Duurzaamheid - Koraalkweek

Bijscholingsdagen
AOC docenten
4 november 2014

Michaël Laterveer
Blue Linked B.V.
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Achtergrond

- Drs. Michael Laterveer, RUL (RUG, UvA)
- 16 jaar Diergaarde Blijdorp, Curator Oceanium
- Oceanium; natuurbehoud, toegepast wetenschappelijk onderzoek, educatie
- SECORE project, Sexual Coral REproduction
- Onderzoek naar basisprocessen (controleren)
- Praktijkervaring workshops Curaçao, Puerto Rico, Singapore
- Eind 2011 – Blue Linked BV (www.bluelinked.nl) innovatieve projecten koraalrifherstel & aquacultuur

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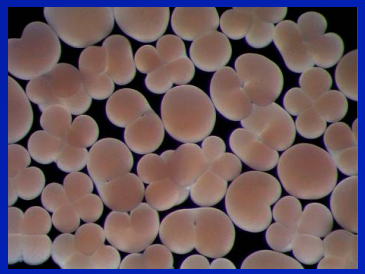
Overzicht presentatie

- Koraalriffen en hun status
- Seksuele voortplanting, basisprocessen
- Koralenkweek: opzet, systeem en uitvoering
- Koraalrifherstel project



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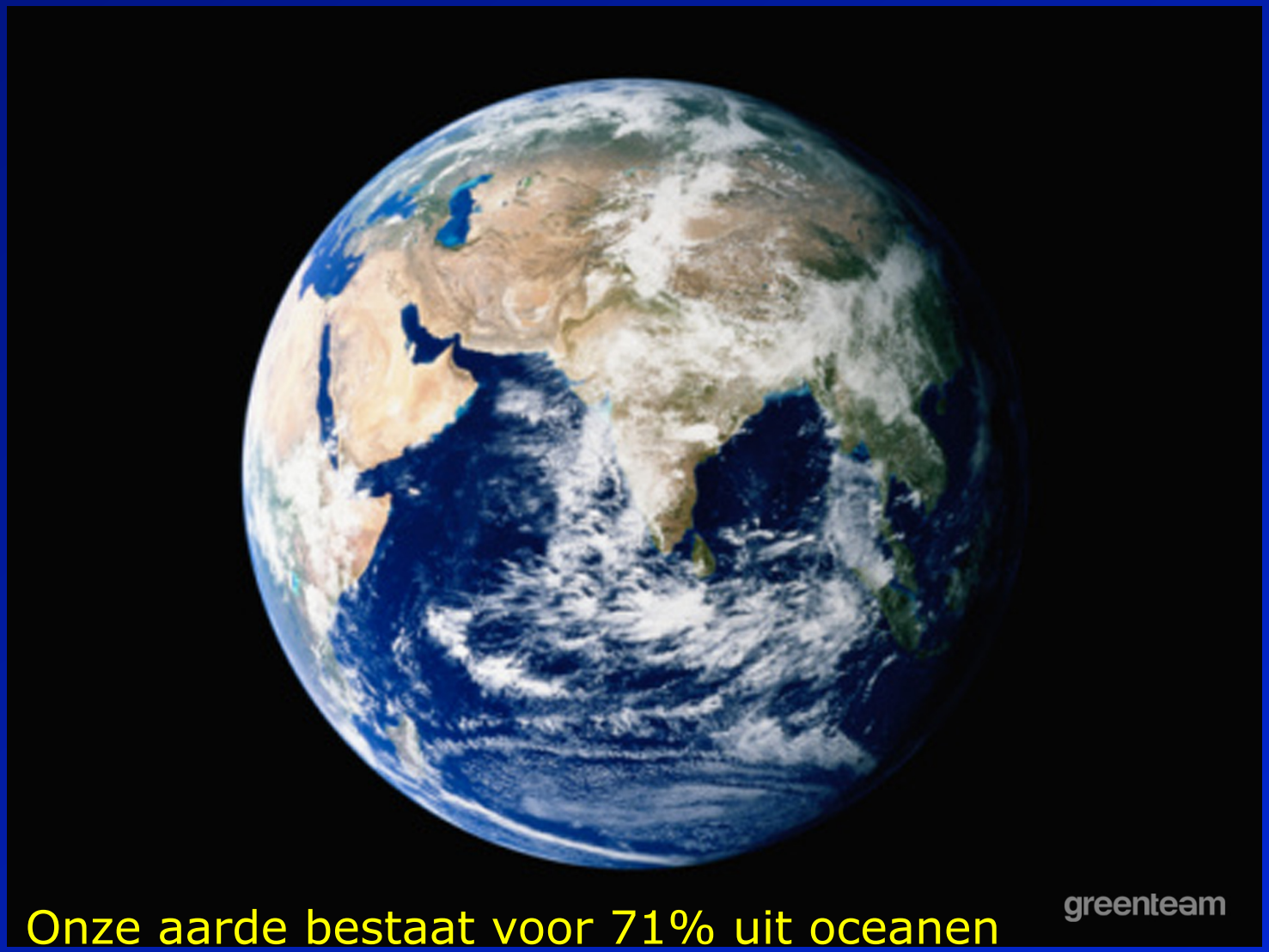
Blauwe planeet



Onze aarde bestaat voor 71% uit oceanen

Koraalriffen: 0,2% aardoppervlak

Vergelijkbaar met het oppervlak van Bolivia

Verspreiding koraalriffen

Diversiteit

Bouw koraaldiertjes (poliepen)

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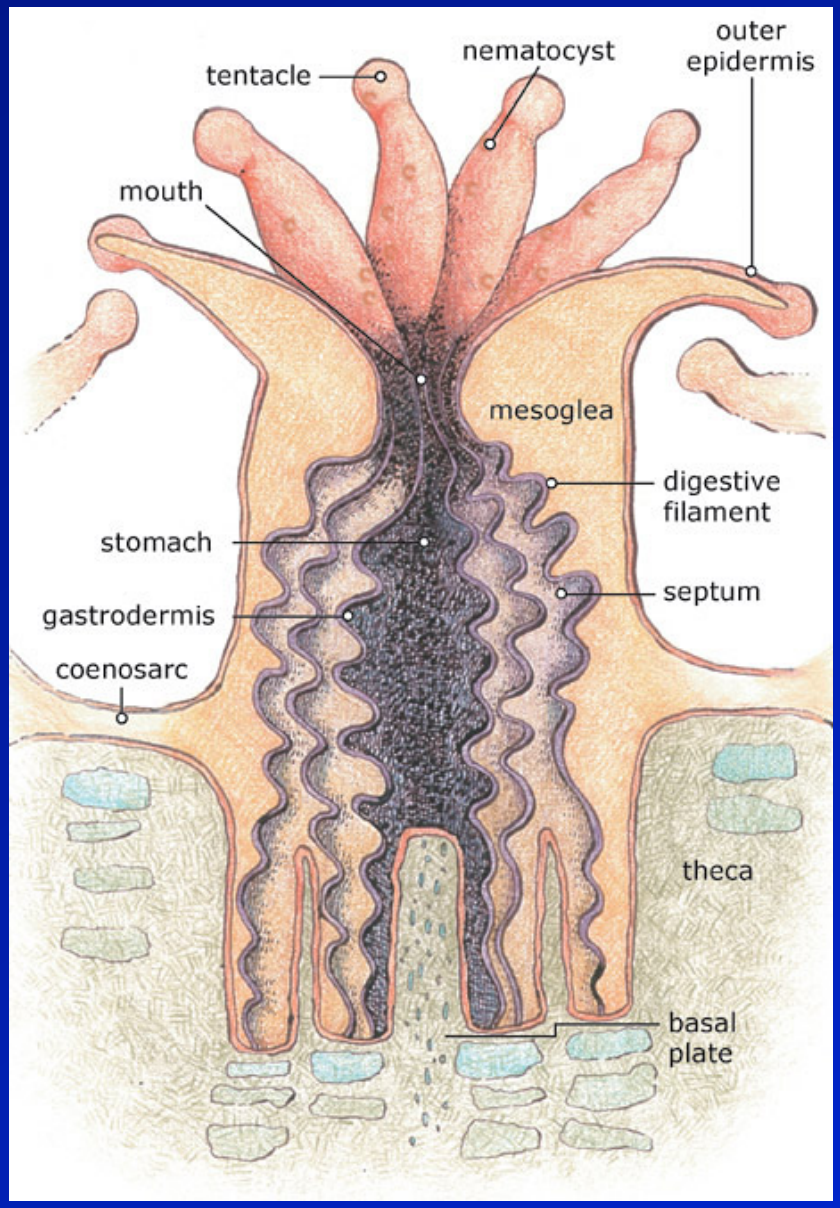

Functie koraalriffen

- Broedkamer en leefomgeving

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Functie koraalriffen

- Natuurlijke apotheek (AIDS, kanker)

Diergaarde BLIJDORP rotterdam zoo

Functie koraalriffen

- Natuurlijke kustbescherming

Functie koraalriffen

- Bron van inkomsten (visserij, ecotoerisme e.d)

Functie koraalriffen

- Broedkamer en leefomgeving
- Natuurlijke apotheek (AIDS, kanker)
- Natuurlijke kustbescherming
- Bron van inkomsten (visserij, ecotoerisme e.d)
- Zuiveren de lucht, zoals bomen van tropisch regenwoud.

Maar …

Bedreigingen: lokaal en mondiaal

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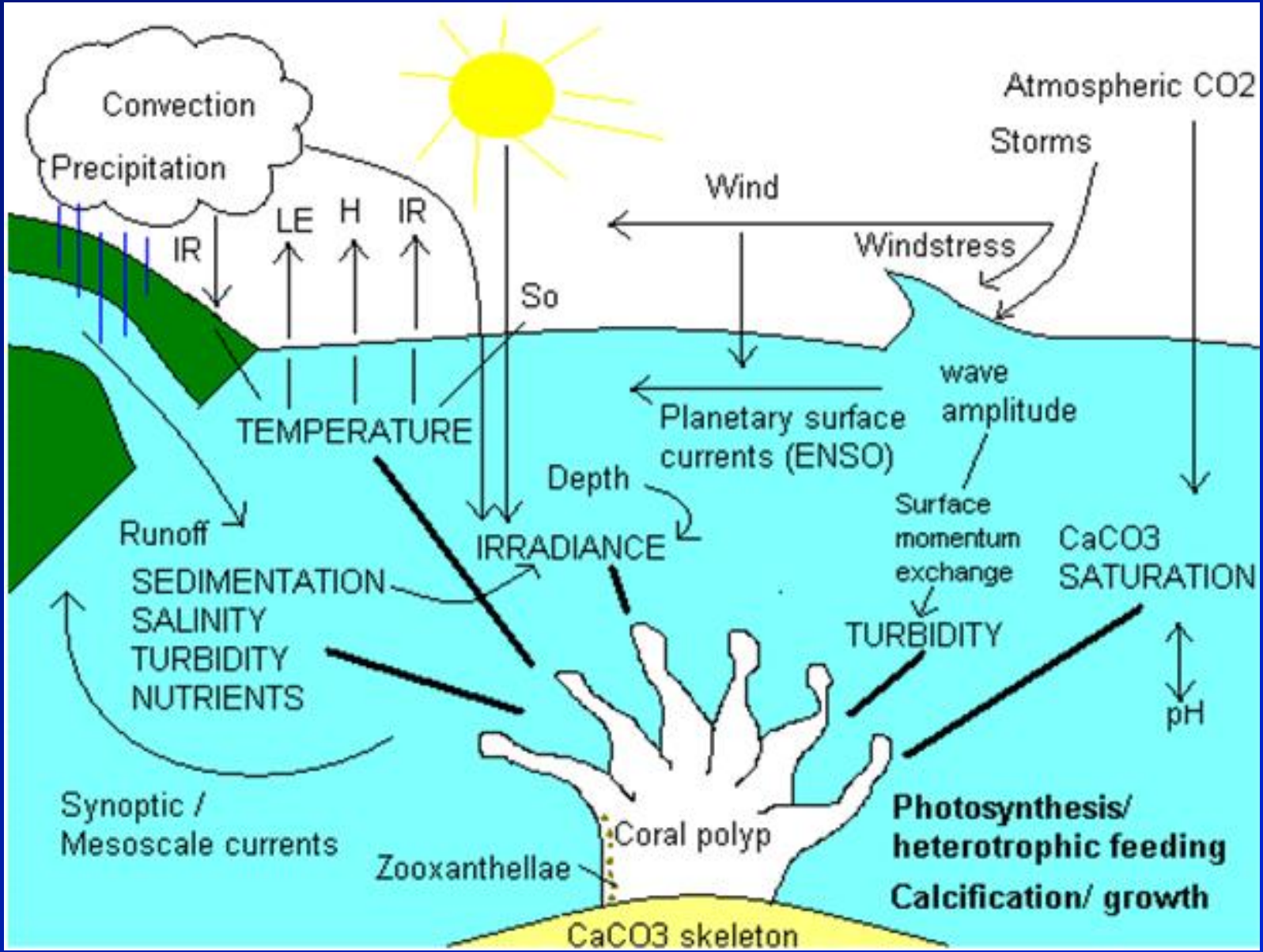
Bedreigingen: divers



Bahama's, Rainbow Reef

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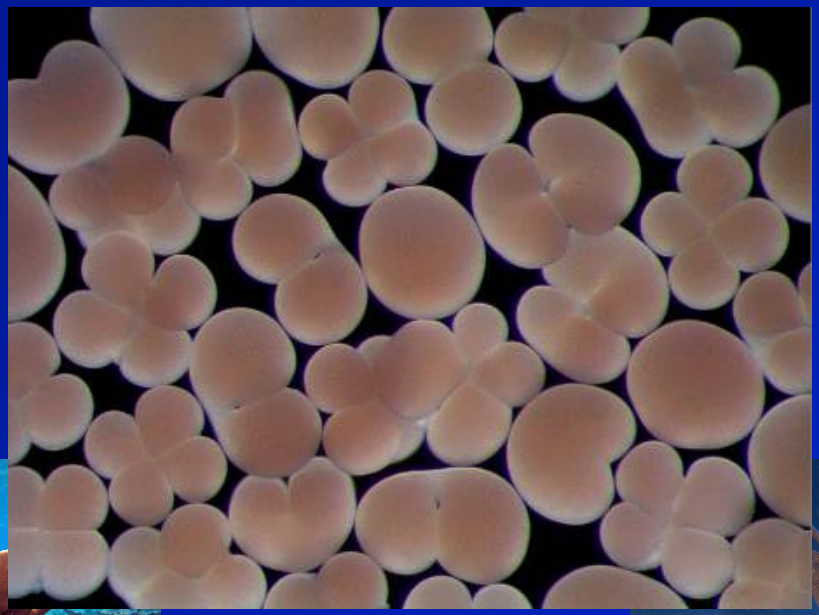

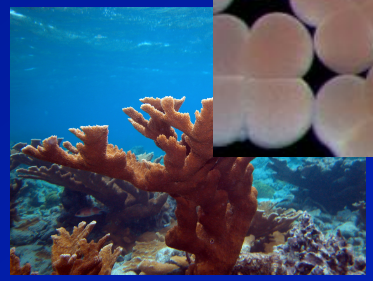

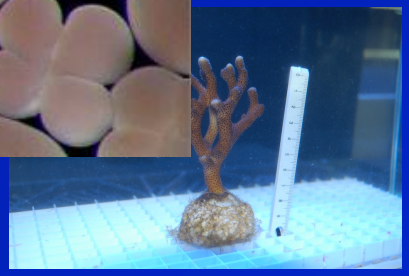

Voortplanting

- Fragmentatie
  - Klonen van ouderdier
  - Verspreiding beperkt
  - Continu, gericht of incidenteel (stormen)
  - Voornamelijk vertakte koraalsoorten
- Seksuele voortplanting
  - Genetische variatie
  - Groot verspreidingsgebied
  - Periodiek in voortplantingscyclus
  - Alle soorten maar met kwetsbare ontwikkelingsfase

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Voortplanting

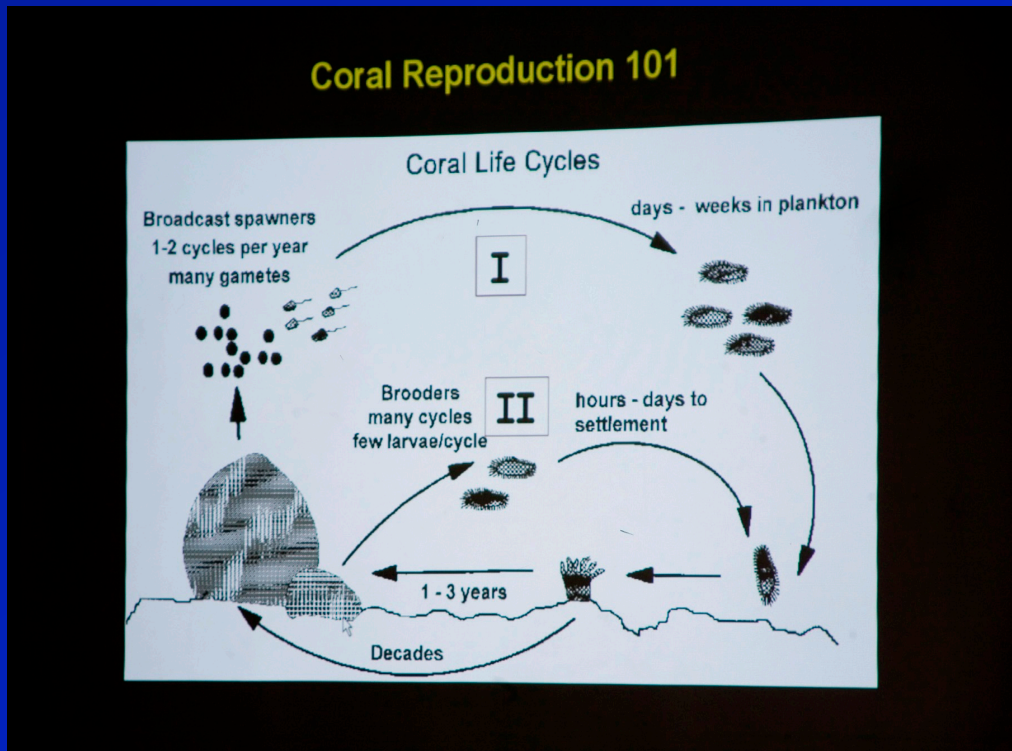
- Seksuele voortplanting
  - Cyclus:
    - Jaarlijks, maandelijks
    - Dag-nachtritme
    - Getijdenwerking
    - Watertemperatuur

Moon phases

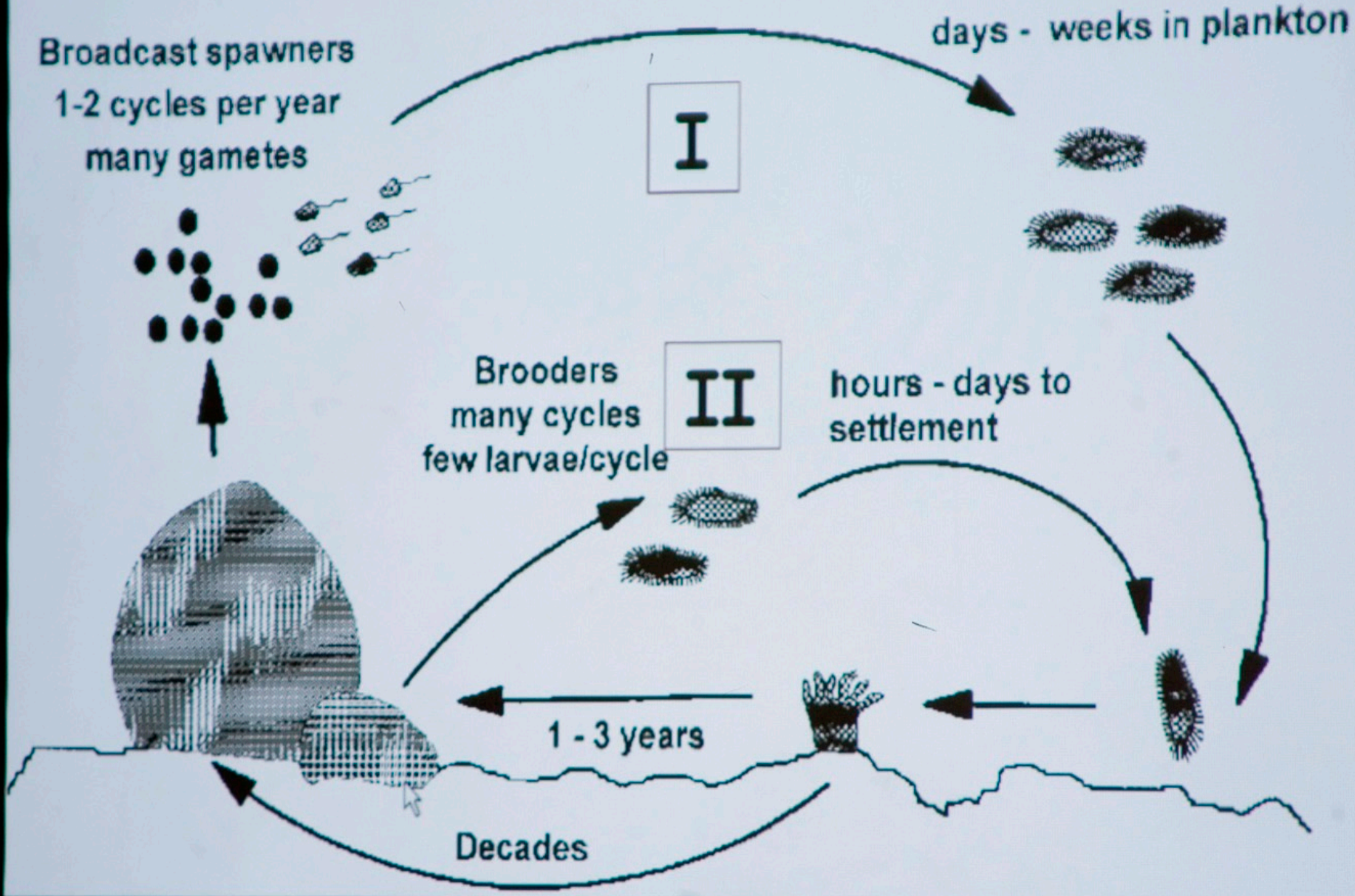
Courtesy: U.S. Naval Observatory

Voortplanting

- Seksuele voortplanting
  - Eenslachtig (25%) of tweeslachtig (75%)
  - Broeders of vrijleggers



Coral Life Cycles

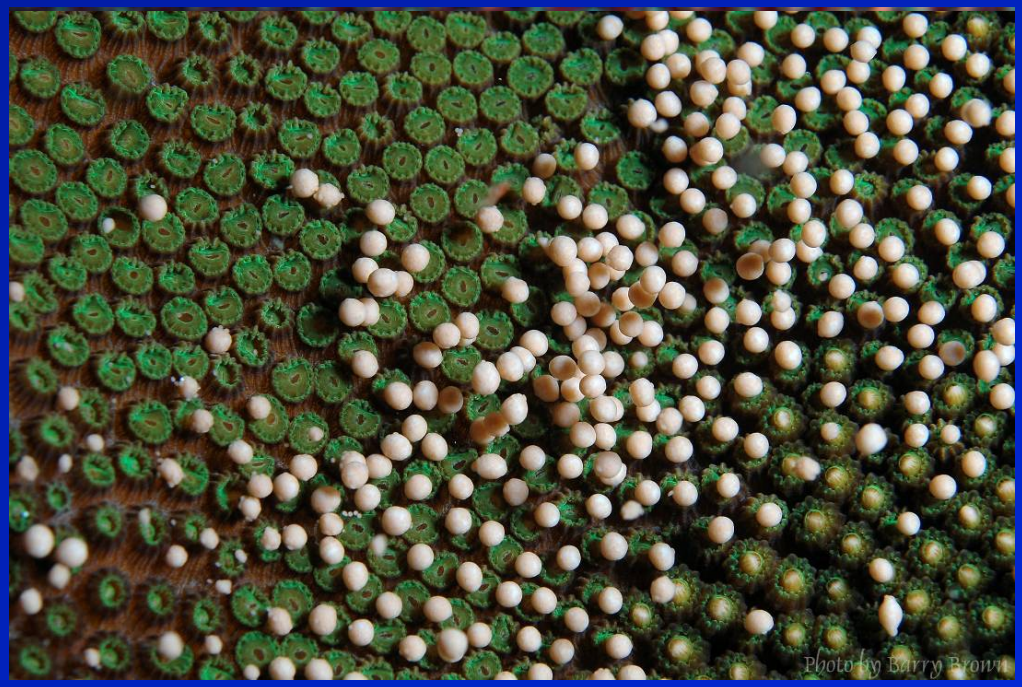


Voortplanting

- Broeders (*brooders*)
  - Inwendige bevruchting
  - Direct vrijgeven van larve
  - Vestiging na enkele uren

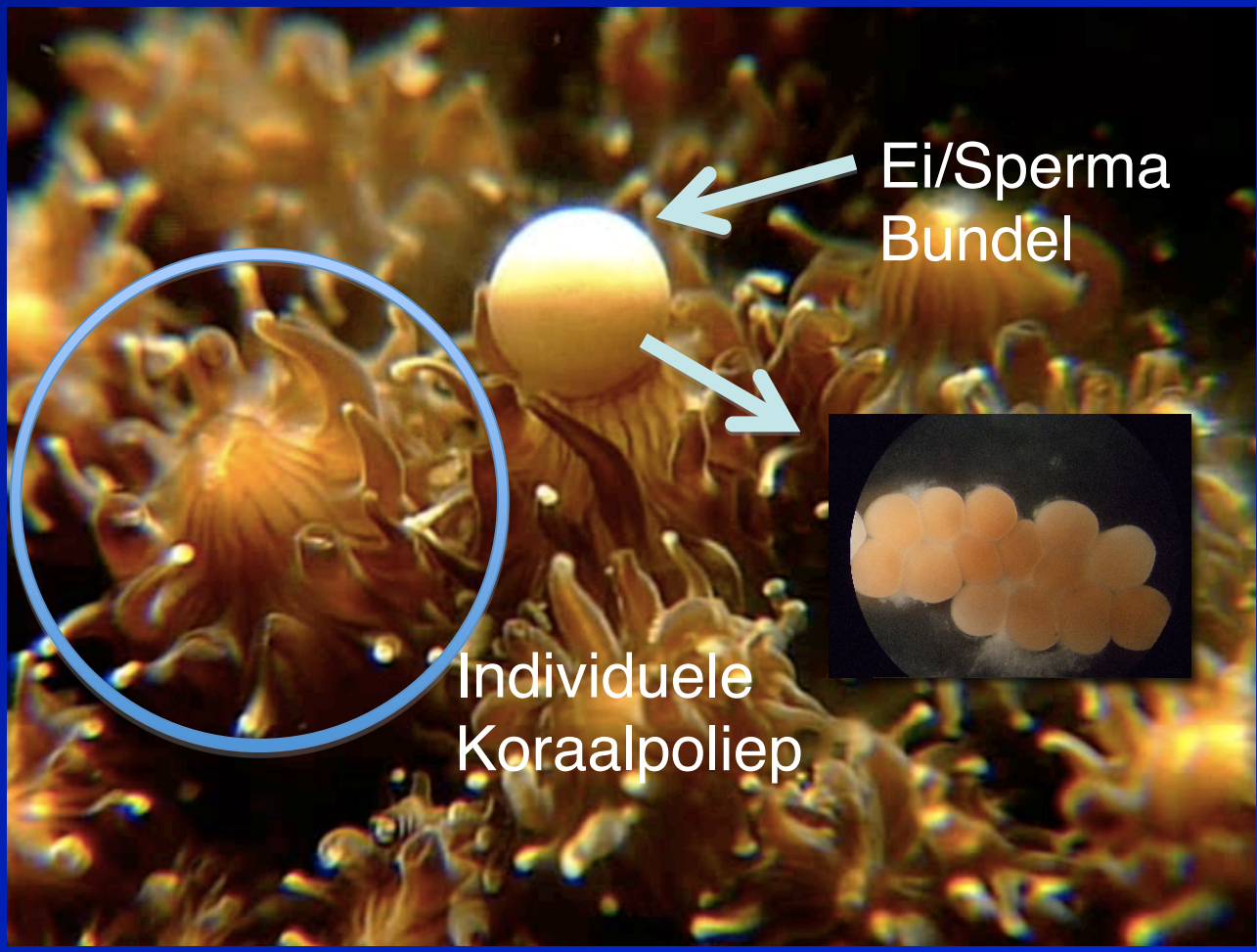
Voortplanting

- Vrijleggers (*spawners*)
  - Uitwendige bevruchting
  - Ei-sperma bundels
  - Vestiging na enkele dagen



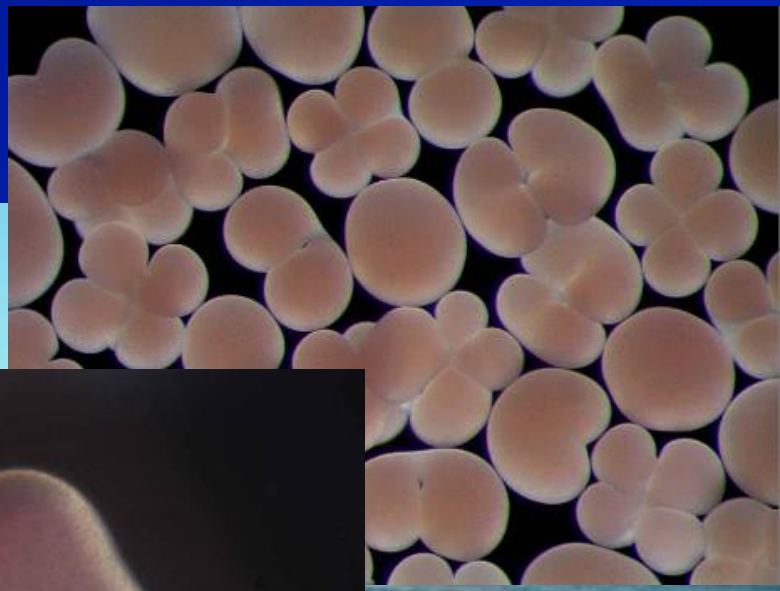
Voortplanting

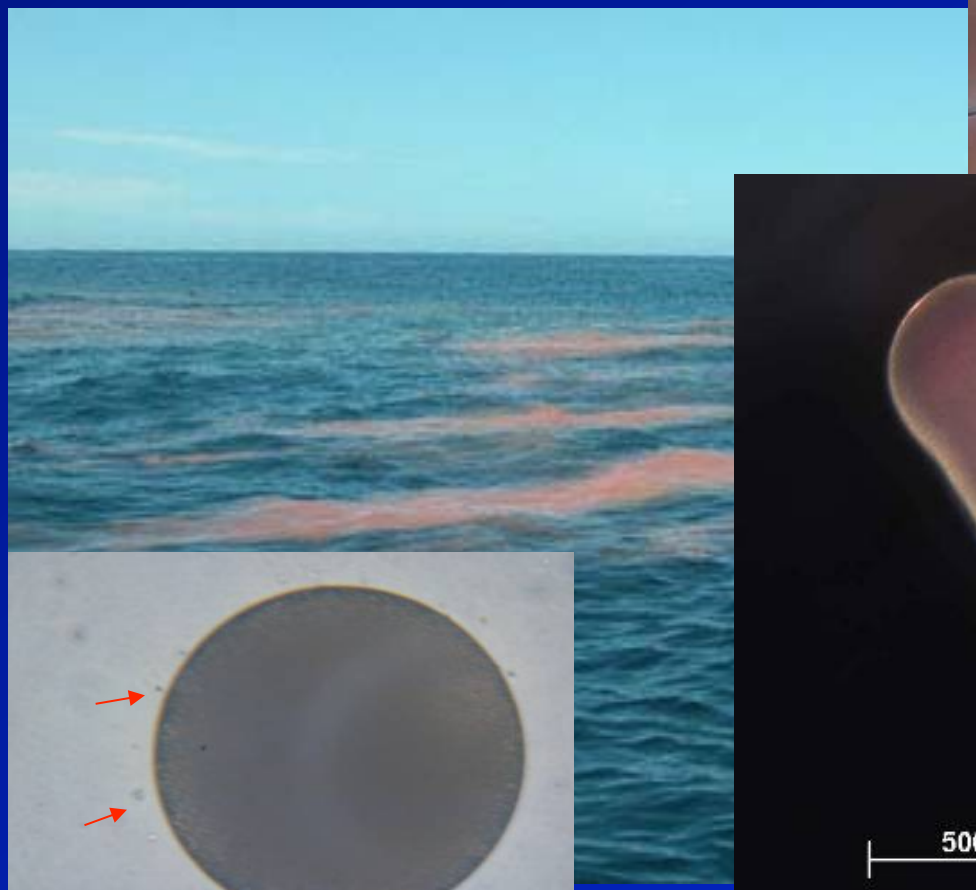
- Vrijleggers (*spawners*)

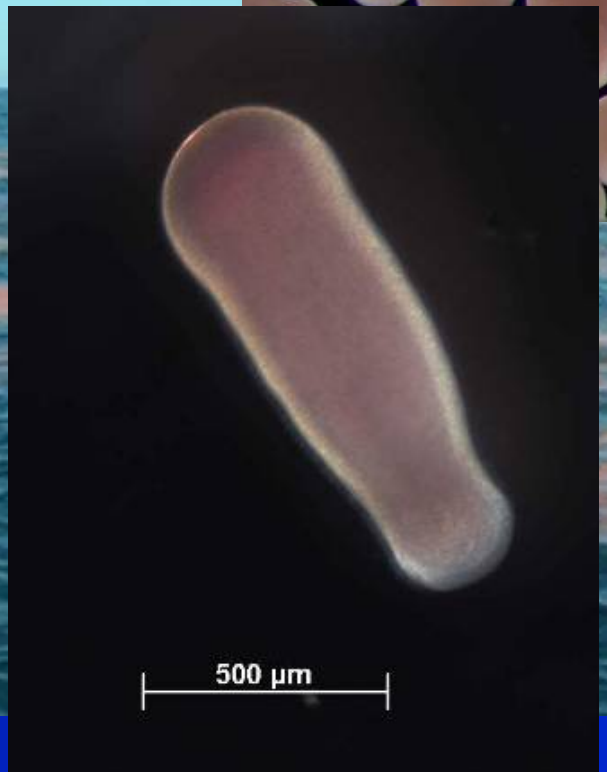


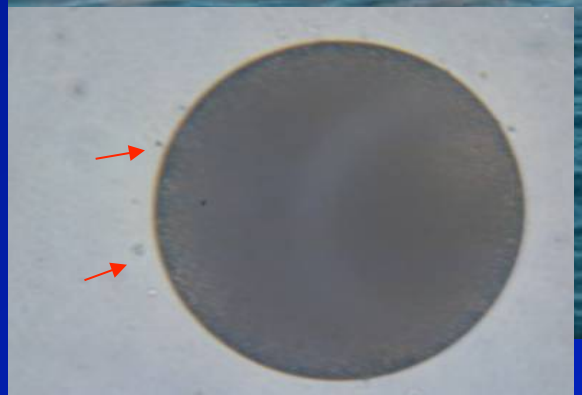
Voortplanting

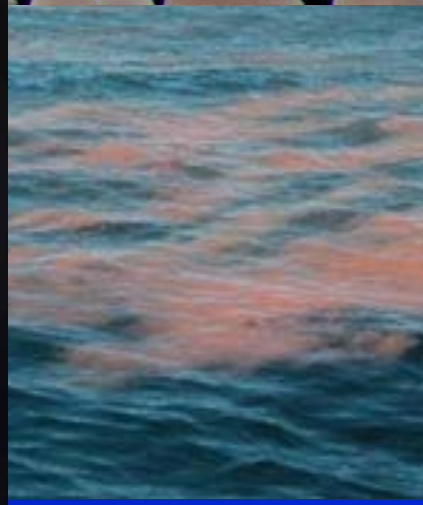
- Vrijleggers (*spawners*)





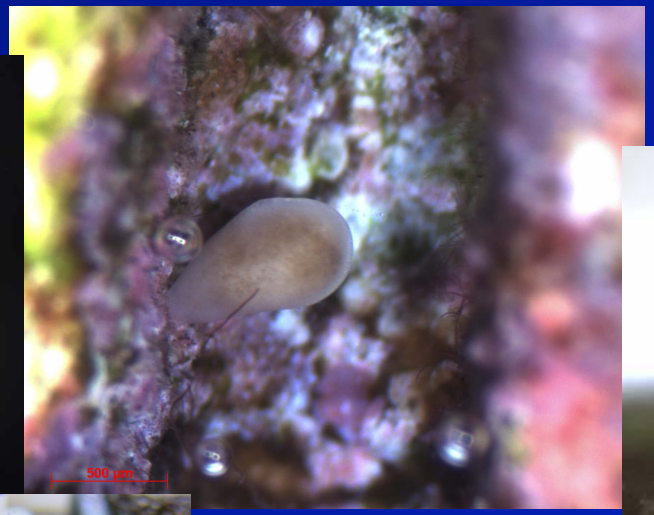






Voortplanting

larve



primaire poliep

adult

juveniel

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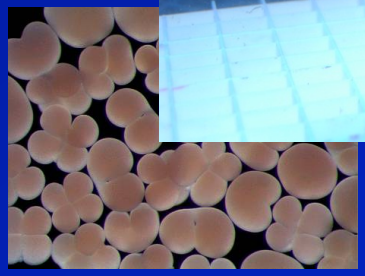


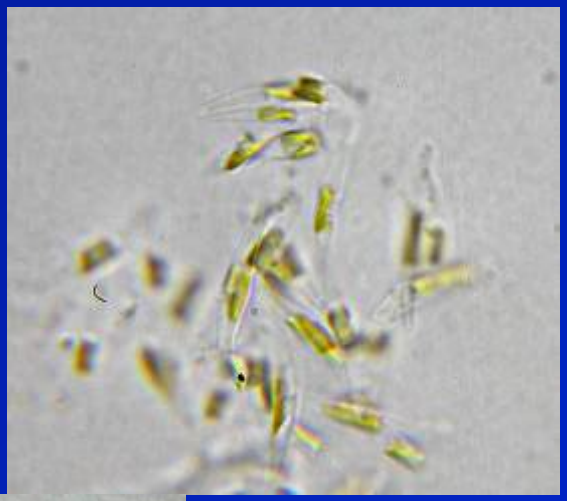
Koralenkas project (EcoDeco)

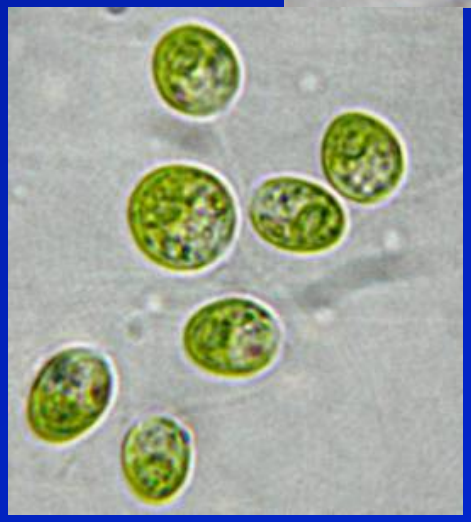
- DyMiCo waterzuivering
- Basis in Utrecht
- 2010 SBIR project –MKB

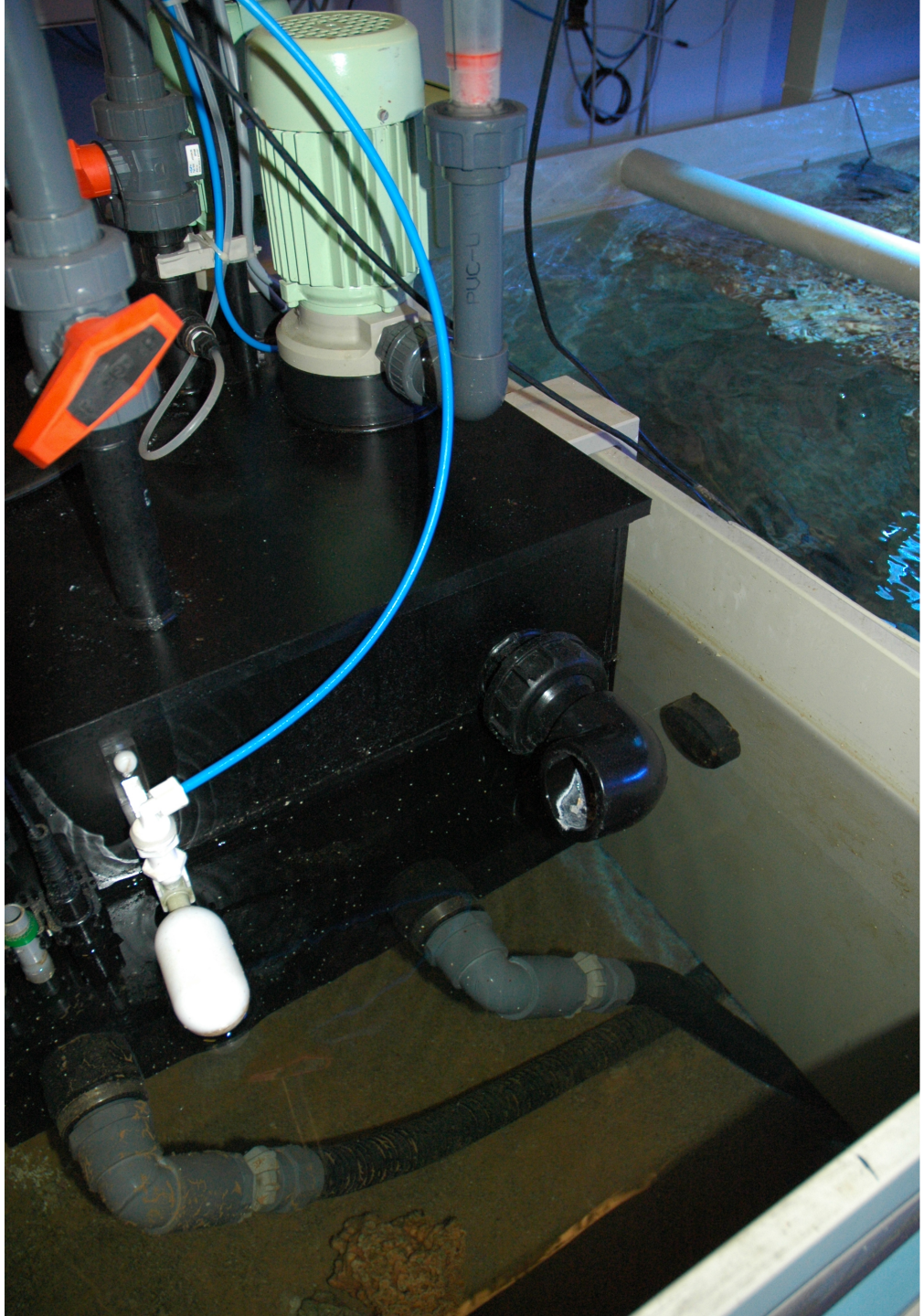
- Het DyMiCo systeem

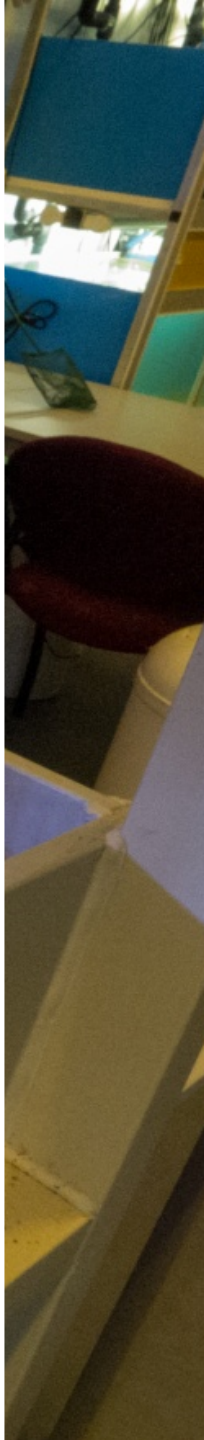
  -> Dynamic Mineral Control

  - Levend water
  - Bezinking van afvalstoffen
  - Actieve bodem



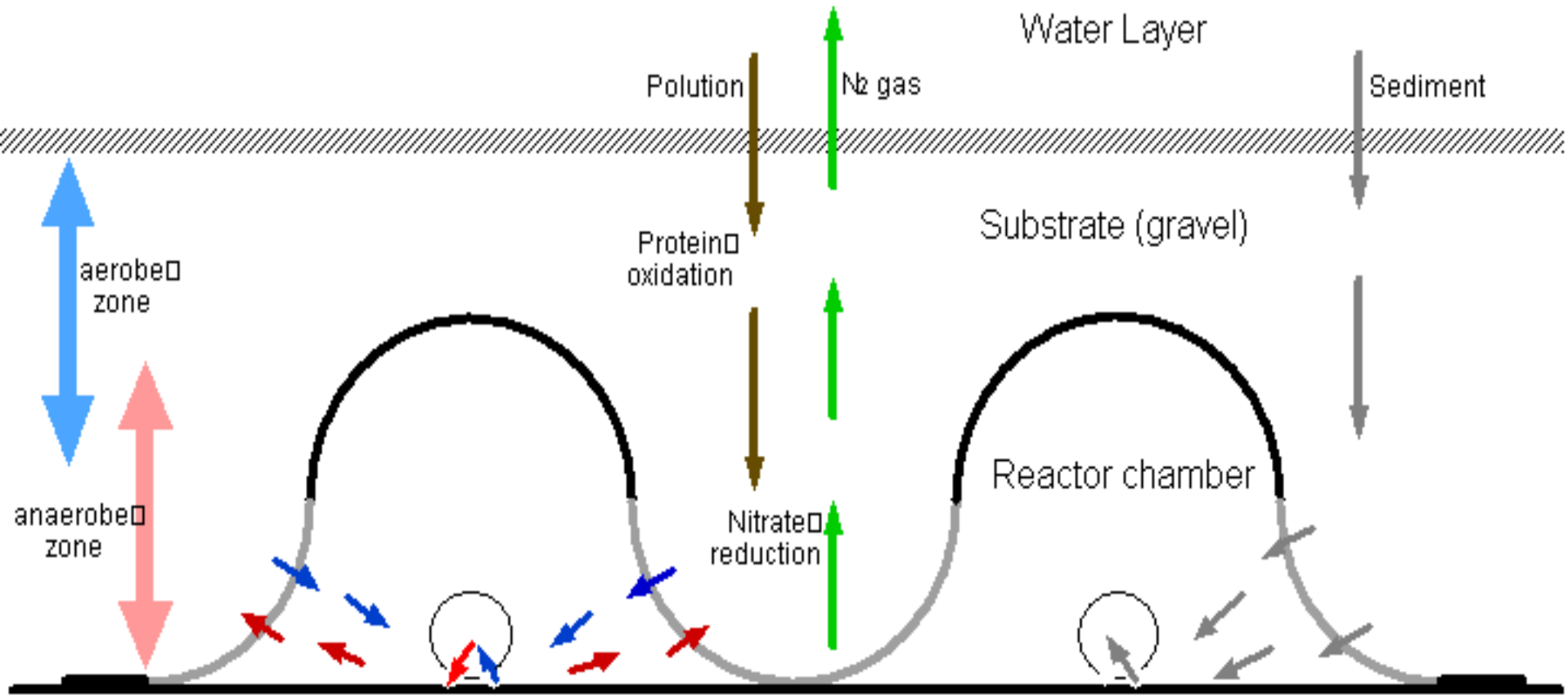



PVC-U



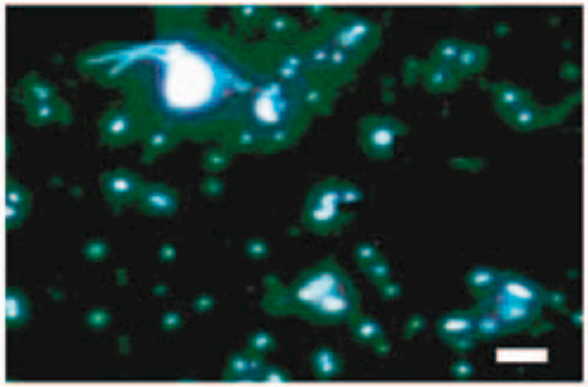
Opzet en uitvoering

Dynamic Mineral Control



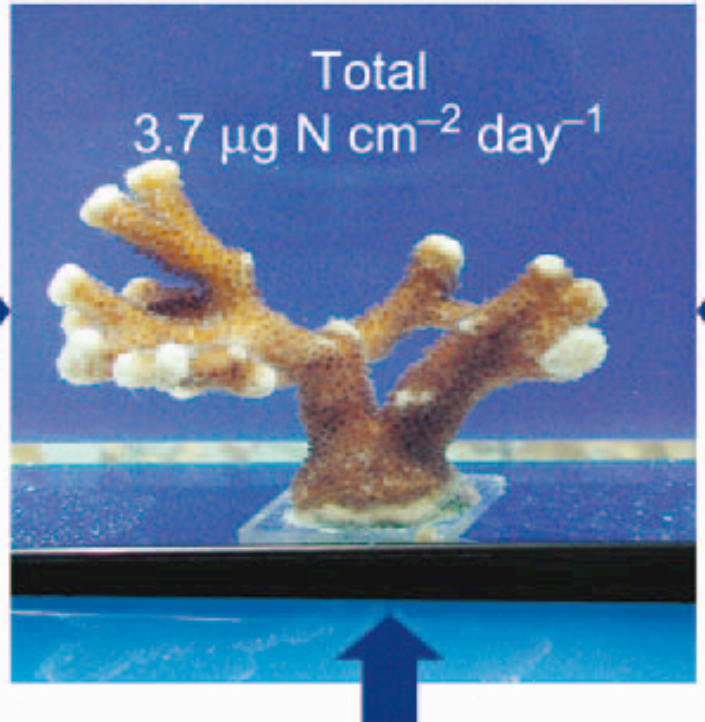
Natural zooplankton

1.8 µg N cm^{-2} day^{-1}



Pico- and nanoplankton

1.4 µg N cm^{-2} day^{-1}



Opzet en uitvoering

- 2 systemen van 11x 1,5 meter
- 2 m actieve bodem
- 2 verlichtingstypen – Plasma & LED
- 20 soorten koraal
- 200 vissen
- 2.000 koraalkolonies
- 2.000.000 algen

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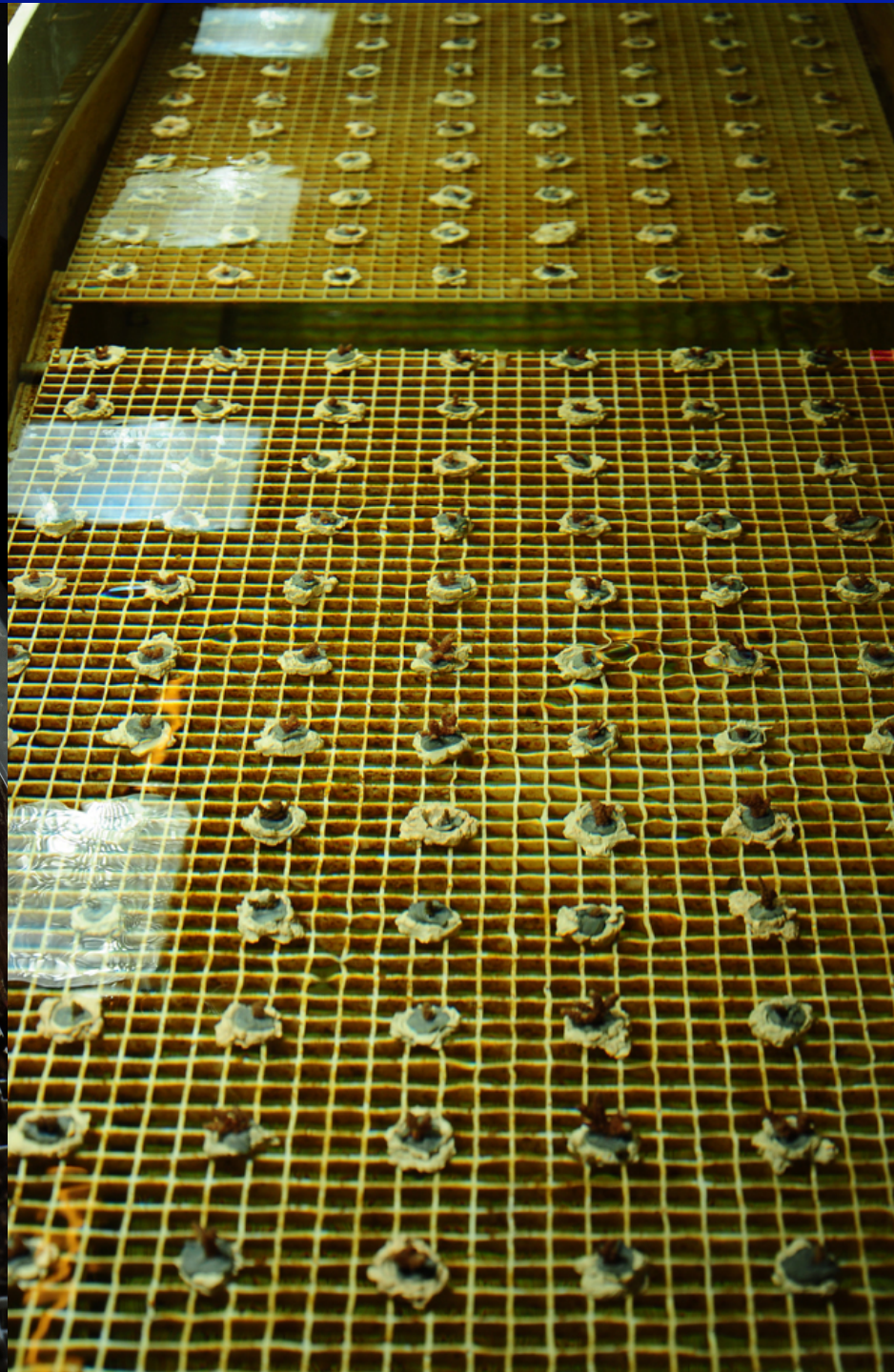
EcoDeco

EcoDeco

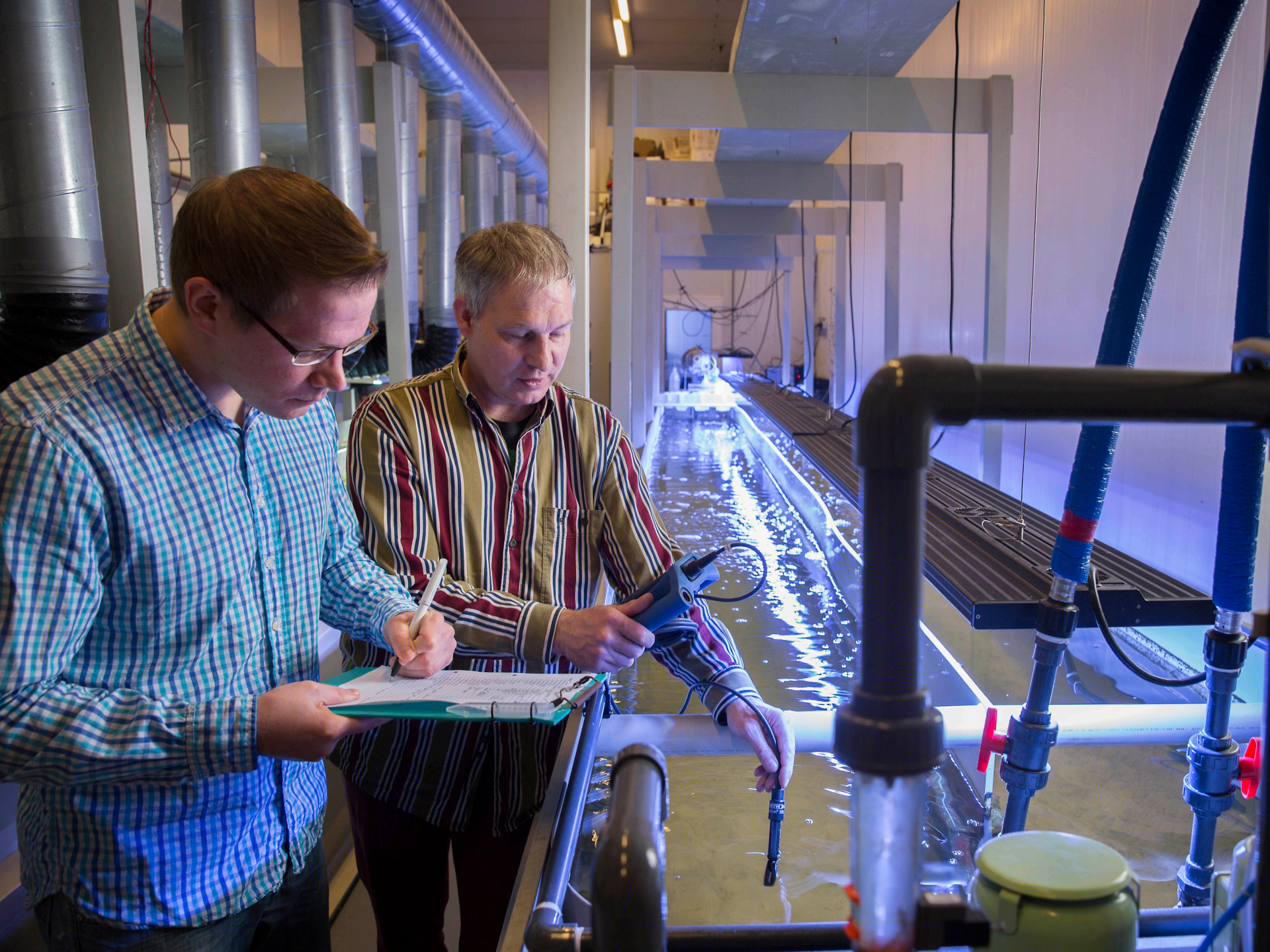


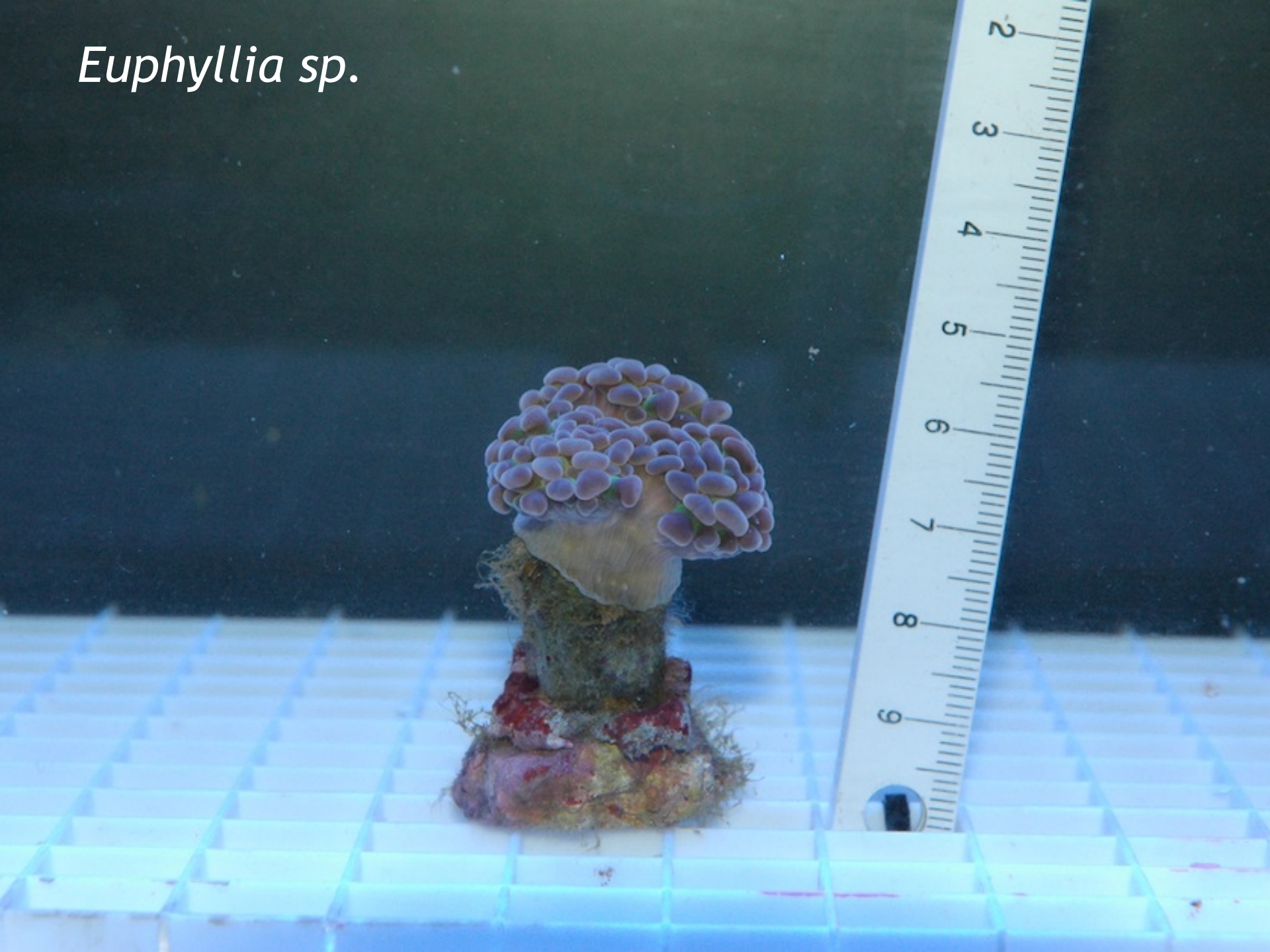
BlueImprint

LIVE
tropical
FISH
KLM
CARGO
LIVE
TROPICAL
FISH
THIS SIDE UP
QUICK
TRANSFER
SPECIAL
COMPARTMENT

10th Annual
Regional Aquatics
Workshop
Cabrillo Marine Aquarium
Aquariums of the Pacific
Long Beach, CA
June 20-23, 2005

30 juni 2012




Euphyllia sp.

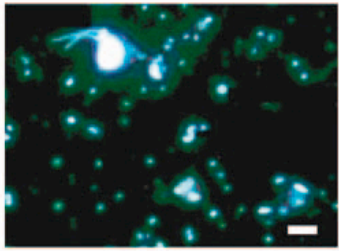
Opzet en uitvoering

- ‘heilige’ drie-eenheid van koralenkweek
- Holobiont
  - 1 Alg (dinoflaggelaat),
  - 2 Bacterie &
  - 3 Koraaldier
- Levensvoorwaarden
  - 1 Waterkwaliteit
  - 2 Voedingsstoffen
  - 3 Licht

Blue linked

Natural zooplankton

1.8 µg N cm^{-2} day^{-1}



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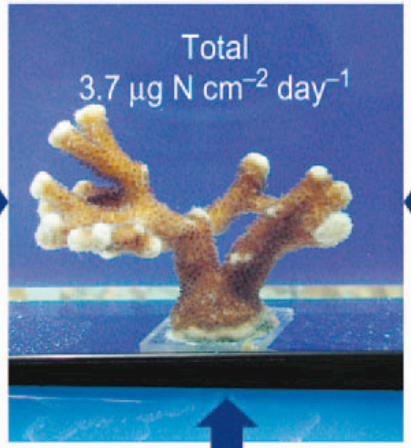
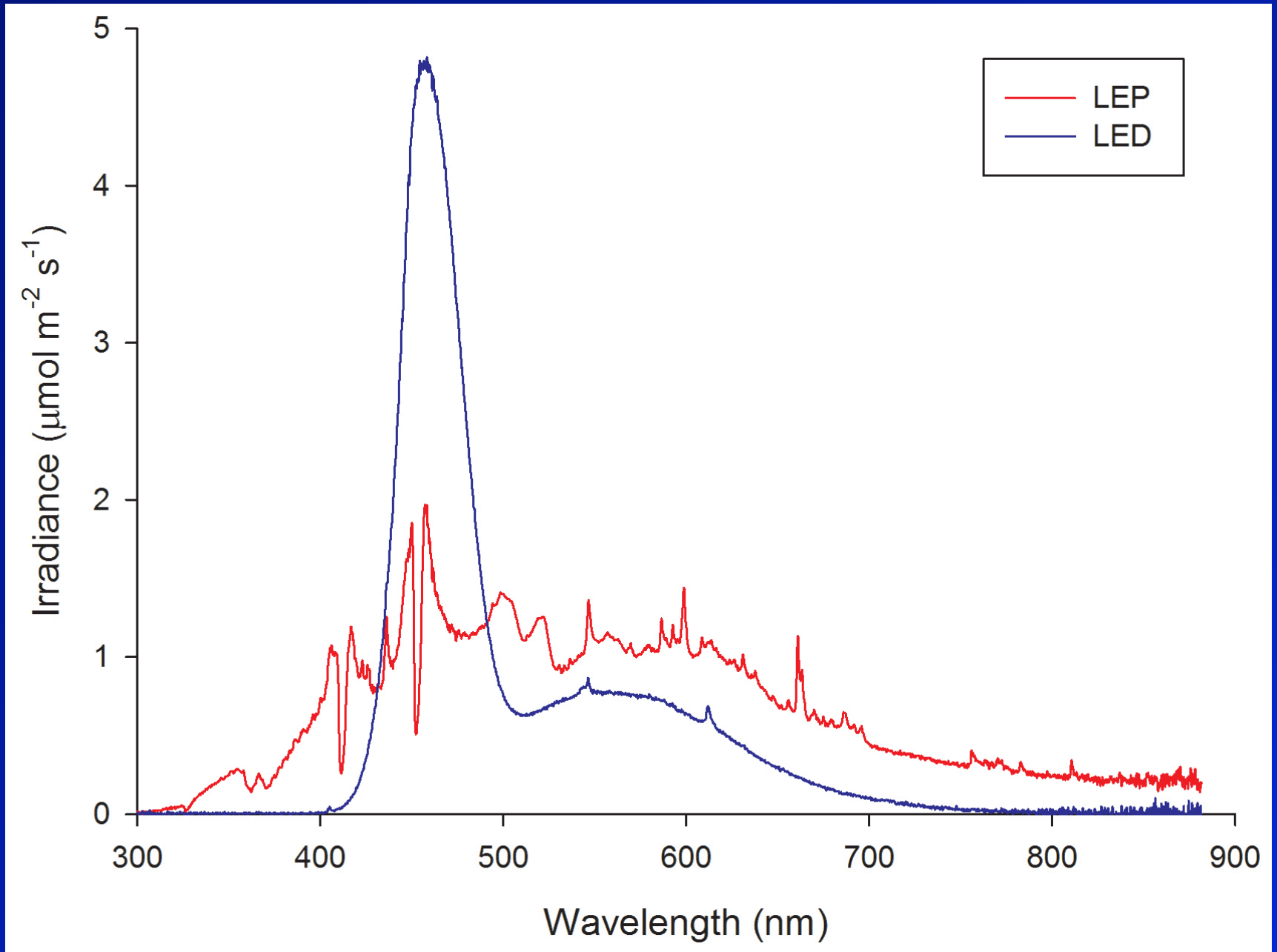


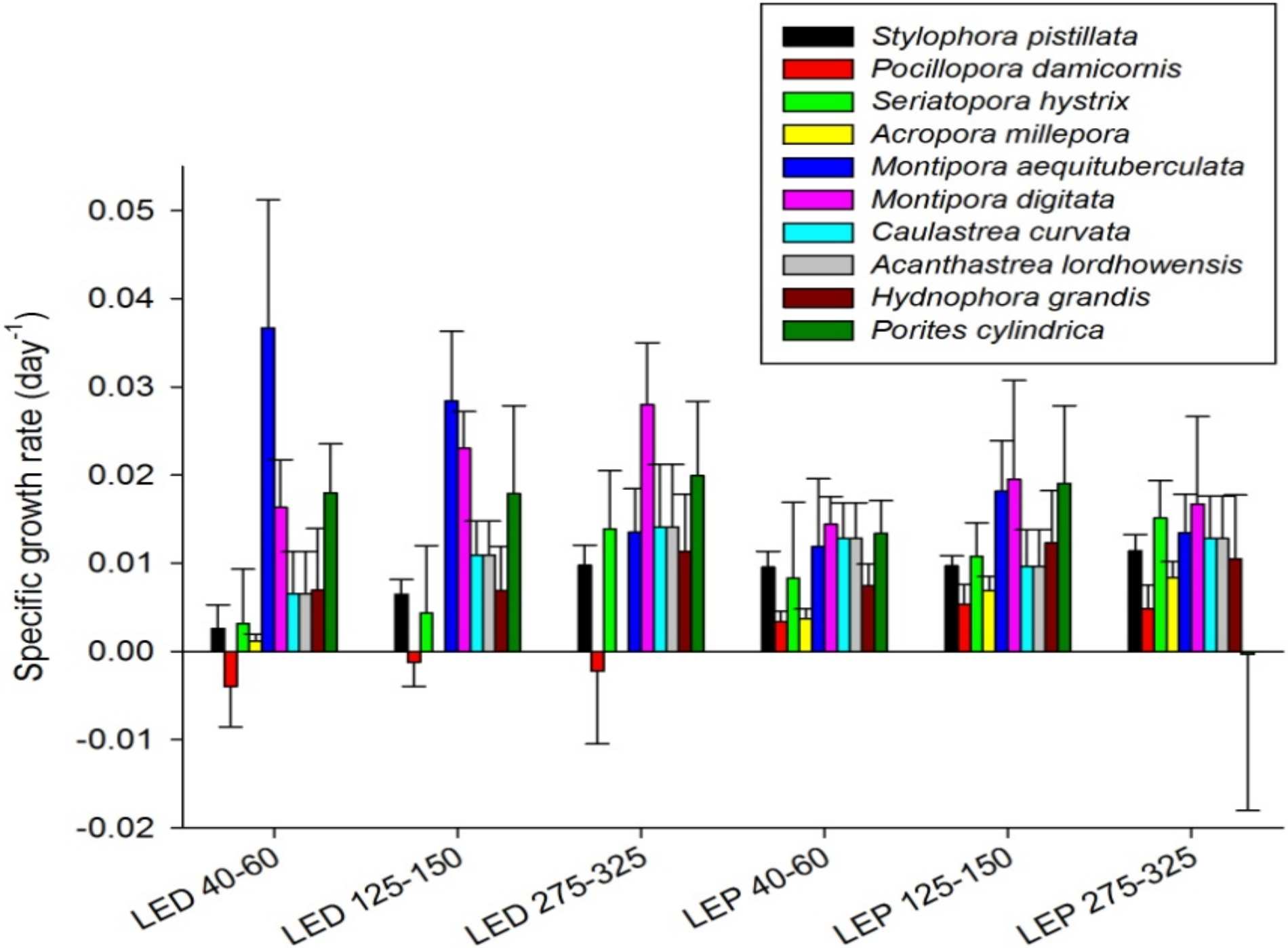
DON

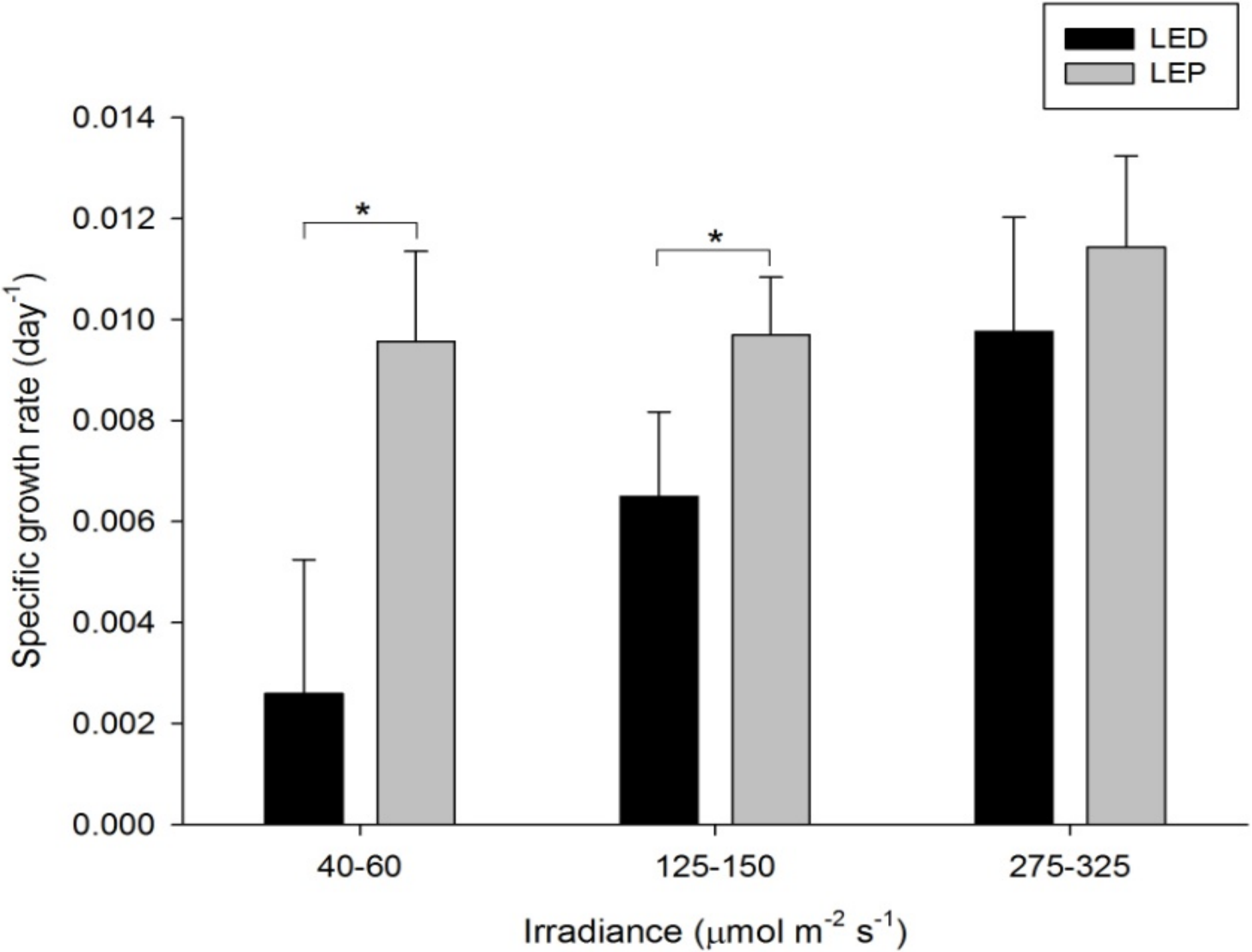
Dissolved organic nitrogen

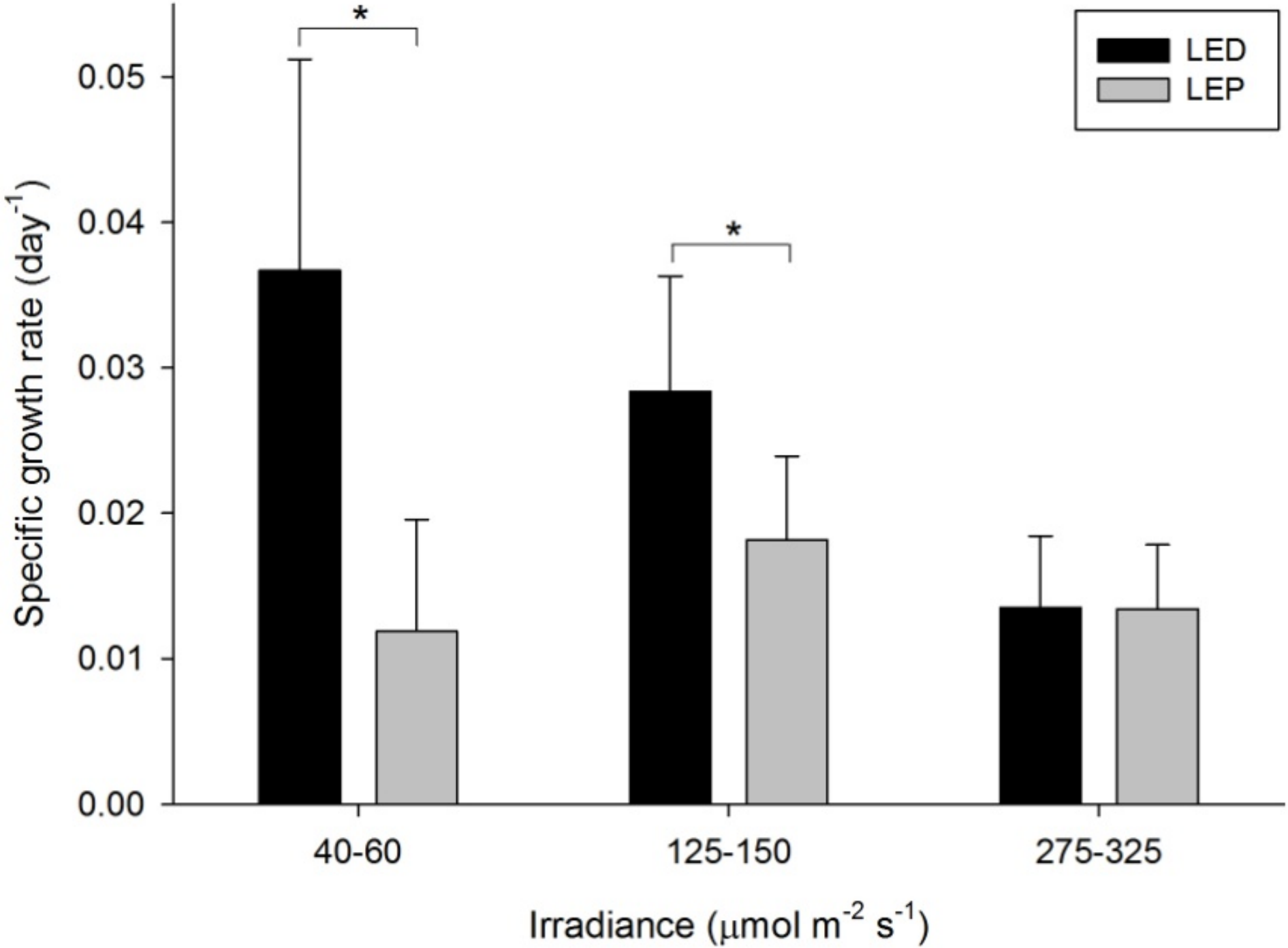
0.5 µg N cm^{-2} day^{-1}

Koralen: de resultaten




Stylophora pistillata
Pocillopora damicornis
Seriatopora hystrix
Acropora millepora
Montipora aequituberculata
Montipora digitata
Caulastrea curvata
Acanthastrea lordhowensis
Hydnophora grandis
Porites cylindrica
Specific growth rate (day-1)
0.05
0.04
0.03
0.02
0.01
0.00
-0.01
-0.02
LED 40-60
LED 125-150
LED 275-325
LEP 40-60
LEP 125-150
LEP 275-325


LED
LEP
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Specific growth rate (day-1)
*
*
40-60
125-150
275-325
Irradiance (µmol m-2 s-1)


LED
LEP
*
*
0.05
0.04
0.03
0.02
0.01
0.00
Specific growth rate (day-1)
40-60
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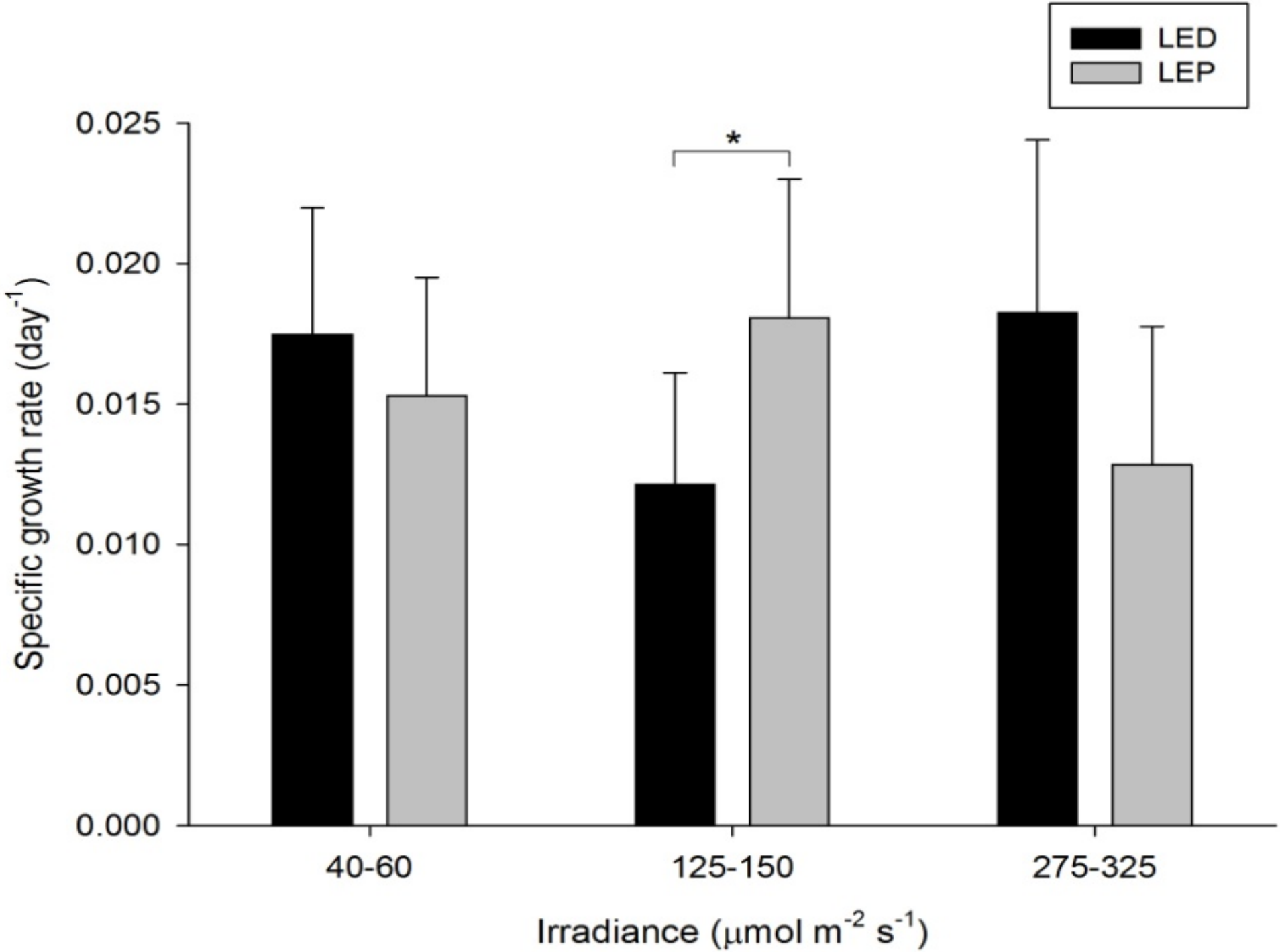
LED
LEP
*
0.025
0.020
0.015
0.010
0.005
0.000
Specific growth rate (day-1)
40-60
125-150
275-325
Irradiance (μmol m-2 s-1)

Species	Highest growth condition(s)	Most efficient growth condition(s)
Stylophora pistillata	LED 275-325, LEP 40-325	LEP 40-60
Pocillopora damicornis	LEP 40-325	LEP 40-60
Seriatopora hystrix	LED/LEP 275-325	LED/LEP 40-60
Acropora millepora	LEP 125-325	LEP 40-60
Montipora aequituberculata	LED 40-60	LED 40-60
Montipora digitata	LED 275-325	LED/LEP 40-60
Caulastrea furcata	N/A	LEP 40-60
Acanthastrea lordhowensis	N/A	LED/LEP 40-60
Hydnophora grandis	N/A	LED/LEP 40-60
Porites cylindrica	LED 40-325, LEP 40-150	LED/LEP 40-60

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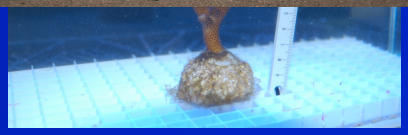

Blue linked

Coral Rehabilitation Initiative

- Blue Linked en Van Oord
- Doelstelling
  - Aantonen dat seksuele reproductie bij koralen kan worden gebruikt voor rifherstel, mitigatie en creatie van nieuwe koraalrifgebieden
- Methode
  - Voortbouwen op bestaande veldtechnieken, gericht op grootschalige kweek van koraallarven

Blue linked

Coral Rehabilitation Initiative

- Innovatie
  - Gecontroleerde omgeving voor koraalkweek (temperatuur, waterkwaliteit, licht)
  - Speciaal ontwikkelde kweektechnieken voor koraallarven
  - Gecontroleerde settlement van koraallarven, bedoeld om koraalkolonies terug te zetten op het rif
  - Opkweken primaire poliepen
  - Plug-and-play mobiel koraallaboratorium

Blue linked

Coral Rehabilitation Initiative

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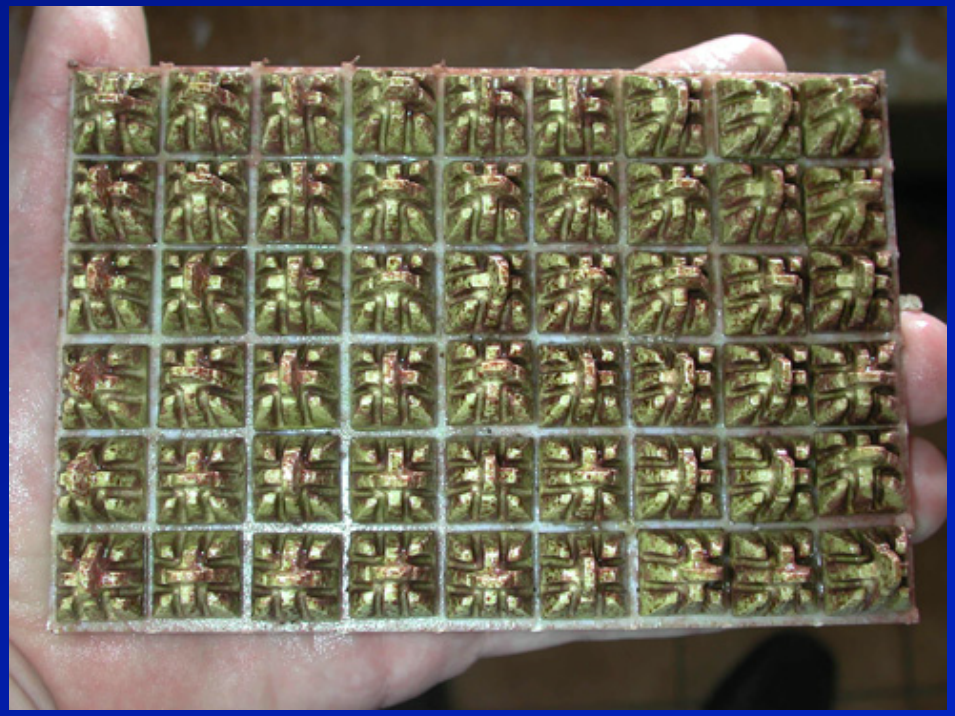
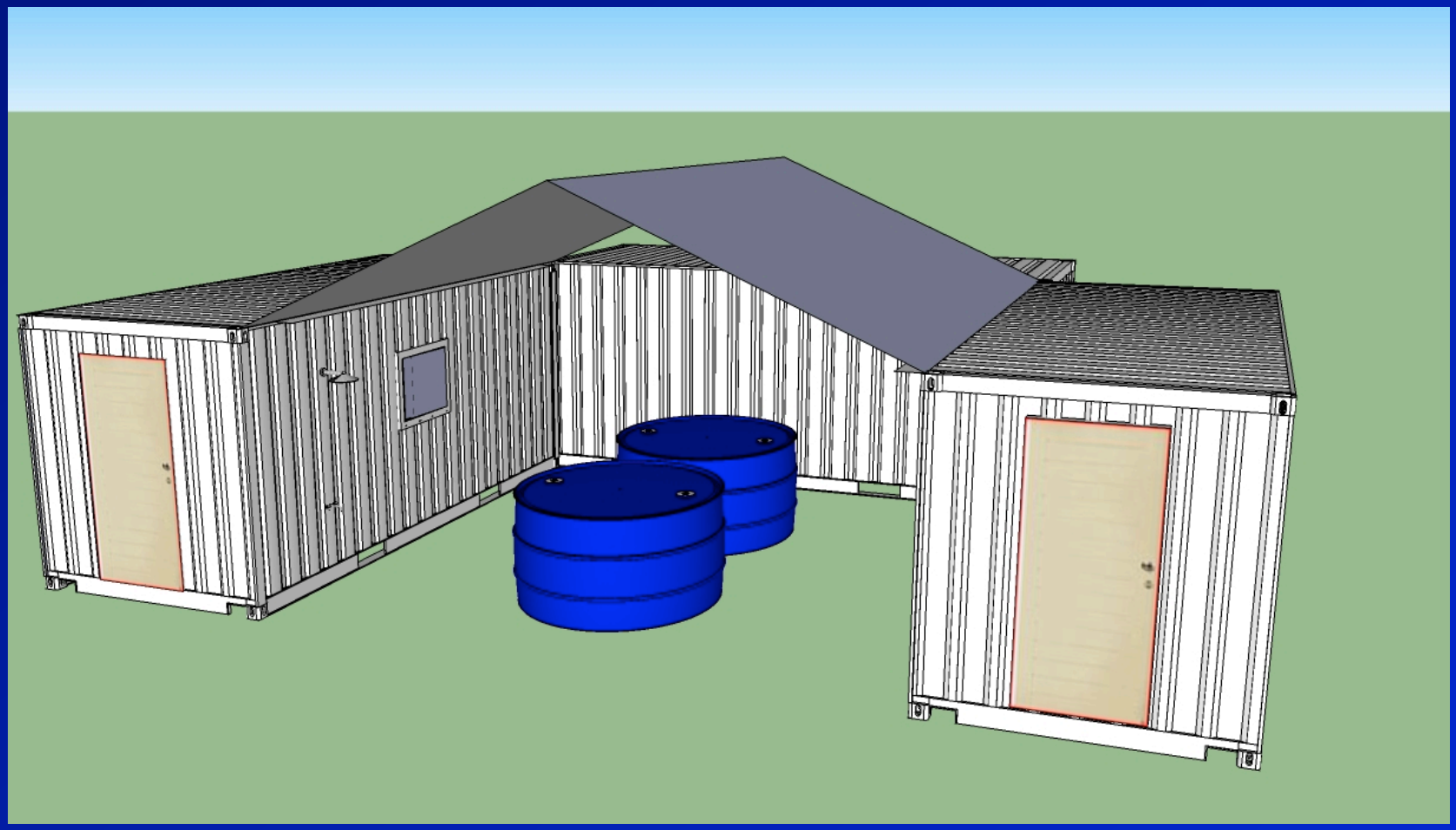
Coral Rehabilitation Initiative



Blue linked

Coral Rehabilitation Initiative



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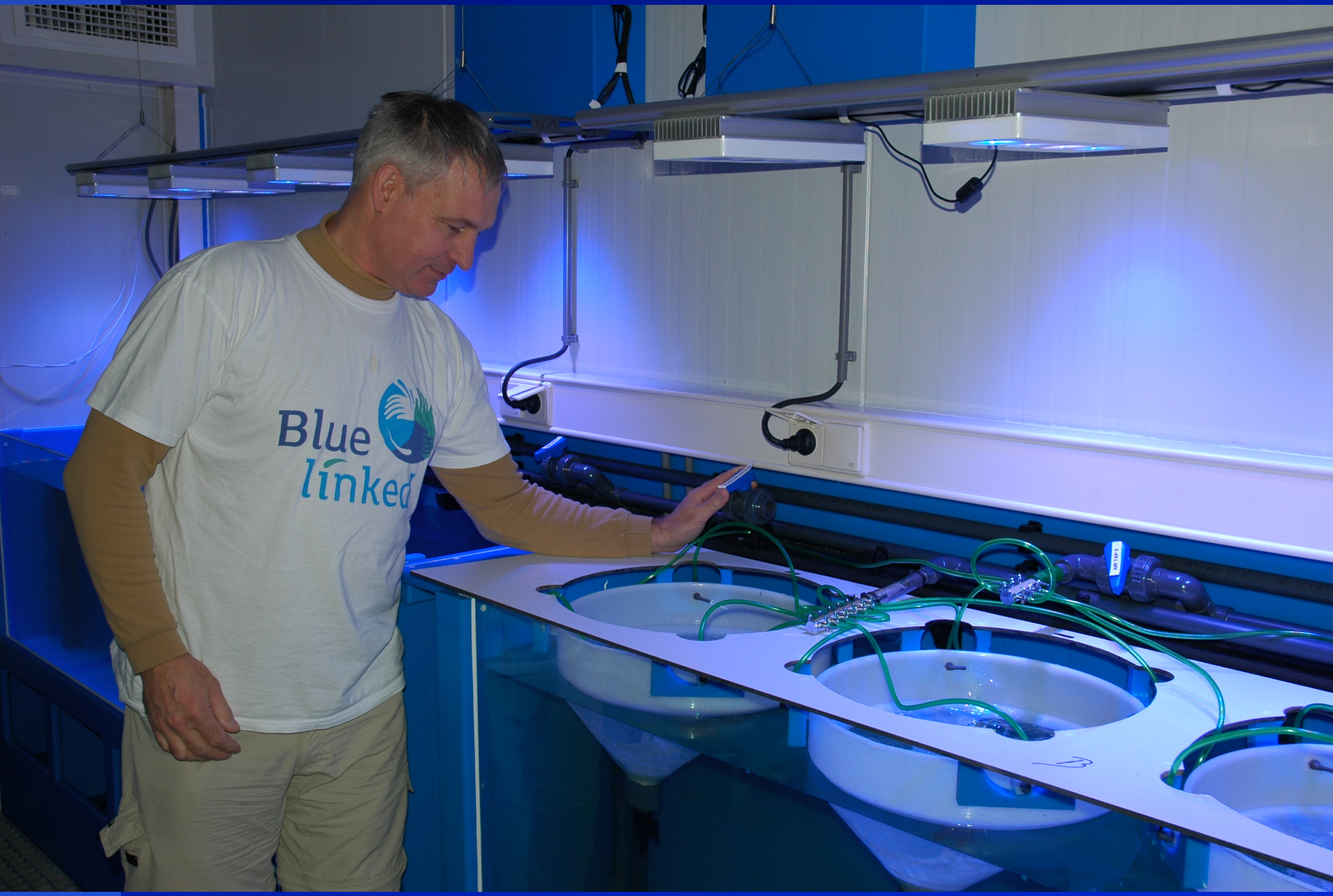
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Vragen?

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