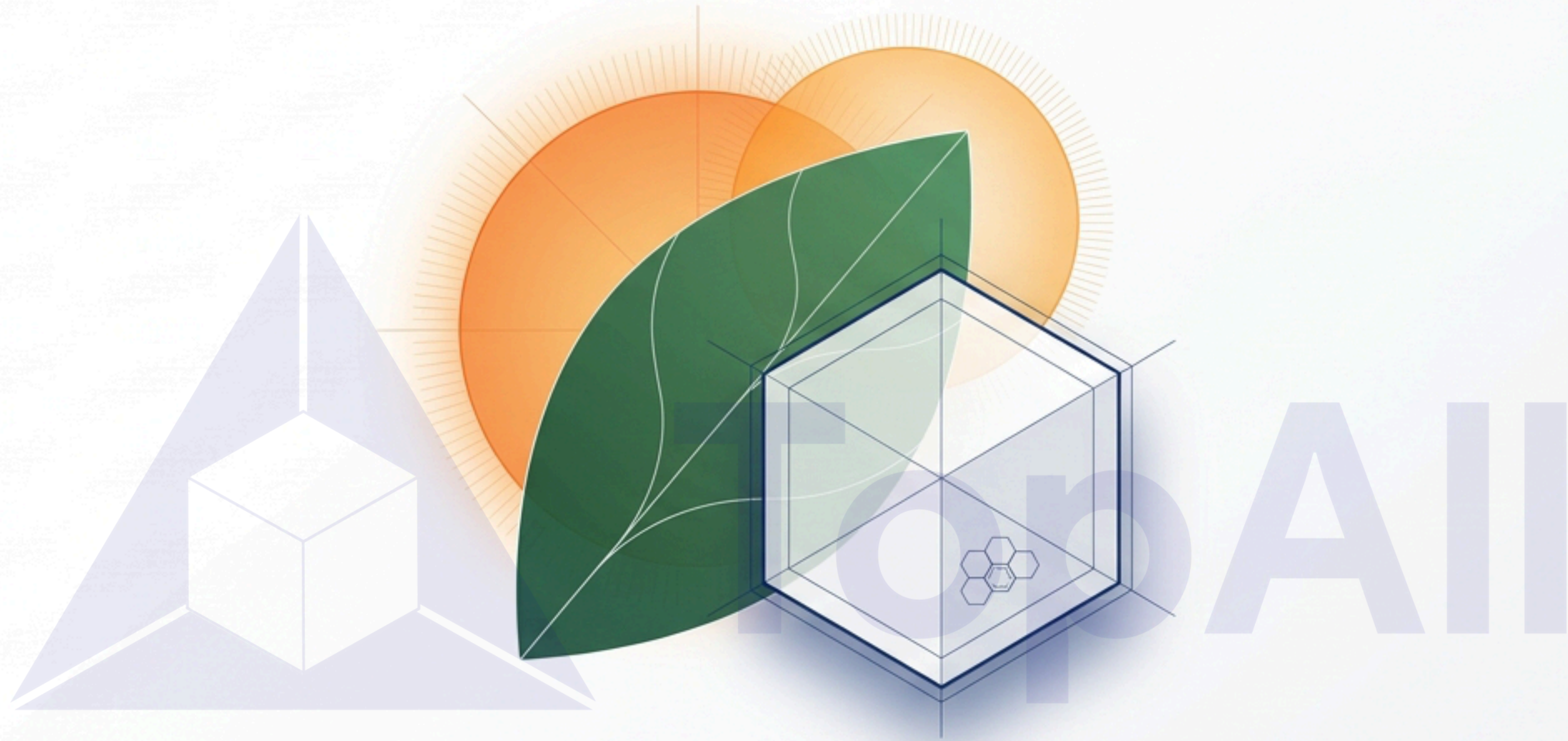




BIOLOGY: THE UNIT OF LIFE

Colour, Storage and Photosynthesis

An exploration of Plastids, their classification, and their cellular functions.

The Foundations of Plastids

Plastids are prominent, membrane-bound organelles unique to specific eukaryotes. They bear specific pigments that fundamentally determine the color of the host organism or function as crucial storage vaults. Crucially, they are entirely absent in animal cells.

OBSERVATION: Due to their relatively large size, plastids are easily observed under standard light microscopes.

Plant Cells

Universal presence across all plant cells (e.g., in the mesophyll of leaves).



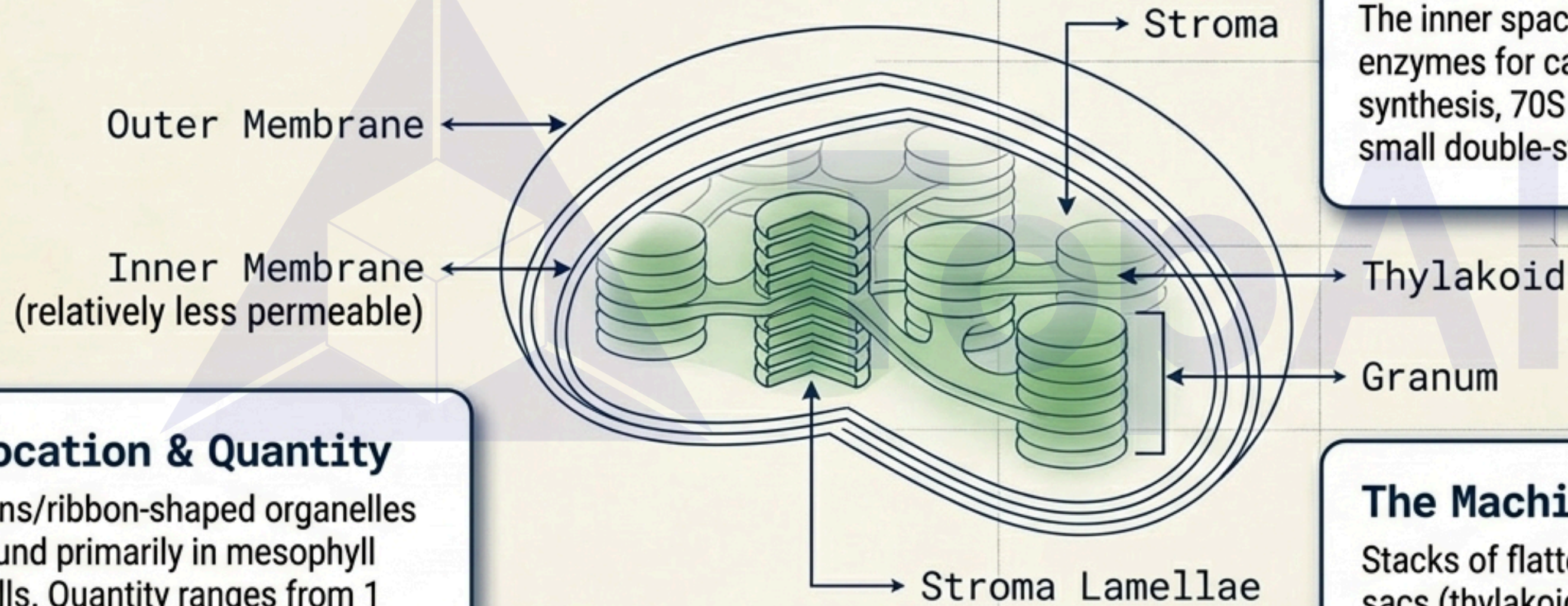
Euglenoids

Also found in these unique single-celled flagellate eukaryotes.

Chloroplasts: The Photosynthesis Engine

PIGMENT: CHLOROPHYLL & CAROTENOIDS

SIZE: 5-10 μ m L / 2-4 μ m W



Location & Quantity

Lens/ribbon-shaped organelles found primarily in mesophyll cells. Quantity ranges from 1 per cell (*Chlamydomonas*) to 20-40 per cell.

The Matrix (Stroma)

The inner space containing enzymes for carbohydrate/protein synthesis, 70S ribosomes, and small double-stranded circular DNA.

The Machinery (Grana)

Stacks of flattened membranous sacs (thylakoids) enclosing a lumen. This is where light-trapping chlorophyll resides.



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Chromoplasts: The Colour Providers

PIGMENT: FAT-SOLUBLE CAROTENOIDS

The Pigments

Rich in carotene, xanthophylls, and other specialized fat-soluble carotenoid pigments.

The Function

Responsible for imparting brilliant colors to various parts of the plant, such as flowers, fruits, and aging leaves.

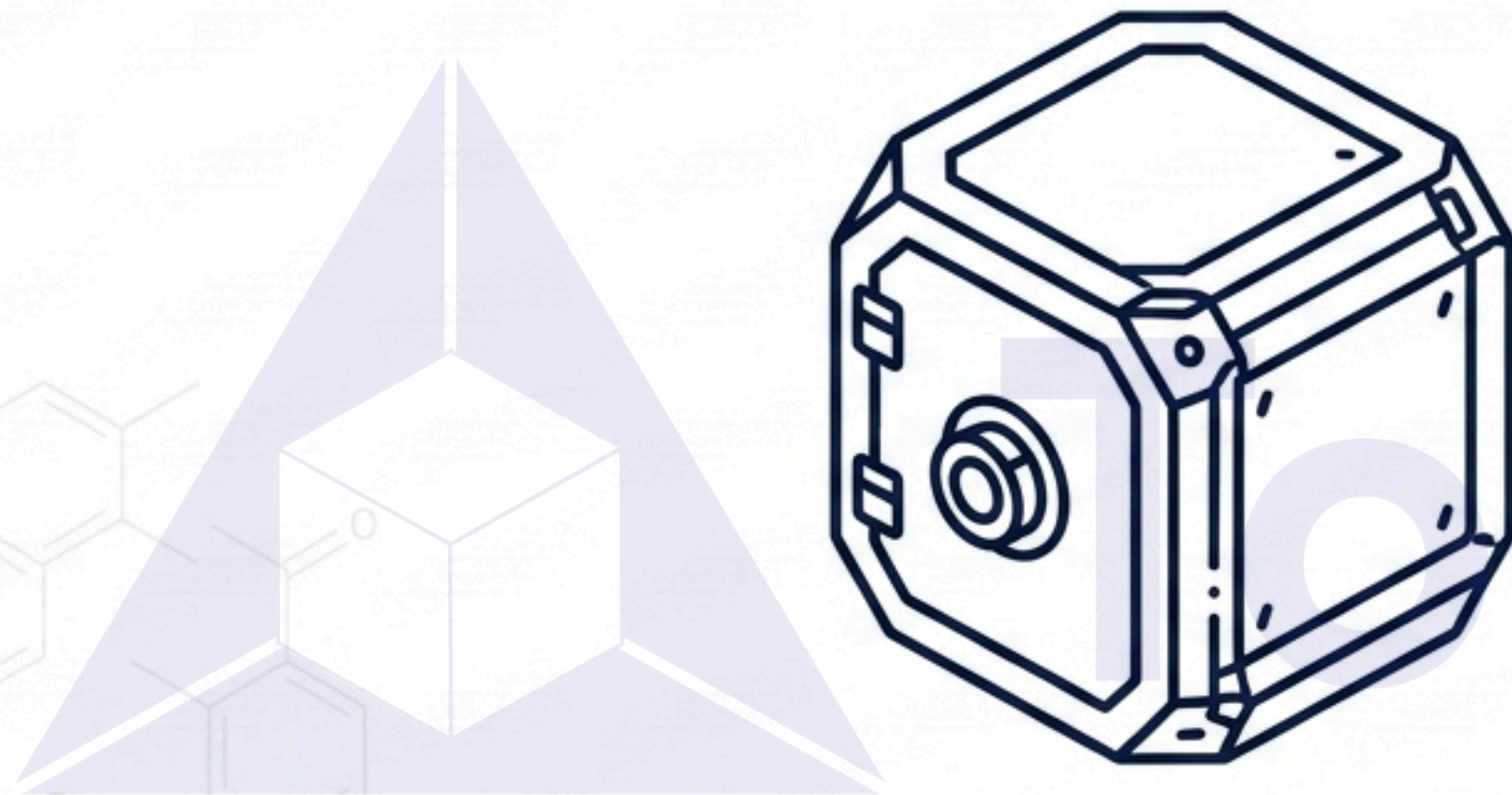
The Visual Range

Manifests visually as distinct Yellow, Orange, and Red hues, serving vital ecological roles like attracting pollinators and seed dispersers.

Leucoplasts: The Colourless Vaults

Leucoplasts are defined by what they lack-color-and what they provide: highly specialized cellular storage.

PIGMENT: NONE



- Devoid of any pigments, appearing entirely colourless under observation.
- Exhibit highly varied shapes and sizes depending on the specific cell type and its unique storage requirements.
- Act as the primary storage facilities for vital plant nutrients, remaining hidden in non-photosynthetic tissues.

Classification of Storage Plastids



STORAGE: CARBOHYDRATES

Amyloplasts

Synthesize and store carbohydrates in the form of starch.

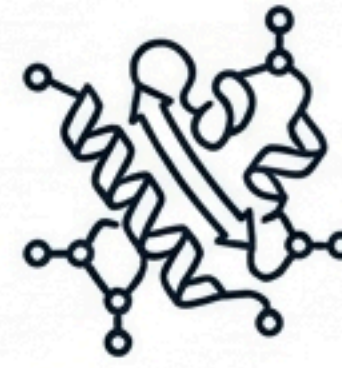
- Found in highly concentrated amounts within potato tubers.



STORAGE: OILS & FATS

Elaioplasts

Specialized organelles dedicated to the synthesis and storage of essential plant lipids and oils.



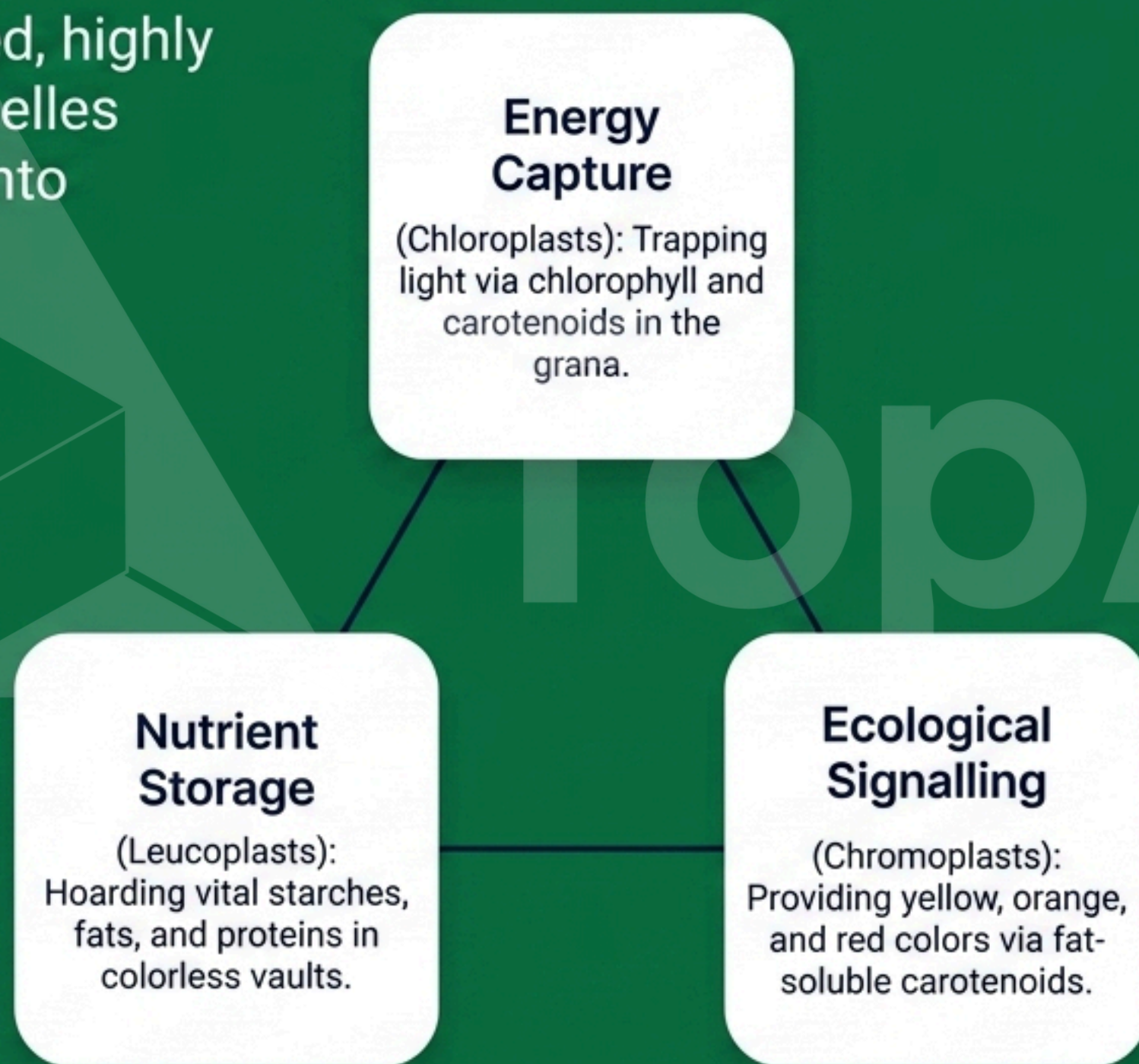
STORAGE: PROTEINS

Aleuroplasts

Dedicated to storing protein granules, most frequently observed in the tissues of seeds.

Summary: The Plastid Triad

Plastids form a specialized, highly adaptable family of organelles that divide cellular labor into three fundamental roles:



EVOLUTIONARY NOTE:

Chloroplasts contain their own circular DNA and 70S ribosomes (smaller than the host's 80S cytoplasmic ribosomes), pointing to their unique, semi-autonomous origin.



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