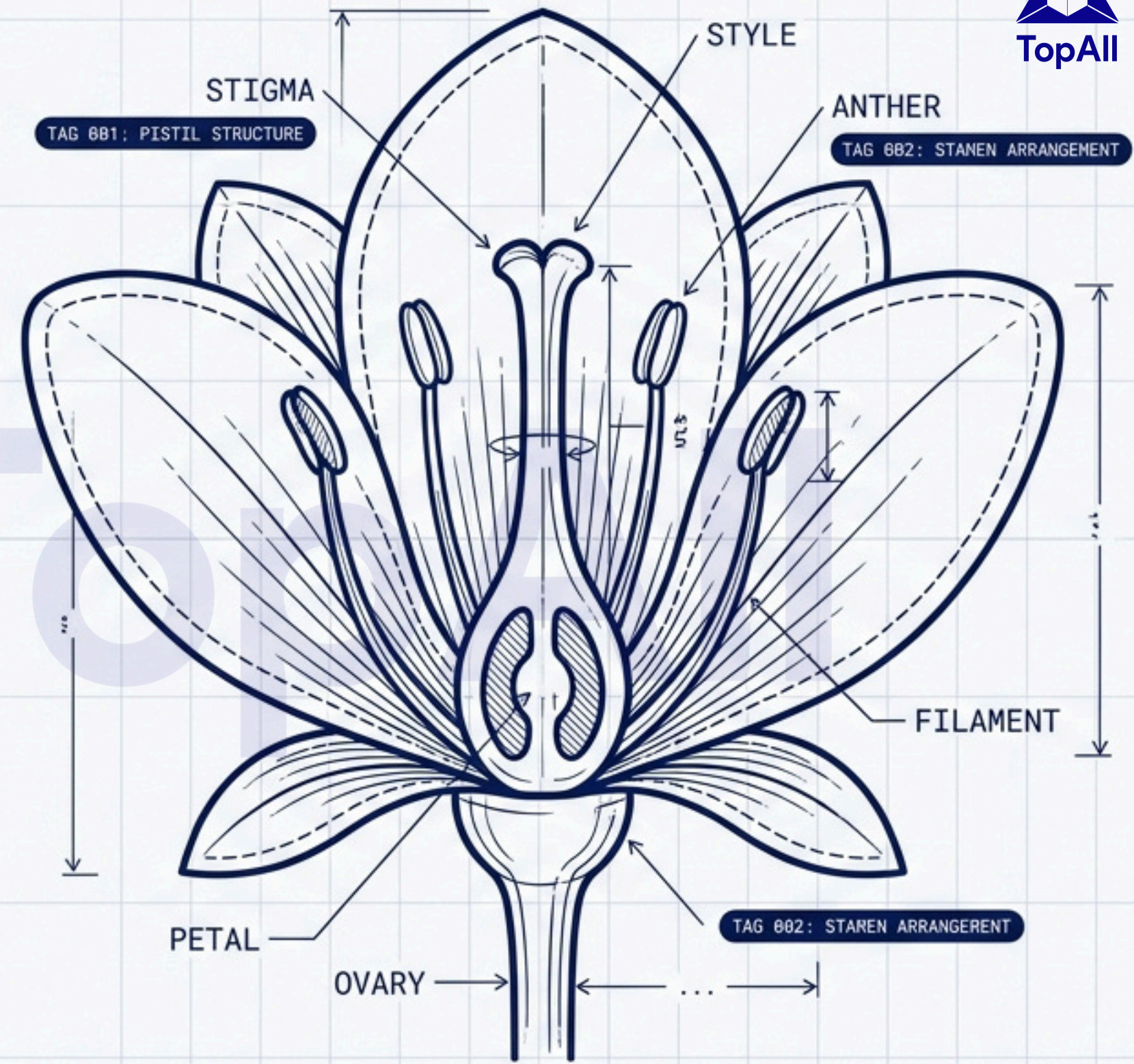
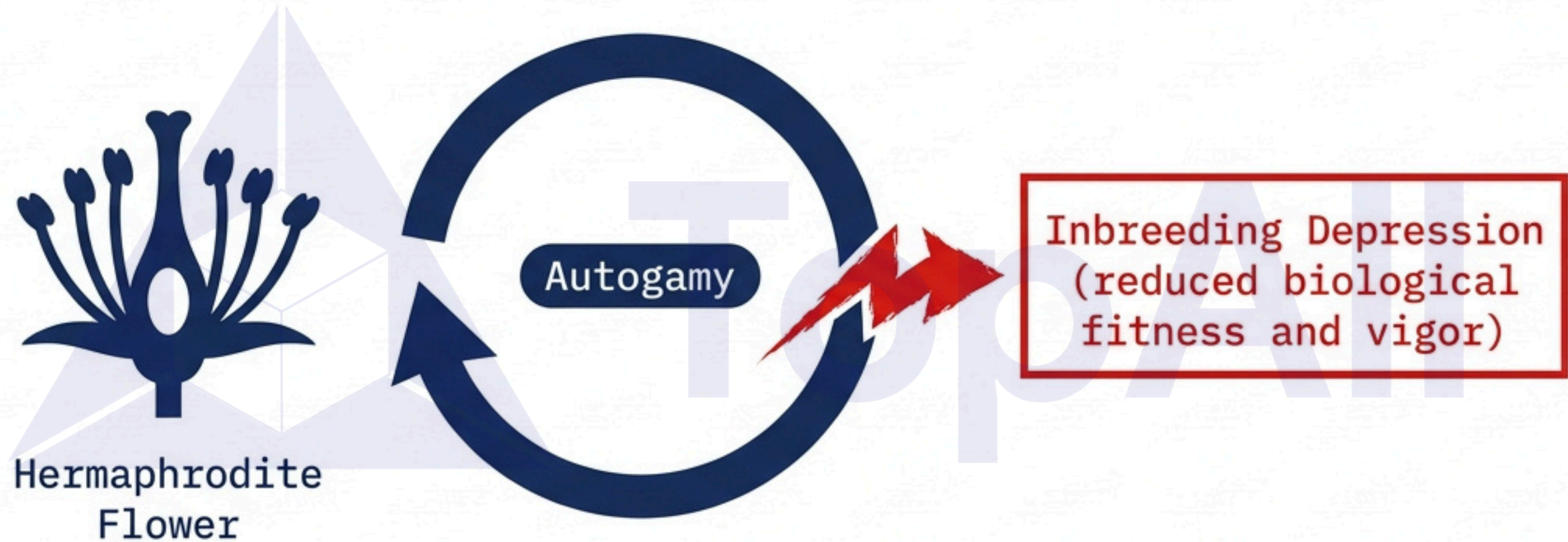


How Flowers Avoid Self-Pollination

Evolutionary mechanisms and outbreeding devices in angiosperms





To maintain genetic diversity and survival advantage, flowering plants have evolved specific devices to discourage self-pollination.

Temporal Asynchrony

Pollen Release First



Prevents Autogamy

By lacking synchrony, the pollen simply cannot fertilize the stigma of the same flower.

Stigma Receptive First



Prevents Autogamy



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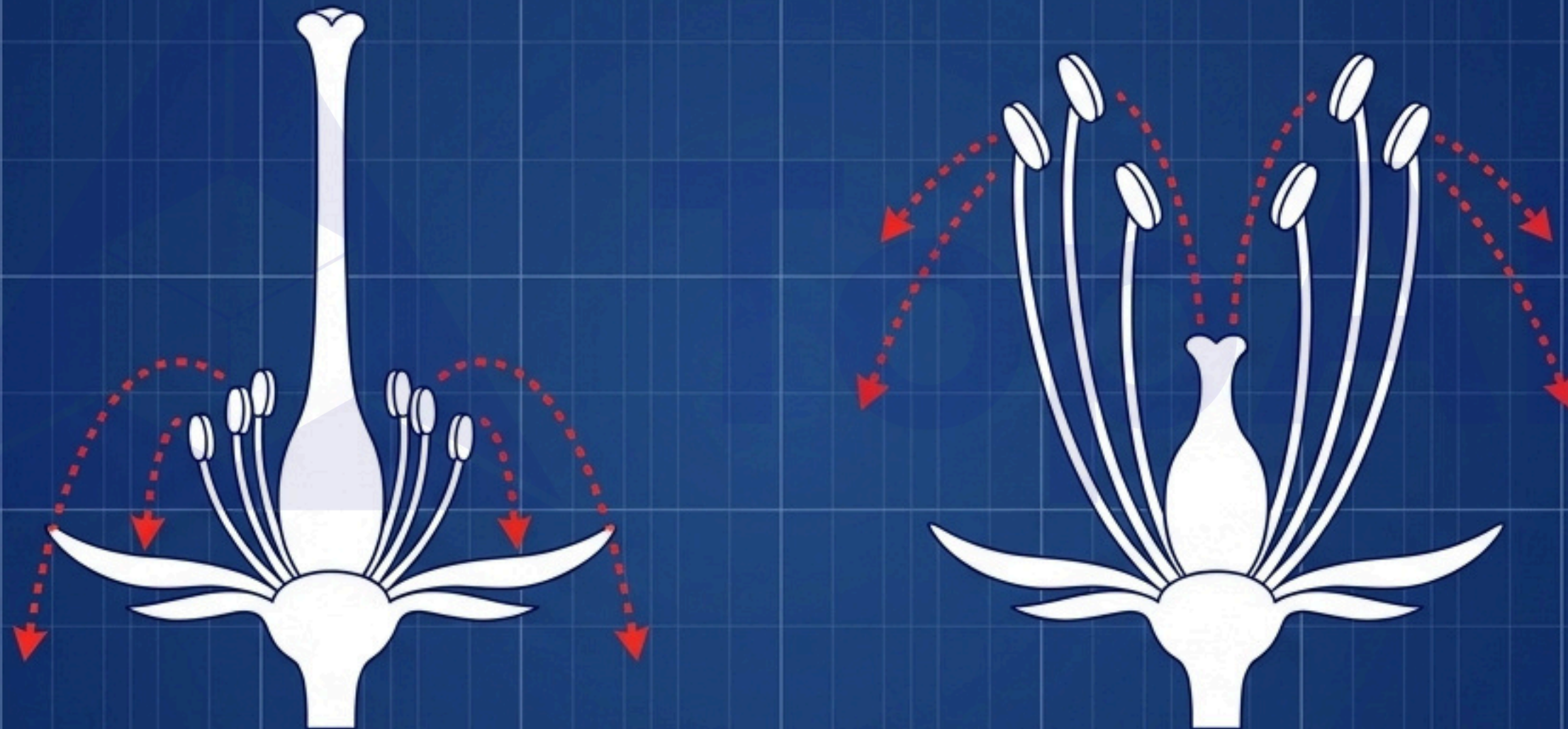
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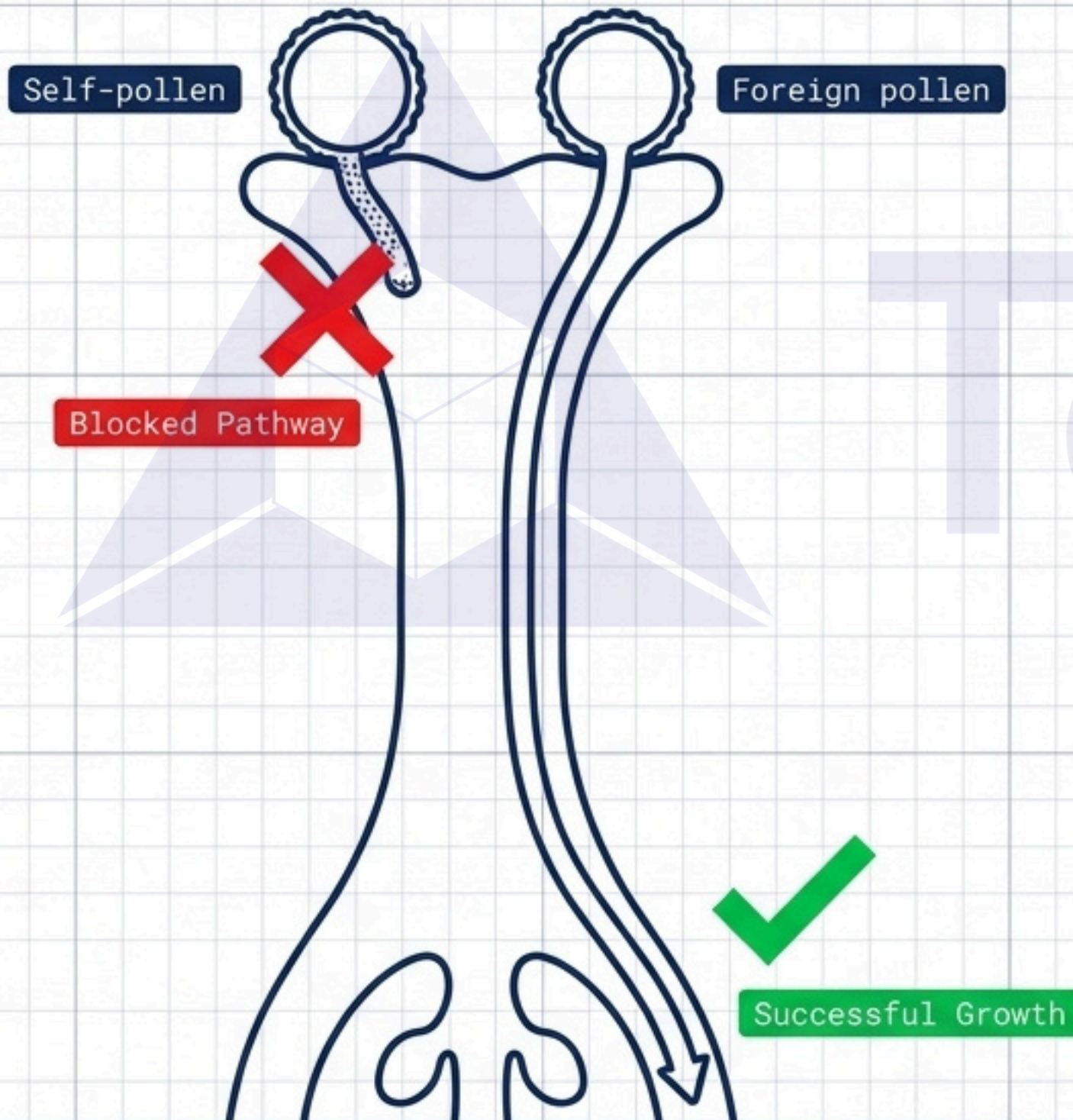
Spatial Separation

Different Anther-Stigma Positions



Physical Barrier to Autogamy

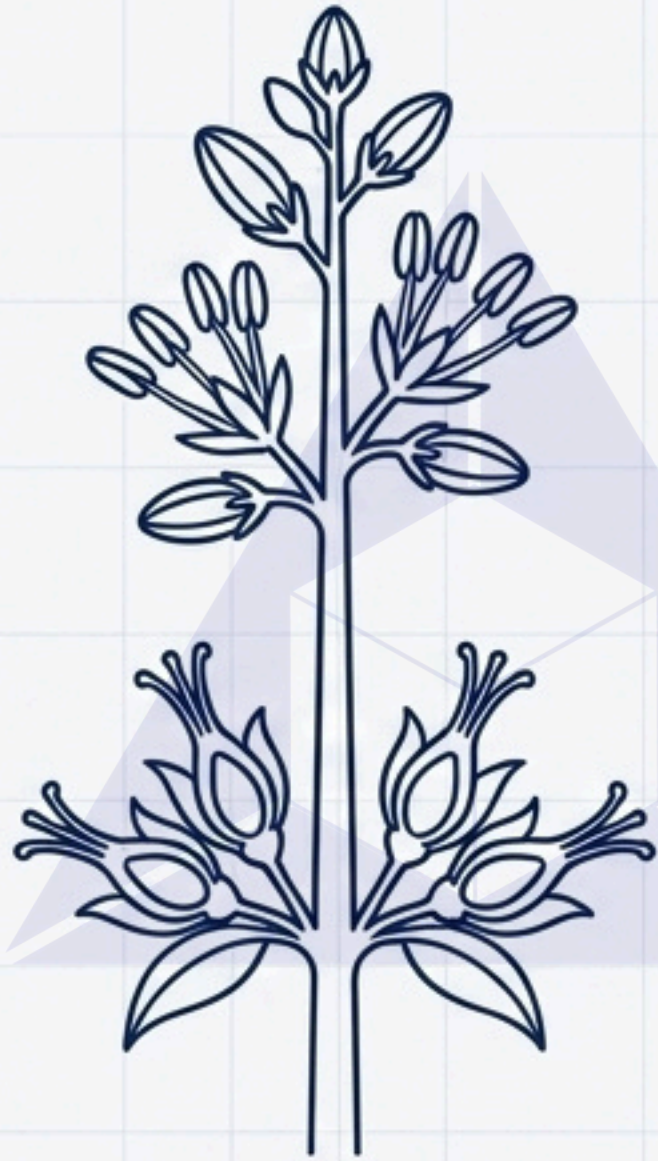
The Genetic Blocker: Self-Incompatibility



A genetic mechanism that recognizes and inhibits self-pollen (from the same flower or other flowers of the same plant) from germinating or growing a pollen tube.

GENETIC MECHANISM

Monoecy (e.g., Castor, Maize)



Prevents Autogamy

❌ Does NOT prevent geitonogamy (same-plant pollination).

Dioecy (e.g., Papaya)



Plant A



Plant B

Prevents Autogamy & Geitonogamy

Nature prioritizes genetic variation. Through temporal, spatial, genetic, and structural adaptations, plants ensure cross-pollination to build stronger, more adaptable species.

Outbreeding Device	Blocks Autogamy (Same flower)?	Blocks Geitonogamy (Same plant)?
Temporal Mismatch	✓	✗
Spatial Separation	✓	✗
Self-Incompatibility	✓	✓
Monoecy (Unisexual flowers on same plant)	✓	✗
Dioecy (Unisexual flowers on different plants)	✓	✓

Geitonogamy is functionally cross-pollination but genetically similar to autogamy.



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