

ASMar

FROM NATURAL RESOURCES TO IMTA TOWARD
BIOREMEDIATION AND ANIMAL WELFARE

M.Sc. MICHELA CARIGLIA
Prof. CATERINA LONGO

FIERA AQUAFARM 2020 | PORDENONE | 19-20/02/2020
SALA DEL PESCE



“

**HO RISENTITO IL PROFUMO
D'ALGHE DI QUESTO MARE.
UN PROFUMO UNICO AL MONDO**

GIUSEPPE UNGARETTI

ASMar at a glance



ASMar: Assessment of Sponge Mariculture potential in polyculture system in the Manfredonia gulf

From BLUE_BOOST HACKATHON 12-13 giugno 2019, Polignano a mare (BA)

Caterina Longo

Knowledge Provider:

Dipartimento di Biologia - Università degli Studi di Bari

Michela Cariglia

Enterprise:

Gargano Shell Fish Farm arl

UNIVERSITY OF BARI



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ALDO MORO

Interreg 
ADRION ADRIATIC-IONIAN
European Regional Development Fund - Instrument for Pre-Accession II Fund

BLUE_BOOST



Per promuovere l'innovazione
nell'acquacoltura



Poriferi o Spugne



Batteri

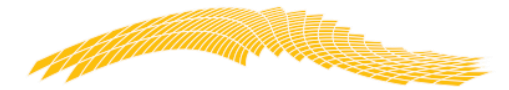
PROBLEM & SOLUTIONS



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European Regional Development Fund - Instrument for Pre-Accession II Fund

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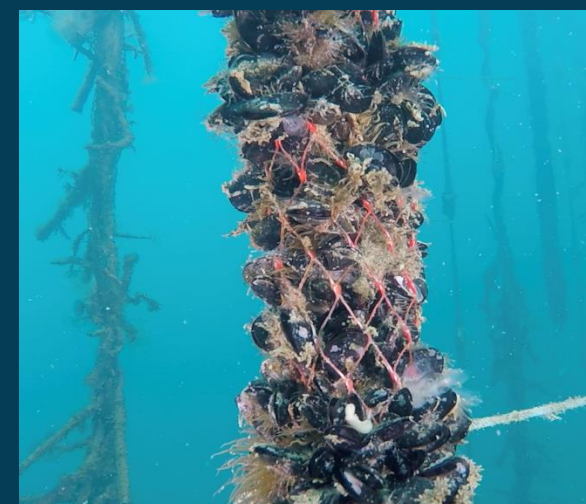
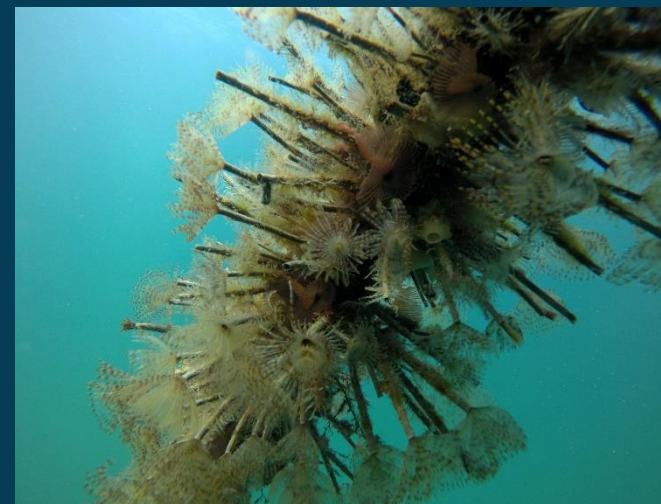


PROBLEMA: Ridurre l'impatto ambientale nella maricoltura in gabbie galleggianti

SOLUZIONE: I BIORISANATORI

Organismi "naturalmente presenti" che posizionati sotto le gabbie di allevamento ittico ripuliscono l'acqua

Invertebrati



Macroalghe



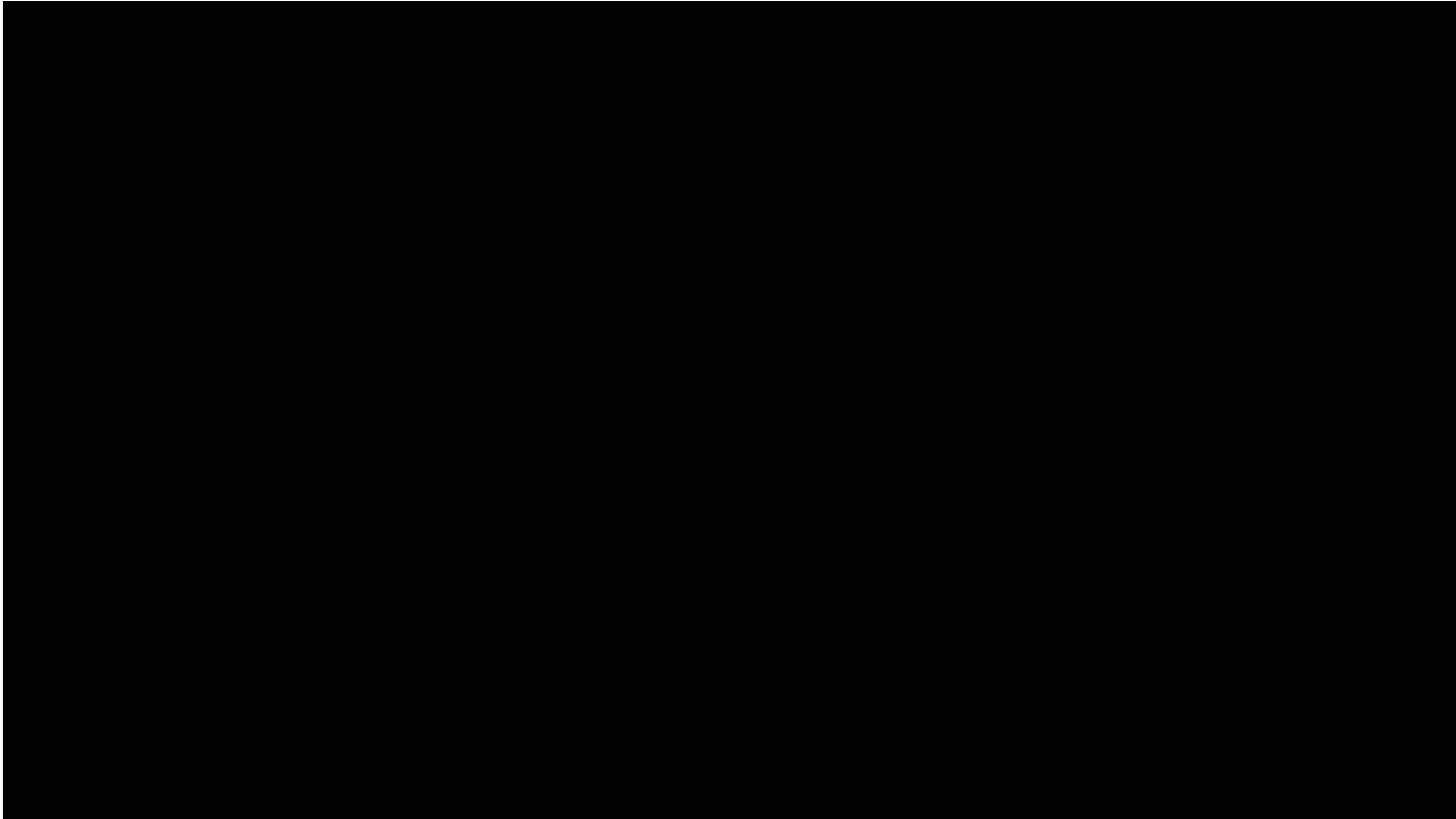
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aims to test the survival and growth of different species of sponges placed near off-shore fish farm cages of the Gargano Shell Fish Farm in the Gulf of Manfredonia



Why do farm sponges near offshore
fish farming cages?





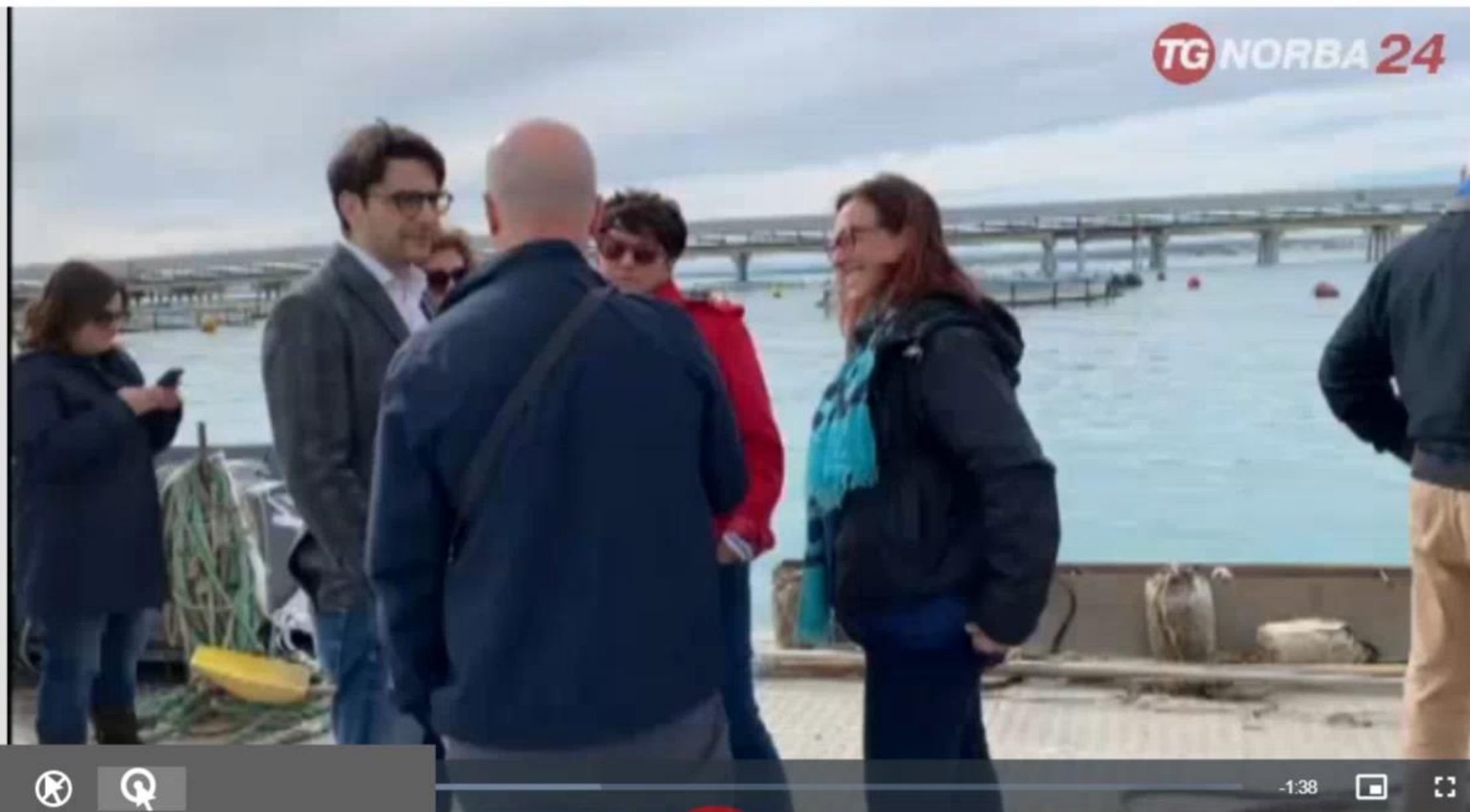
November 2019



HOME NEWS ON DEMAND LIVE EDIZIONI LOCALI SPECIALI

CRONACA POLITICA ATTUALITÀ REGIONE ECONOMIA CULTURA SPETTACOLI SPORT

TG NORBA 24



Manfredonia: spugne e pesci, il futuro degli allevamenti ittici

16-11-2019

Mare più pulito e maggiore produzione ittica grazie alle spugne: è l'obiettivo del progetto in corso, a Manfredonia, negli allevamenti di pesce di una storica cooperativa

Servizio di Pietro Loffredo

Intervista a Michela Cariglia, coop. Gargano Shell Fish Farm



-1:38

Scegli la programmazione



Michela Cariglia | 29/01/2020



Porifera (Porifera Grant, 1836; from Latin, porers) or sponges are aquatic invertebrates widely spread in the sea from coastal coastal environments to oceanic depths, and in a minimum percentage in fresh waters. To date, there are over 9000 species (World Porifera Database) of Porifers divided into 4 classes: Hexactinellida, Demospongiae, Homoscleromorpha and Calcarea

The Porifera

THE PORIFERA



- Asymmetrical, with very variable shape, size and color
- Generally sessile. Extremely simple from a structural point of view: lack of tissues and organs
- Filtration feed
- "Skeleton" formed by CaCO_3 or SiO_2 spicules and / or spongin fibers
- Always used for cosmetic purposes (bath sponges).
- Recently exploited for the extraction of active ingredients useful in different areas (medical, agricultural, industrial).

PERCHÈ I PORIFERI?

1

efficaci filtratori e biorisanatori, estraggono più dell'80% delle particelle organiche in sospensione di dimensioni comprese tra i 0,5 e 50 μm (batteri eterotrofi, eucarioti eterotrofi, fitoplancton, sostanza organica disciolta e particolata). Il picoplancton (<2 μm) ed in particolare il batterioplancton è considerato la loro maggiore fonte di carbonio



PERCHÈ I PORIFERI?

2

alcune tra le spugne più pregiate di interesse commerciale, cosmetico e farmacologico, *Spongia officinalis* var. *adriatica* e *S. lamella* (= *S. agaricina*), *H. perlevis*, rispondono in modo estremamente promettente a differenti **tecniche di coltura** (strutture sospese lungo la colonna d'acqua o sul fondo), suggerendo un notevole potenziale di espansione per la spongicoltura (Mercurio et al., 2003; Corriero et al., 2004)

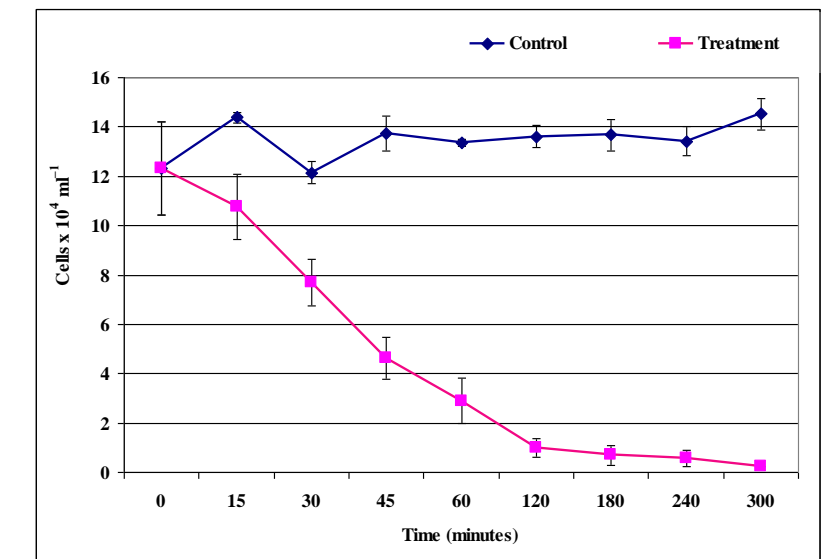
PERCHÈ I PORIFERI?

3

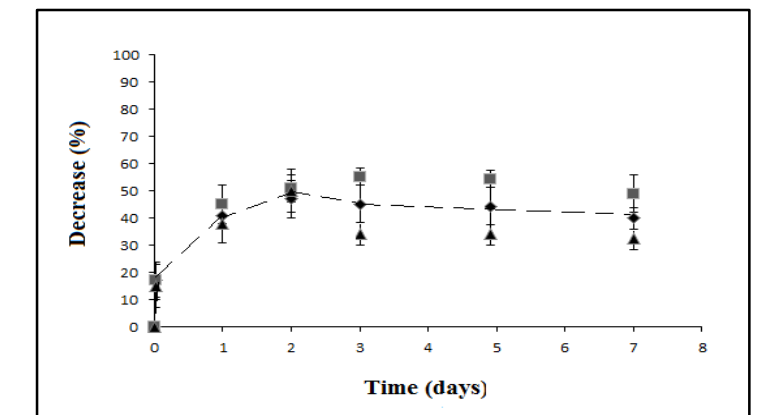
alcune specie presentano una **elevata tolleranza** alle condizioni di stress ambientale indotte dall'attività di acquacoltura (aumento della rata di sedimentazione, incremento della concentrazione dei nutrienti, presenza di sostanze inquinanti quali pesticidi ed insetticidi organofosforici) (Corsi et al., 2004, 2005; Pastore et al., 2006)

EFFICIENT BIOREMEDIATOR

- Microbic componets



- Organic pollution es. lindano



- Water management and inorganic pollutants i.e. heavy metals

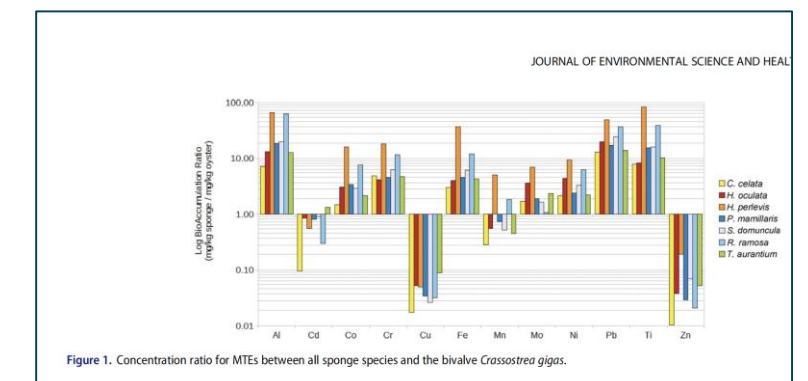
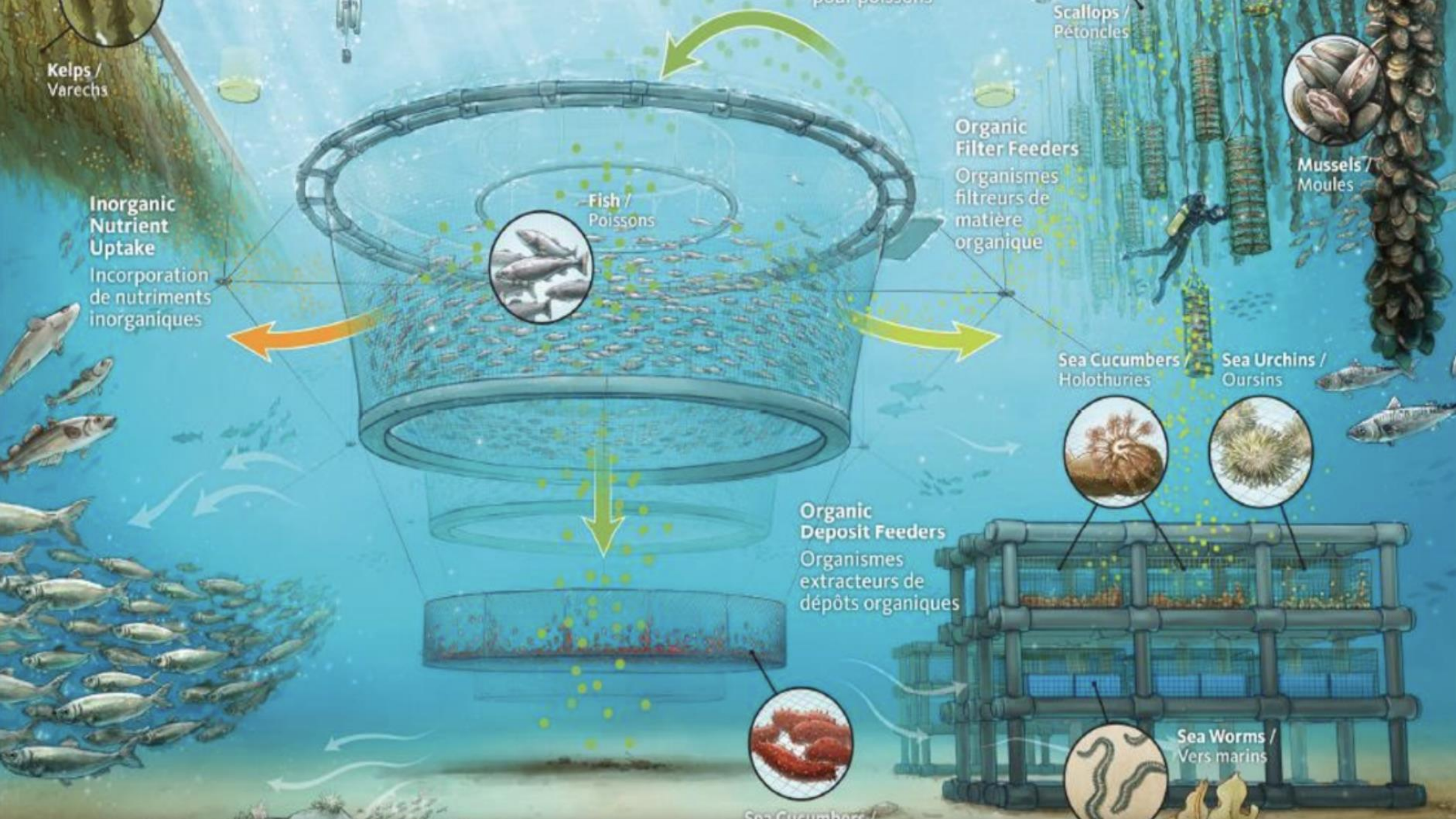


Figure 1. Concentration ratio for MTEs between all sponge species and the bivalve *Crassostrea gigas*.

In proximity to fish farms the release of metabolic by-products, food residues, faecal material and possibly drugs can lead to an increase in microbial concentration and deterioration of water quality with potential consequences on the spread of pathogens that represent a health risk of farmed species and a potential danger to human consumption.



INTEGRATED MULTI-TROPHIC AQUACULTURE (IMTA)
associate fish farming with that of species placed at different levels of the trophic chain capable of using the energy surplus and transforming it into potentially exploitable biomass



Kelps /
Varechs

**Inorganic
Nutrient
Uptake**
Incorporation
de nutriment
inorganiques

Fish /
Poissons

**Organic
Filter Feeders**
Organismes
filtreurs de
matière
organique

Scallops /
Pétoncles

Mussels /
Moules

Sea Cucumbers /
Holothuries

Sea Urchins /
Oursins

**Organic
Deposit Feeders**
Organismes
extracteurs de
dépôts organiques

Sea Worms /
Vers marins

Sea Cucumbers /
Holothuries

MAR GRANDE - TARANTO IONIAN SEA



long line



off-shore cages

bioremediators: filter invertebrates and algae

Bivalvs



Poriferi

Anellidi Policheti



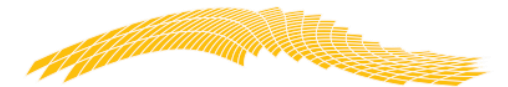
REMEDIA life

REmediation of Marine Environment and Development of Innovative Aquaculture



LIFE16 ENV/IT/000343

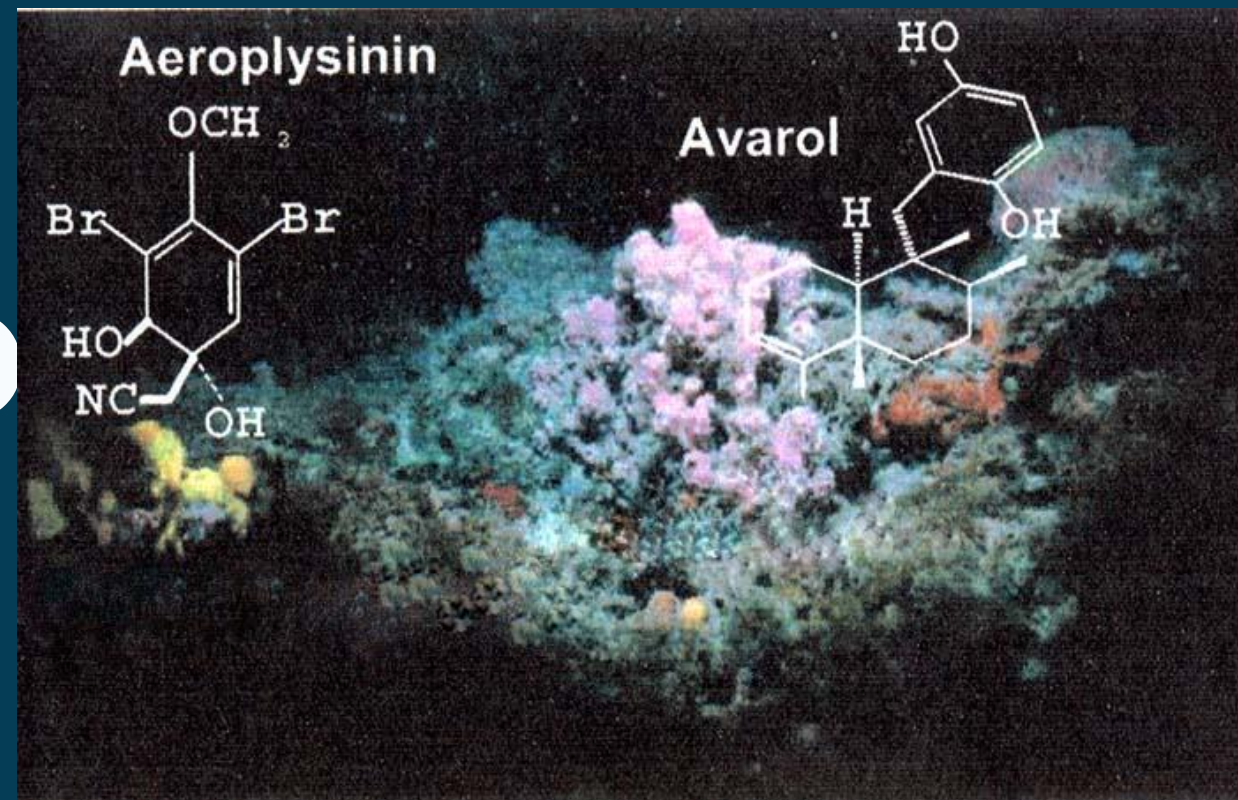
POTENZIAL COMMERCIAL OPPORTUNITIES



Porifera have significant commercial potential:
they are a natural reserve of bioactive
compounds;
usable in the cosmetic and nutraceutical sector;
in aquarism.



BIOACTIVE COMPOUND

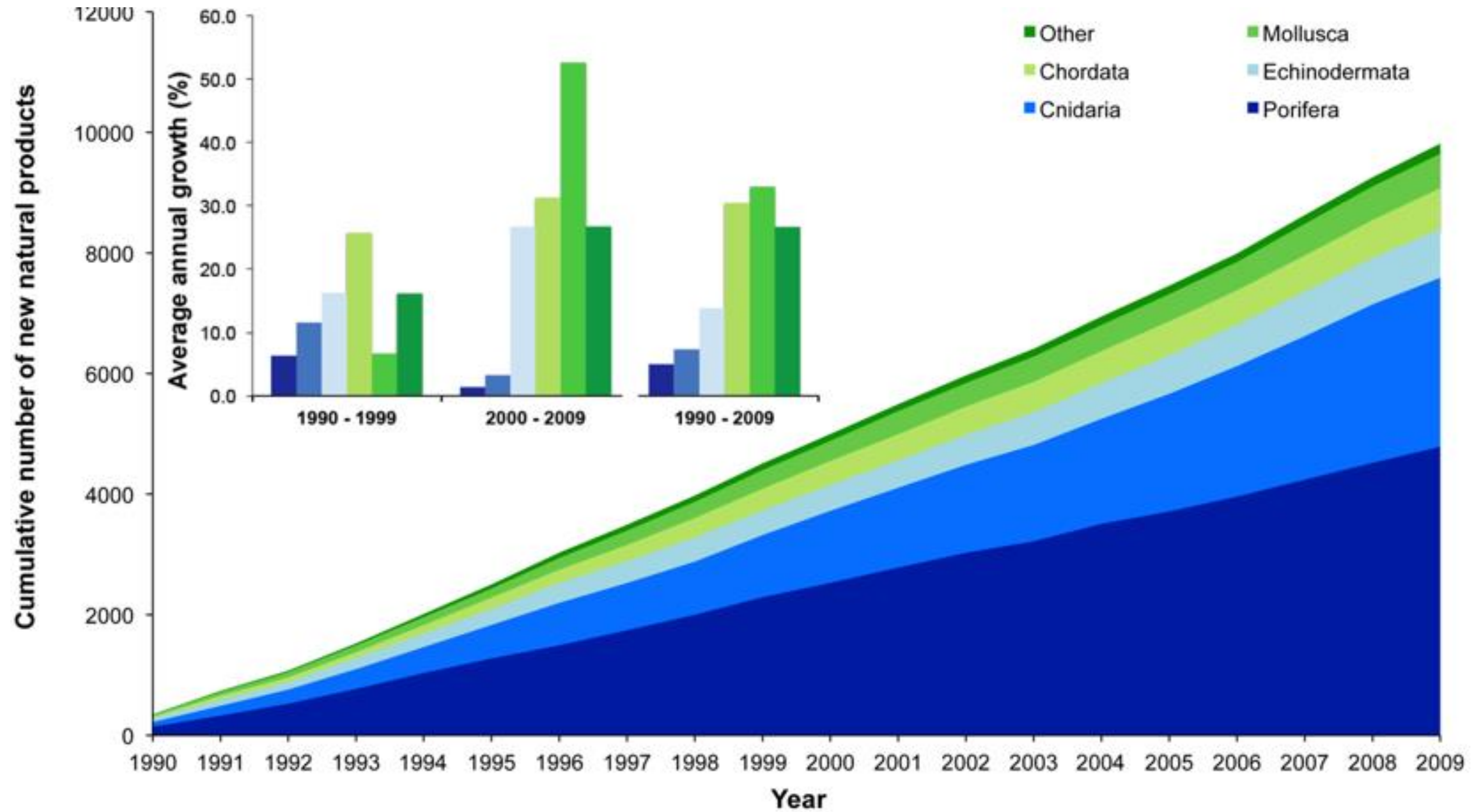


Aplysina aerophoba

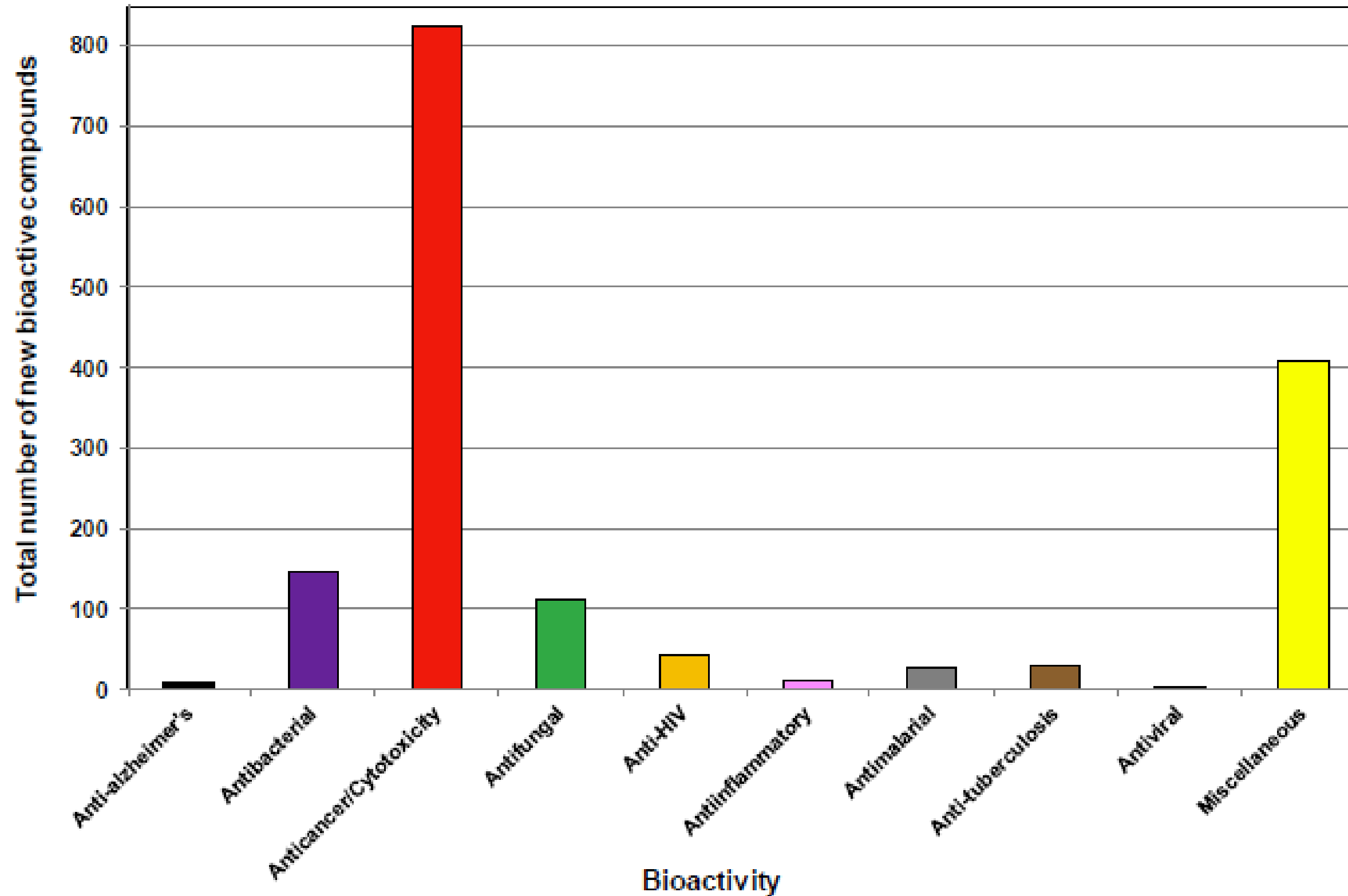


Dysidea avara

New molecules extracted from marine organisms between 1990 and 2009 (Leal et al., 2012)



Bioactive compound isolated from porifera from 2001 till 2010 *(Nehbub et al., 2014)*





MARINE NATURAL PRODUCTS FROM SPONGES

BROMOTYROSINE DERIVATIVES FROM VERONGIDA

Aerophysinin-1:

- cytotoxic against:
 - lymphoma and epithelioma cells
 - human breast cancer cells
- antiangiogenic
- antibiotic

Enzo Life Sciences^(R)
Isofistularin-3
222.00 € / 1 mg!!

Special Offer

abcam.com^(R)
(+)-Aerophysinin-1
565.00 USD / 1 mg!!

Special Offer

FIG. 1. Wound-induced bioconversion of the brominated isoxazoline alkaloids aerophobin-2 (1), aplysinamisin-1 (2), and isofistularin-3 (3) to aerophysinin-1 (5) and the dienone (6) in tissue of *Aplysina aerophoba*. When isofistularin-3 (3) is used as a substrate for the reaction, the bisoxazolidinone derivative (4) is recovered as a further product.



«The low temperatures for collagen extraction allows the production of gelatine with a lower temperatures than the mammals thus they provide a duplex advantage from spongae biomass: raw material for gelatines and food and cosmetics industry as well.

COSMETIC & NUTRACEUTICS

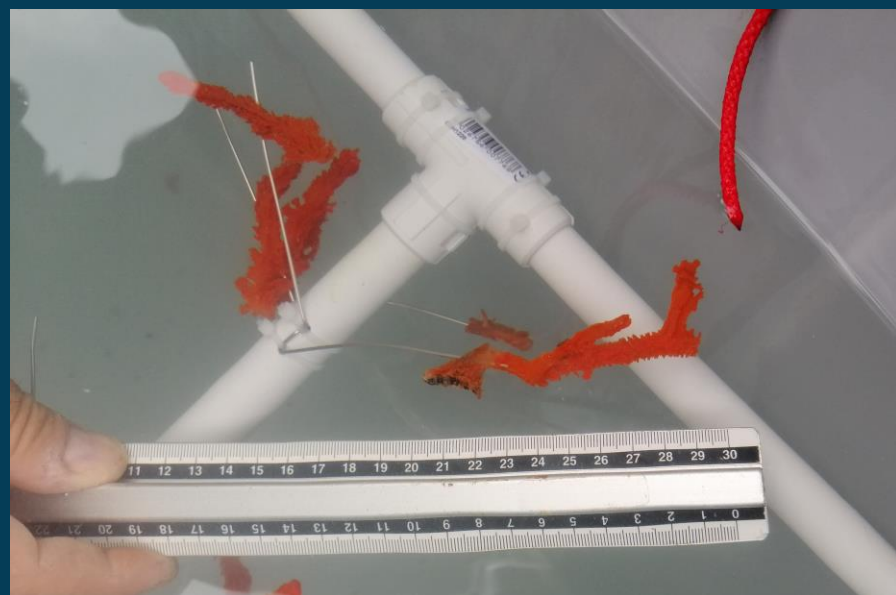


Article

**Collagen from the Marine Sponges
Axinella cannabina and *Suberites carnosus*:
Isolation and Morphological, Biochemical,
and Biophysical Characterization**

Leto-Aikaterini Tziveleka ¹, Efstathia Ioannou ¹, Dimitris Tsiourvas ², Panagiotis Berillis ³,
Evangelia Foufa ¹ and Vassilios Roussis ^{1,*}

AQUARIUM



ASMar



AUTCTON SAMPLE HARVESTIONG UNDER SEA FARM IN MANFREDONIA GULF



Sarcotragus spinosulus Schmidt, 1862

Ircinia variabilis Schmidt, 1862



Chondrosia reniformis Nardo, 1847

SAMPLE CUTTING ON SITE IN MANFREDONIA GULF



Timeline



JUNE 2019



ASSESTMENT ON DIFFERENT TYPES OF SPONGAE FARMING

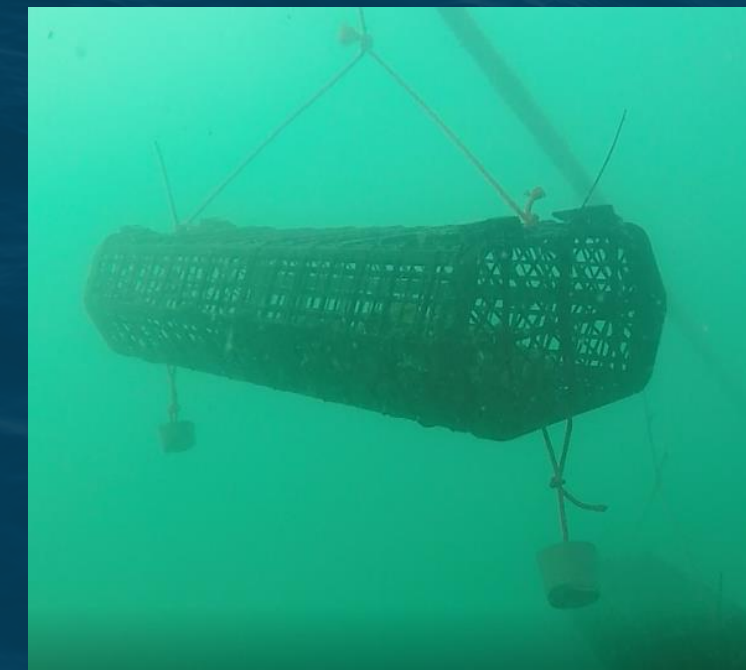
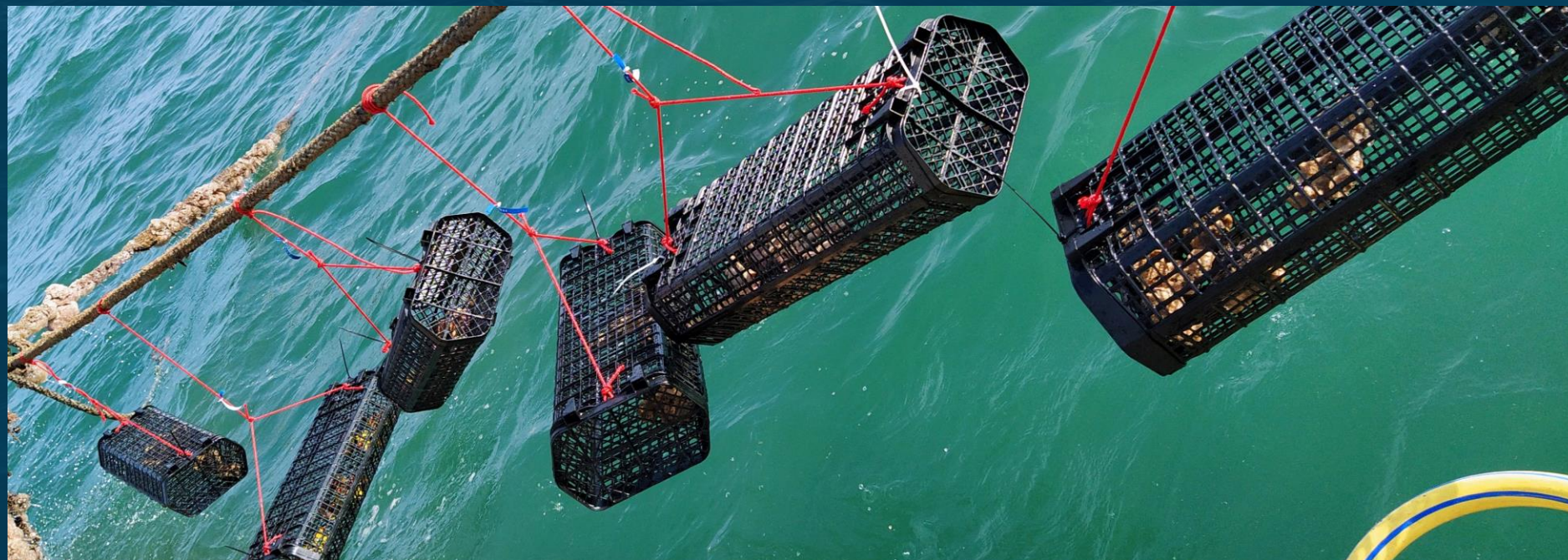
PVC frame



Lanternnet



PVC frame



Seapa net

January 2020



January 2020



January 2020



January 2020



January 2020



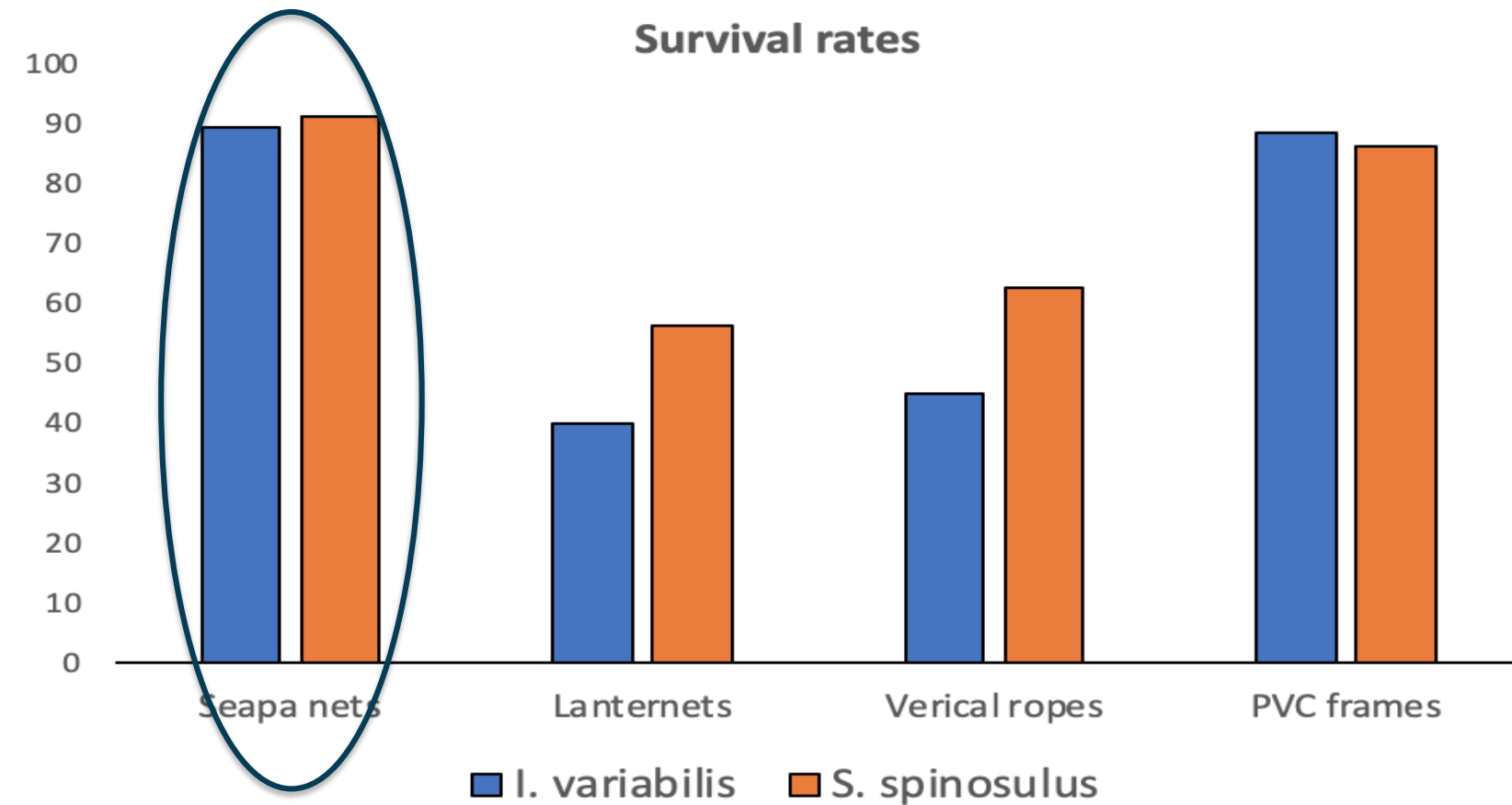
January 2020



PIC OF THE DAY!

- Gargano Shell Fish Farm
- Università degli Studi di Bari
- Università degli Studi del Molise

RESULTS



COMPARISON TABLE AMONG DIFFERENT FARMING TECHNICALITIES FOR SPONGAE

Seapa nets provides the best performance the fragments of spongae gave the best results in terms of healed cut and less epibiosis by the abundant fouling community that instead completely covered the fragments positioned on the PVC squares and vertical ropes.

**Thank you
for your
kind
attention!**

MICHELA CARIGLIA

Gargano Shell Fish Farm

cariglia.michela@gmail.com

Research Group from
UNIVERSITY OF BARI:

- Dott. Caterina Longo
- Dott. Cataldo Pierri
- Dott.ssa Roberta Trani
- Dott.ssa Maria Scrascia

Gargano Shell Fish Farm

- Alessandro Cariglia
- Francesca Cariglia
- Michela Cariglia