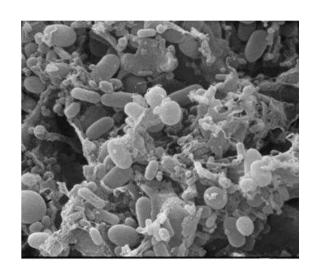
# Functional diversity of marine microbial symbionts: Exploitation of the under-utilized groups of marine microorganisms







OCKY KARNA RADJASA
DIPONEGORO UNIVERSITY



Diponegoro University located in Semarang, Central Java, Indonesia Vision: To become an excellent Research University in 2020 Main Scientific Interest: Coastal region ecodevelopment 1700 staff, 43.000 student

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#### Central Laboratory of Research and Services-Diponegoro University (CORES-DU)



An integrated laboratory, a home for 20 different laboratories covering medical, biological, chemical and physical fields with the state of the art equipment "Tropical Marine Biotechnology Laboratory"





#### The Coral Triangle\* **Basic Facts** Richest marine life on the planet Supports livelihoods and food security of 120 million people Total annual value of reefs, mangroves & associated habitats estimated at US\$2.3 billion Tuna spawning & nursery grounds support multi-billion tuna industry Eastern THAILAND Healthy marine resources contribute to tourism and coastal protection Total area of reefs (75.000 km²): over 500 species of corals; over 3,000 species of fish North Borneo BRUNE Sulawesi Sea/ Makassar Strait Halmahera Northeast Sulawesi Bismarck Sea INDONESIA SOLOMONISLANDS Solomon Sea TIMOR LEST Lesser Sunda Solomon Archipelago \* Scientists define a "core" Coral Triangle Area based on the highest levels of coral diversity (at least 500 species of hard coral).

The Coral Triangle, cover around 75,000 sq.km. areas of six countries: Indonesia, the Philippines, Malaysia, PNG, Solomon Islands, and Timor Leste, as home more than 500 coral species, 3000 fish, support about 120 million coastal communities. The Coral Triangle Initiative was declared during the APEC meeting in Sydney, September 9,

covering six countries: the Philippines, Malaysia (Sabah), Indonesia (central and eastern), East Timor, Papua New Guinea, and the Solomon Islands. The Coral Triangle Region includes additional neighboring countries, such as Australia and Japan,

Coral Triangle - Ecoregion

# Biological Diversity = Chemical Diversity

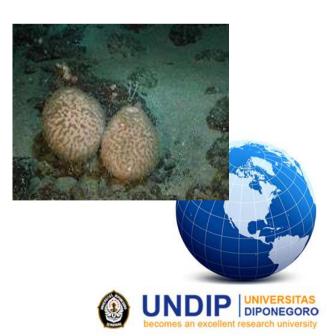




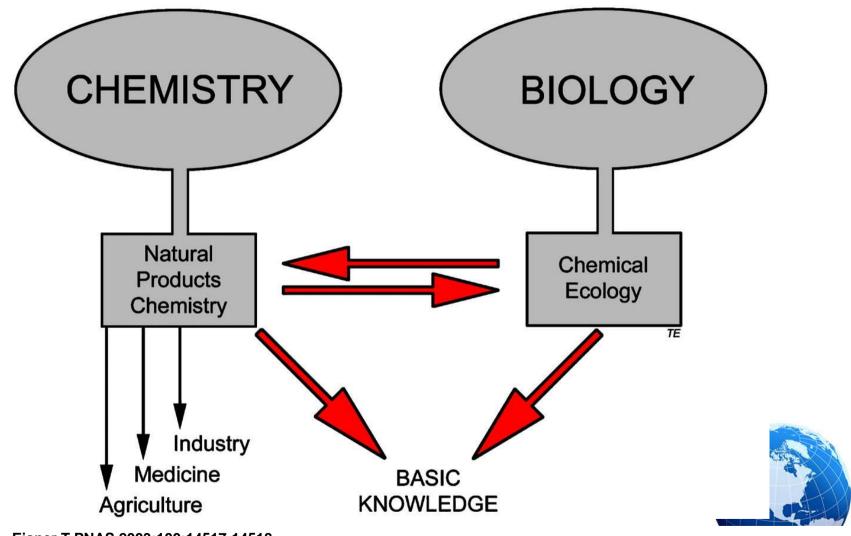






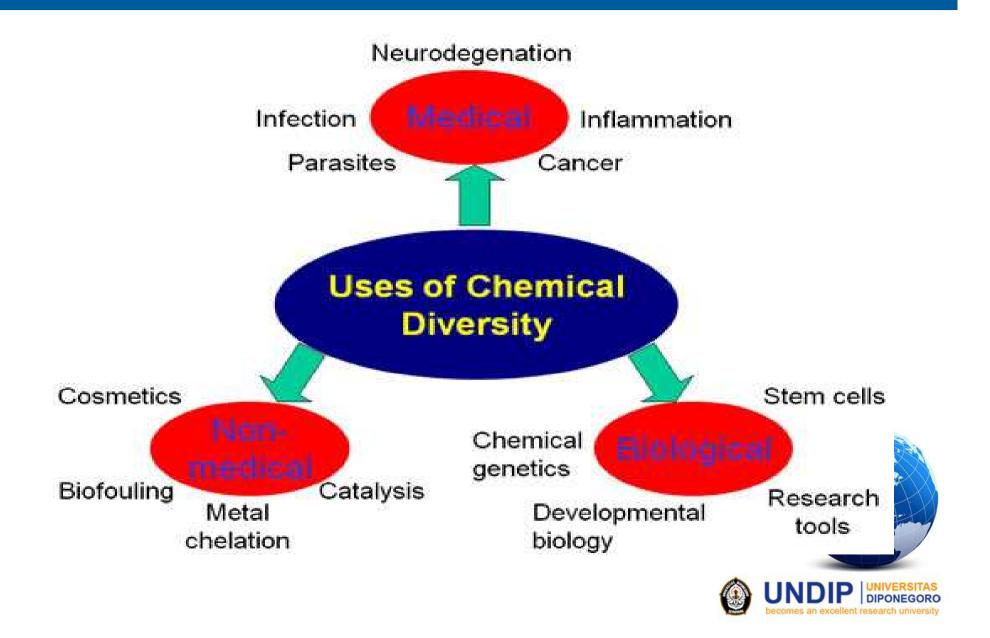


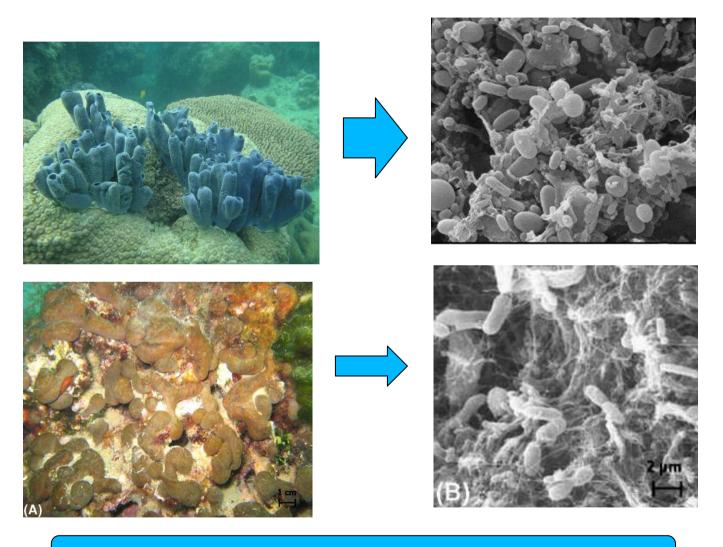
Chemical ecology and natural products chemistry are linked in a productive partnership aimed at clarifying the chemical basis of ecological and behavioral interactions in nature.



Eisner T PNAS 2003;100:14517-14518

## **Uses of Chemical Diversity**









### Threat from pathogenic "Multi-drugs Resistant"



		Antibiotika Komersial								
N o	MDR strain	AM	ОХ	CRO	SXT	С	Р	AMX	AM	СТХ
1	E.coli	R	R	R	R	R	R	R	R	R
2	Staphylococcus sp.	R	R	R	R	R	R	R	R	R
3	Enterobacter sp.	R	R	R	R	R	R	R	R	R
4	Proteus sp.	R	R	R	R	R	R	R	R	R



## Samples of hard corals

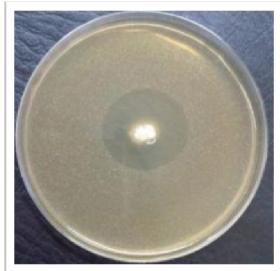


## Activity of anti MDR of fungal symbiont











### **Novel pigments from microbial symbionts**

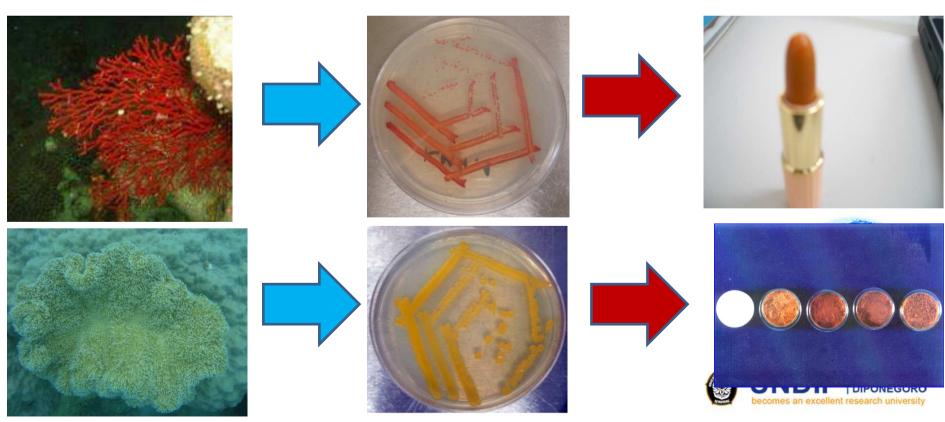


- Cleaner
- Regulator
- Regeneration



#### **Carotenoid:**

- Provitamin A
- Antioxidant
- Anticancer
- Immunity



# Enzymes from symbionts with application in Industry



SEM of untreated (A–E) and treated (F–J) raw starch granules by *B. aquimaris* MKSC 6.2 alpha-amylase.
Starch granules of corn (A and F), cassava (B and G), sago (C and H), potato(D and I), and rice (E and J).

