

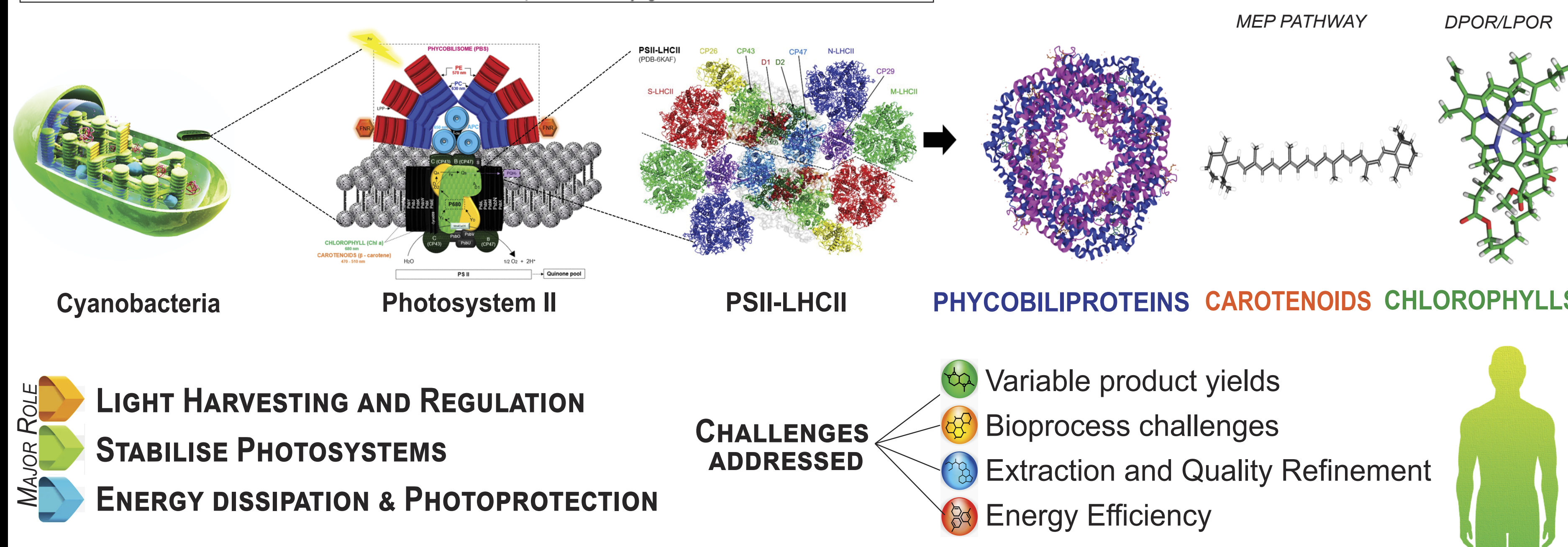
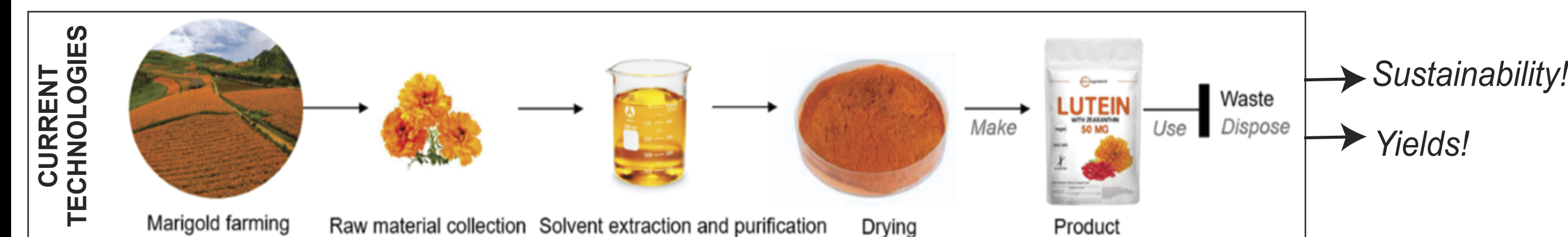
HIGH-VALUE BIOPRODUCTS FROM MICROALGAE: ADVANCING HUMAN HEALTH AND NUTRITION

Charu Deepika^{1*}, Ben Hankamer²

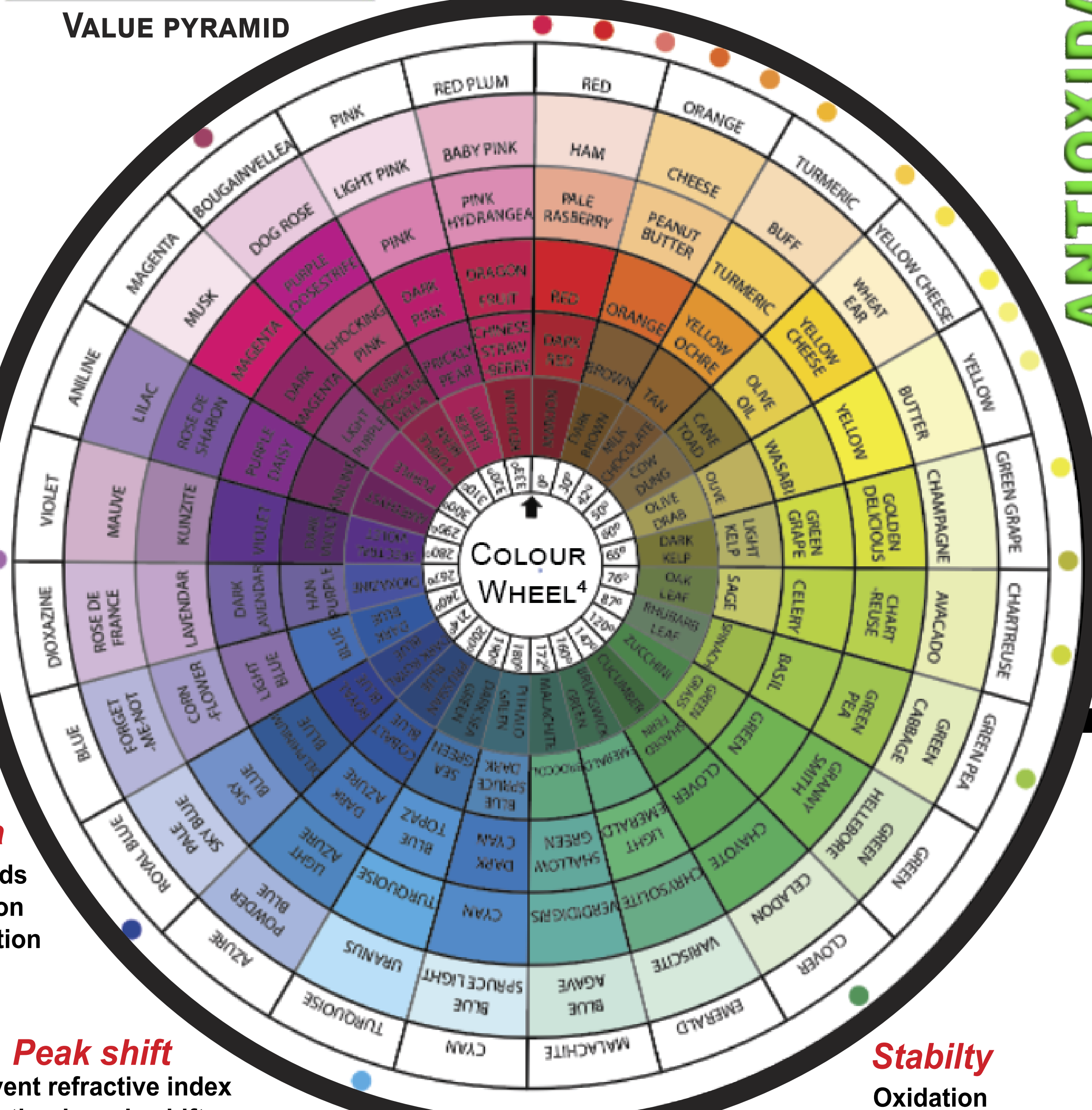
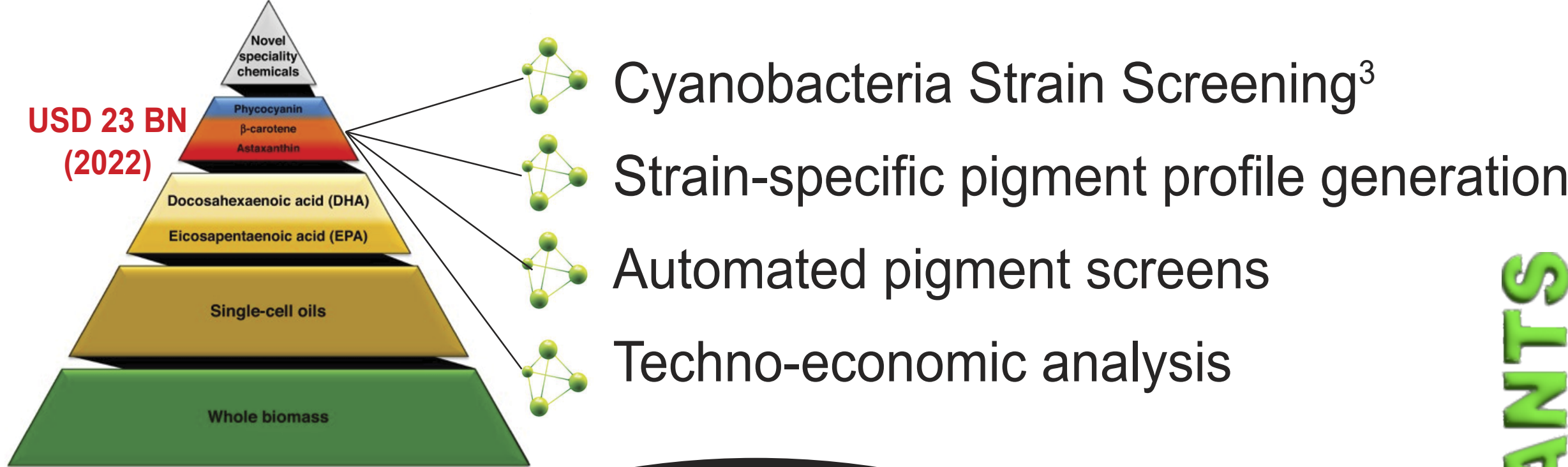
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BACKGROUND AND AIMS

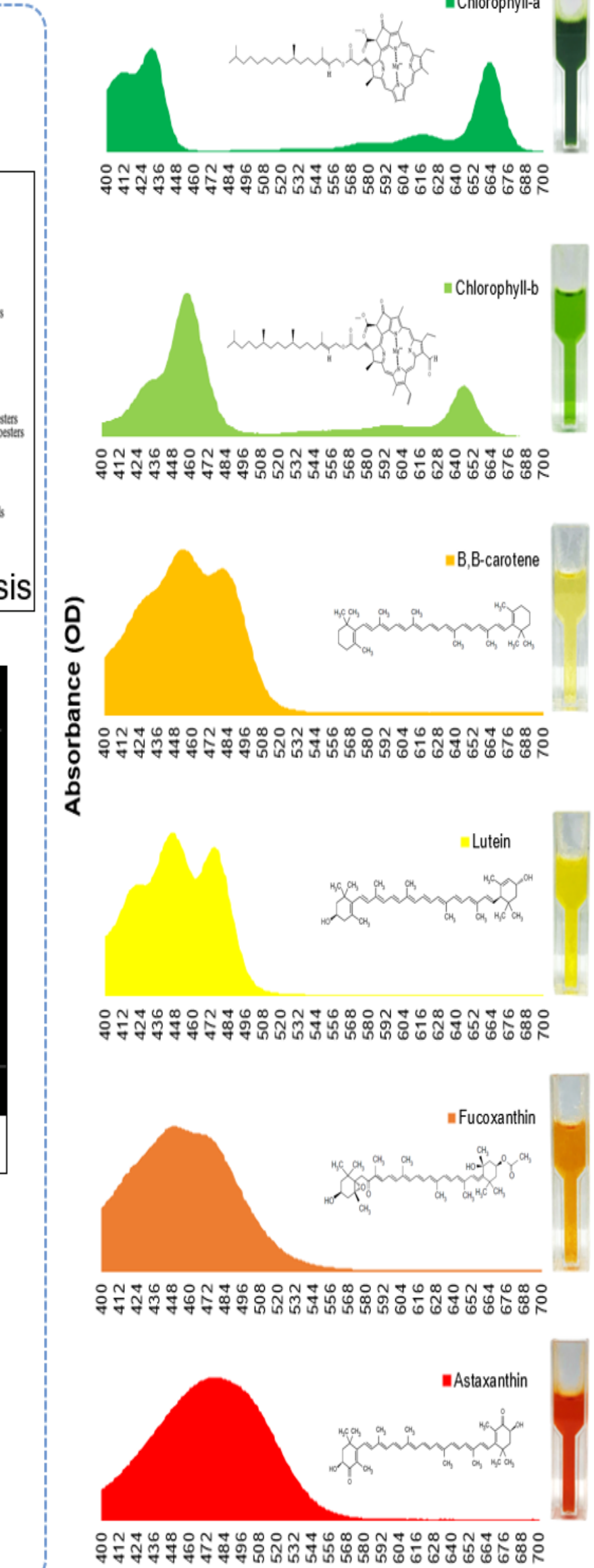
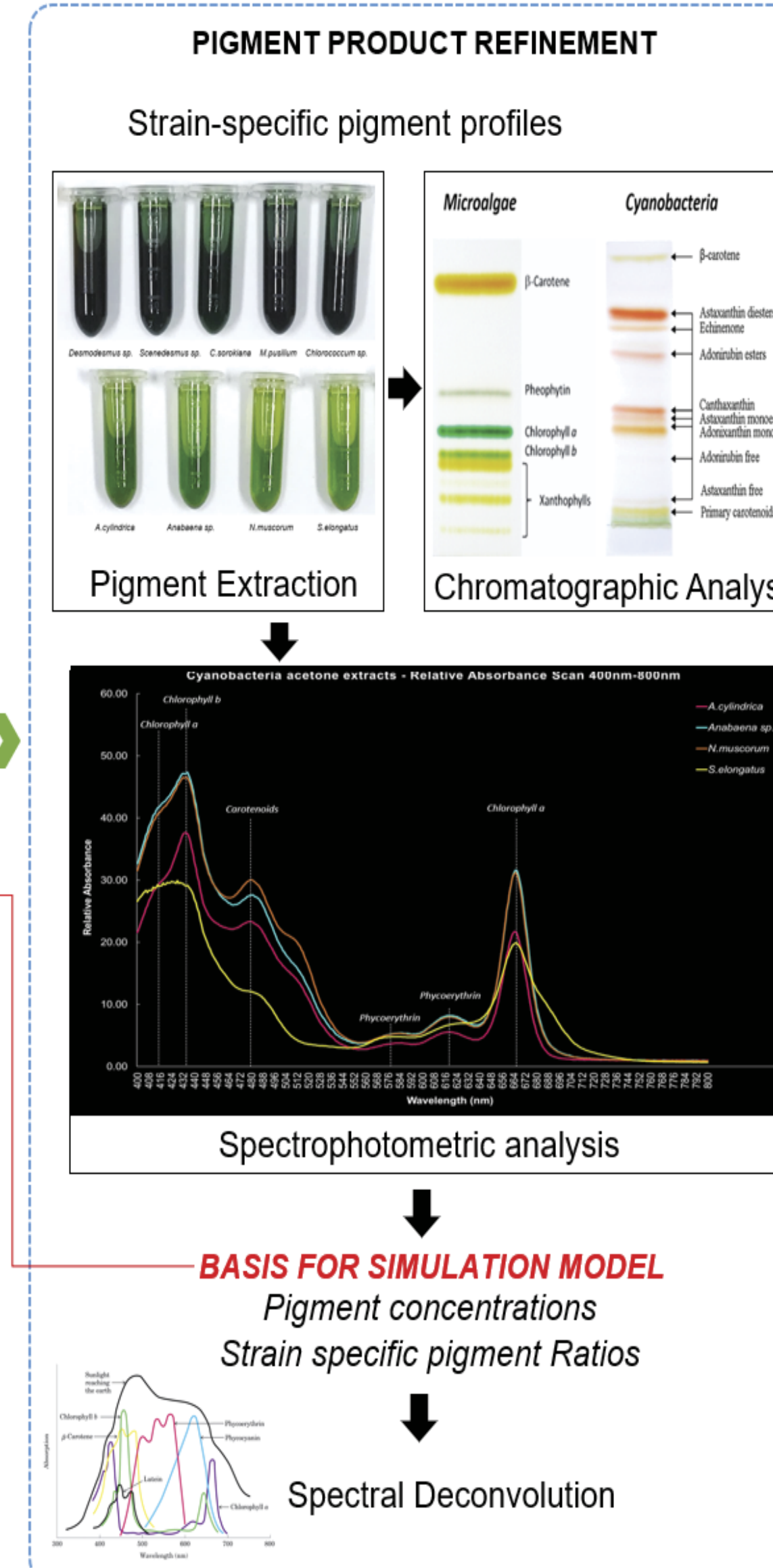
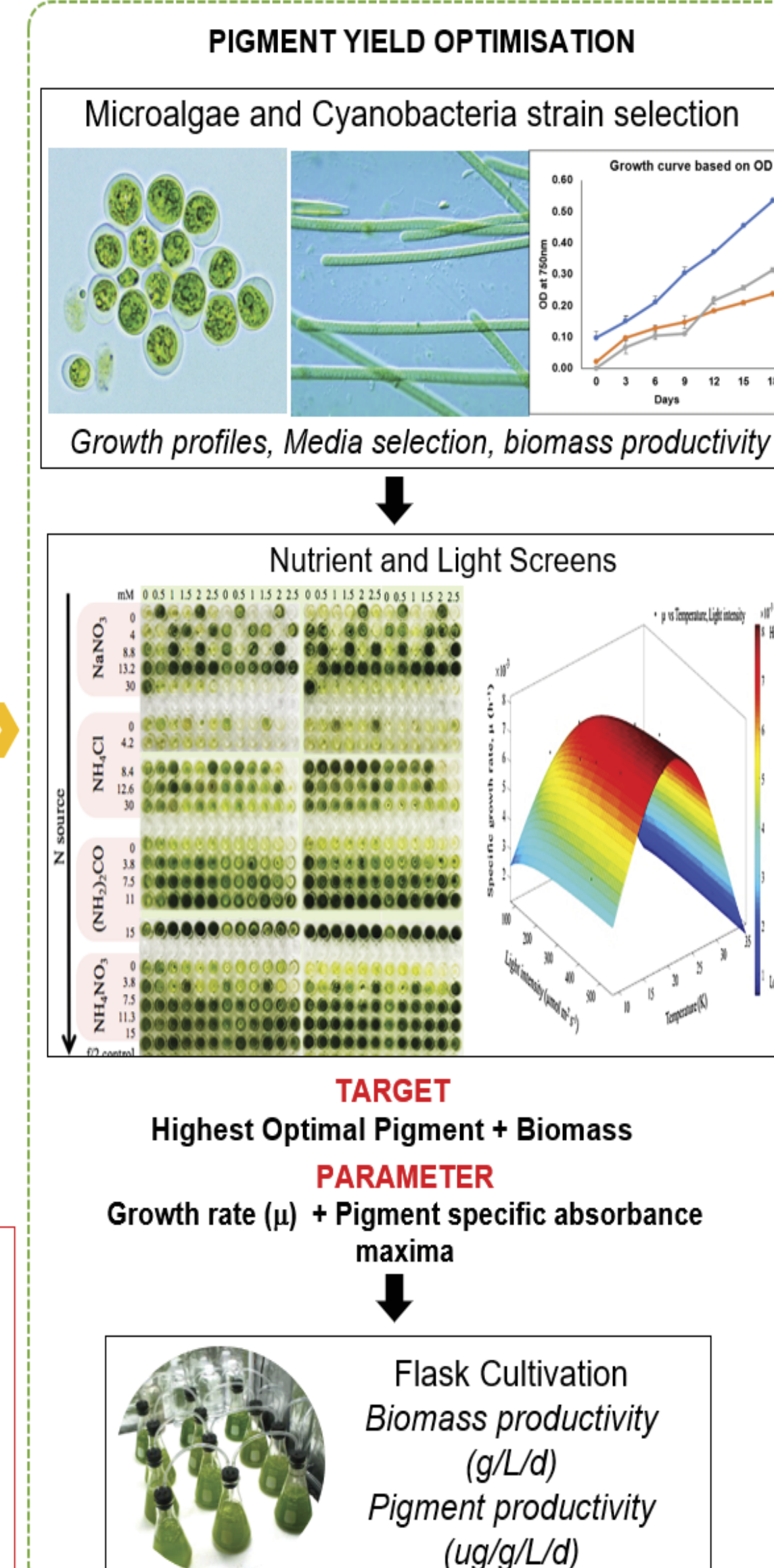
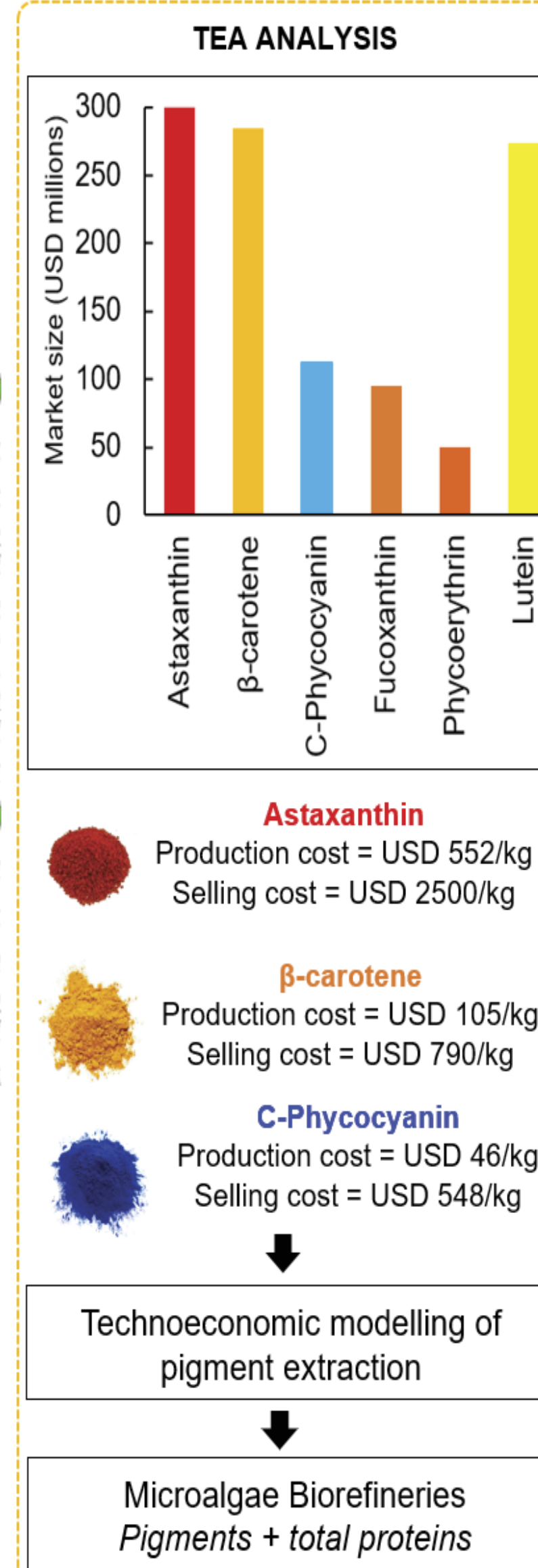
- Natural pigments are environmentally friendly¹.
- Photosynthetic pigments are highly potent bioactives.
- Microalgae are robust production platforms for high-value bioproducts.
- High growth rates and increased biosafety.
- Microalgae biorefineries will contribute to meet 12 UN SDG's².



METHODOLOGY



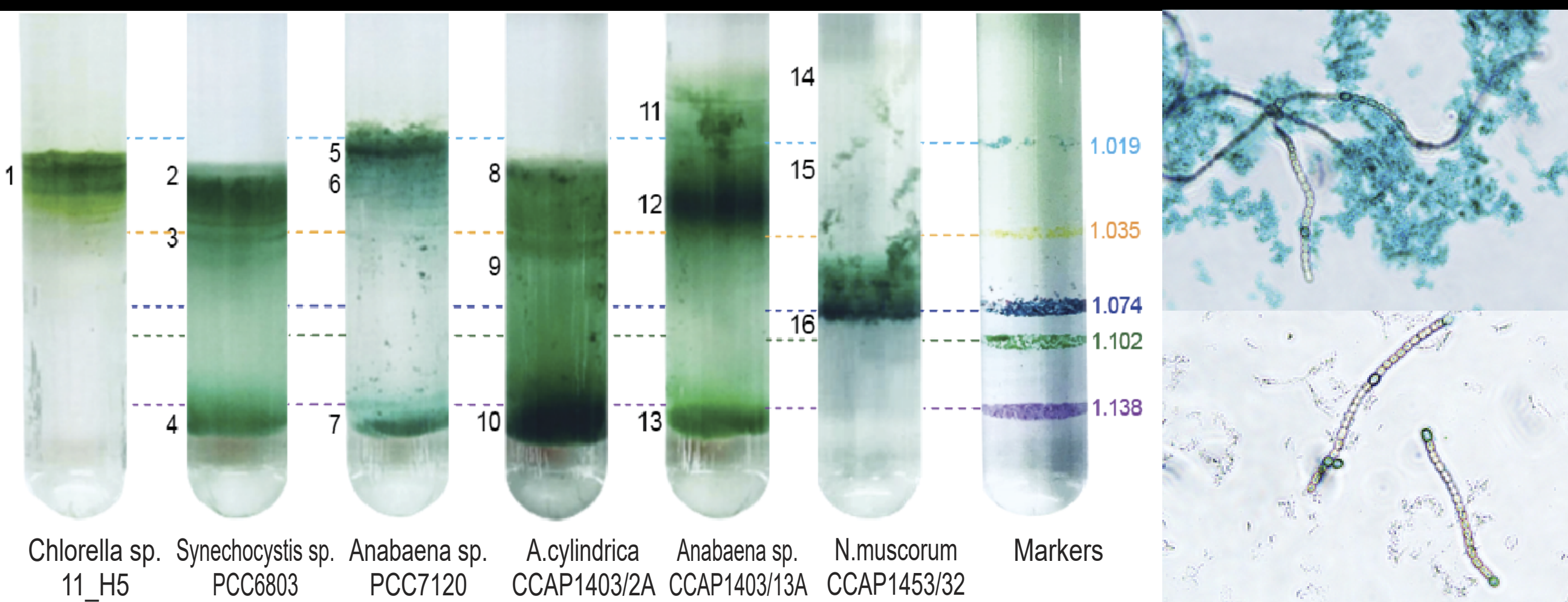
ANTIOXIDANTS



RESULTS

Developed diazotrophic cyanobacteria isolation technique

Novel
Rapid
Gentle



Cyanobacteria
Accuracy in OD reads
Filament aggregation
Production optimisation

Peak shift
Solvent refractive index
Bathochromic shift
Hypsochromic shift
Solute concentration

Peak broadening
Molecular interactions
Temperature & Light sensitivity

Stability
Oxidation
Metal chelation

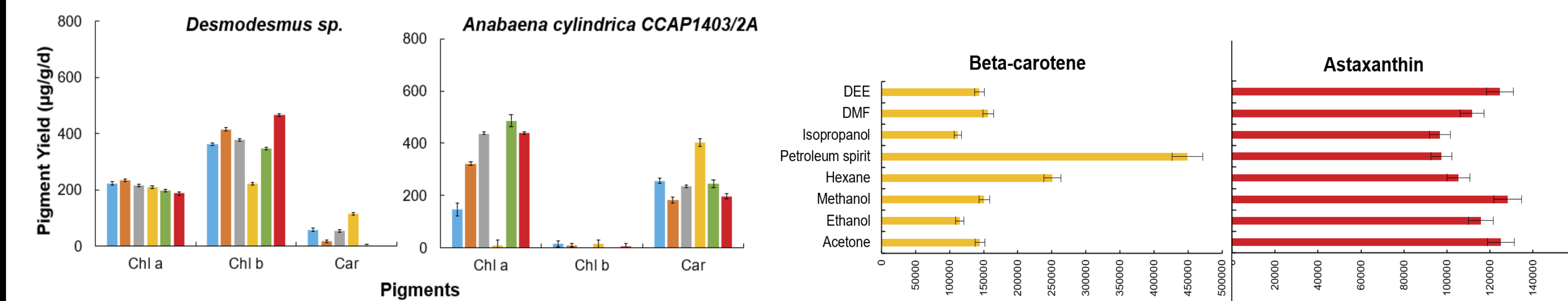


Fig 2: Solvent extraction comparison. (Increasing polarity DEE < Acetone < DMSO < DMF < Ethanol < Methanol)

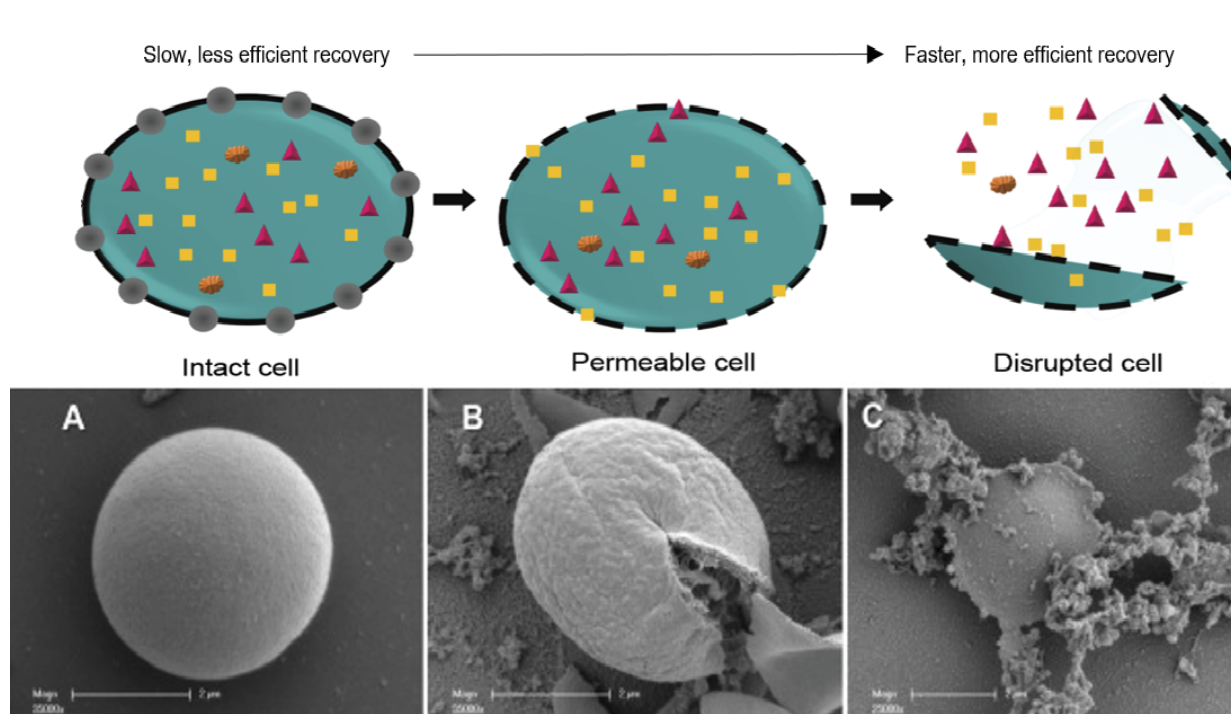


Fig 3: Variations in extinction coefficient calculated

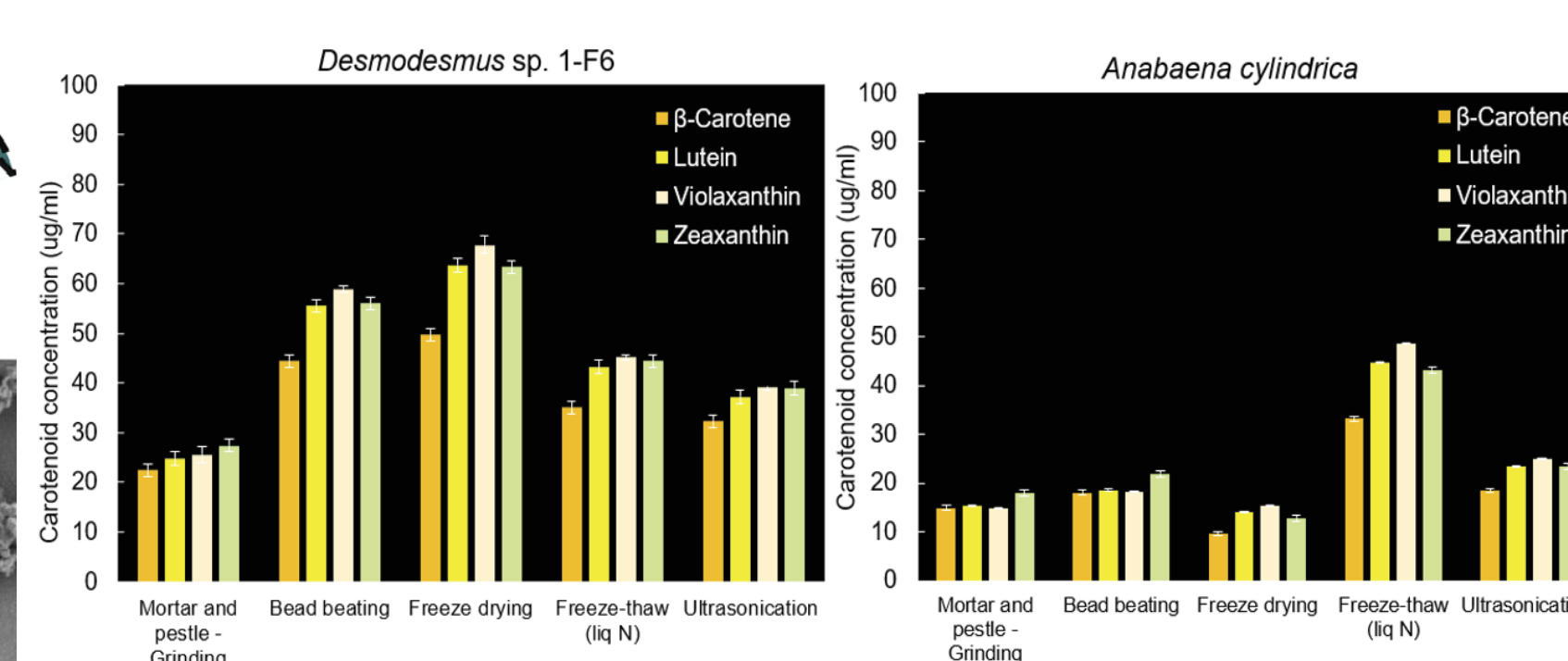


Fig 4: Comparison of cell disruption techniques

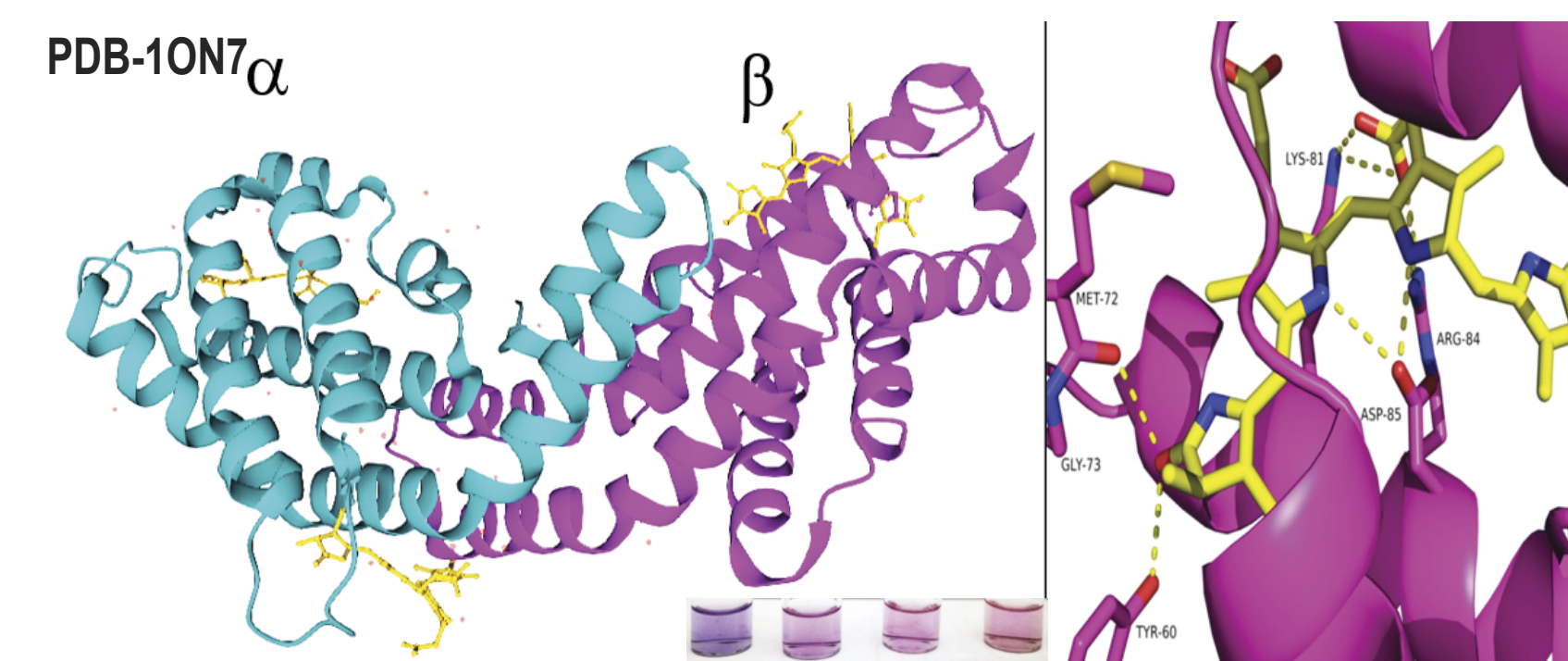
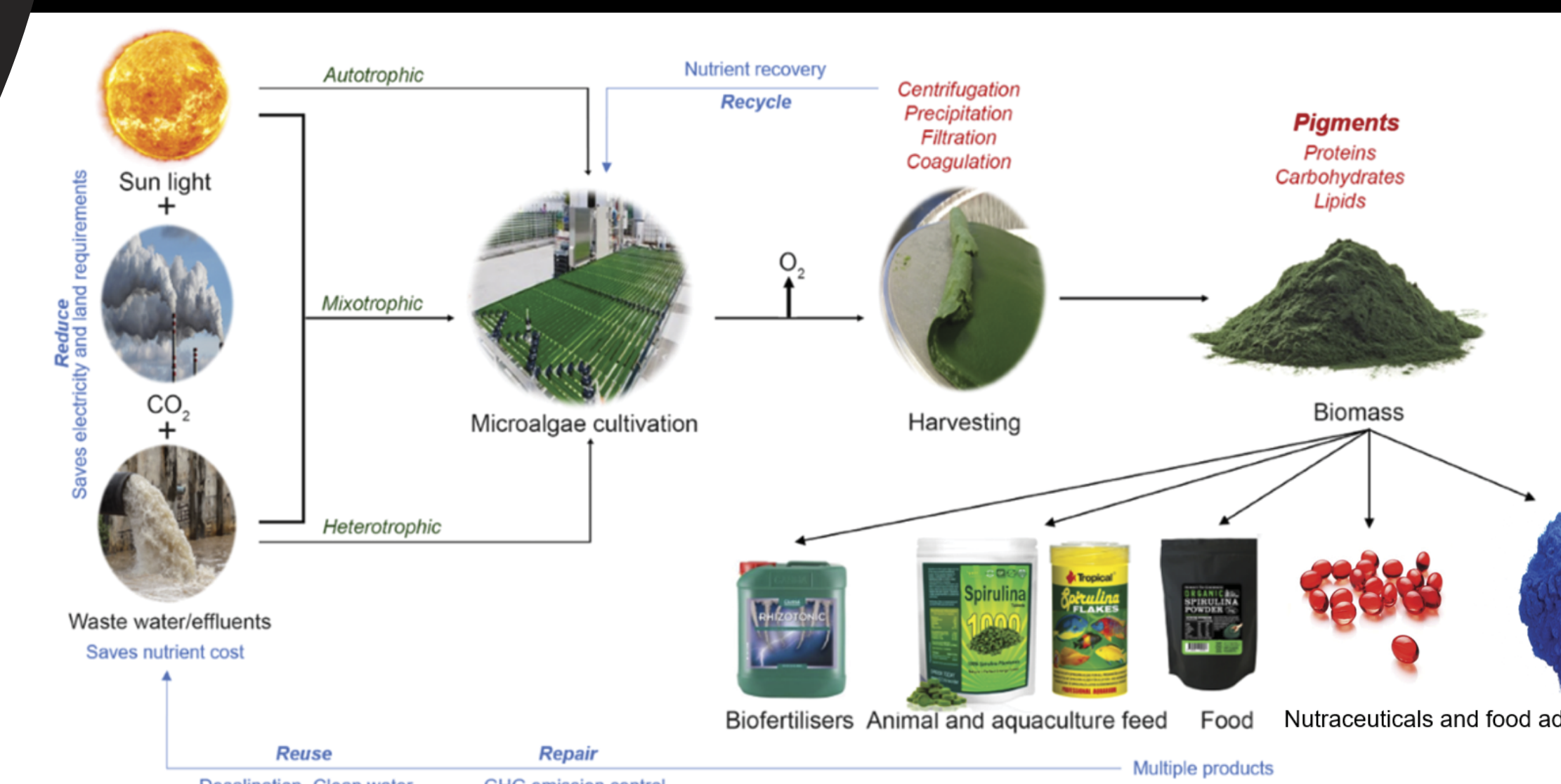


Fig 5: Phycocyanobilin Chromophore Degradation



CONCLUSION

Development and process optimisation leads to efficient recovery of valuable pigments playing a significant role in medicinal and food industry.

Solar-driven photosynthetic cyanobacteria offer significant new routes for the production of sustainable natural pigments for use in wide range of industries.

FUTURE PERSPECTIVES

- Modelling sustainable algae coproduction platforms.
- Two-Phase Cultivation Systems
- Sequential extraction techniques for biorefinery.
- Pigment-specific encapsulation.

ACKNOWLEDGEMENTS

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REFERENCES

- Britton, G., The biochemistry of natural pigments. 1983: Cambridge University Press.
- Kim, R.C., Can creating United Nations Sustainable Development Goals (UN SDGs) collaborate for a better world? Sustainability, 2018. 10(11): p. 4128.
- Wolf, J., et al., High-throughput screen for high performance microalgae strain selection and integrated media design. Algal Research, 2015. 11: p. 313-325.
- Martian Colour Wheel. Warren Mars (http://warrenmars.com/visual_art/theory/colour_wheel/colour_wheel.htm).

“Development of a sustainable bioeconomy is increasingly central to the growing world.”