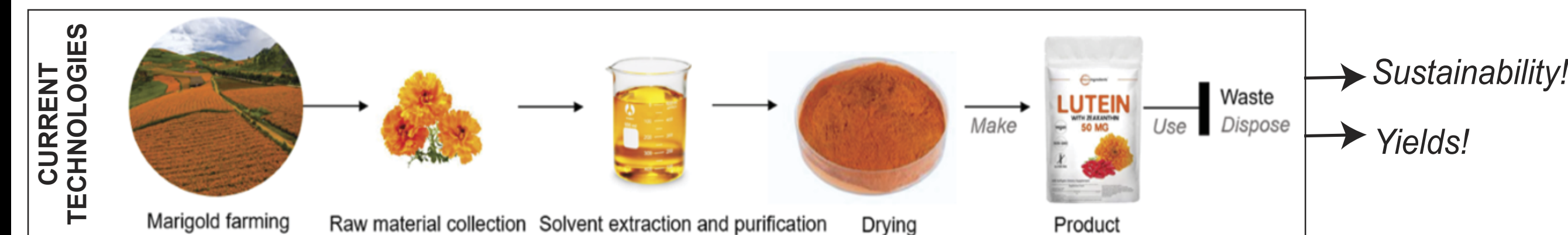
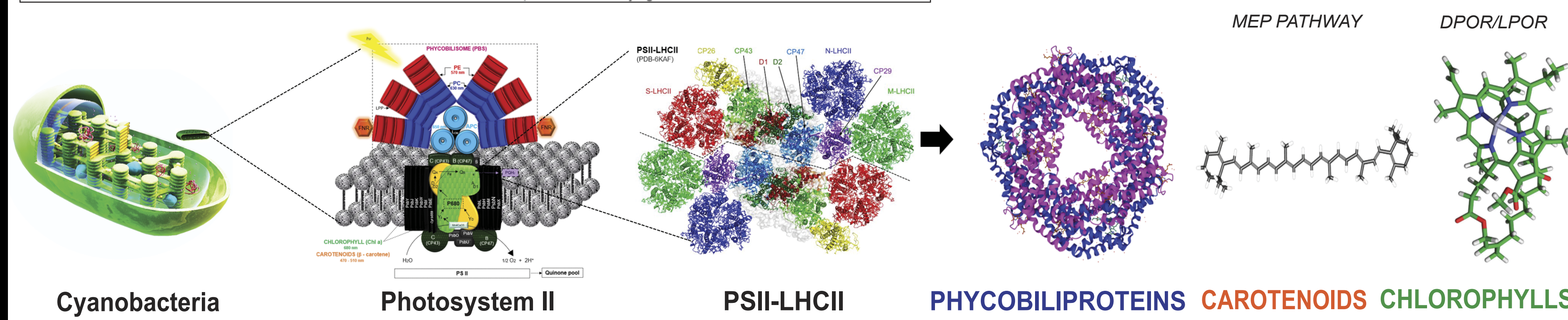


CYANOBACTERIA: LIGHT-DRIVEN SUSTAINABLE NATURAL PIGMENT PRODUCTION PLATFORM

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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.

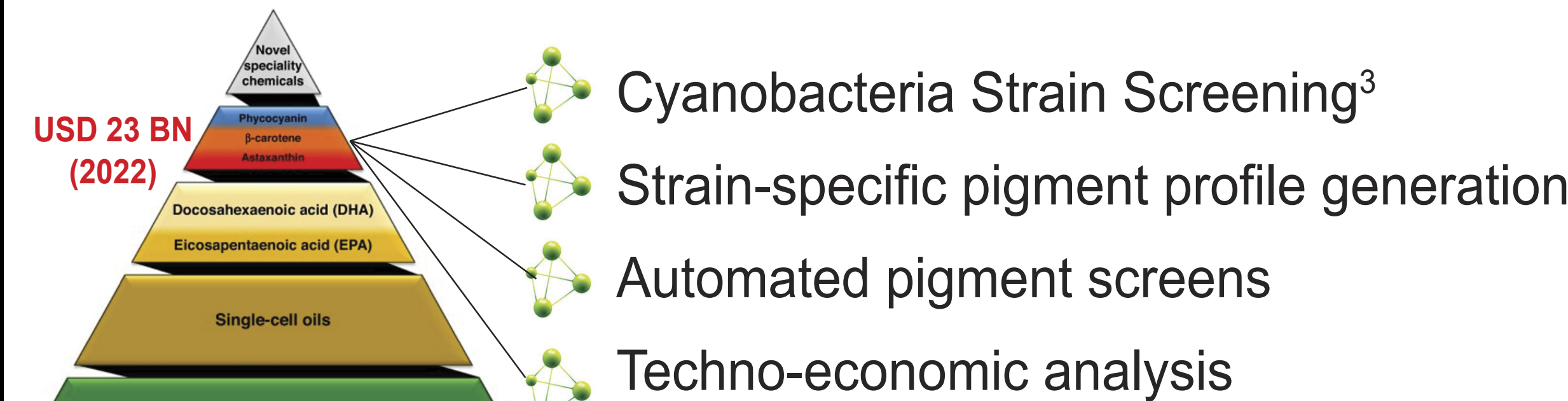
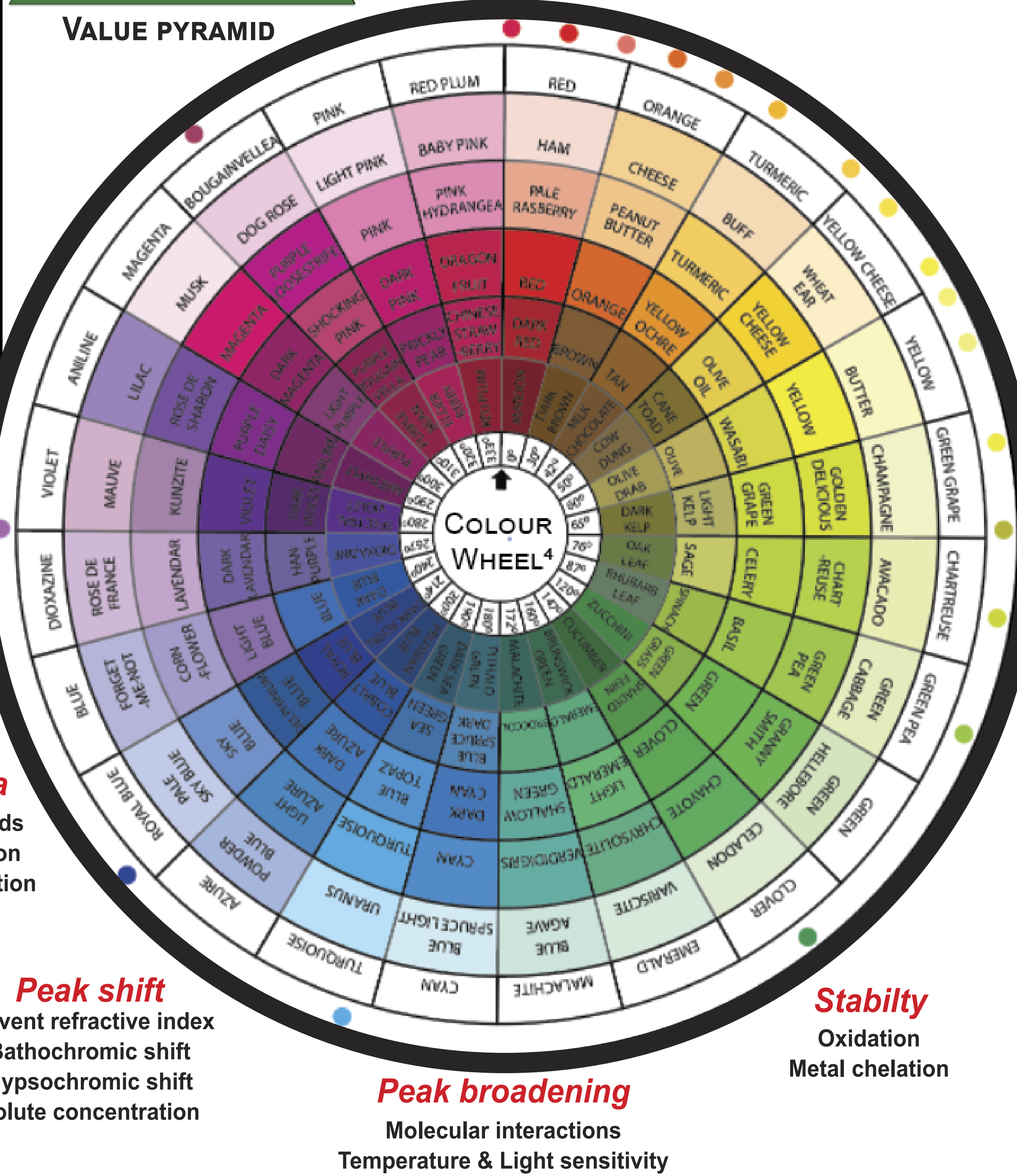
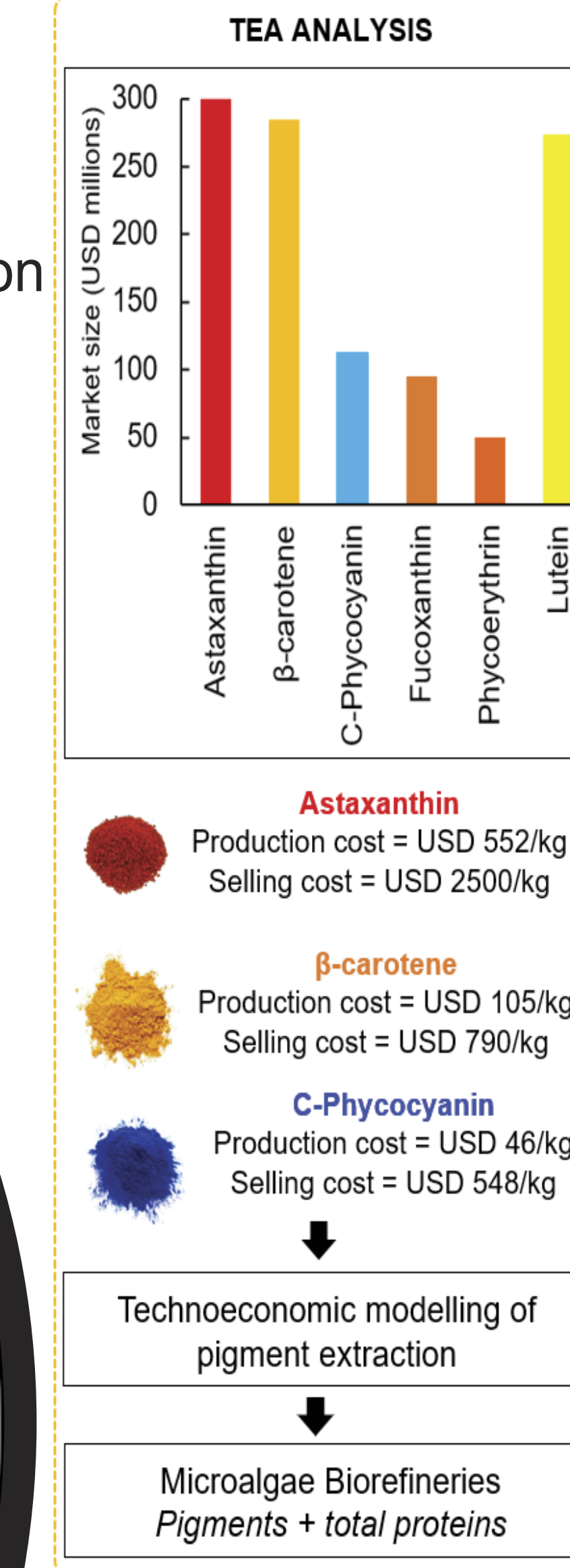
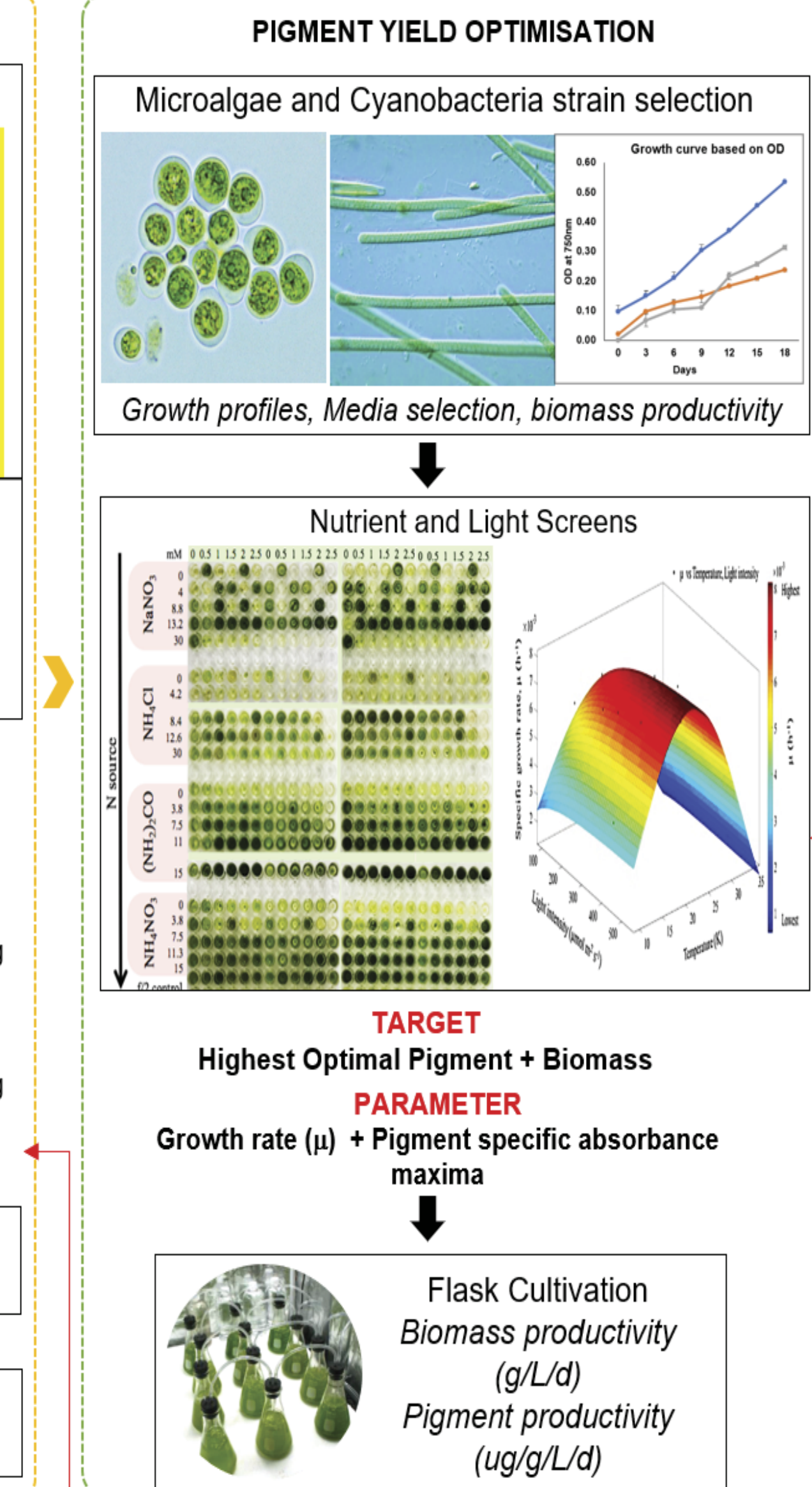
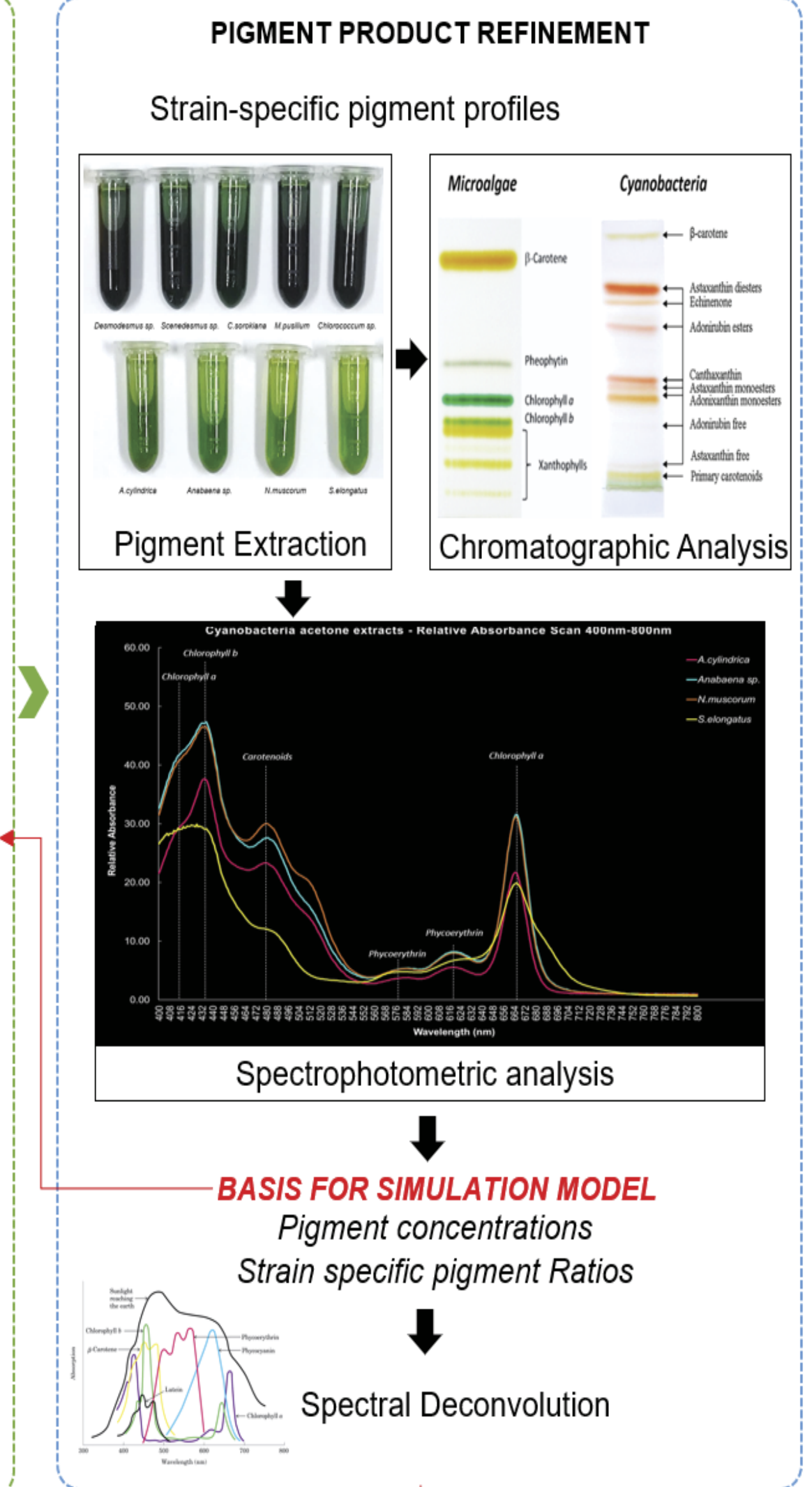
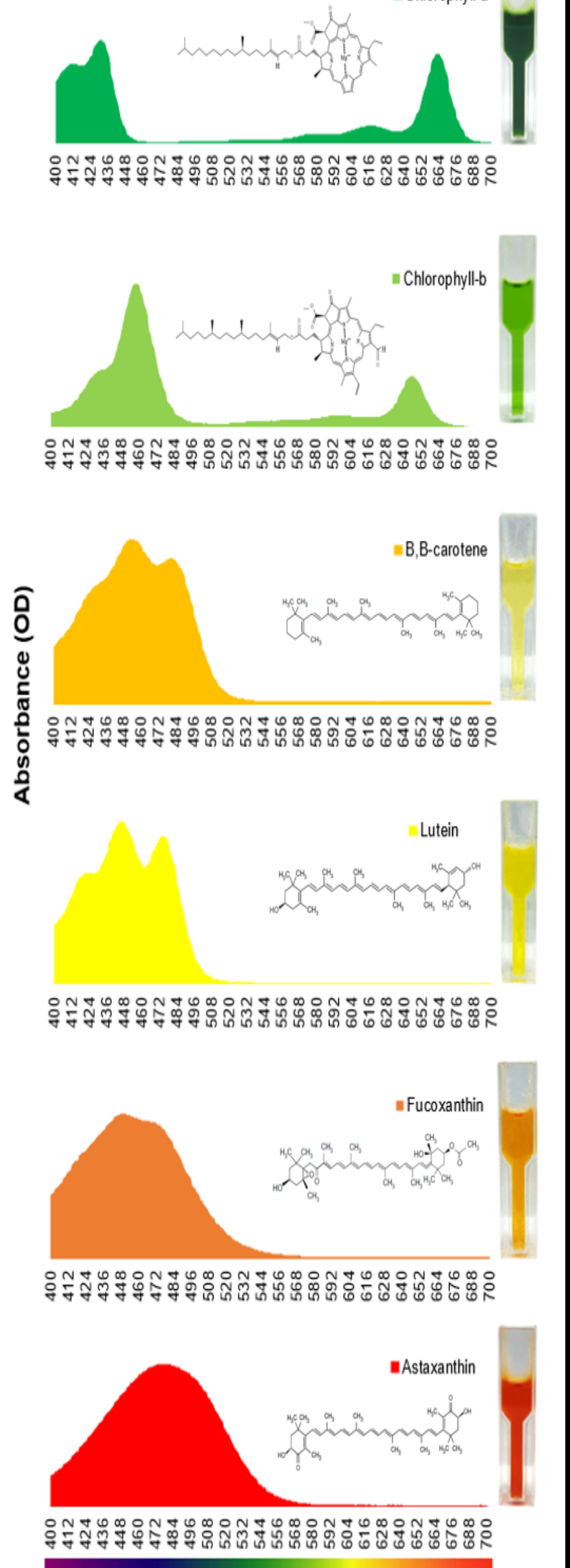


- MAJOR ROLE**
- LIGHT HARVESTING AND REGULATION
- STABILISE PHOTOSYSTEMS
- ENERGY DISSIPATION & PHOTOPROTECTION

- CHALLENGES ADDRESSED**
- Variable product yields
- Bioprocess challenges
- Extraction and Quality Refinement
- Energy Efficiency



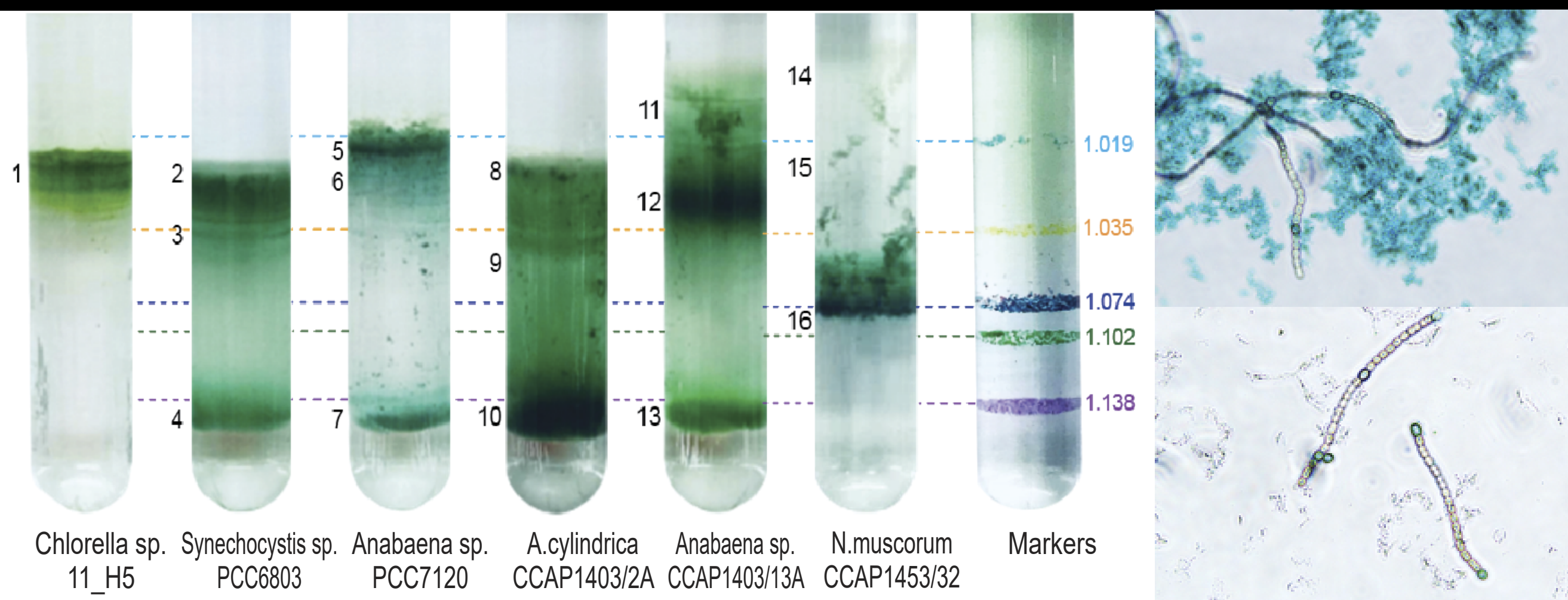
METHODOLOGY



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

Stability
Oxidation
Metal chelation

Peak broadening
Molecular interactions
Temperature & Light sensitivity

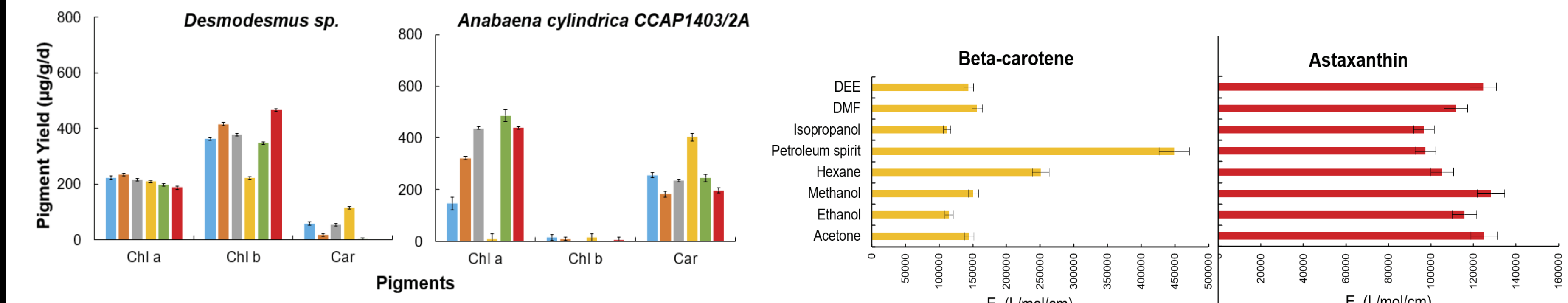


Fig 2: Solvent extraction comparison.
(Increasing polarity DEE < Acetone < DMSO < DMF < Ethanol < Methanol)

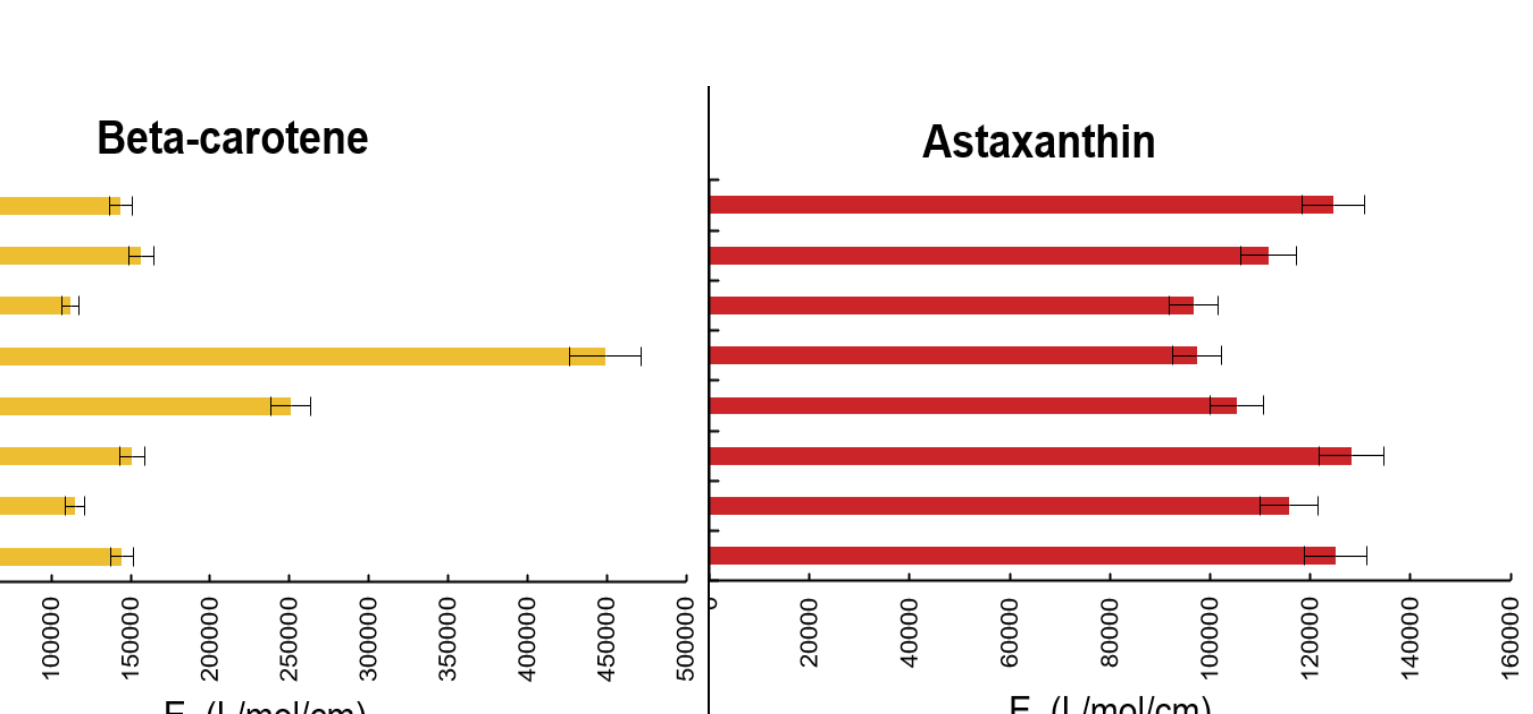


Fig 3: Variations in extinction coefficient calculated

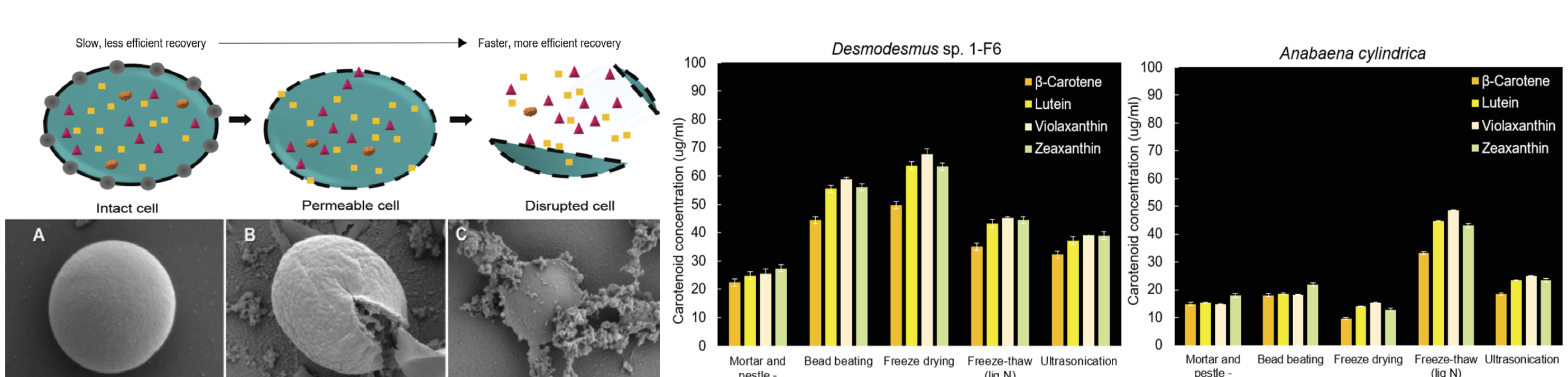


Fig 4: Comparison of cell disruption techniques

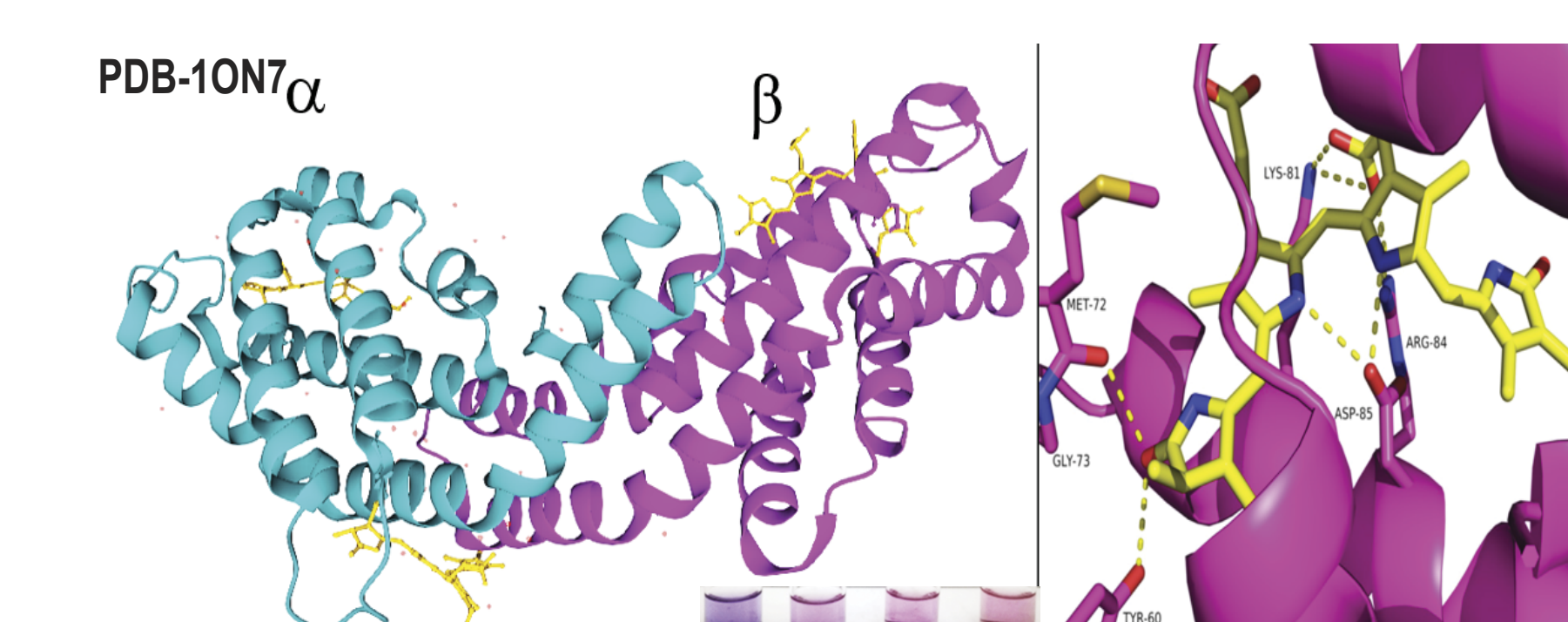


Fig 5: Phycocyanobilin Chromophore Degradation

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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“Development of a sustainable bioeconomy is increasingly central to international government policies the across the world.”