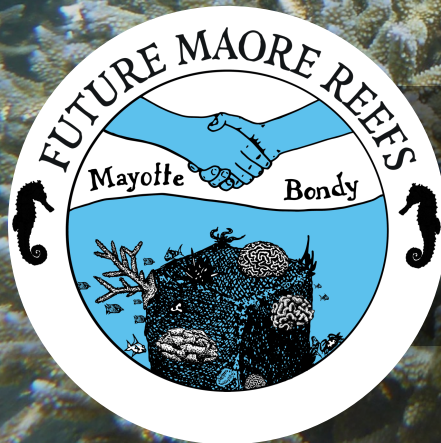


Le bouturage corallien

Making coral nubbin



Anne CHAUVIN

École d'Été Future Maore Reefs

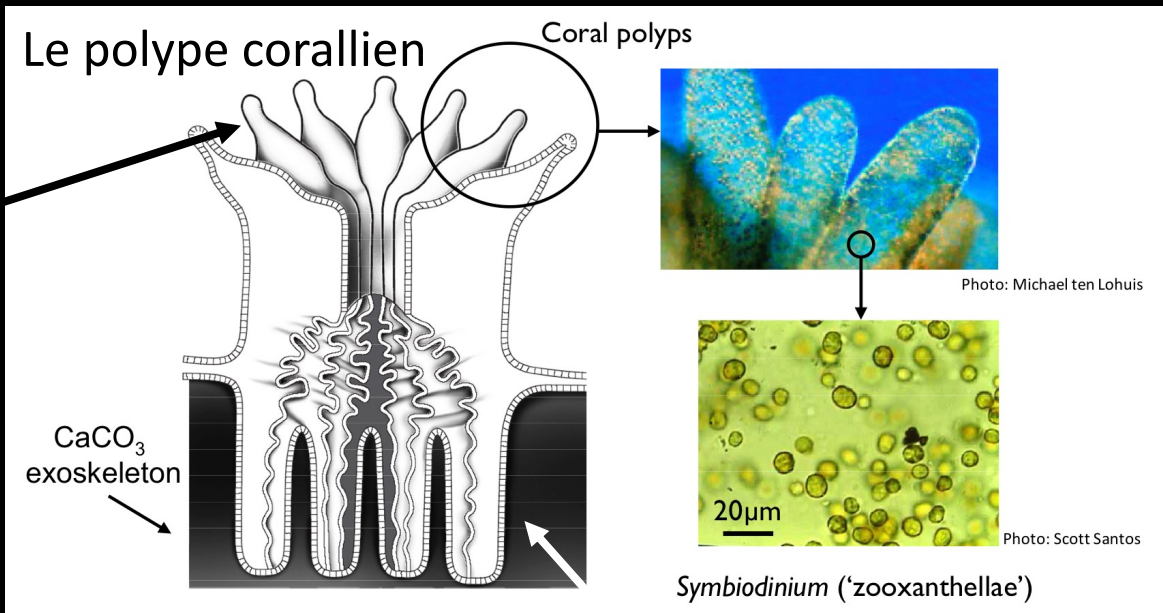
Le 26 septembre 2023



Le polype corallien

The coral polyp

Les tentacules
Tentacles



Le squelette en aragonite
Aragonite skeleton

La colonie corallienne
Coral colony





La forme des colonies

The shape of colonies

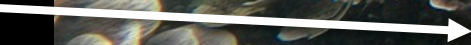
1 – Tabulaire
Tabular



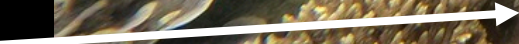
2 – Branchu
Branching



3 – Foliacé
Leafy



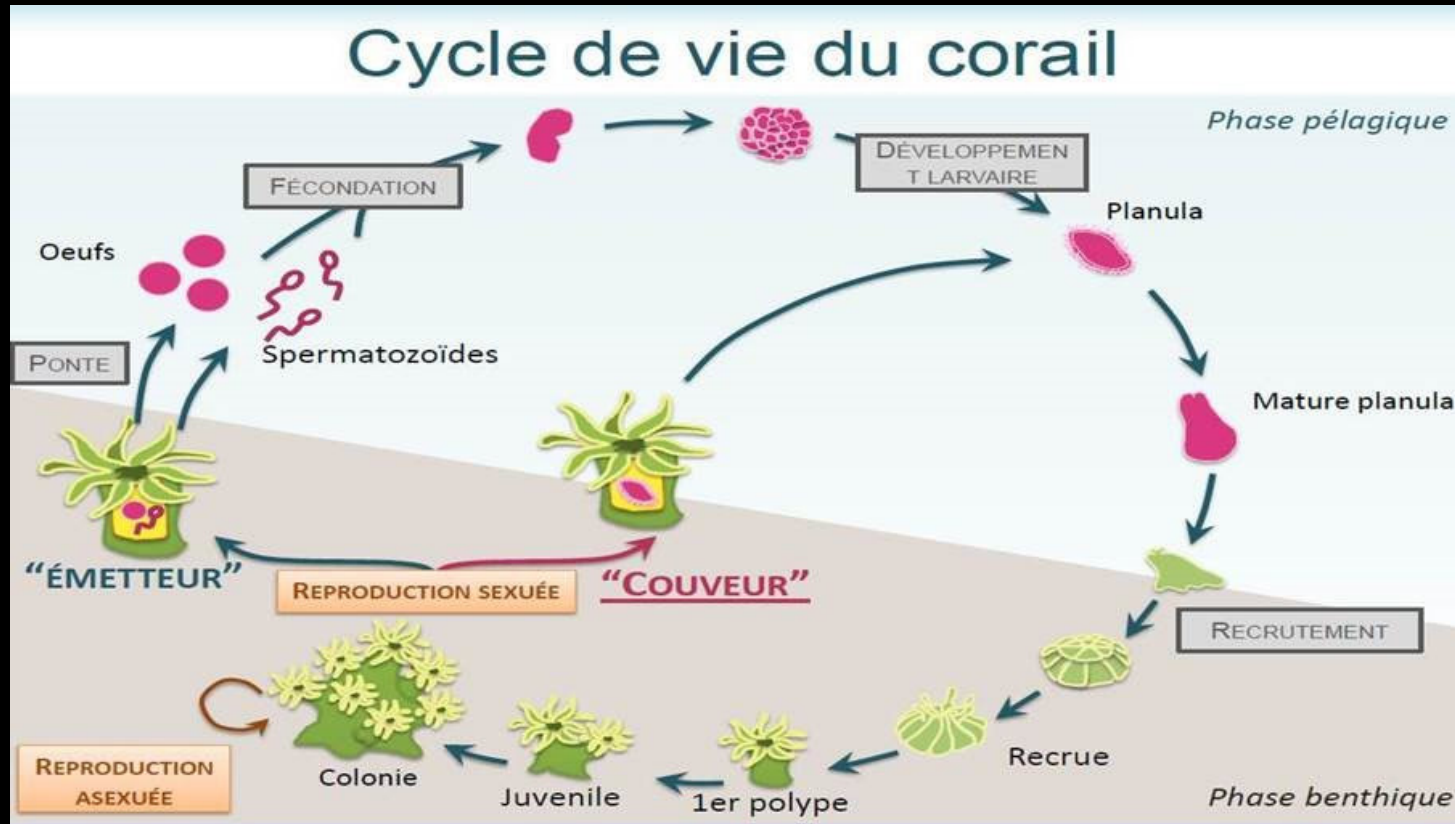
4 – Massif
Massive





Le cycle de vie du corail

The coral's life cycle



Les coraux ont une phase benthique (fixés au substrat) et une phase pélagique (libres dans la colonne d'eau)

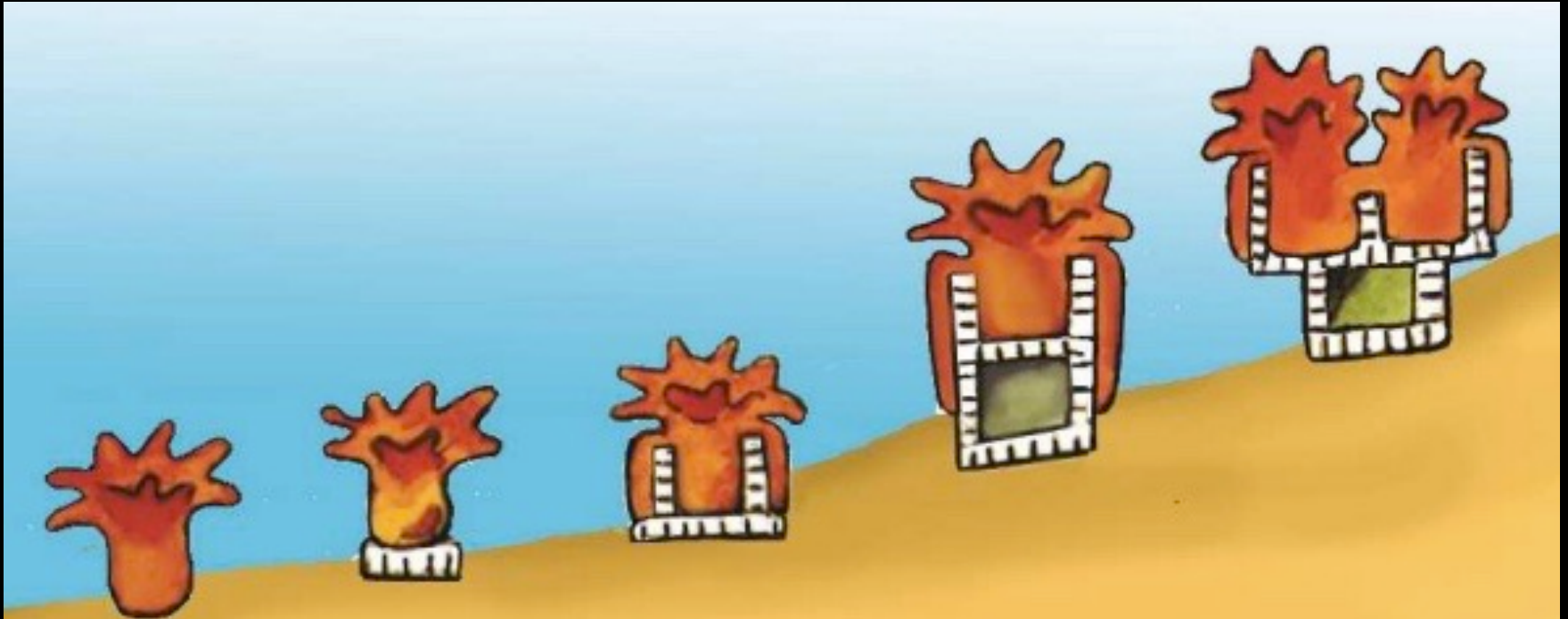
Corals have a benthic phase (attached to the substrate) and a pelagic phase (free in the water column).



Le bourgeonnement

Budding

Reproduction asexuée – *Asexual reproduction*



Le polype crée un autre polype identique à lui-même (= clone)
BOURGEONNEMENT CORALLIEN pour former la colonie

*The polyp creates another polyp identical to itself (= clone)
CORAL BUDDING to form the colony*



Les pépinières de corail

Coral nursery

Arbre à coraux - *Coral trees*



Structure en tubes PVC, ancrée au fond et en flottaison dans la colonne d'eau, suspension des boutures avec du fil de nylon

PVC tube structure, anchored to the bottom and floating in the water column, nubbins suspended with nylon thread



Fil de nylon



Les pépinières de corail

Coral nursery

Dômes à coraux - *Coral frames*



Structure en fer à béton sablée,
ancrée au fond, maintien des
boutures avec des colliers de
serrage

*Sandblasted rebar structure,
anchored to the bottom, holding
nubbins in place with cable tie*





Les pépinières de corail

Coral nursery

Tables à coraux - *Coral tables*



Structure en fer à béton sablée, ancrée au fond et recouverte d'un filet rigide, maintien des boutures sur des cookies en béton et avec des câbles en cuivre

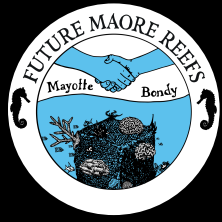
Sand-blasted rebar structure, anchored to the bottom and covered with a rigid net, holding the cuttings on concrete cookies and with copper cables

Il existe d'autres types de pépinières:

- ✓ Sur cordes
- ✓ Sur coquilles ou squelettes morts

There are other types of nursery:

- ✓ On ropes
- ✓ On shells or dead skeletons



Le bouturage dans le projet FUTURE MAORE REEFS

Coral nubbin in the Future Maore Reefs project



Sentier sous-marin

Underwater pathway



Sentier sous-marin de Musical Plage



©Sentinelle 2



Cartographie ©G2OI & FMR

10 m



Sentier sous-marin

Underwater pathway



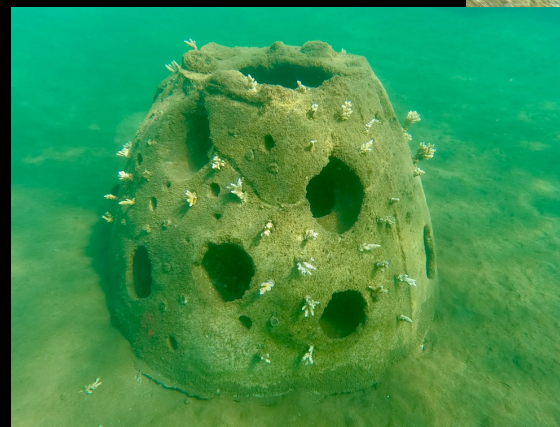
Étiquette sur les bouées
Label on buoys



Bouée du sentier sous-marin
Buoys

Récif artificiel : REEF BALL®
avec les boutures

*Artificial reef: REEF BALL®
with nubbins*



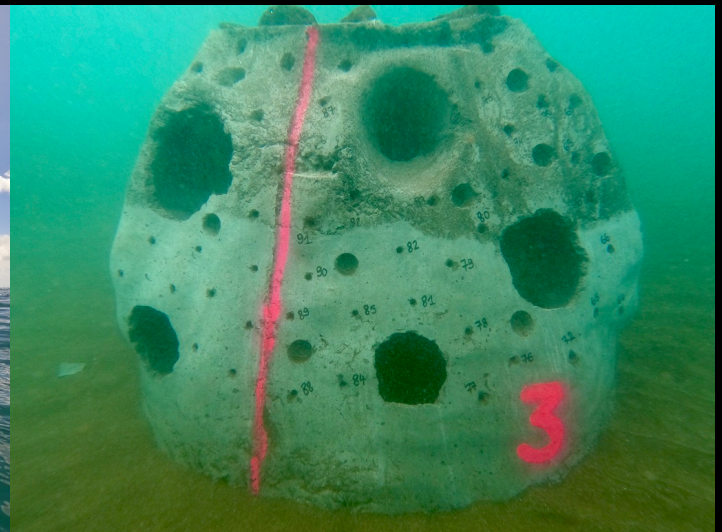


Fabrication de la Reef Ball

Making Reef Ball®



Moulage et démoulage du béton - *Moulding and demoulding concrete*



Transport et immersion sur le site - *Transport and immersion on site*

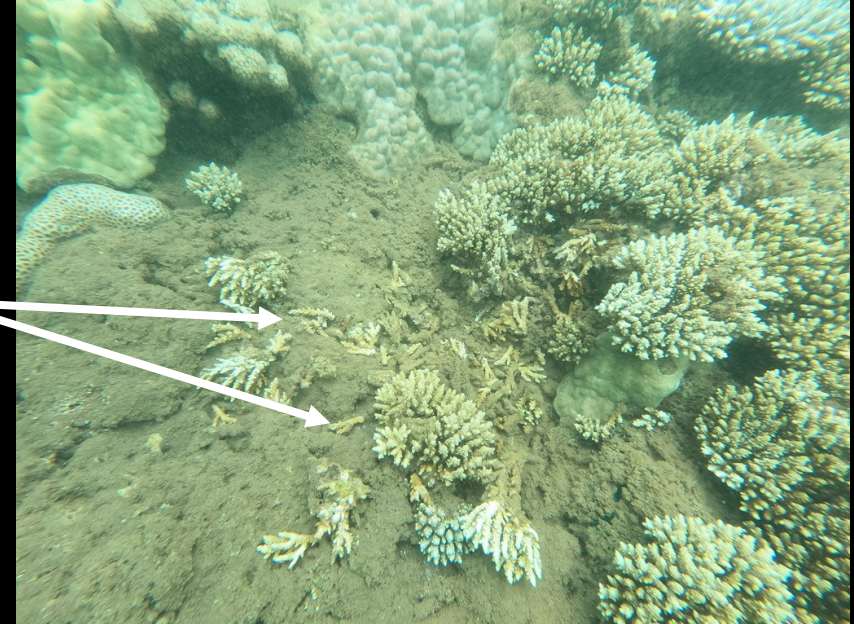
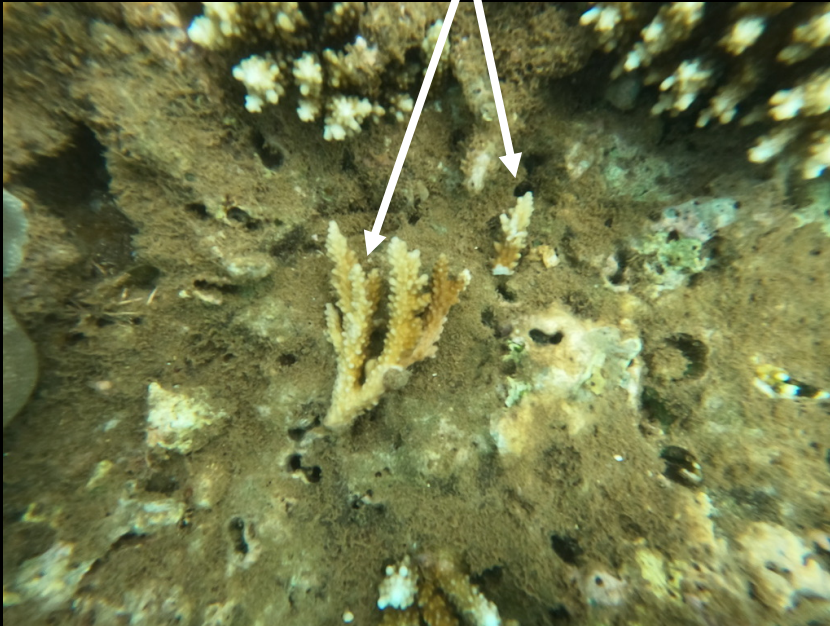


Les étapes du bouturage

Steps for making a nubbin

COLLECTE

Ramasser les fragments de coraux déjà cassés sur le sol
Collect fragments of coral already broken on the ground



Les déposer délicatement dans un panier
Place them carefully in a basket

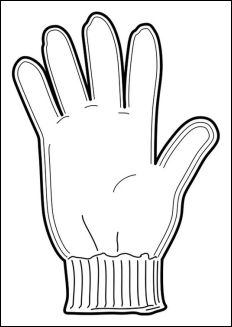




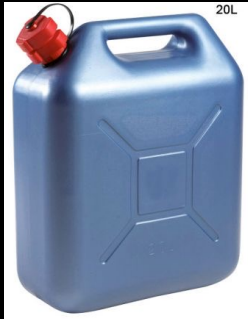
Les étapes du bouturage

Steps for making a nubbin

MATÉRIEL



Gants



Eau de mer



Bassine



Colle
non
toxique



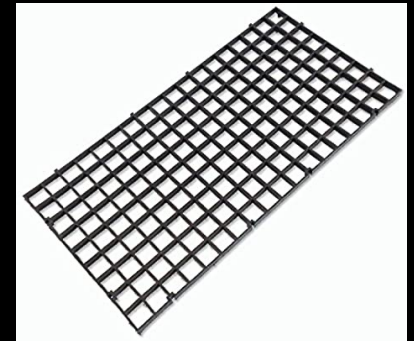
Fragment de corail



Pince coupante



Support en calcaire



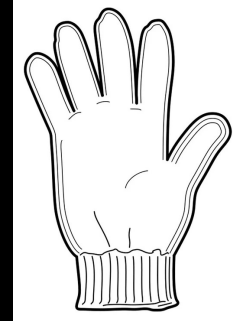
Grille



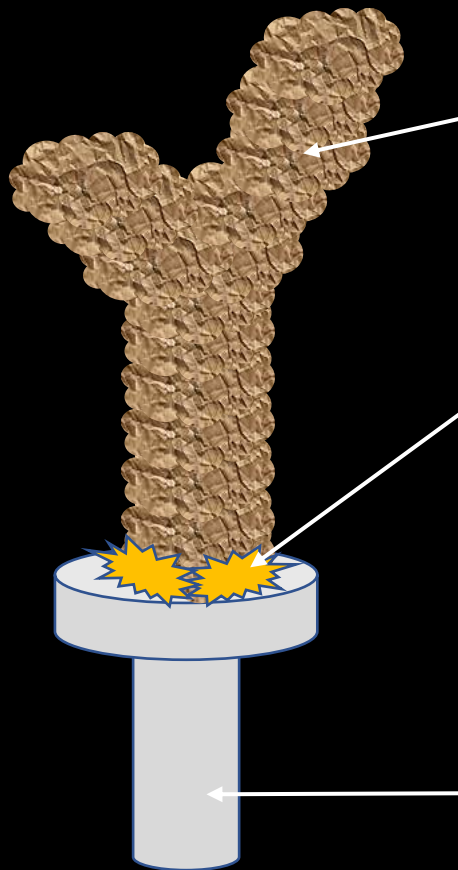
Les étapes du bouturage

Steps for making a nubbin

ASSEMBLAGE



Porter des gants !
Wear gloves !



Fragment d'*Acropora*
Acropora fragment

Colle non nocive pour les
organismes (humains et marins)
Non-harmful glue for organisms
(human and marine)



Support en calcaire
Limestone support





BEF Experiment

- To root restoration / compensation actions on ecological fundamental sciences



- Biodiversity – Ecosystem functioning experiment



BEF Experiment

- Biodiversity has a positive effect on ecosystem functioning (productivity, stability, resilience)
- How can we use this science to propose nature-based solutions for ecosystem restoration / compensation ?



BEF Experiment

Neighbor Diversity Regulates the Productivity of Coral Assemblages

Mike McWilliam,^{1,3,*} Tory J. Chase,^{1,2} and Mia O. Hoogenboom^{1,2}

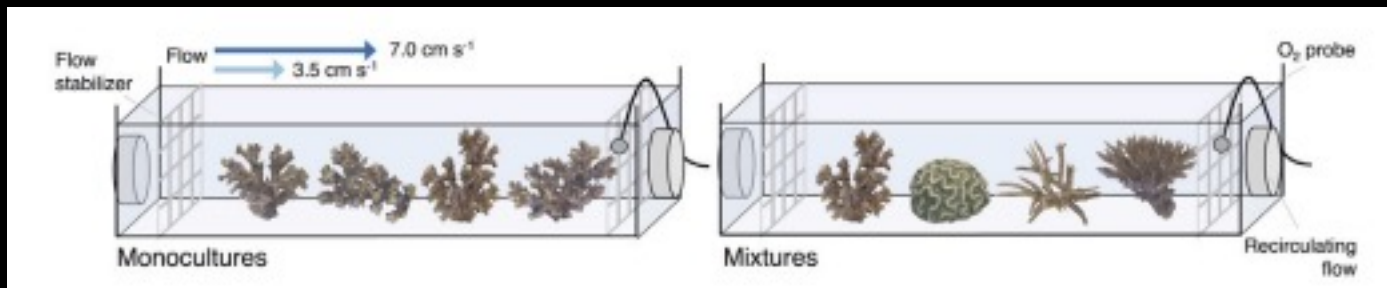
¹Australian Research Council (ARC) Centre of Excellence for Coral Reef Studies, James Cook University, Townsville, QLD 4811, Australia

²Marine Biology and Aquaculture, College of Science and Engineering, James Cook University, Townsville, QLD 4811, Australia

³Lead Contact

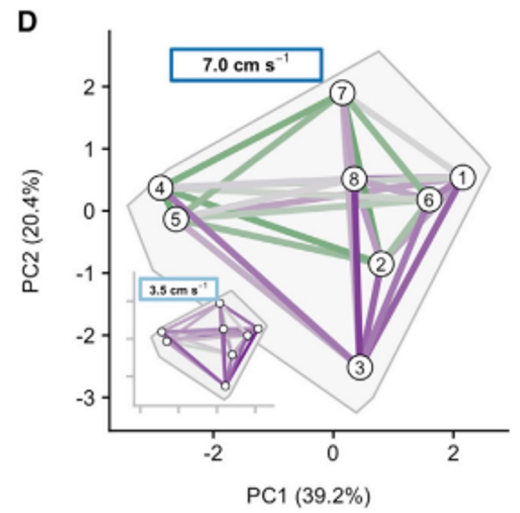
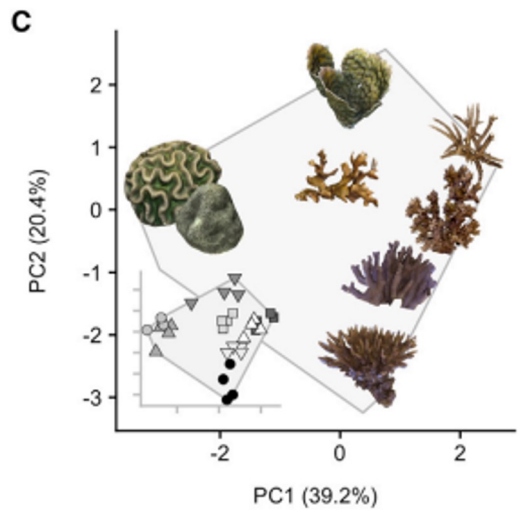
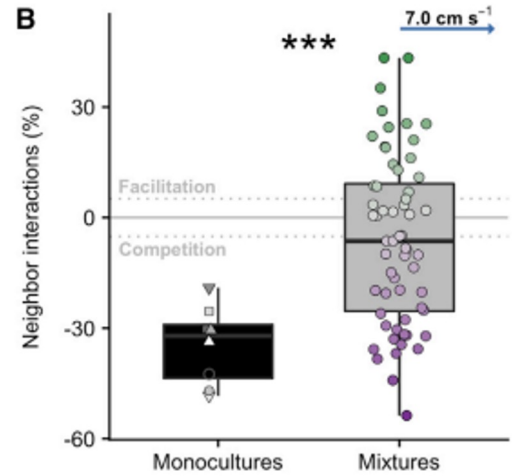
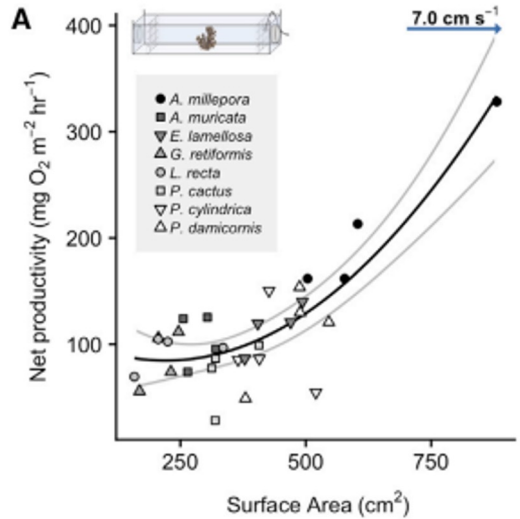
*Correspondence: michael.mcwilliam@my.jcu.edu.au

<https://doi.org/10.1016/j.cub.2018.09.025>






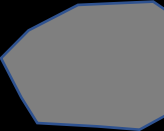

BEF Experiment

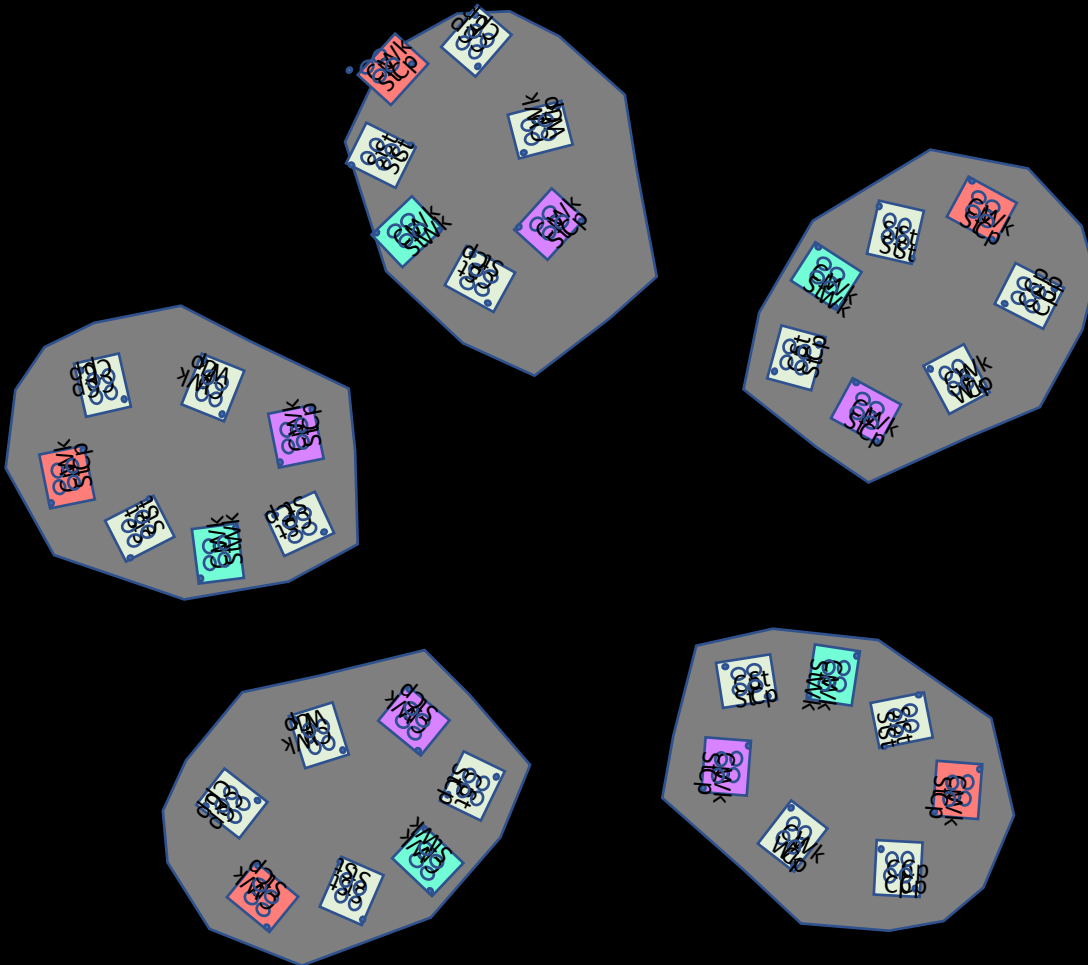




Design expérimental

Experimental design

- 3 sites d'études aux conditions environnementales contrastées 
- 5 blocs de basalte 
- 36 plaques d'assemblage 
- 144 boutures de 6 espèces



- *3 study sites with contrasting environmental conditions*
- *5 basalt blocks*
- *36 concrete assembly slabs*
- *144 nubbins of 6 species*



Design expérimental

Experimental design

BLOC 4

AÉROPORT

23	Amur2	Gret2	Ahya2	Ahum1
24	Amur3	Gret3	Plut2	Ahum2
25	Amur4	Ahya3	Plut3	Ahum3
26	Gret1	Gret2	Gret3	Gret4
27	Gret1	Gret3	Ahya1	Ahya3
28	Gret2	Gret4	Plut1	Plut3
29	Gret2	Gret3	Ahum1	Ahum3

Fragments issus de 4 colonies mères différentes

3 types d'assemblages:

- Monospécifiques
- Bispécifiques
- Quadrispécifiques

Fragments from 4 different mother colonies

3 types of assemblages:

- *Monospecific*
- *Bispecific*
- *Quadrispecific*



Fabrication des supports

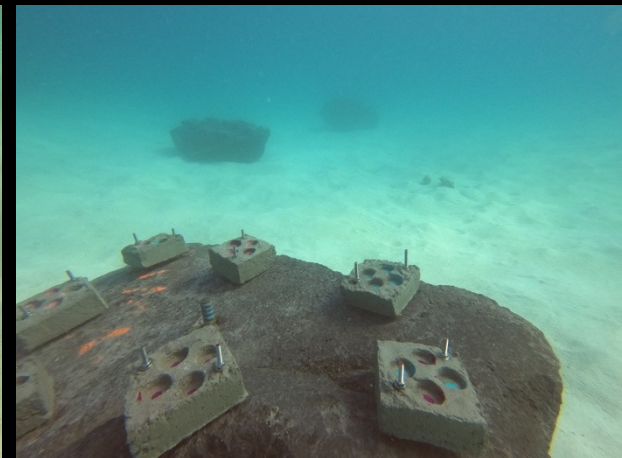
Manufacture of supports



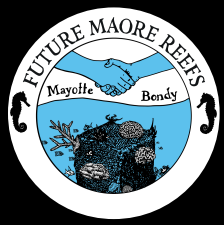
Fabrication des plaques de béton
Manufacture of concrete slabs



Fixation sur les blocs de basalte
Fixing to basalt blocks



Transport et immersion sur les sites - *Transport and immersion on the sites*



Bouturage

Coral nubbin



Collecte des fragments
Fragments collect



Mise en bouture et séchage du béton
Nubbin and drying the concrete



Collage des boutures sur les plaques de béton - *Gluing nubbins to concrete slabs*

