



THE CALVIN CYCLE!

THE CAST

The Groom (RuBP)
The Groomsmen (4 Carbons)
The Bride (CO₂)
The Minister (Rubisco)
Wedding attendees (ATP and NADPH)
Reception guests (G3Ps)
Ensemble

The setting
The leaf (classroom)
The stroma (the inner space)
the stoma (the open doors)

Act 1

We meet RuBP and his 5 carbon entourage floating in the stroma. Other characters roam in the background

Here's the story of RuBP
Who was floating in the stroma on its own
There were lots of other RuBPs around
But each was all alone

Act 2

One CO₂ enters the leaf through an open stoma and diffuses through the membrane path til it reaches the stroma inside the chloroplast.

Here's the story of carbon dioxide
That had come in through an open stoma
It diffused through mesophyl cytoplasm
Ending in the stroma

Act 3

Carboxylation! Rubisco joins the two together to form a 6 carbon compound. After the ceremony, the bride and groom immediately get in a big fight and get ready to split.

Till Rubisco brought these two together at last
And in one magical moment of chemistry
They were joined as one and seemed to have a blast
But their union was not really meant to last...
Not meant to last, not meant to last, their union was not meant to last

Act 4

Following the fight between the bride and groom, the 6 carbon compound splits in two to form two G3Ps also float around in the stroma.

When their blissful union so ended
The 6 carbon compound had split into two
Forming two molecules of Phosphoglycerate
So what's a plant to do?

Act 5

NADPH and the hyperenergetic ATP that are present in the stroma change the G3Ps to the aldehyde triosphosphate by donating one phosphate from its tail and NADPH gives its H

NADPH and ATP too
Bring energy and electrons for the ride
They reduce the acid on phosphoglycerate
Forming an aldehyde

Act 6

One of the triose phosphate is used to make starch in the chloroplast (and floats away) exported to be used in other biochemical steps to make sugars in the cytoplasm, the rest will go through the regeneration process.

Now some aldehydes are used to make the sugars
Starch or other carbon need a plant may see
But no more CO_2 can be taken up now
Unless somethings done about RuBP
RuBP, RuBP something is done about RuBP

Regeneration

Final Act

The remaining carbons go through the complicated regeneration steps to reform RuBP With the help of more ATP's

The remaining Triosephosphates arrange themselves into a group of 9 (which splits into a 5 and 4) then forms 7 and 10 and splits into two 5's

The aldehydes each have 3 carbons

There are 5 carbons in RuBP

Making a five carbon compound from one with 3

A problem you see

Now take 5 of the 3 carbon compounds

A total of 15 for your use

You can then make 3 of the 5 carbon sugars

Problem solved! What good news!

