TROPICAL DEEP SEA BENTHOS

New Caledonia Azooxanthellate Scleractinia

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IRD
Institut de recherche pour le développement

UNIFESP
Universidade Federal de São Paulo
1933

CEBIMar 60 years
1955 2015
Center for Marine Biology
University of São Paulo USP

Smithsonian
National Museum of Natural History

TROPICAL DEEP SEA BENTHOS

NEW CALEDONIA AZOOXANTHELLATE SCLERACTINIA

Zooxanthellate
Restricted to shallow waters
Tropical and warm temperate waters
Majority are colonial

Azooxanthellate
From shallow to bathyal waters
From Arctic to Antarctic
Majority are solitary

THESE TWO ECOLOGICAL SETTINGS HAVE ABOUT THE SAME NUMBER OF EXTANT SPECIES (~720 [Cairns et al., 1999]).

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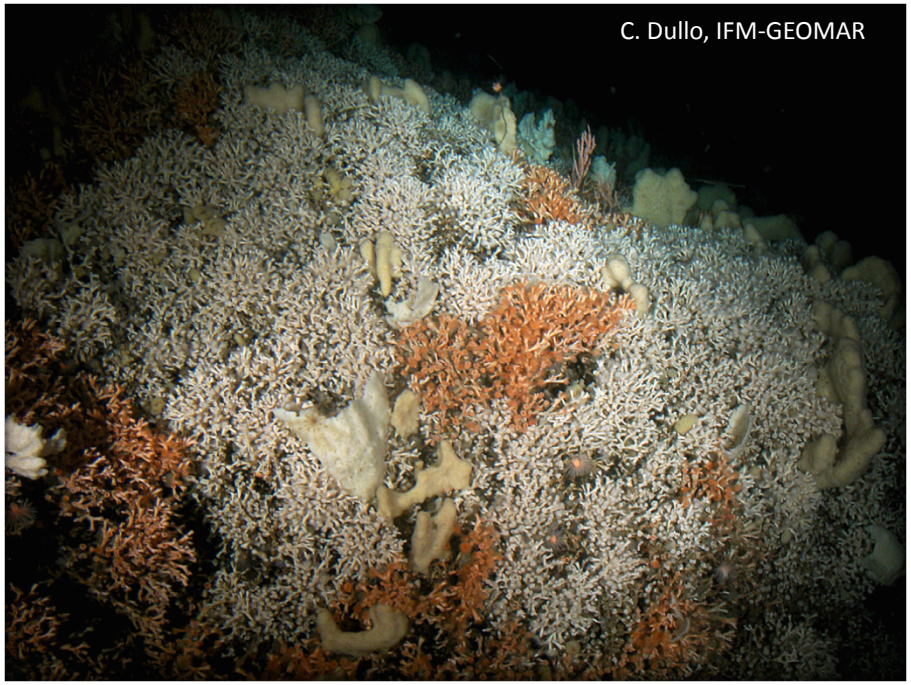
Even though most azooxanthellate corals are not “reef” builders, those that are have been demonstrated to be quite important habitat engineers



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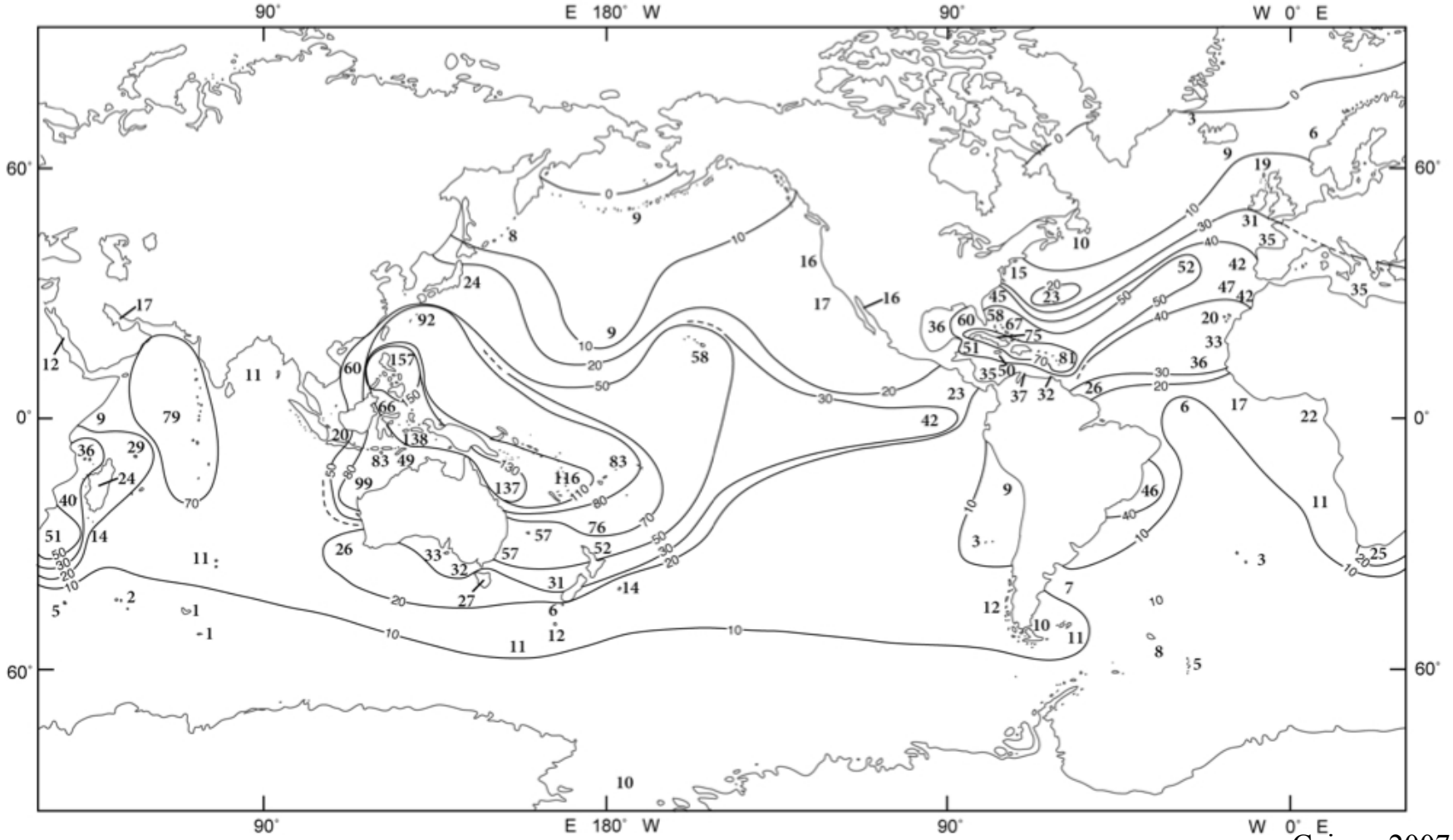

Cairns, 2007

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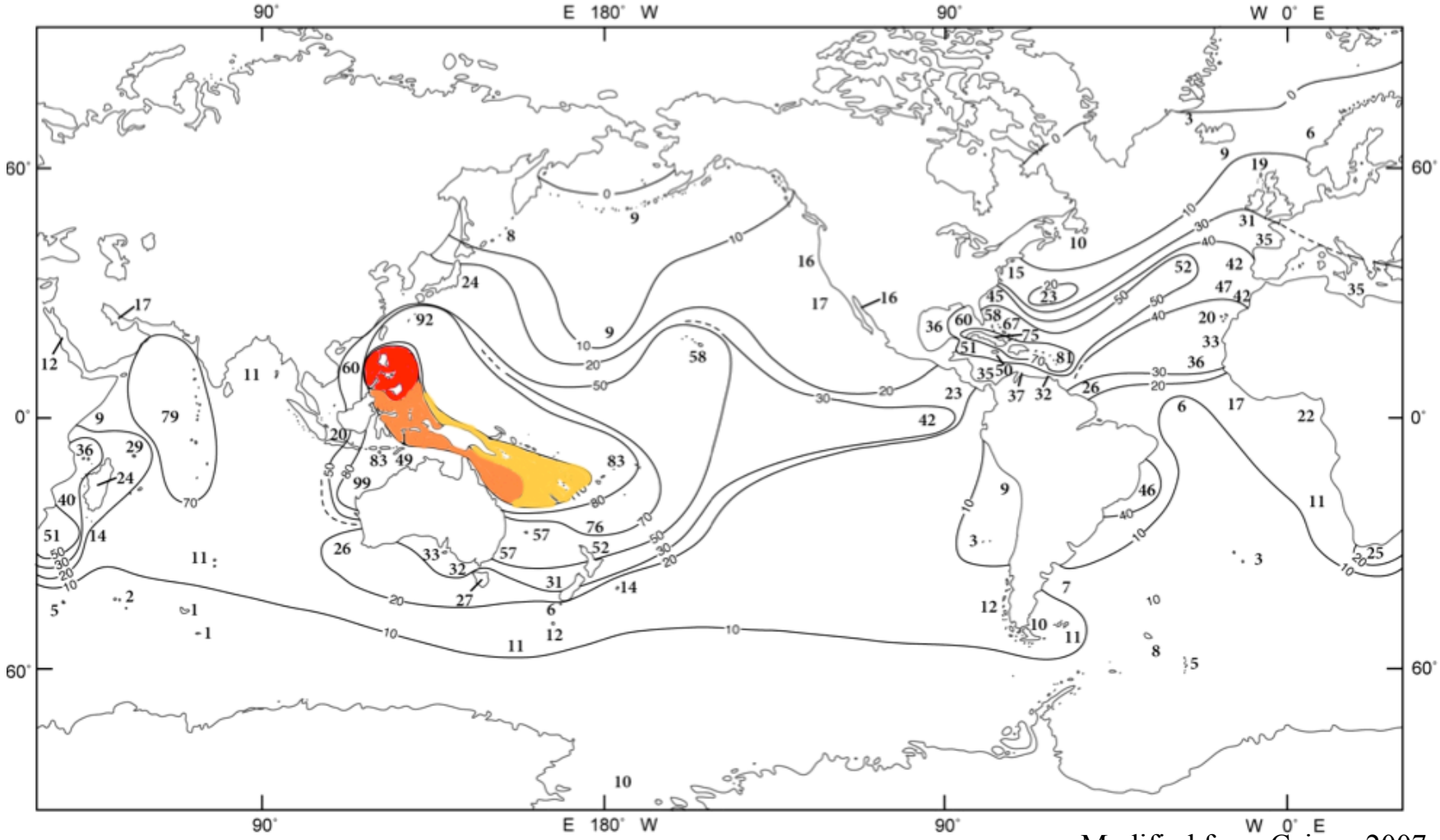

Modified from Cairns, 2007

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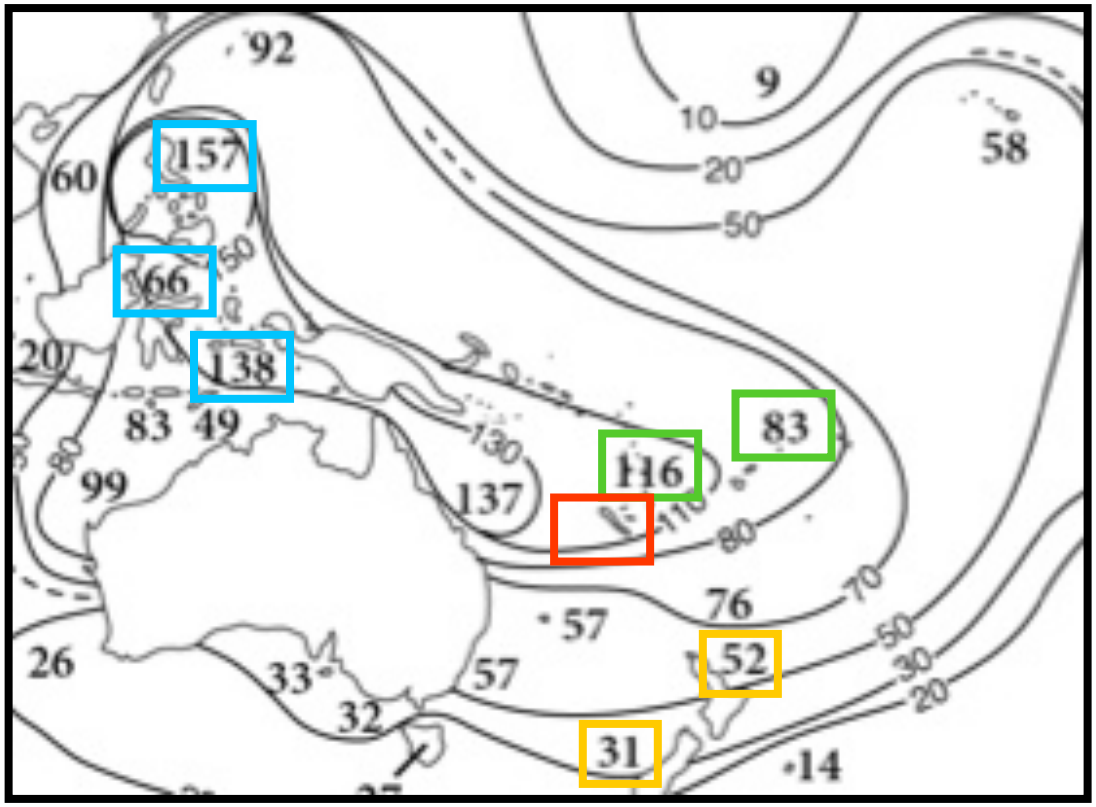

Cairns (1989) - Smithsonian Contribution to Zoology - n 486

Cairns & Zibrowius (1997) - Résultats des Campagnes Musorstom - vol 16

Cairns (1999) - Résultats des Campagnes Musorstom - vol 20

New Caledonia

Cairns (1995) –New Zealand Oc. Memoirs – vol 103

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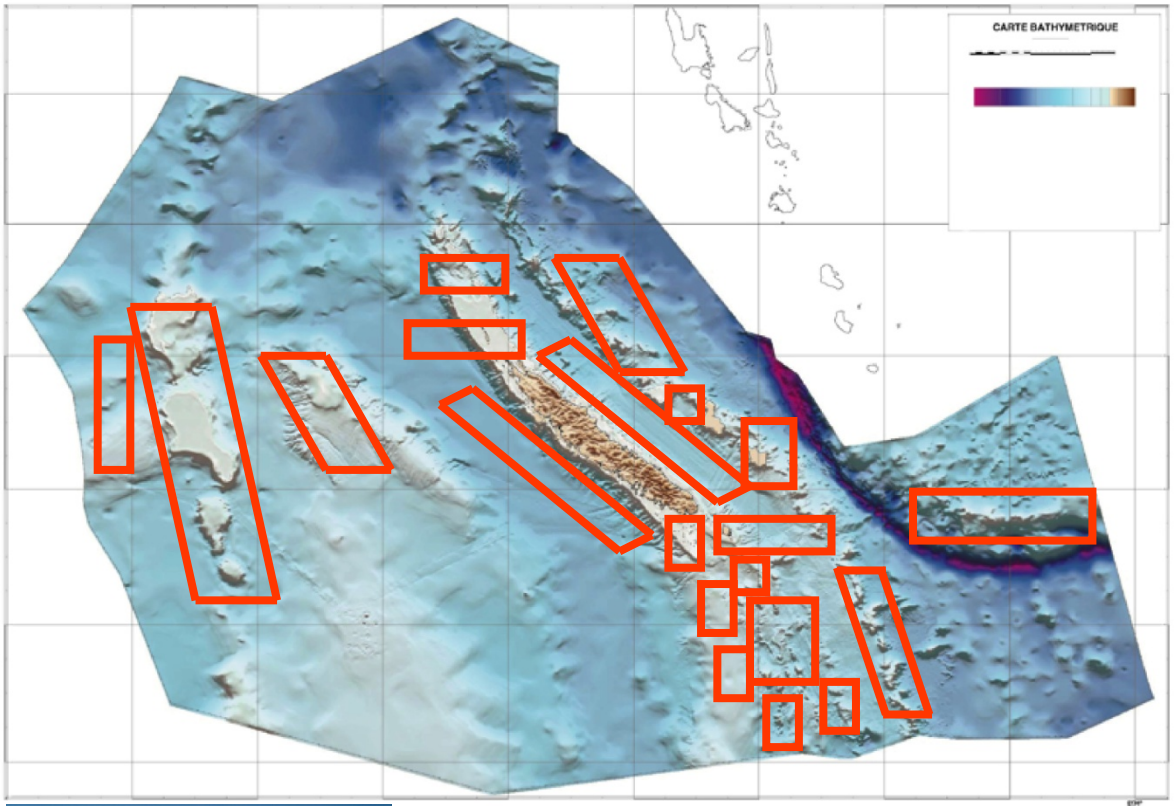

43 expeditions (Vauban - 1978 to EXBODI - 2011)

Scleractinian corals were collected from more than 1,150 stations

Over 53,000 specimens

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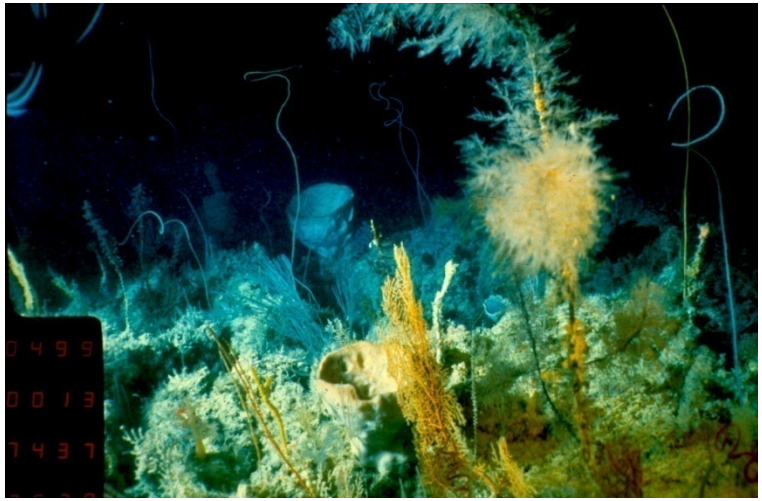
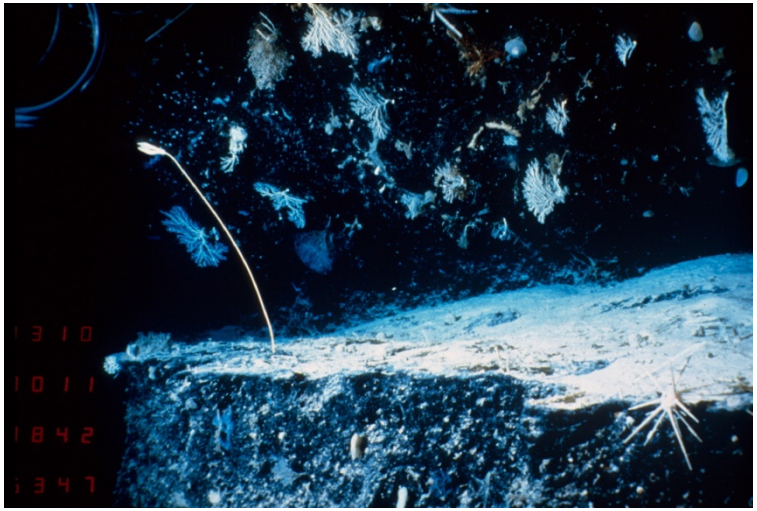




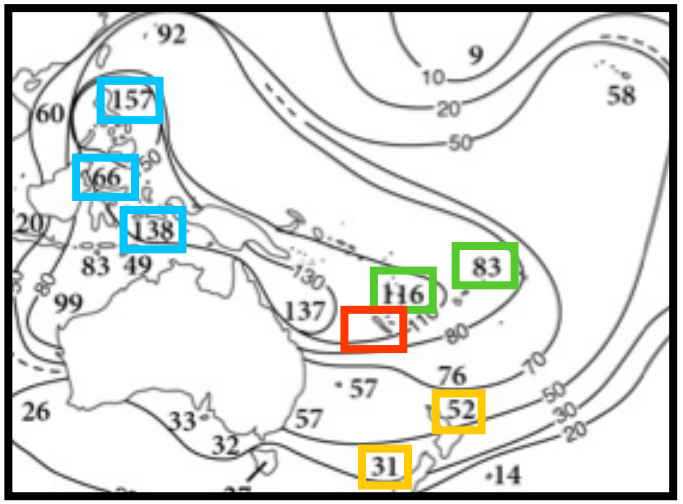
All families (16) that have azooxanthellate corals have been collected in New Caledonia;

73 out of 101 genera of azooxanthellate corals;

271 species identified (208 new records);

56 new species
4 new genera
5 new families**
1 new "sub-order"**

**** - using morphology + DNA**



"The solitary corals, classified and in part described in this communication, are remarkable for the large number of new species" (Gardiner, 1899: 161).

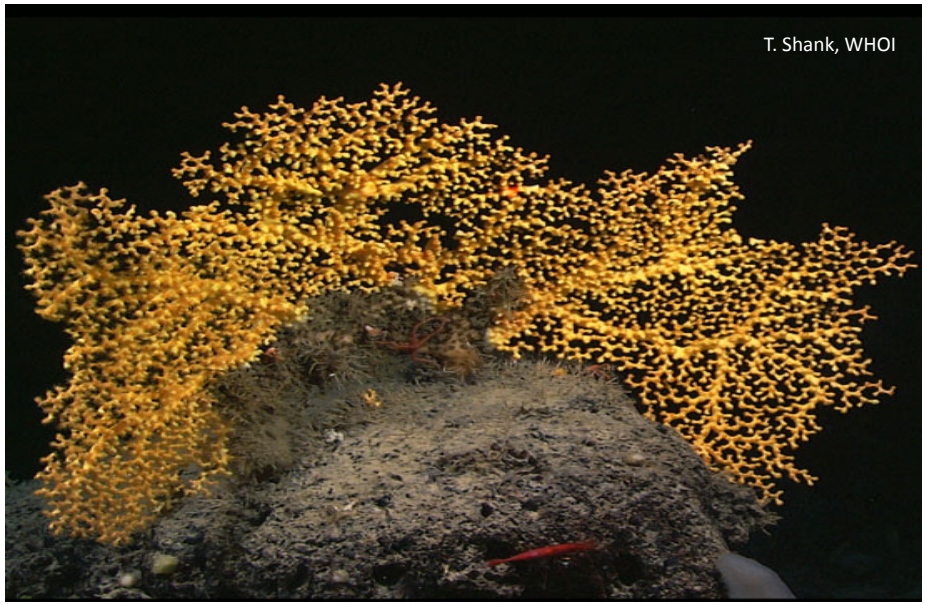
New Caledonia

- Overall, 5.1 species per station, although some stations had 60 species.
- 271 species (35%), of which ~89% are solitary. However...

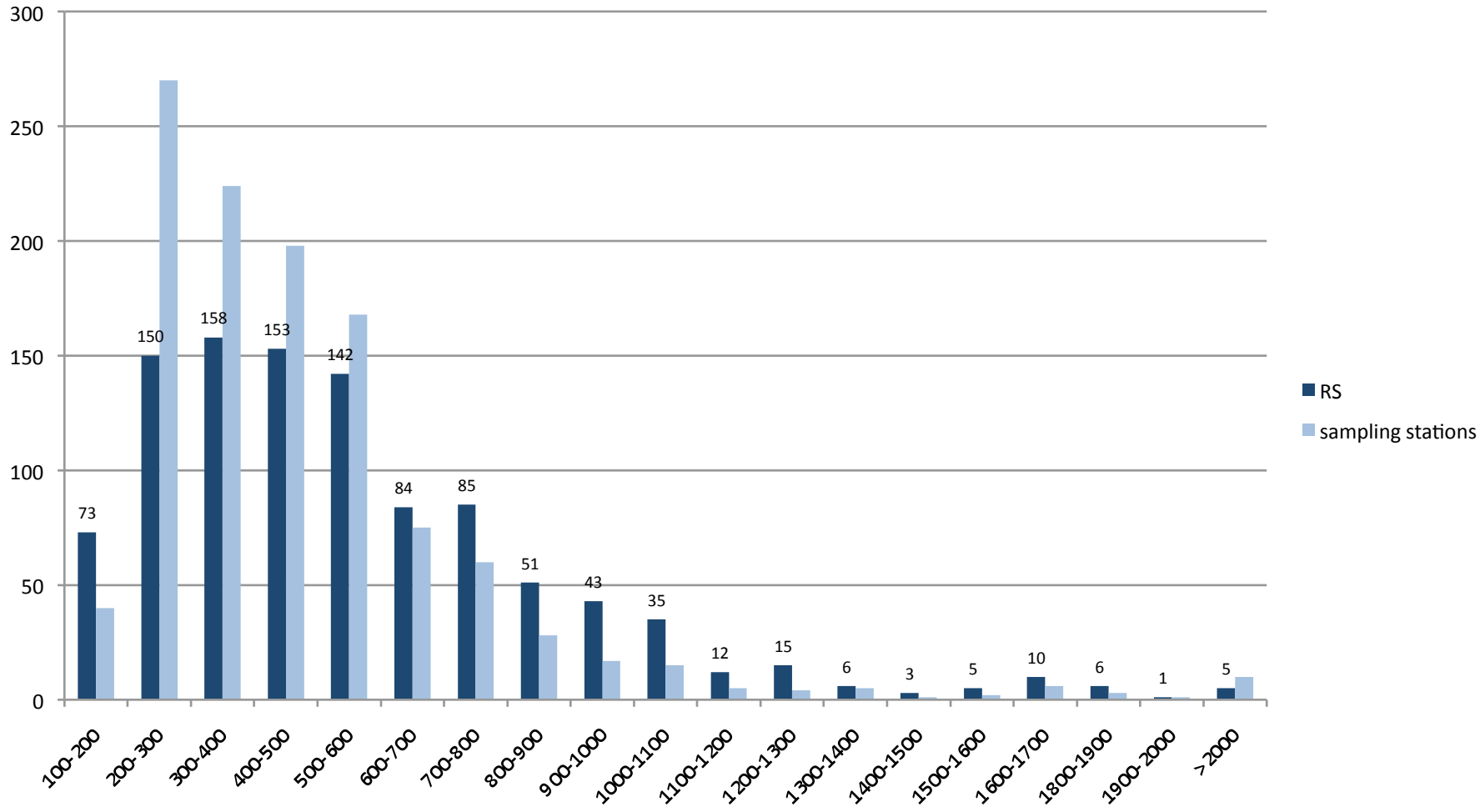
Dendrophyllia alcocki

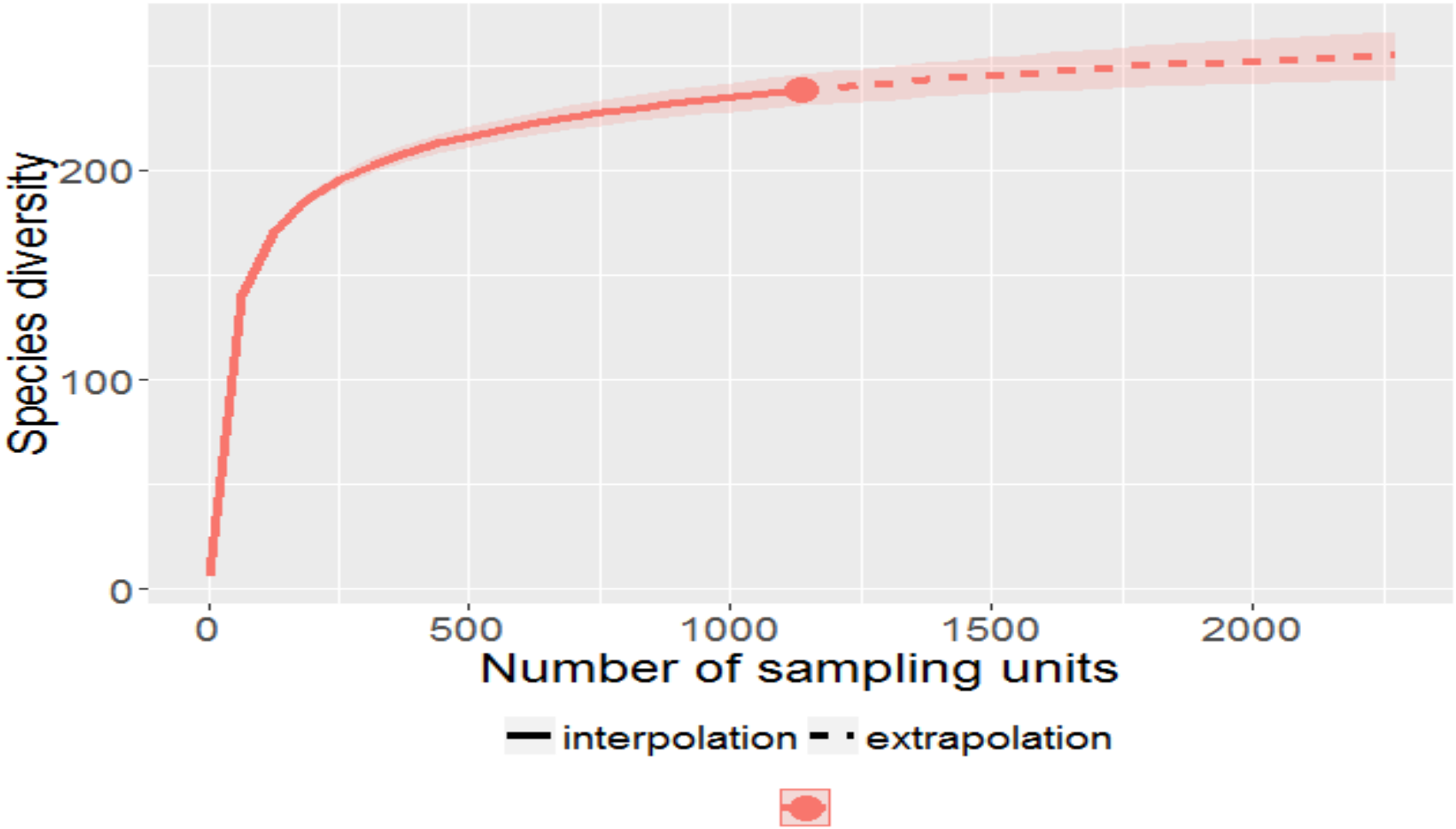
Almost 500 stations

Enallopsammia rostrata



Species Richnes and sampling effort




Species diversity
200
100
0
0
500
1000
1500
2000
Number of sampling units
interpolation
extrapolation

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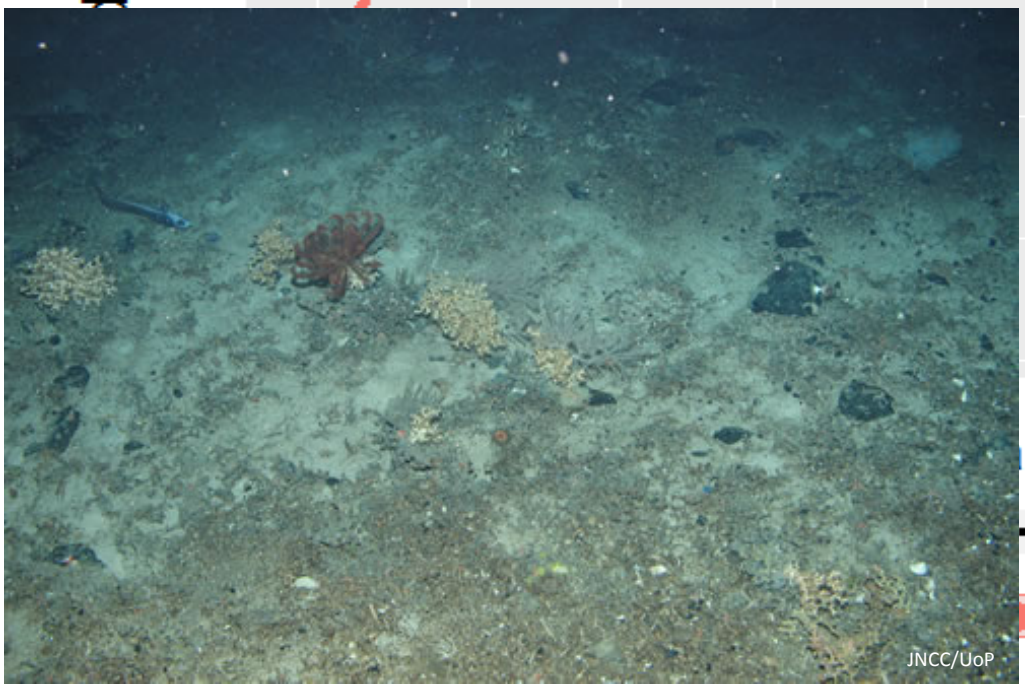

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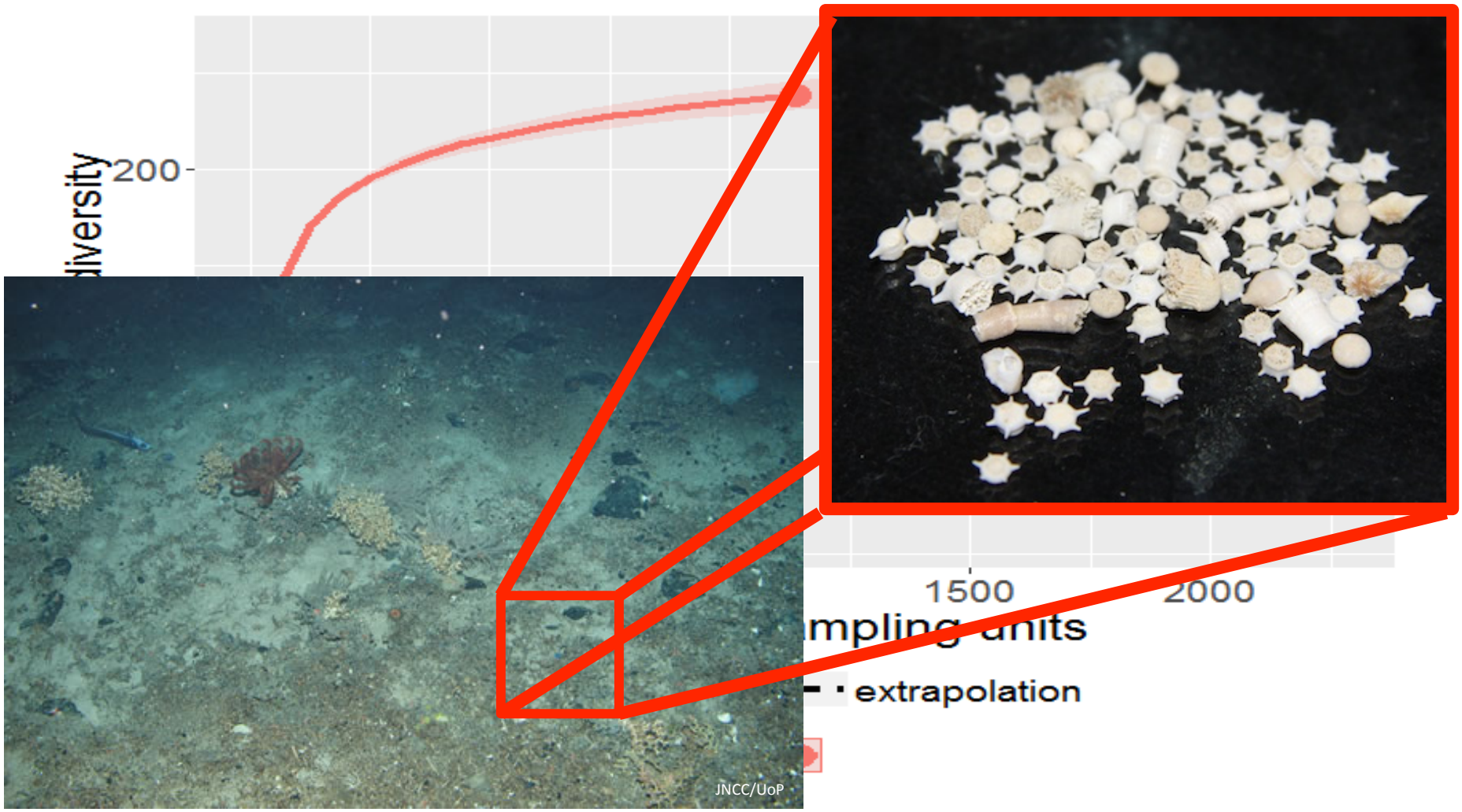

Why is New Caledonian so diverse in terms of scleractinian corals?

Very well sampled;

Propensity for more species to occur in spatially heterogeneous regions that are relatively stable over time;

New Caledonian shelf and slope region is the most extensive contiguous area of substrate at 200–1000 m depth (the prime depth for azooxanthellate corals) in the world, providing geographically complex (hard, muddy, and sandy) substrates that are available for colonization (Cairns, 2007);

Aragonite Saturation Horizon (ASH) depth;

Other oceanographic aspects (such nutrients, water masses, etc)?

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GBE

Mitochondrial Genome Rearrangements in the Scleractinia/Corallimorpharia Complex: Implications for Coral Phylogeny

Mei-Fang Lin[1,2,3,†], Marcelo Visentini Kitahara[4,†], Haiwei Luo[5], Dianne Tracey[6], Jonathan Geller[7], Hironobu Fukami[8], David John Miller[2,3,*], and Chaolun Allen Chen[1,9,10,*]

http://www.biomedcentral.com/1471-2148/11/316

BMC Evolutionary Biology

RESEARCH ARTICLE Open Access

The ancient evolutionary origins of Scleractinia revealed by azooxanthellate corals

Jarosław Stolarski[1*], Marcelo V Kitahara[2], David J Miller[2], Stephen D Cairns[3], Maciej Mazur[4] and Anders Meibom[5]

OPEN ACCESS Freely available online

PLoS one

A Comprehensive Phylogenetic Analysis of the Scleractinia (Cnidaria, Anthozoa) Based on Mitochondrial CO1 Sequence Data

Marcelo V. Kitahara[1]*, Stephen D. Cairns[2], Jarosław Stolarski[3], David Blair[4], David J. Miller[1]

The first modern solitary Agariciidae (Anthozoa, Scleractinia) revealed by molecular and microstructural analysis

Marcelo V. Kitahara [A G], Jaroslaw Stolarski [B], Stephen D. Cairns [C], Francesca Benzoni [D], Joel L. Stake [E] and David J. Miller [F]

RESEARCH ARTICLE

Fine-Scale Skeletal Banding Can Distinguish Symbiotic from Asymbiotic Species among Modern and Fossil Scleractinian Corals

Katarzyna Frankowiak[1], Sławomir Kret[2], Maciej Mazur[3], Anders Meibom[4,5], Marcelo V. Kitahara[6], Jarosław Stolarski[1]*

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MNHN Malacology Department team!
IRD Nouméa and R/V Alis crew members!