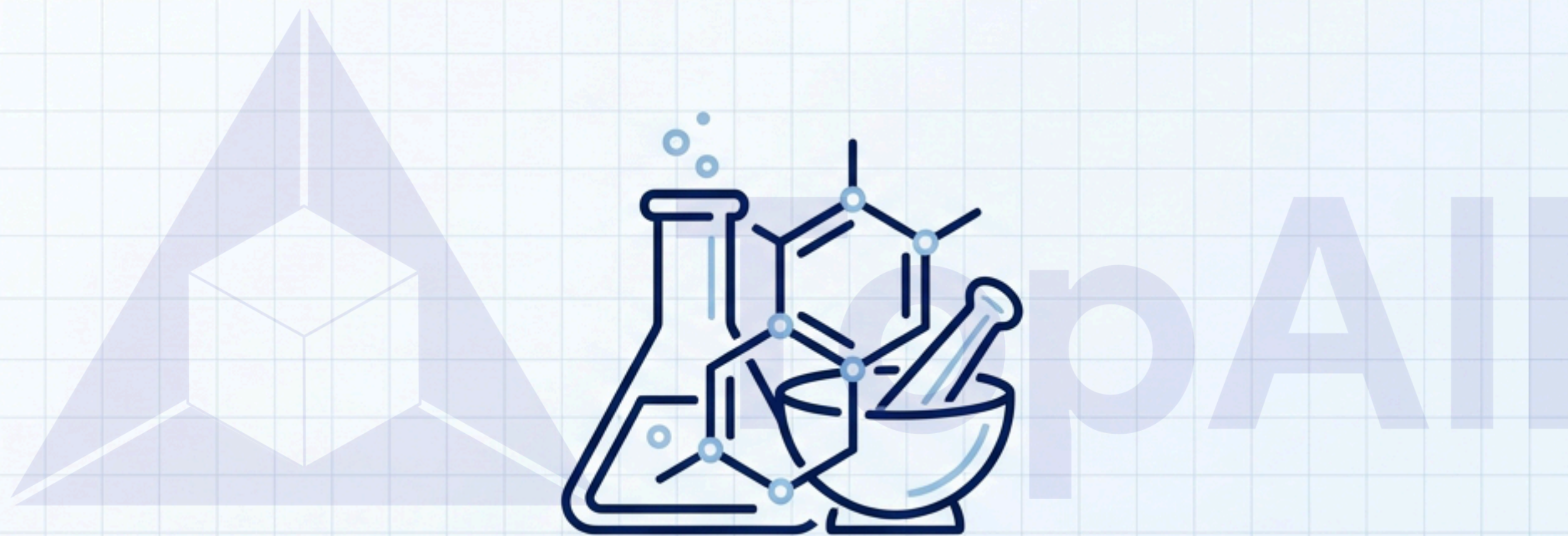




How Scientists Find Biomolecules

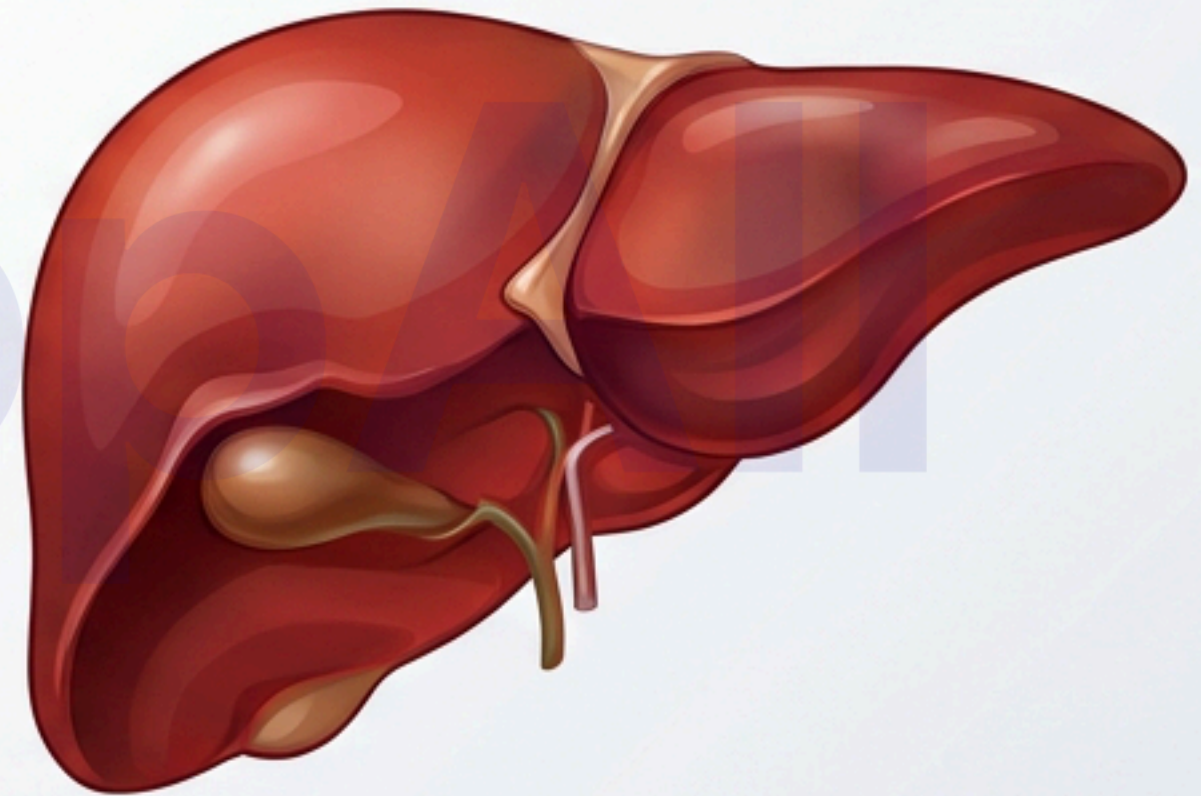
A step-by-step laboratory protocol for analyzing the chemical composition of living tissues.

Procurement: Selecting the Living Tissue Sample

To answer if all living organisms are made of the same chemicals, we must perform an elemental and chemical analysis. The process begins by harvesting a sample of living matter—whether plant, animal, or microbial paste.



Plant Tissue (e.g., Leaf)



Animal Tissue (e.g., Liver)

Disruption: Grinding the Sample

The Tool



Mechanical grinding apparatus used to physically break cell walls and membranes.

The Reagent



Trichloroacetic acid. An acid used to precipitate proteins and extract soluble molecules.

The Action



Mechanical and chemical cellular disruption. The tissue is aggressively ground to release its internal chemical components.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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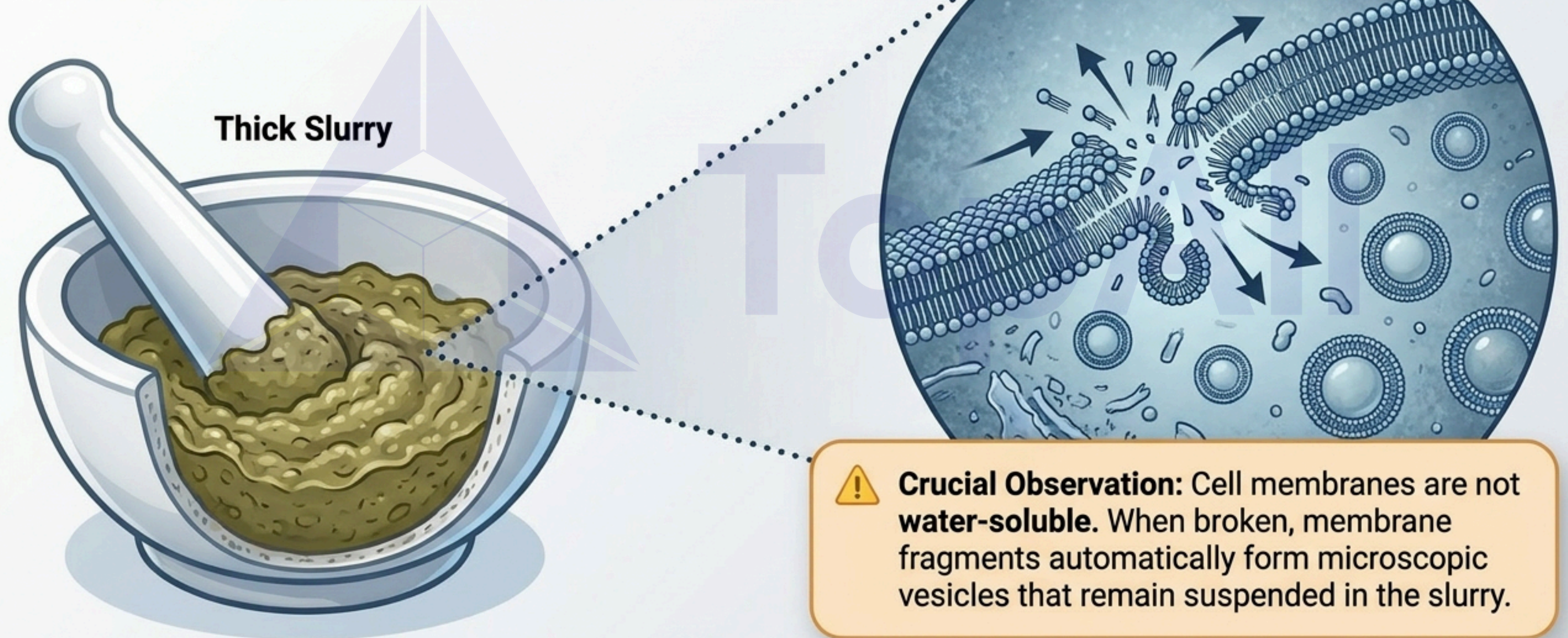
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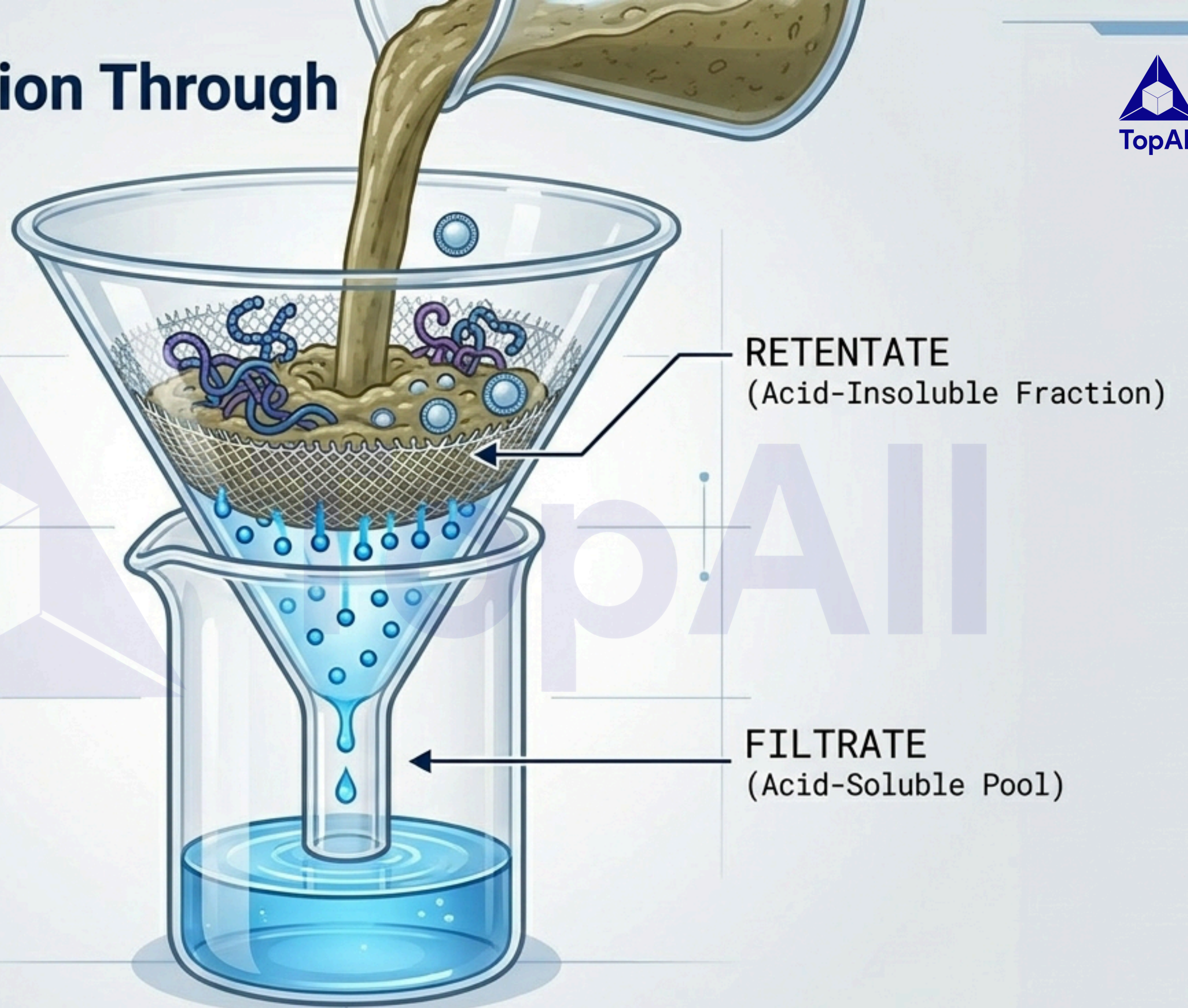


State Change: Formation of the Thick Slurry

The grinding process completely disrupts cellular architecture. The resulting mixture is a thick, heterogeneous slurry containing a mix of spilled cellular liquids and broken structural fragments.



Separation: Filtration Through Cheesecloth



Fraction 1: The Acid-Soluble Pool

Fraction Name	Filtrate
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Molecular Weight	18 – 800 Da (Daltons)
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Classification	Micromolecules (Biomolecules)
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Constituents	Sugars, amino acids, nitrogen bases, nucleotides.
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Represents roughly the cytoplasmic composition. These are the small, soluble building blocks freely floating in the cell's fluid.

Fraction 2: The Acid-Insoluble Fraction

Fraction Name	Retentate
Molecular Weight	>10,000 Da (Daltons)
Constituents	Biomacromolecules (Polymers)

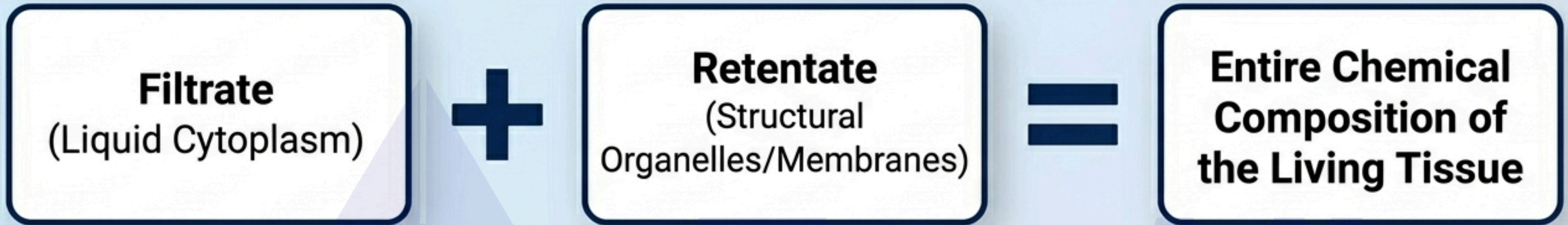


Why are **Lipids** here? Lipids weigh <800 Da, but they are **NOT** polymers. Because they form **insoluble membrane vesicles** during grinding, they get **physically trapped** in the retentate despite their **small molecular weight**.



Represents the structural macromolecules from the cytoplasm, cell membrane, and organelles.

The Biological Architecture Revealed



By grinding and filtering a simple leaf or piece of liver, scientists aren't just making a chemical soup—they are physically separating the cell's fluid building blocks (micromolecules) from its physical machinery (macromolecules). Together, these two pools represent the total chemical reality of life.

PROTOCOL COMPLETE. BIOMOLECULES IDENTIFIED.



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