

Extracting Health & Wealth from New Zealand's Marine Resources

Bioactives Research at Cawthron



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THE THOMAS CAWTHRON STORY



- Philanthropist & visionary
- Recognised science as key to NZ's economic prosperity
- Bequested £233K equivalent of \$127M today
- Cawthron Institute established in 1919.
- Officially opened in 1921

Then....



Now....





Halifax Street site Research & Testing Labs

Aquaculture Park R&D, Industry & Education



POWERED BY THE BEST PEOPLE

197

Scientists and
specialist staff

73 coastal and freshwater
33 aquaculture
71 analytical and lab services
20 corporate

Sectors we work in

Aquaculture, biosecurity, dairy, energy, fisheries,
food export, oil and gas, seafood

Who we work with

Industries, Crown research institutes (CRIs), research
organisations and universities, Māori, central and
local governments

Our talented teams of scientists and specialist staff help New Zealand's leading export sectors stand out from the crowd and take on the world. **Cutting-edge science, it's in our DNA!**

Analytical Services



Aquaculture



Coastal & Freshwater



NATURAL PRODUCTS TESTING

Routine testing for NZ industry

- Chemistry
- Microbiological
- Stability

Accreditation

- IANZ
- GMP
- US FDA
- TGA
- Medsafe

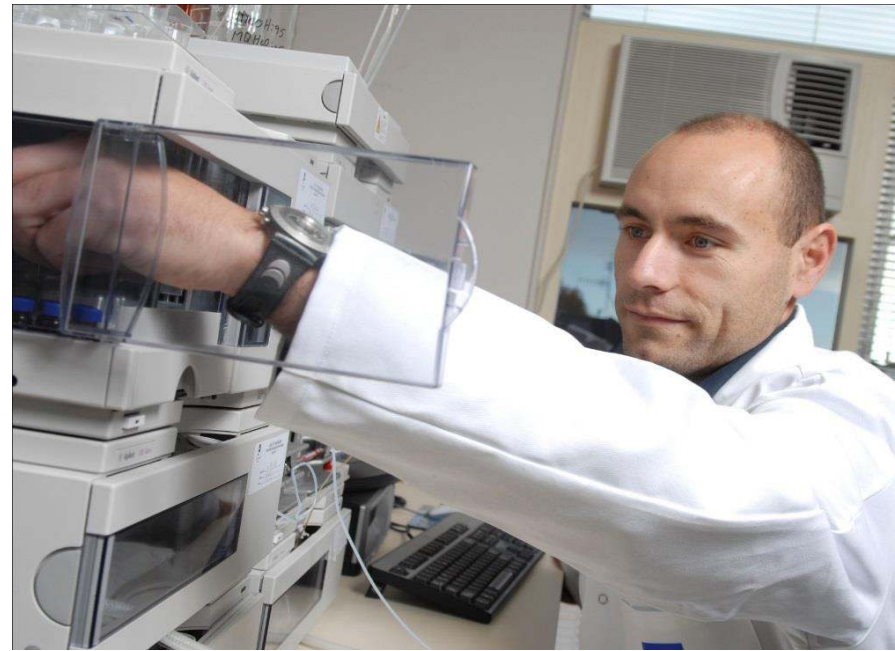
Robust Internal Quality systems



NON-ROUTINE ANALYSIS

Analytical Research and Development

- Analysis of new or novel compounds
- Complex and difficult matrix
- Supplement stability testing
- Unique compound isolation
- Tailor made for your requirements



SPECIALISED TESTING EXAMPLES

- Immunoglobulin IgG
- Flavonoids
- Phospholipids
- Antioxidants
- Lactoferrin
- Sialic acid
- Astaxanthin
- 10 HDA Royal Jelly



PRODUCTS WE HAVE ASSISTED WITH DEVELOPING



Olive leaf
extract



Royal Jelly

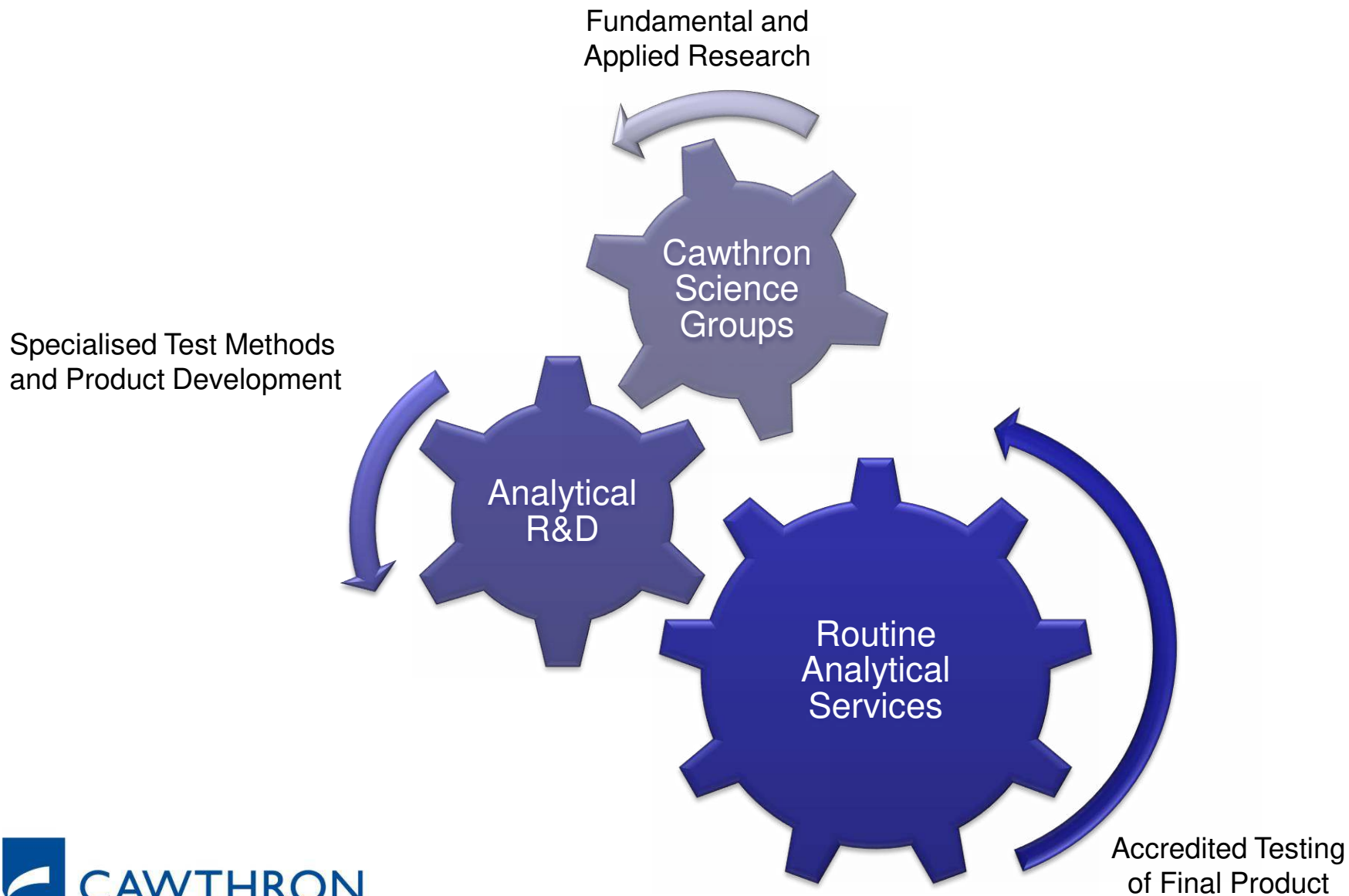


Propolis herbal
extract



Algae Extract
Supplements

INTER-RELATED GROUPS FACILITATE INNOVATION



BENEFICIAL BIOACTIVES

- Biologically-derived compounds with functional benefit for human or animal health:

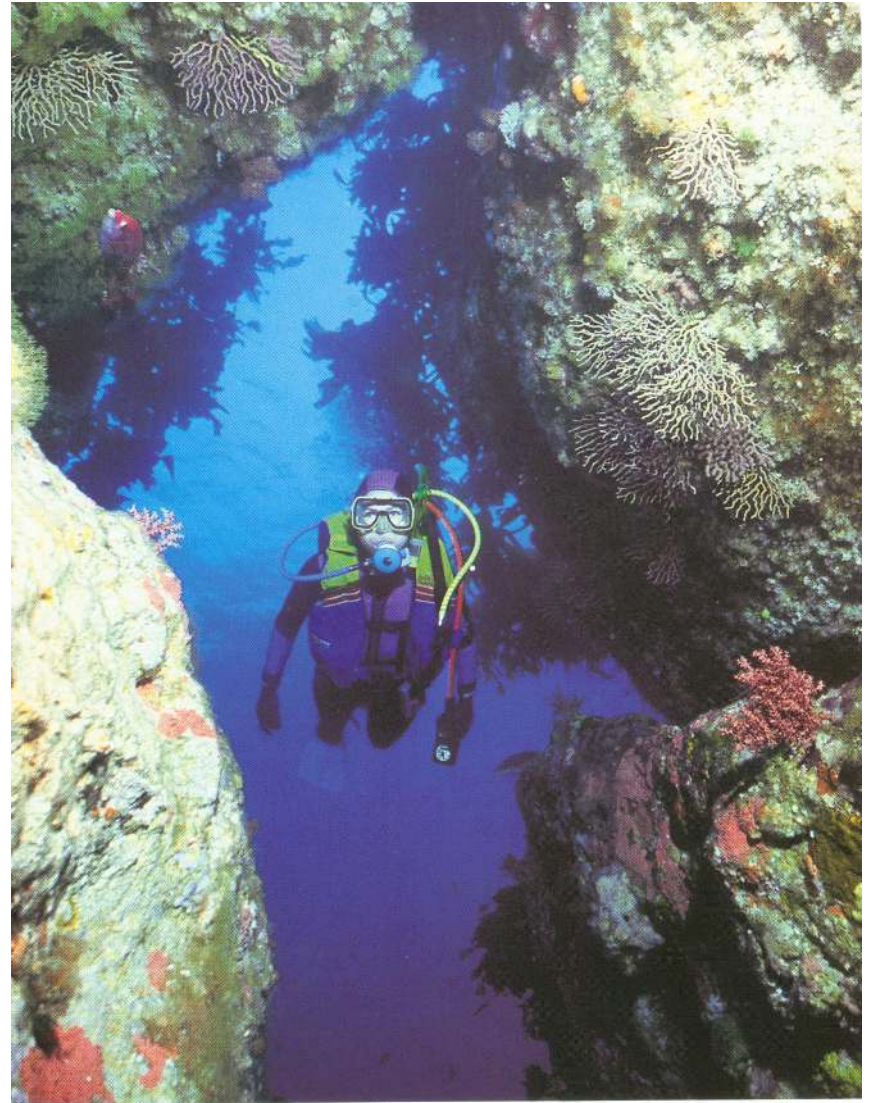
Decreasing Value

- Pharmaceuticals
 - Nutraceuticals
 - Cosmeceuticals
 - Functional food ingredients
 - High-end pet food
- Might be delivered as:
 - Pure compound
 - Extract
 - Food ingredient
 - Whole food



NZ MARINE BIOACTIVES

- Pristine growing environment adds market appeal.
- Unique endemic species:
 - Greenshell mussel
 - Other shellfish
 - Pāua
 - Kina
 - Seaweeds
- Interesting bioactives:
 - Anti-inflammatory lipids
 - Anti-oxidant carotenoids
 - Bioactive peptides
 - Bioavailable glycolipids



MARINE OIL PRICES

Case study in value in the marine oils

Fish oil
\$3-5/kg

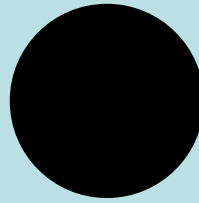
Krill oil
US\$25/kg

Tuna oil
US\$15/kg

GSM
PRICE



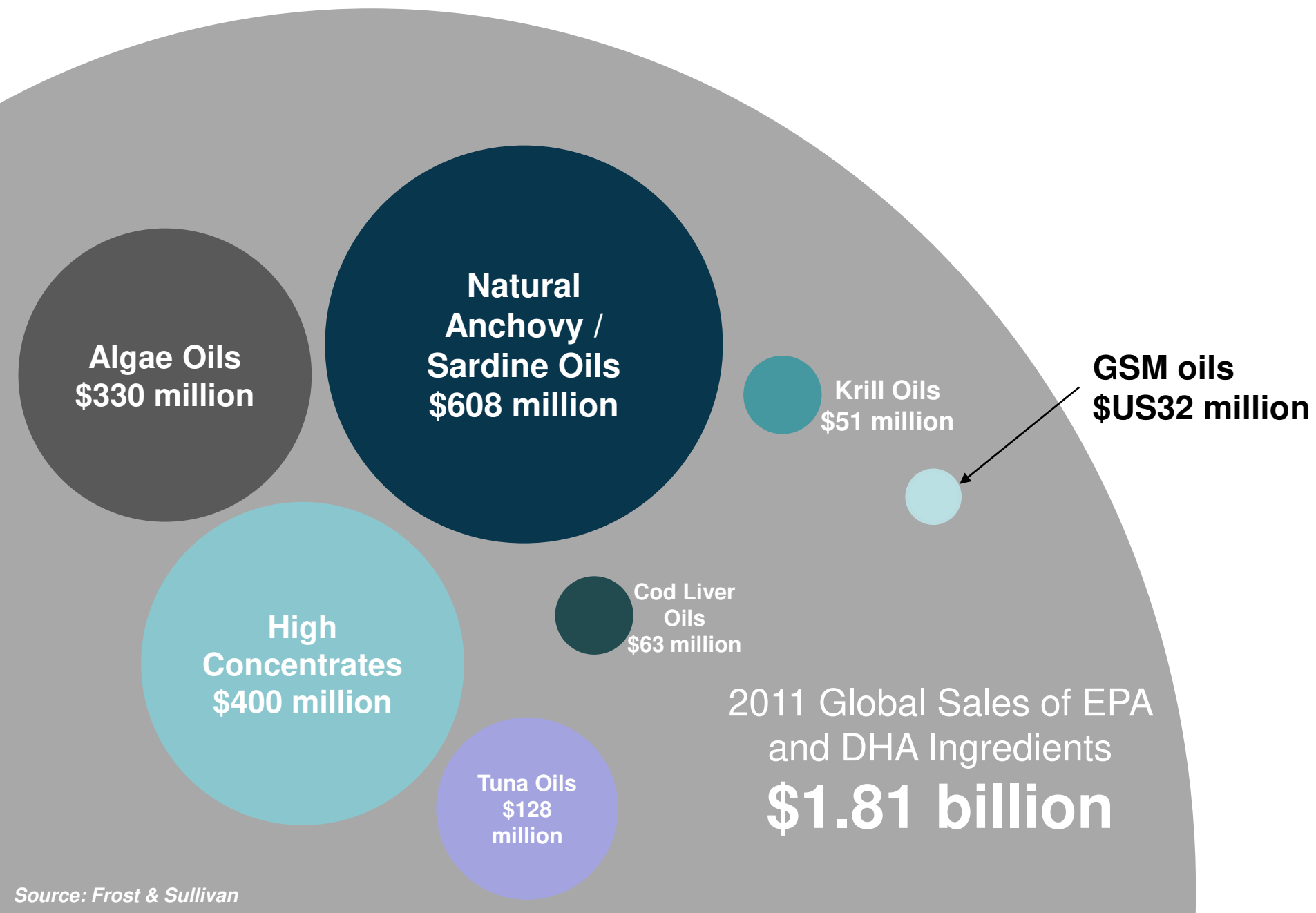
Tuna oil



Krill oil

GSM oil
US \$2,300/kg
(~NZ\$ 3,000/kg)

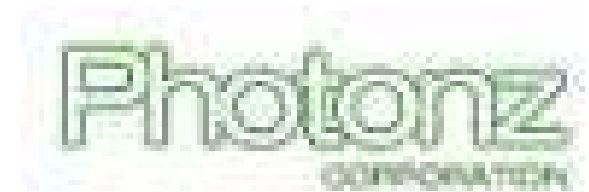
VOLUME AND SCALE ADDS PERSPECTIVE



WHAT WE DO

- Identify new sources of marine bioactives
- Prepare extracts from marine sources:
 - Purification
 - Stabilisation
- Chemical characterisation (specialised testing)
- Efficacy testing (collaborative partnerships)
- Improved yields in source material
- Optimisation of extraction conditions
- Accredited testing of final product

COLLABORATION IS KEY



HEALTHY FOOD INGREDIENTS FROM SHELLFISH AND ALGAE

Funded by MBIE

The efficacy of GSM and microalgae extracts for treating food allergy and inflammatory disorders:

- *In vivo* and *in vitro* models of efficacy
- Algal photo-bioreactor technology for increased algal metabolite production
- Increased extraction efficiency of GSM



NZ & JAPAN RESEARCH COLLABORATION

Funding by MBIE (NZ) & JST (Japan)

Novel function of fatty acids & carotenoids using in *vitro* assays & obesity models.

Extracts and molecules from :

- Microalgae
- Greenshell mussels
- Pāua
- Scallops



HIGH-VALUE NUTRITION NATIONAL SCIENCE CHALLENGE

Funded by High Value Nutrition SC
Business-led project with Sanford

- *Musseling-up: Enhancing mobility with GSM-based high-value formulated foods*
- Greenshell™ mussel and GSM extracts as mobility-enhancing ingredients in formulated high-value nutritional foods.
- Providing industry with rapid analytical tools.



National
SCIENCE
Challenges

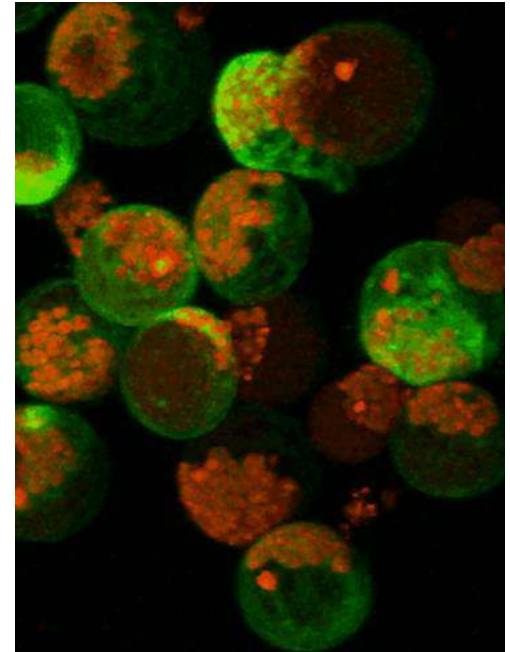
HIGH-VALUE
NUTRITION

Ko Nga Kai
Whai Painga

OPTIMIZING LIPID PRODUCTION PATHWAYS FOR MICROALGAE

Funded by MBIE Catalyst Program

- Investigate unique algae strains for carotenoids & functional lipids
- Novel technologies to improve algae 'breeding' and bioactive yield (metabolic fine tuning).
- Applications in aquaculture and HVN sector.



KINA – DEVELOPING A NUTRACEUTICAL INDUSTRY ON THE EAST CAPE

Funded by Sustainable Seas SC

What's in a Kina?

- Echinochrome A – Potent carotenoid
- Interesting lipids
- Developing analytical capability
- Understanding regional distribution
- Optimising extraction/scale-up
- Verifying the bioactivity of extracts



MASSEY UNIVERSITY



MEDICAL RESEARCH
INSTITUTE
OF NEW ZEALAND



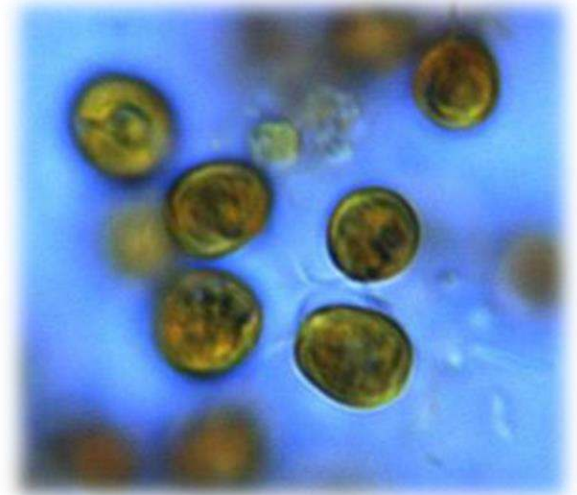
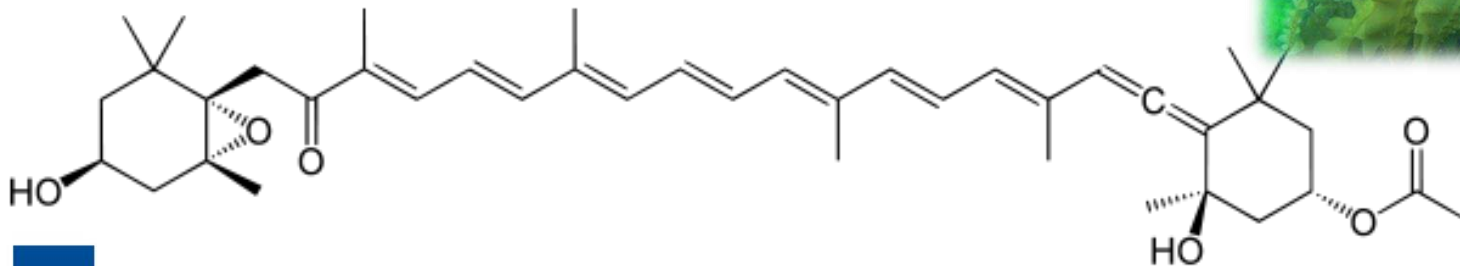
National
Science
Challenges

SUSTAINABLE
SEAS

Ko ngā moana
whakauka

FUCOXANTHIN – A CASE STUDY OF OUR RESEARCH

- Carotenoid produced by microalgae and seaweed
- Accumulates in shellfish
- Anti-oxidant
- Anti-inflammatory qualities
- Anti-obesity properties

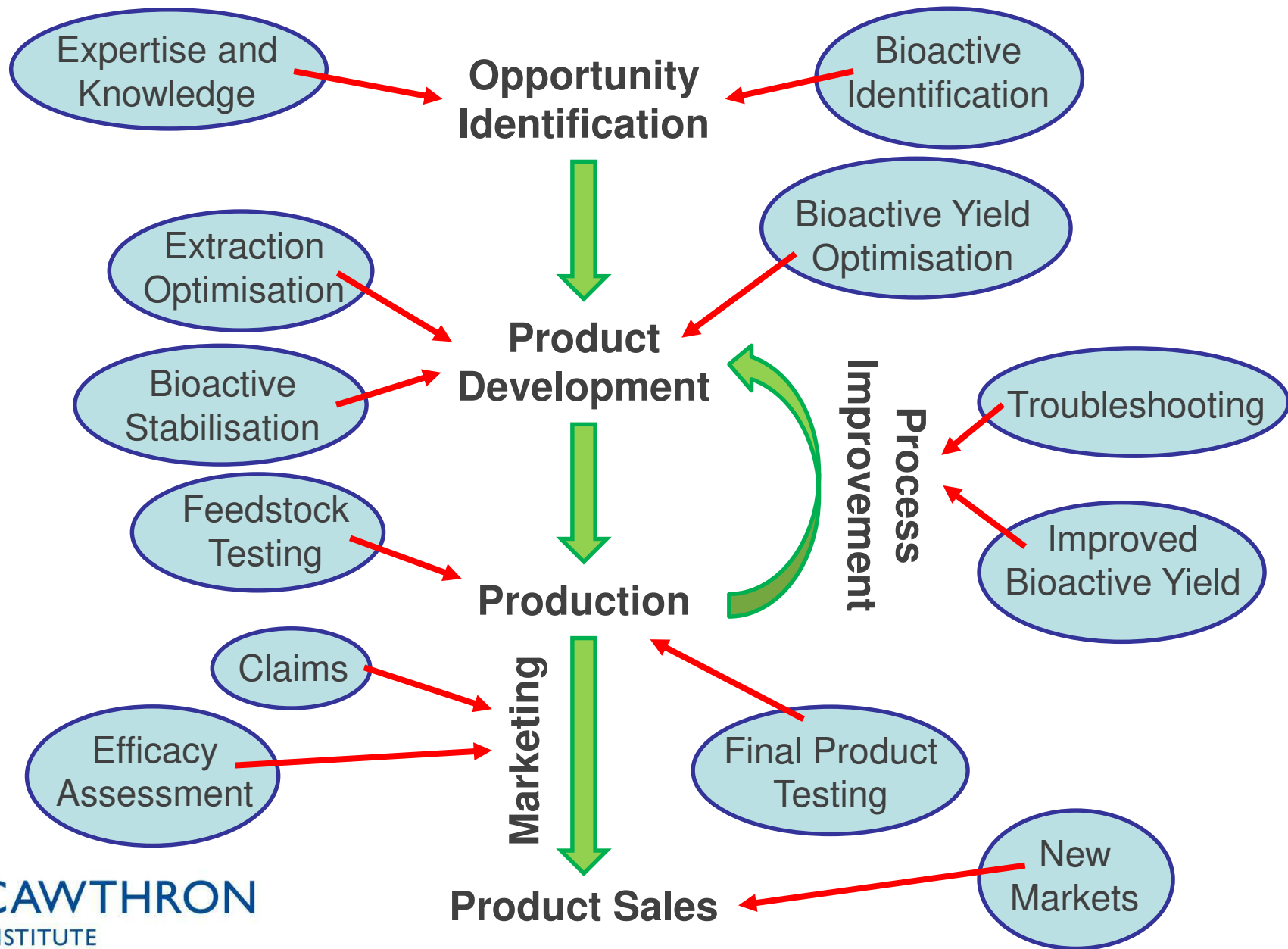


FUCOXANTHIN – A CASE STUDY OF OUR RESEARCH

- Harvest algae biomass
- Conduct extraction
- Isolation & concentrate compounds of interest
- Put through models to test bioactivity
- Identify growth optimisation



FEEDING INTO YOUR VALUE CHAIN



IN SUMMARY

- Bioactivity associated with products increases market value and consumer appeal.
- Bioactive extracts can provide production flexibility.
- Sound science improves product reliability.
- With industry co-funding, government investment is accessible.
- Cawthron provides a unique mix of applied research, product development and robust testing.

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