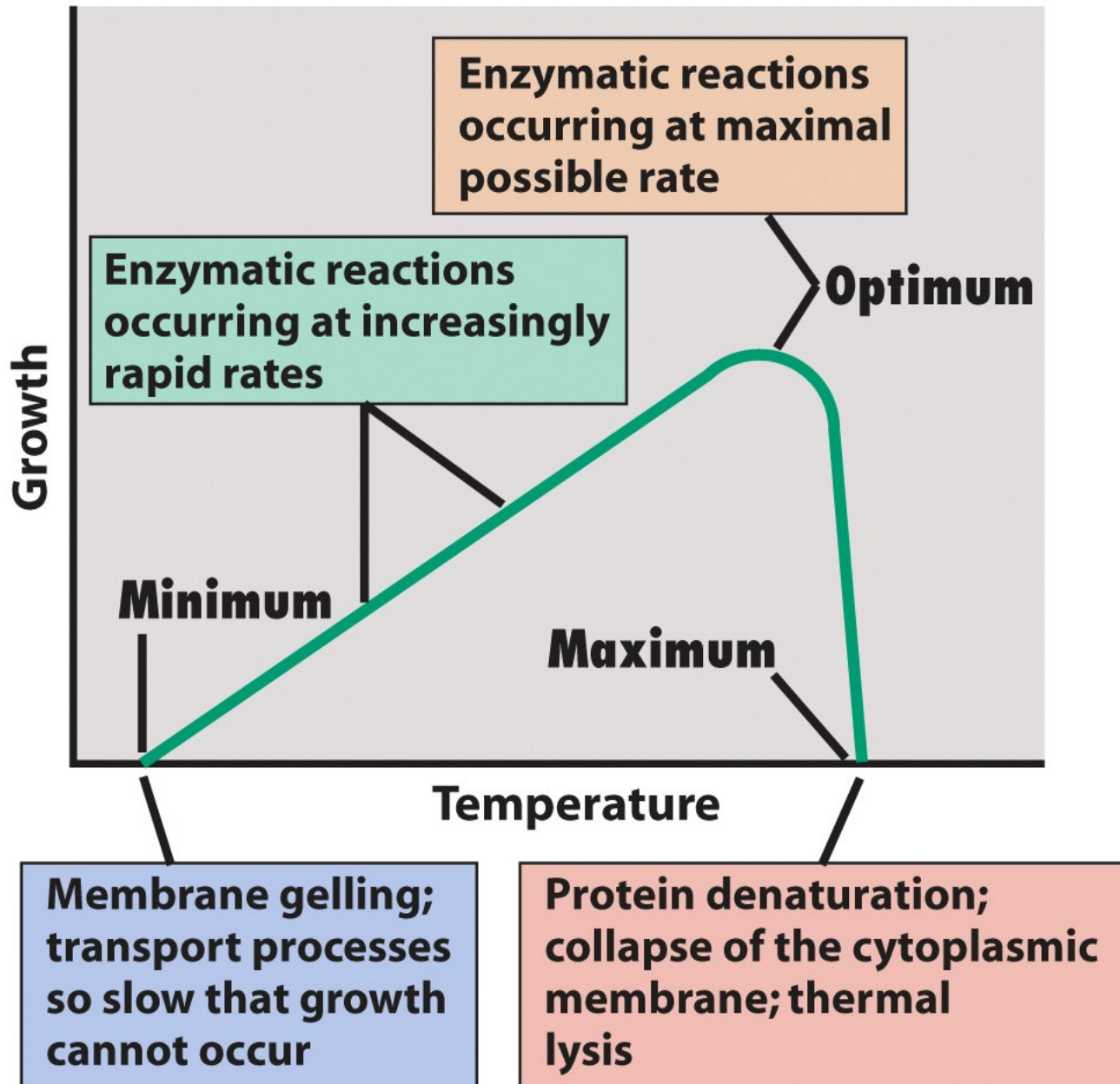


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- Microorganisms can be grouped by the temperature ranges they require.

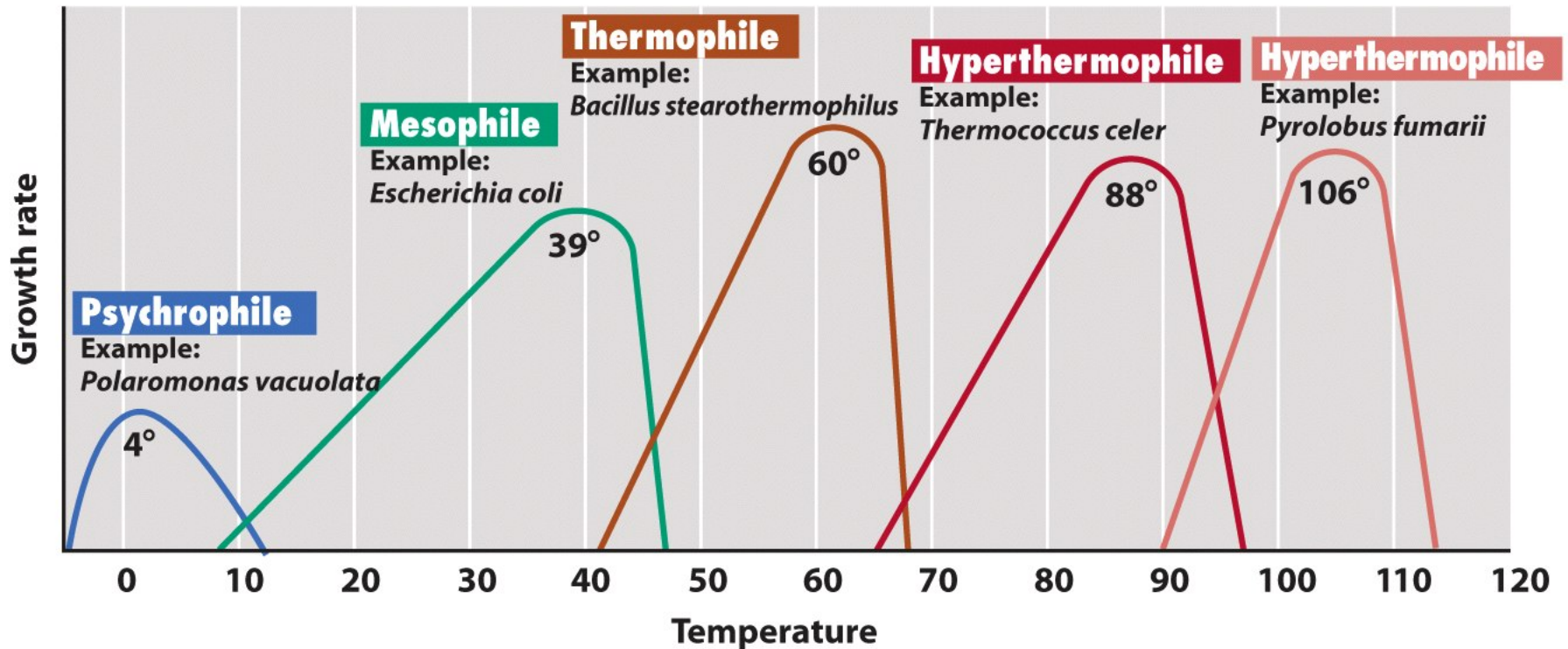


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