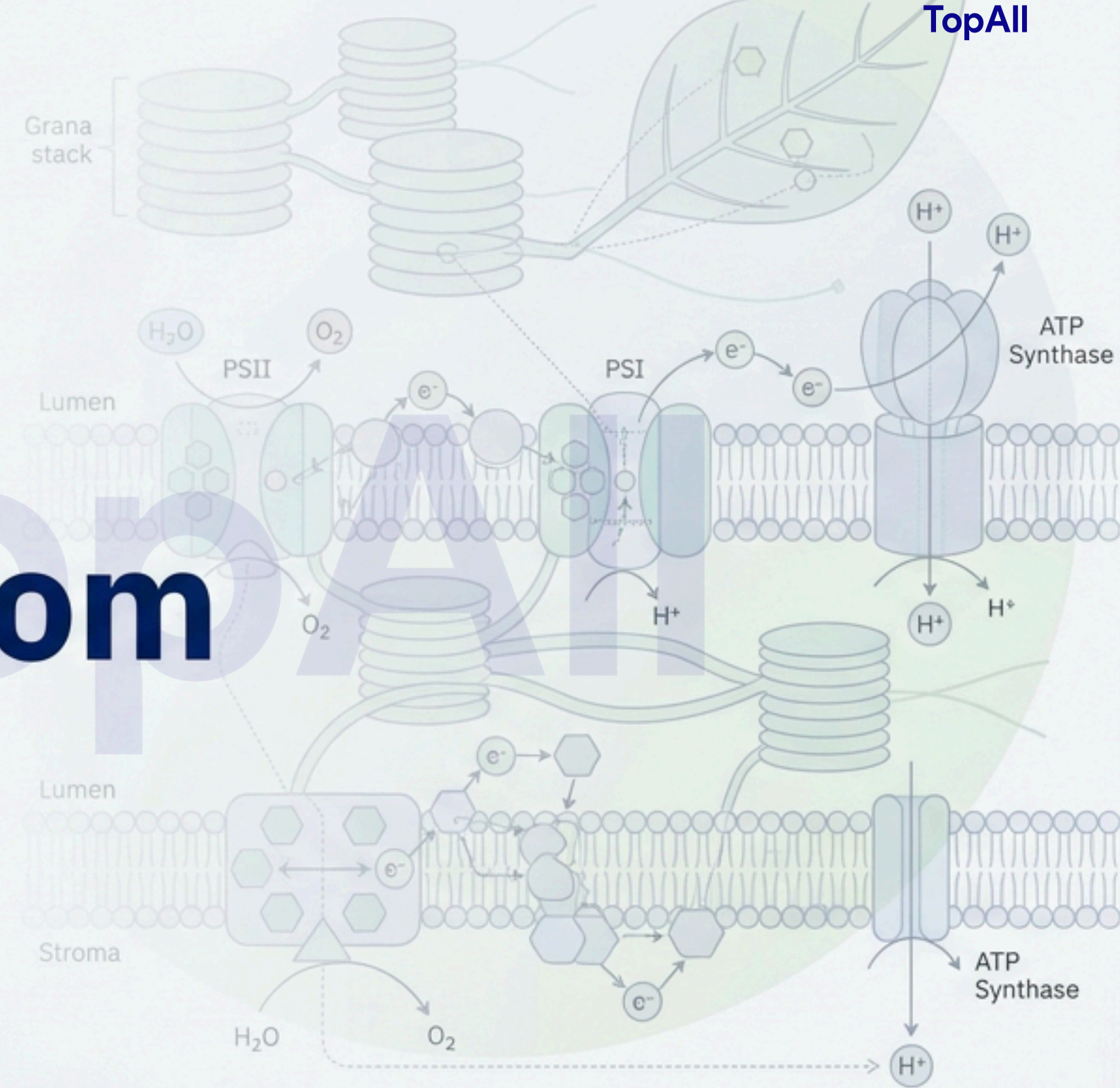
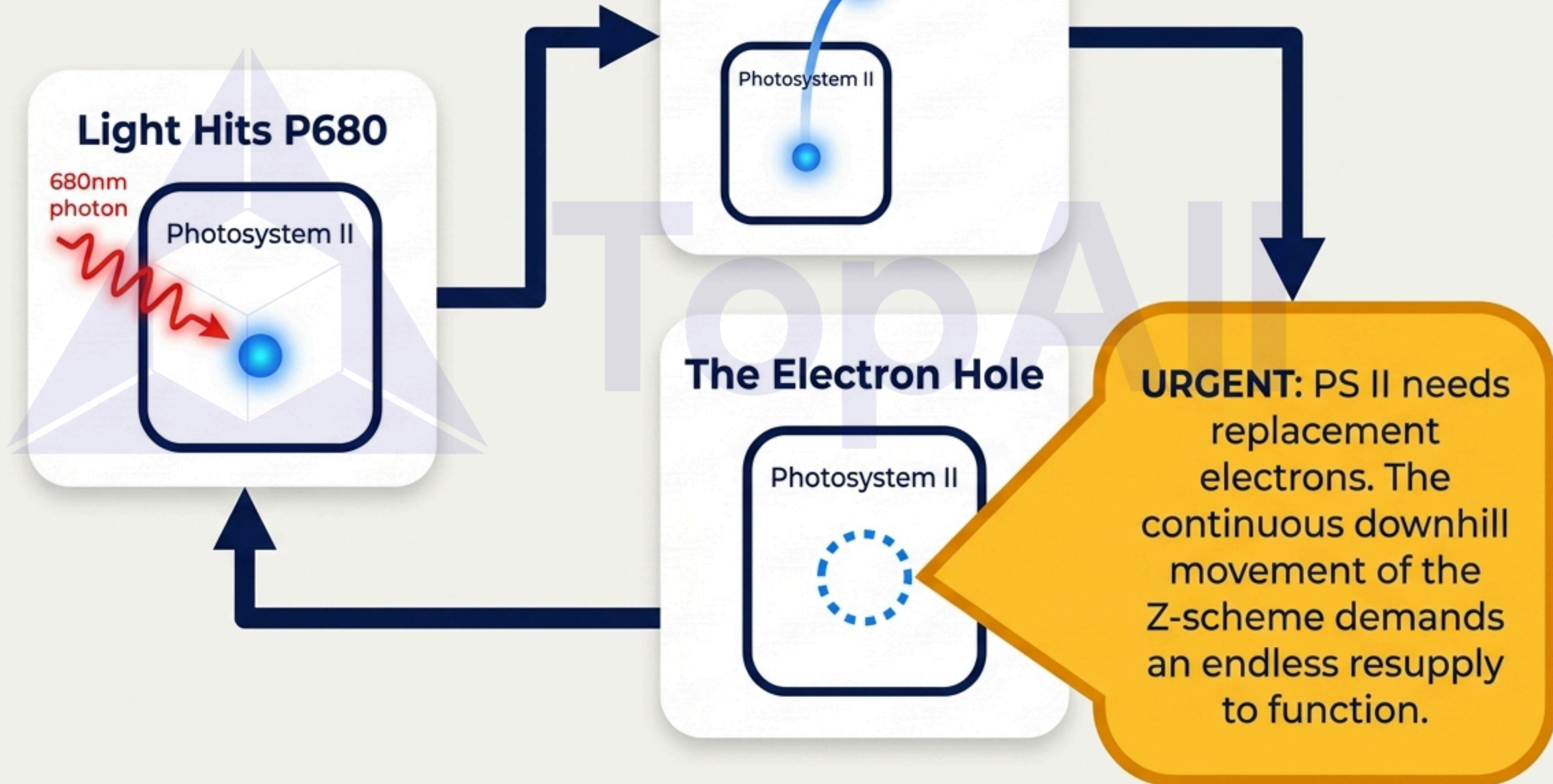


Where Photosynthetic Oxygen Comes From

The biological necessity and chemical mechanics of the water splitting complex.

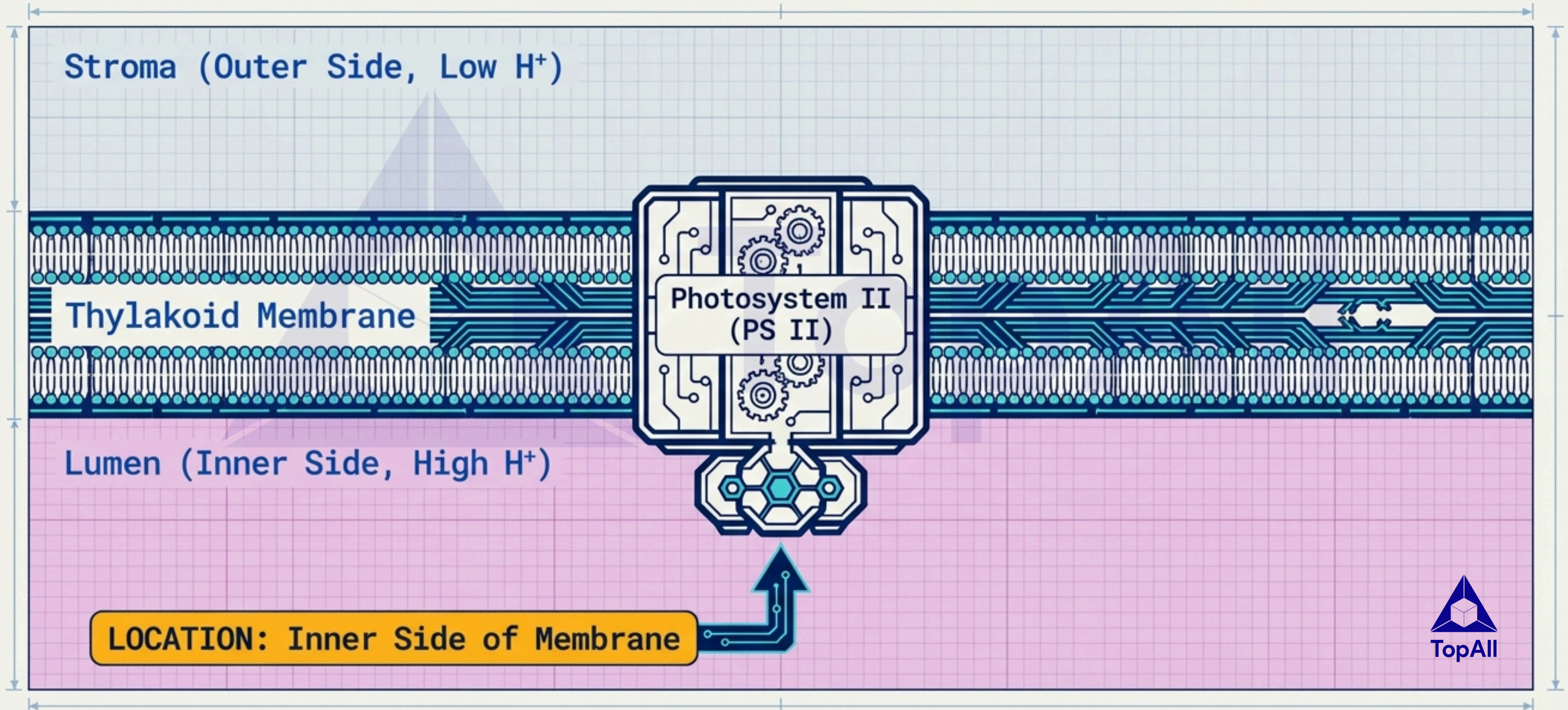


The Continuous Downhill Deficit



The Water Splitting Complex

The water splitting complex is physically associated with PS II, anchored on the inner side of the thylakoid membrane.





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$$E=mc^2$$



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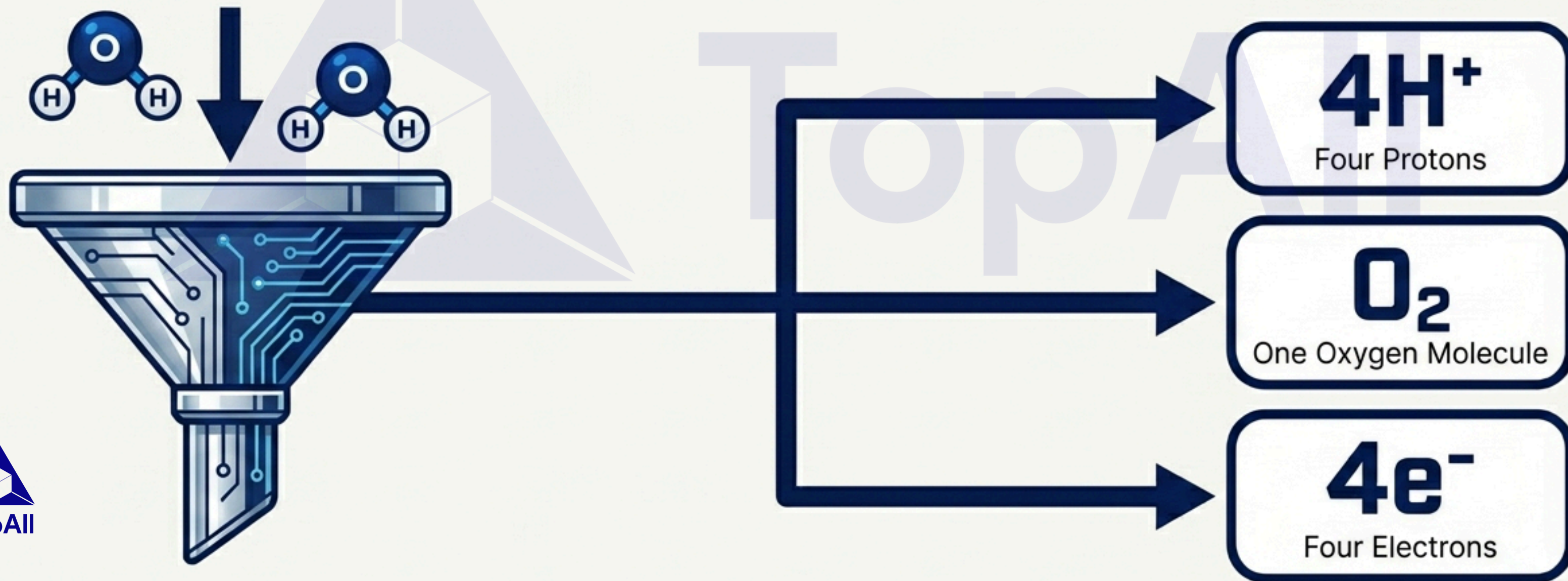
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The Chemical Solution

To replace the lost electrons, PS II physically splits water molecules, creating three distinct byproducts.



Distributing the Output

$4e^-$ (Electrons)



The Replacements.

These electrons are immediately fed back into Photosystem II to fill the hole left by light excitation, sustaining the Z-scheme.

$4H^+$ (Protons)



The Gradient Builders.

Protons accumulate within the thylakoid lumen. This high concentration creates the proton gradient necessary to drive ATP synthesis.

O_2 (Oxygen)



The Net Byproduct.

Oxygen gas diffuses out of the chloroplast and eventually out of the plant, replenishing the atmosphere.

The Ultimate Sacrificial Donor



Water is the ultimate sacrificial electron donor.

- By sacrificing its electrons, water enables plants to continuously store solar energy in chemical bonds.
- In the process of taking water's electrons, the plant releases oxygen—inadvertently oxygenating the Earth and sustaining all aerobic and heterotrophic life.





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