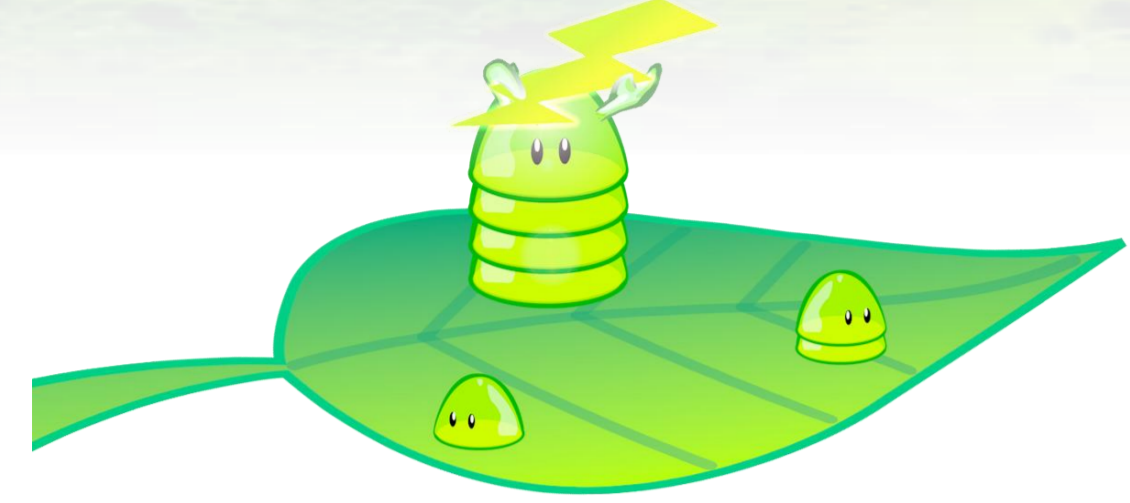


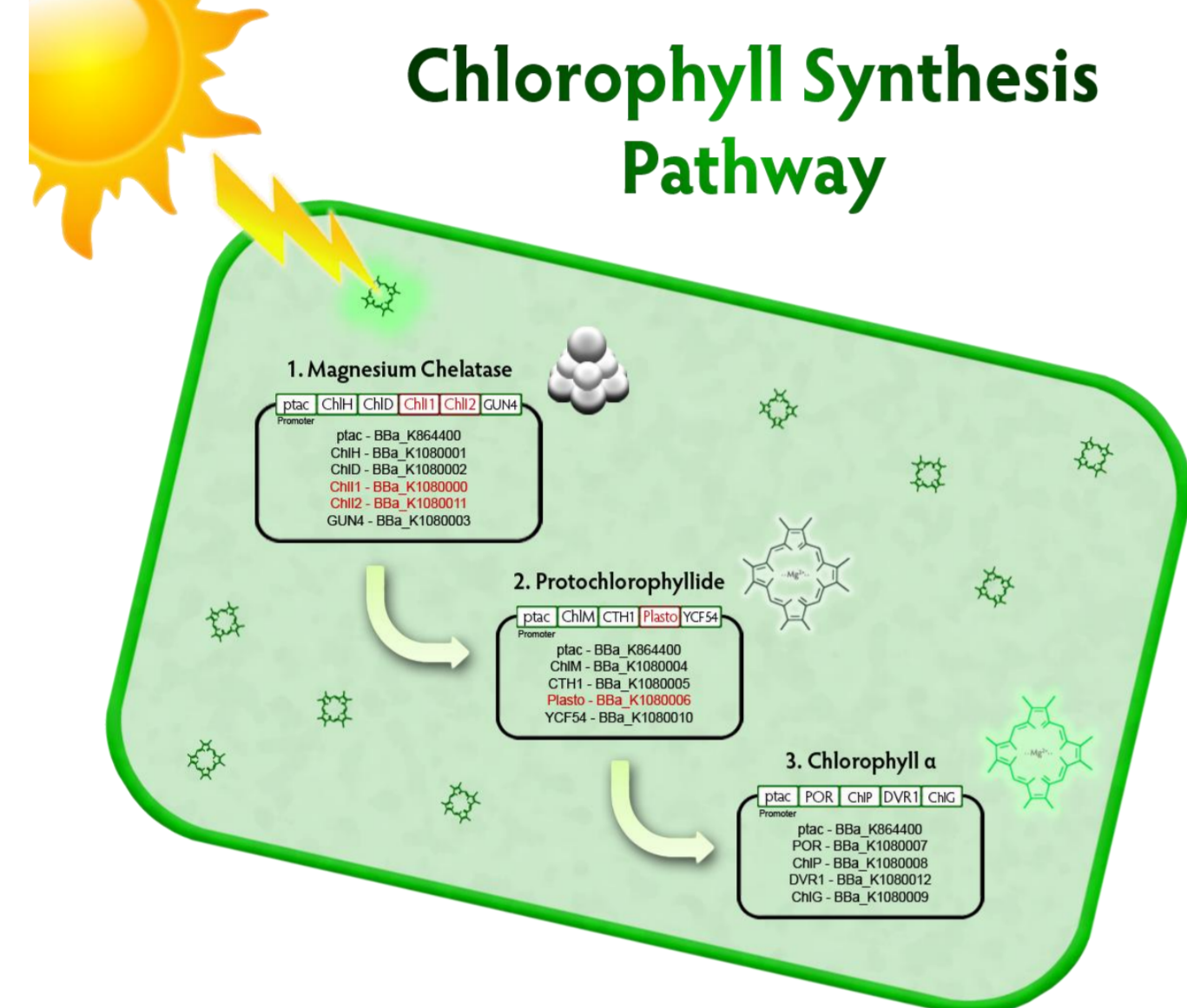
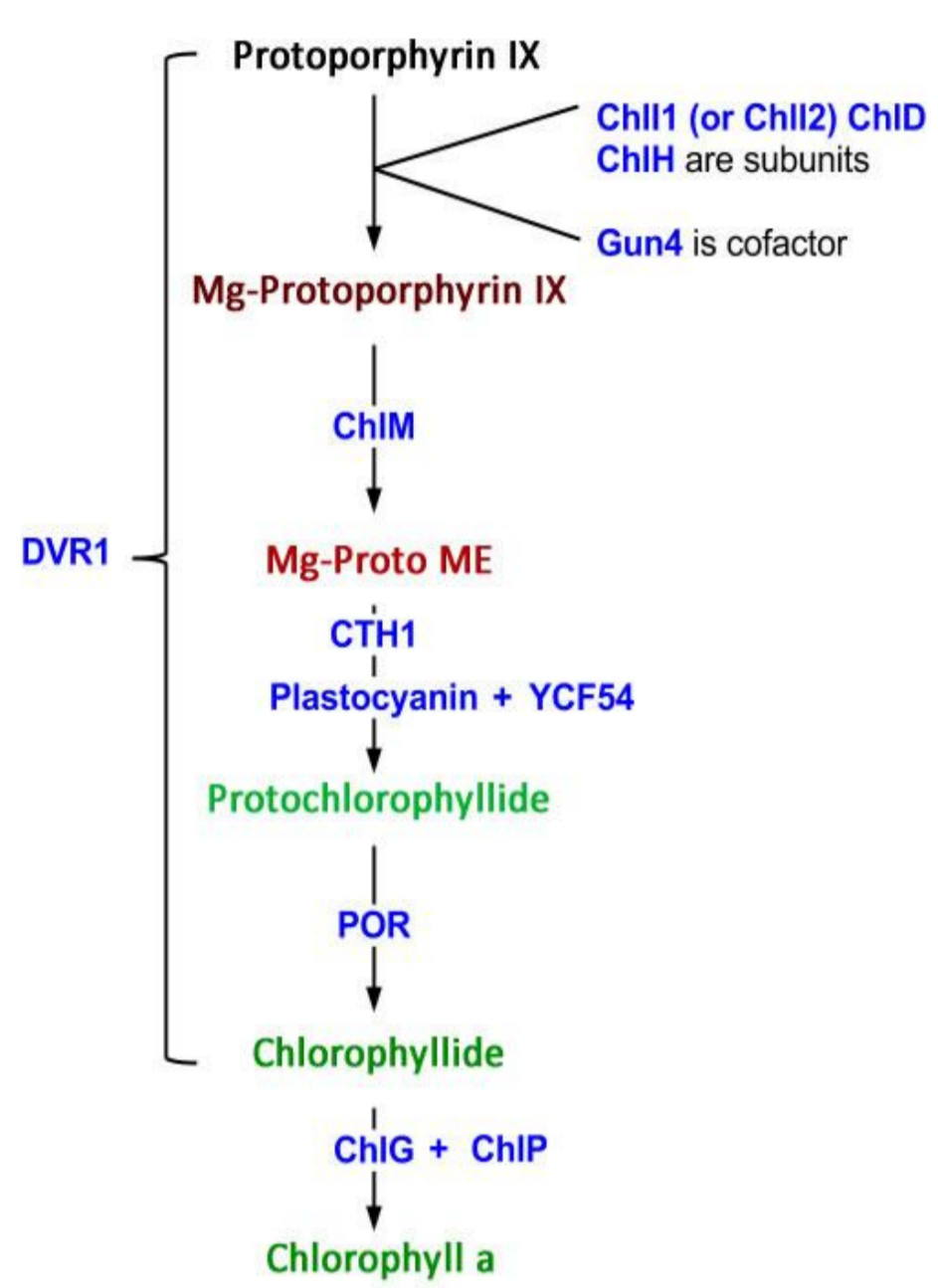
GREEN is the new BLACK



- In 2009 Australia relied on non-renewable energy from fossil fuels for 95% of its energy needs - 41% coal, 36% oil and 19% gas attributed to this. Successful production of chlorophyll in a bacterial host is the first step towards the synthetic construction of photosystem II, and the eventual creation of a new renewable energy source
- Our project aimed to express the thirteen genes (from *Chlamydomonas reinhardtii*) necessary for the chlorophyll biosynthesis pathway in a bacterial host (*Escherichia coli*)

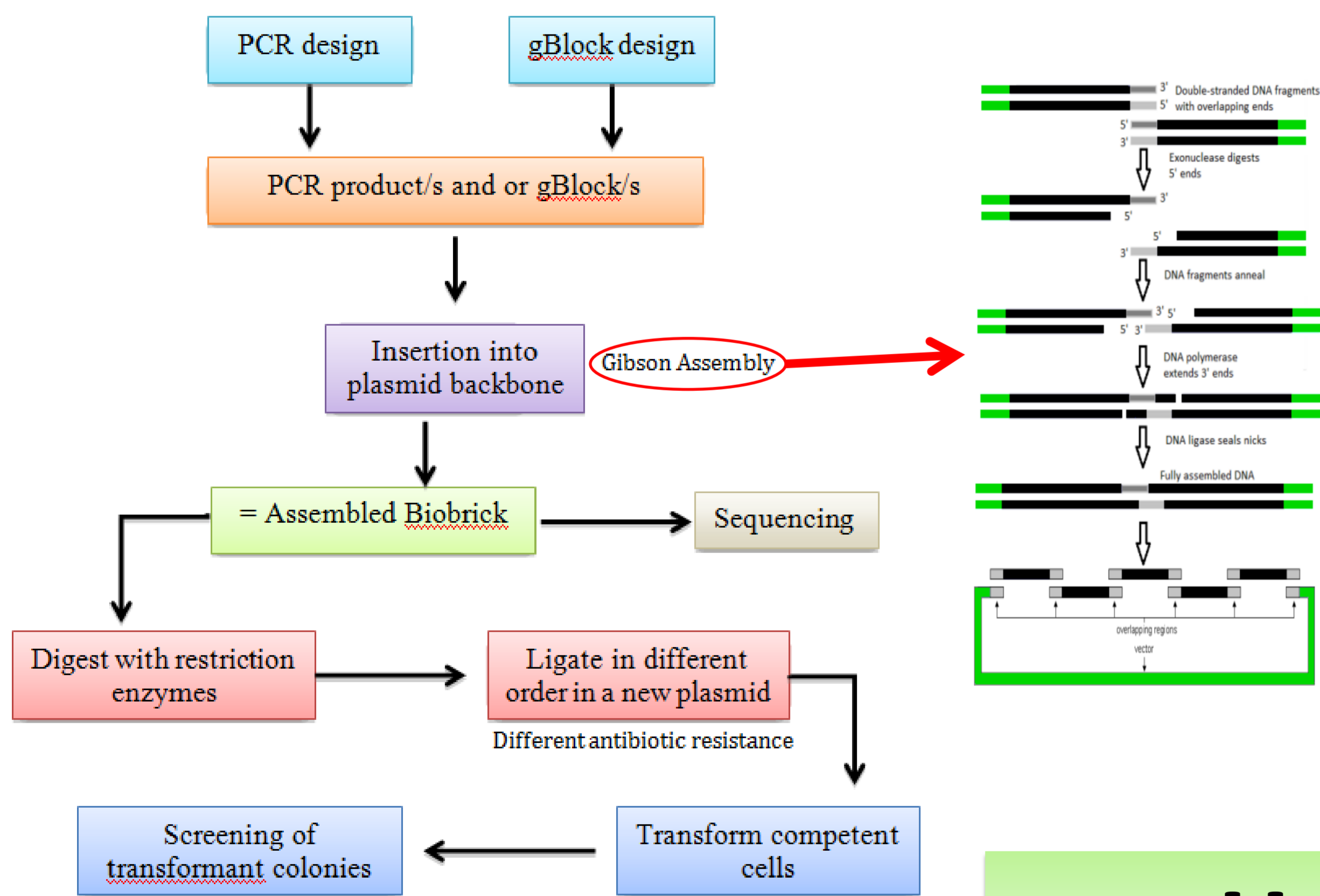
Background

- Chlorophyll is the green pigment responsible for the absorption and transfer of light energy
- During photosynthesis, light energy is converted into chemical energy:



- *C. reinhardtii* is an algae that synthesises Chlorophyll α from protoporphyrin IX through a multistep pathway
- *E. coli* uses protoporphyrin IX in the production of heme
- A branch in the heme synthesis pathway will allow the use of *E. coli* as an expression host to create chlorophyll

Methodology



- **Plastocyanin:** chloroplast precursor - involved in electron transport
- Plastocyanin produces a copper chelated protein
- When exposed to an inducer and copper *E. coli* expressing this gene will turn blue (right plate)

Conclusion

- Successfully constructed 12 BioBricks
- Designed 3 operons necessary for chlorophyll biosynthesis
- Improved understanding on how to manipulate plant genes
- Initiated reproduction of photosystem II to act as a cheap and efficient renewable green energy source
- New sources of electrons and hydrogen gas to combat the energy crisis

Human Practices

Australasian Conference of Undergraduate Research

- **Winner**- Best Presentation in Molecular Biology or Plant Science research

Education

- Presented 2nd year uni lecture on synthetic biology
- High school synthetic biology workshops

Synthetic Biology Conference

- Organised first conference in Southern hemisphere

Synthetic Biology Society

- Initiators of SynBioNet Society

Quarantine

- Recommendations for easy access to information on international standards for shipping regulations

University Open Day

- Organised a variety of laboratory activities for members of the public

Collaboration With Sydney Uni iGEM

- Helped promote the Strange Nature writing competition
- Mentor program

