

Dr. Ronny Marquardt
September 2013

THE FRAUNHOFER SOCIETY AT A GLANCE

The Fraunhofer-Society is the largest organization for applied research in Europe

- Research of direct utility to private and public enterprise and of wide benefit to society
- Customers: Industry, Service sector, Public administration
- 7 Groups:
Information and Communication Technology, **Life Sciences**, Light & Surfaces, Microelectronics, Production, Defence and Security, Materials and components



FOUNDATION OF THE FHG-EMB

Founding group at the University of Lübeck „Intracellular transport“ and mother institute FhG-IBMT

- **2004:** FhG-IBMT Working group:
Cell differentiation & Cell technology
at the UzL (250 m²/2 Mio €)



- **2008:** Fraunhofer-Institution for Marine
Biotechnology (1.200 m²/15 Mio €)

- **2015:** New FHI with focus
on medical and marine
biotechnology (5.000 m²/30
Mio €)



WORKING GROUPS AND CENTRAL FACILITIES



Head of Institution
Prof. Dr. Charli Kruse



Cell differentiation
Dr. M. Brandnburger



Cell technology
Dr. D.H. Rapoport



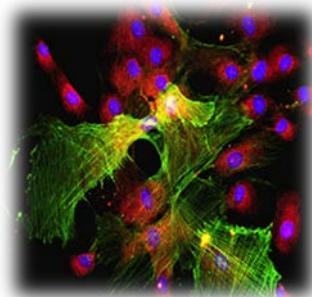
Aquatic cell technology
Dr. M. Gebert



Aquaculture
Dr. R. Marquardt



Translational medicine
Dr. S. Danner

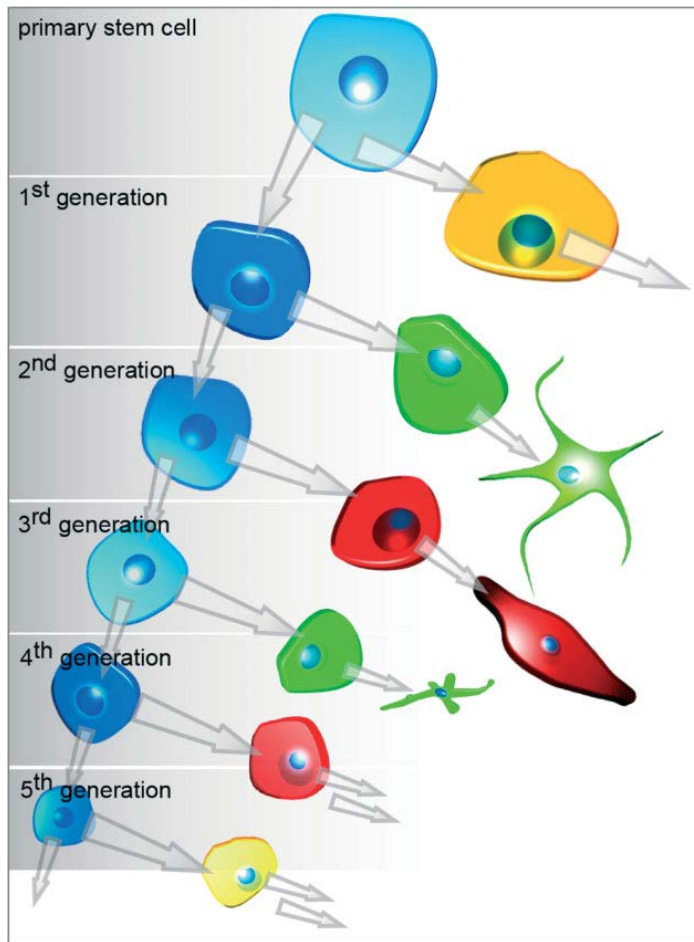


Cell culture and analysis



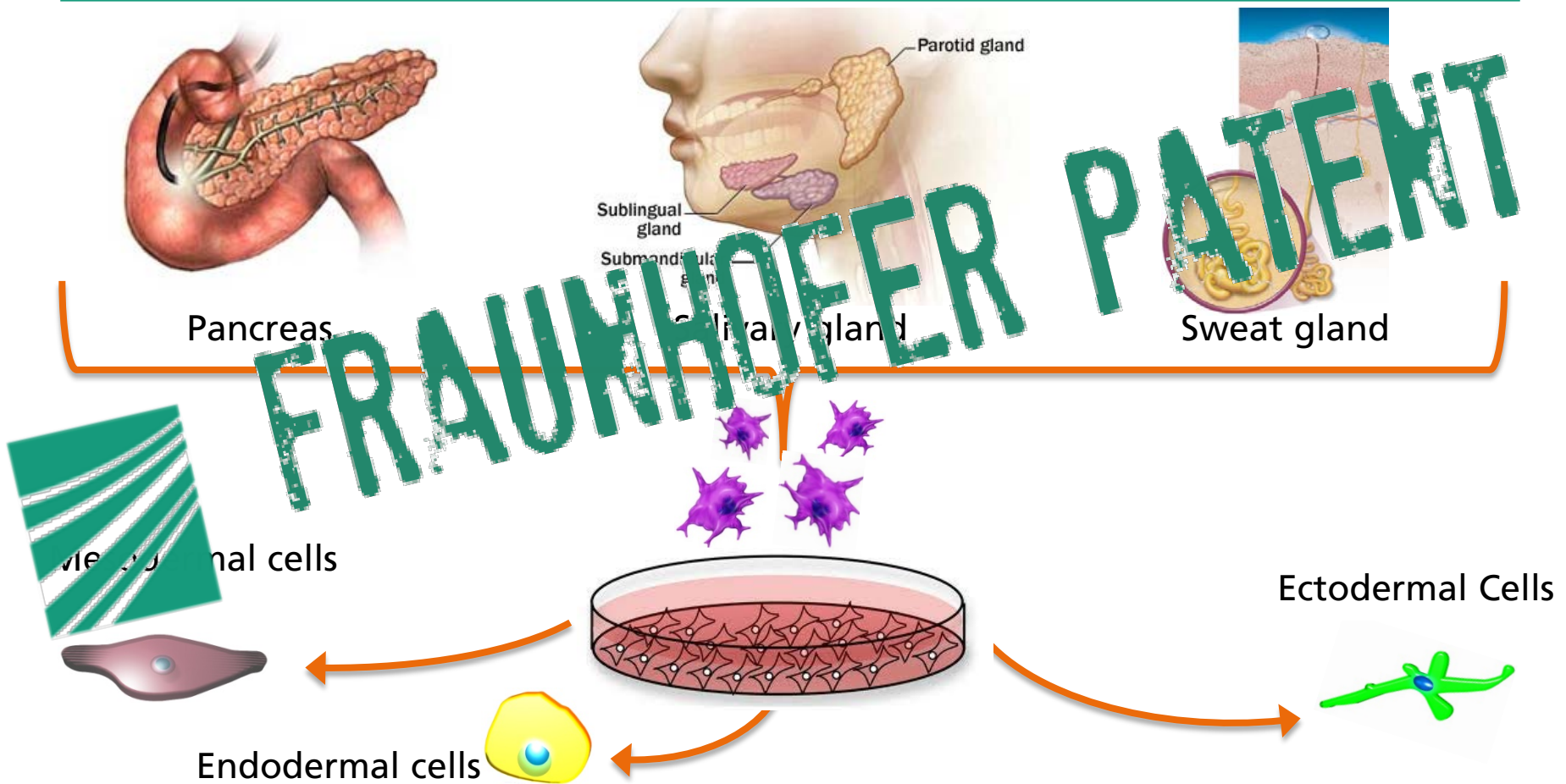
Tools and devices

ADULT STEM CELLS- A SHORT INTRODUCTION



- asymmetric division gives rise to new stem cells (blue) and various progenitor cells (colored)
- progenitor cells differentiate into finally terminated cells (differently shaped)

ISOLATION & ANALYSIS OF MULTI-POTENT GLAND-DERIVED STEM CELLS



WORK GROUP „CELL DIFFERENTIATION“



Ureter



Tissue Engineering



Patient specific in-vitro-testsystems

Electrodes for deep brain stimulation



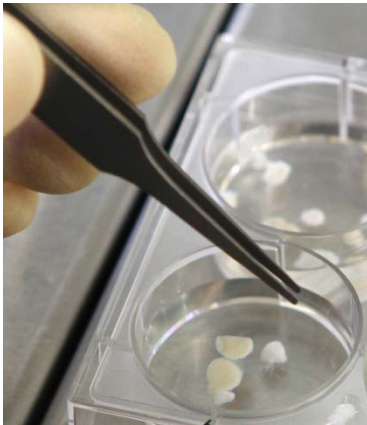
Biologization of implants for minimizing the foreign body reaction



Cell based therapies

- Dermal wound healing
- Peripheral nerves
- Heart
- Intestine
- ...

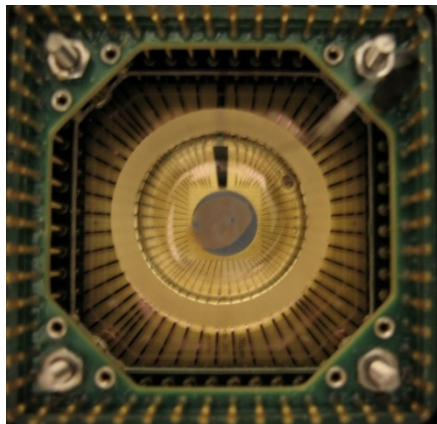
ORGANOTYPIC TEST AND MODEL SYSTEMS



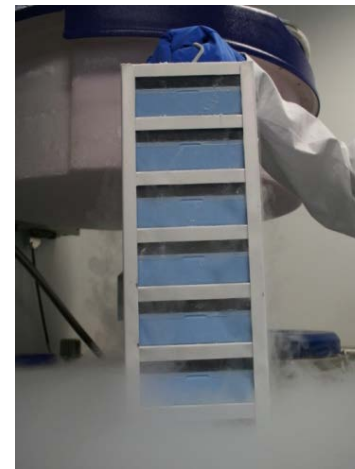
Human 3D skin
equivalent,
e.g. for analyzing
wound healing



Aggregates of
spontaneously
contracting
cardiomyocytes from
rainbow trout

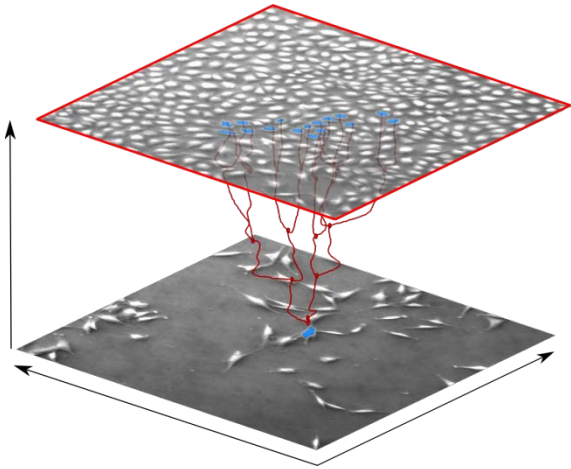


Heart slices
for analyses of
pharmaceuticals



Cryopreservation
of organotypic systems

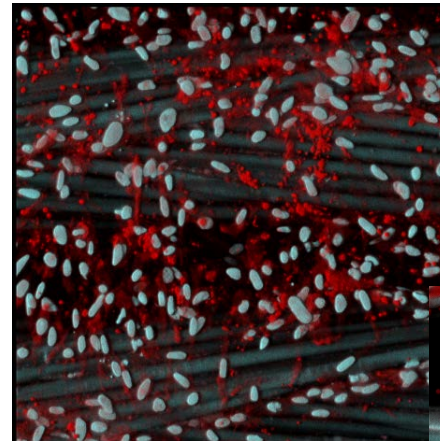
WORK GROUP „CELL TECHNOLOGY“



**Automated
cell tracking**
using time-
lapse
microscopy

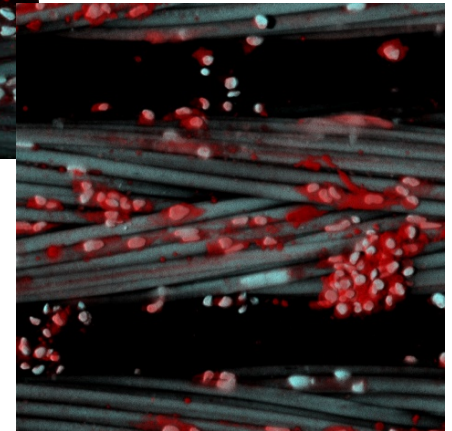


Bioreactors
for adherently growing cells



**3D cell culture/ cell
transplantation:**

- adherence measurements
- biologization of surgery materials



GERMAN CELL BANK FOR WILD ANIMALS „ALFRED BREHM“



- Cryoconservation of stem and progenitor cells from vertebrates
- Cooperation with several zoos (Hagenbeck, Rostock, Neunkirchen, SeaLife Center,...)
- Currently: 31 18 samples from 80 different species of mammals, birds, fishes and reptiles
- 8 fresh water and 4 marine **fish species**
 - ➔ one of the worlds biggest collection of living cells for scientific purposes

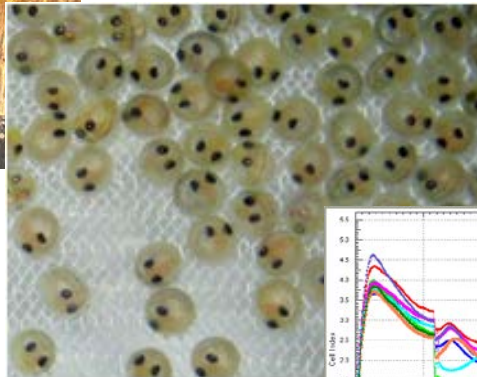
MOBILE STEM CELL LABORATORY



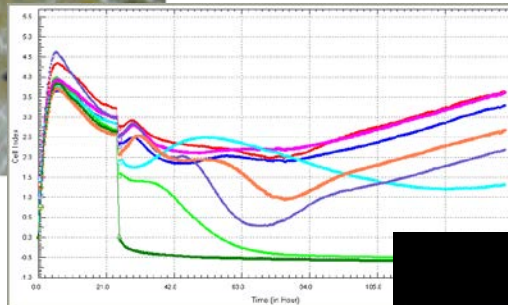
WORK GROUP „AQUATIC CELL TECHNOLOGY“



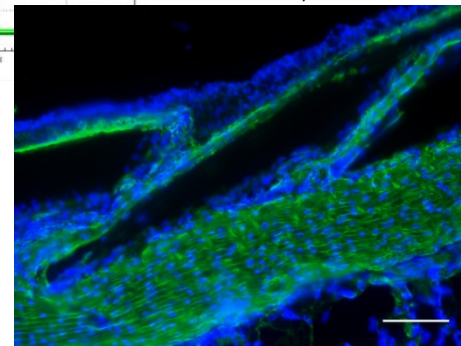
Cell cultures
from aquatic organisms



In vitro manipulation
of fish cells and eggs

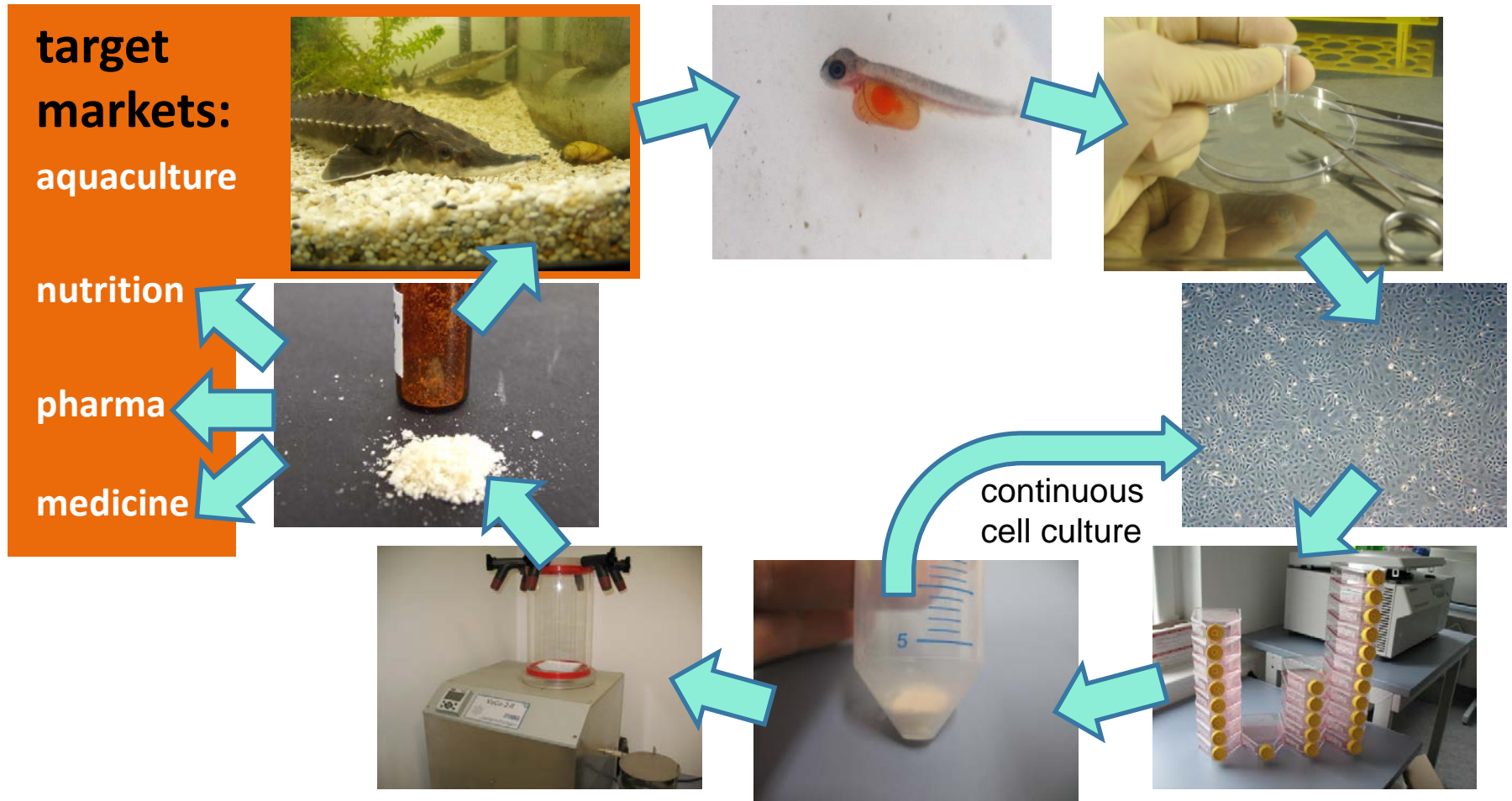


Cellular test systems
(e.g. cytotoxicity, aquatic ecotoxicology, diagnostics for fish diseases)



Development of
molecular tools
for fish

PRODUCTION OF FISH MEAL FROM FISH CELL CULTURES



TECHNICAL CENTER FOR APPLIED FOOD RESEARCH - TFAL



Utilization of marine resources for:

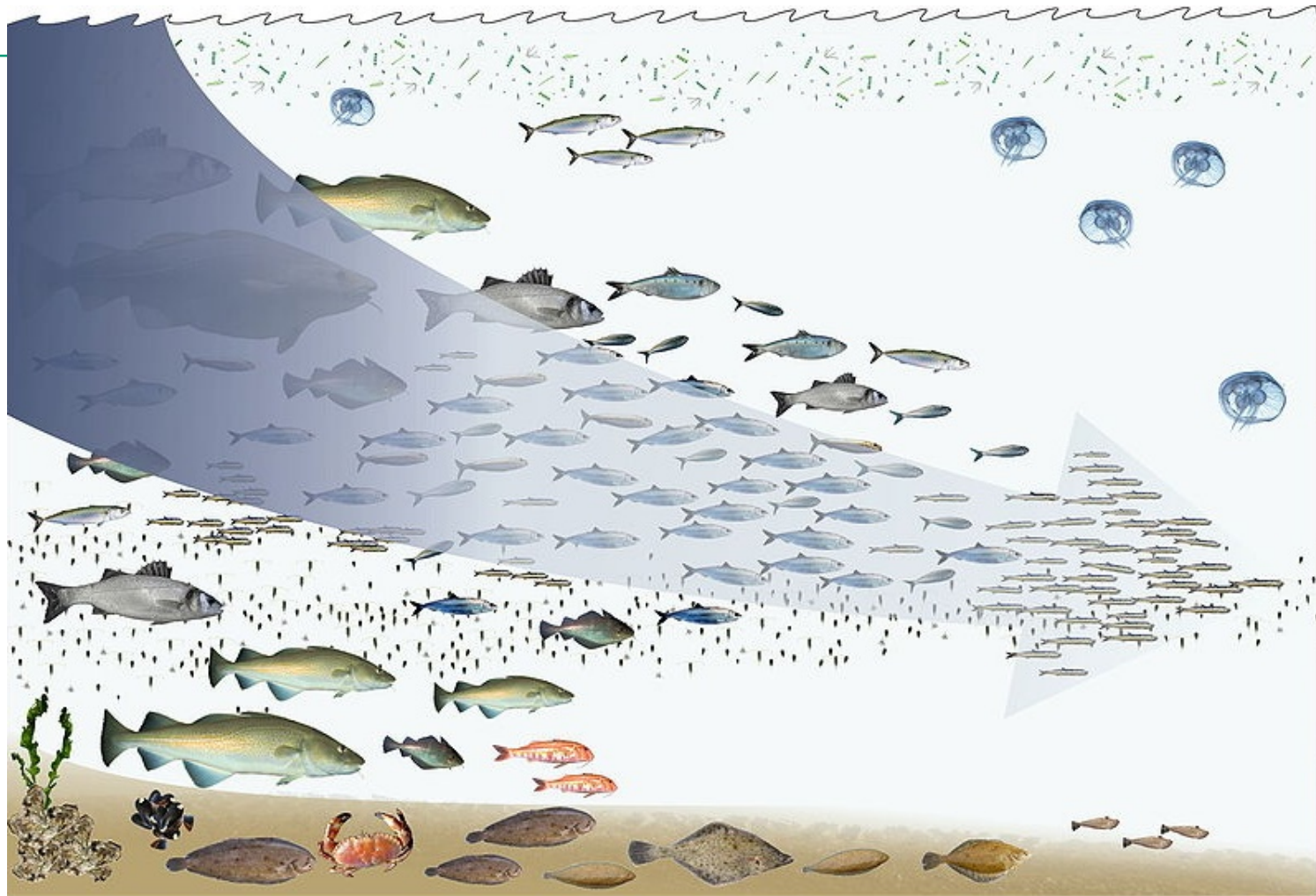
- Development and analyses of dietary supplements for human and animal nutrition, food and feed
- Development of innovative processing-technologies
- Cooperative and mandate research
- Cooperation with universities, practical trainings



WORK GROUP „AQUACULTURE“



„FISHING DOWN THE FOODWEB“



(Pauly et al. 1998
Science)

TO AVOID ENVIRONMENTAL PROBLEMS SOMEWHERE ELSE



Aquaculture in the Baltic Region

- Salmoncages in the sea ??
- Troutcages in clean lakes ???



Aquaculture in the Baltic Region

- Salmoncages in the Baltic ???
- Troutcages in our clean lakes ???

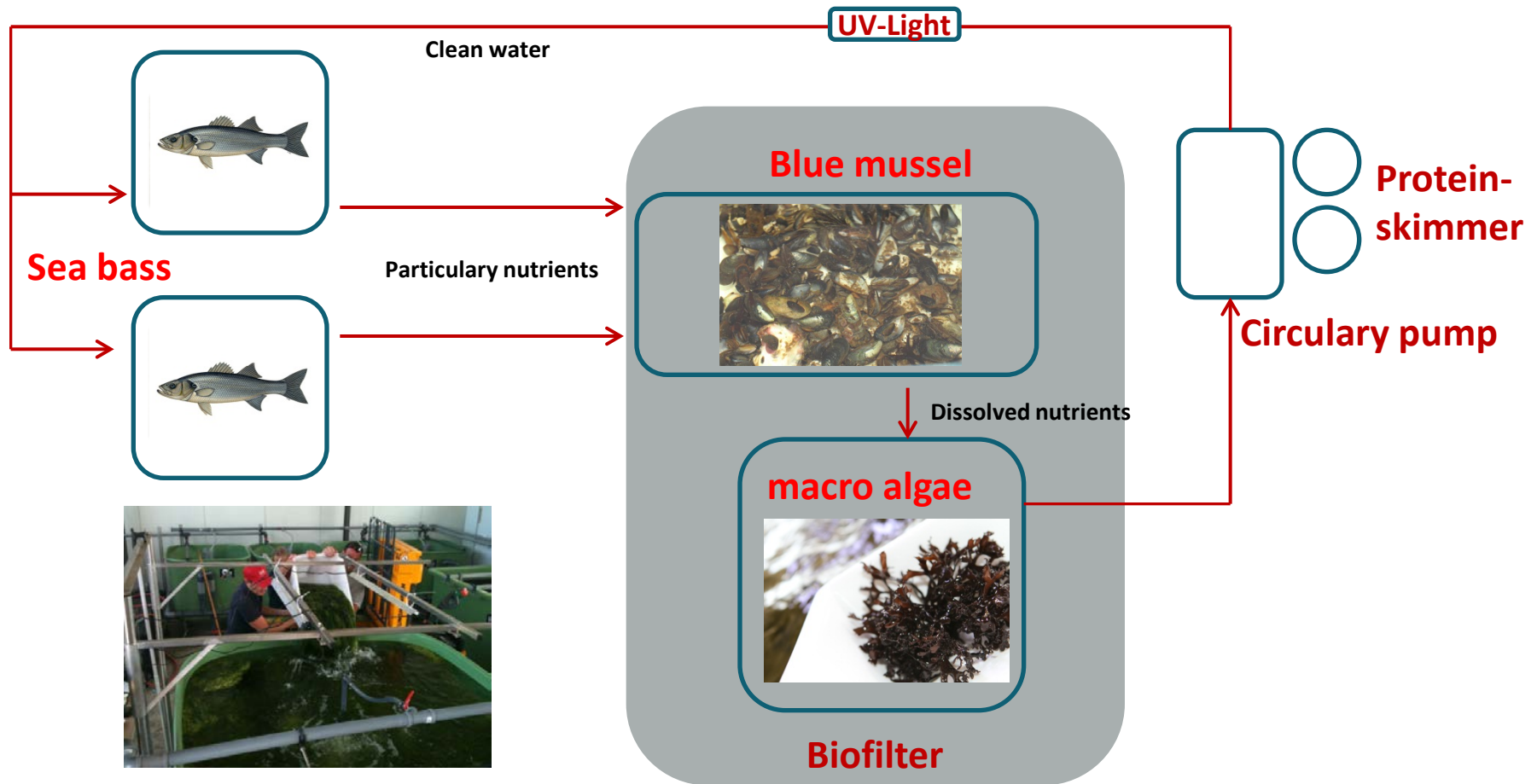


- landbased
(but with multi-trophic concepts)
- new species
- new products

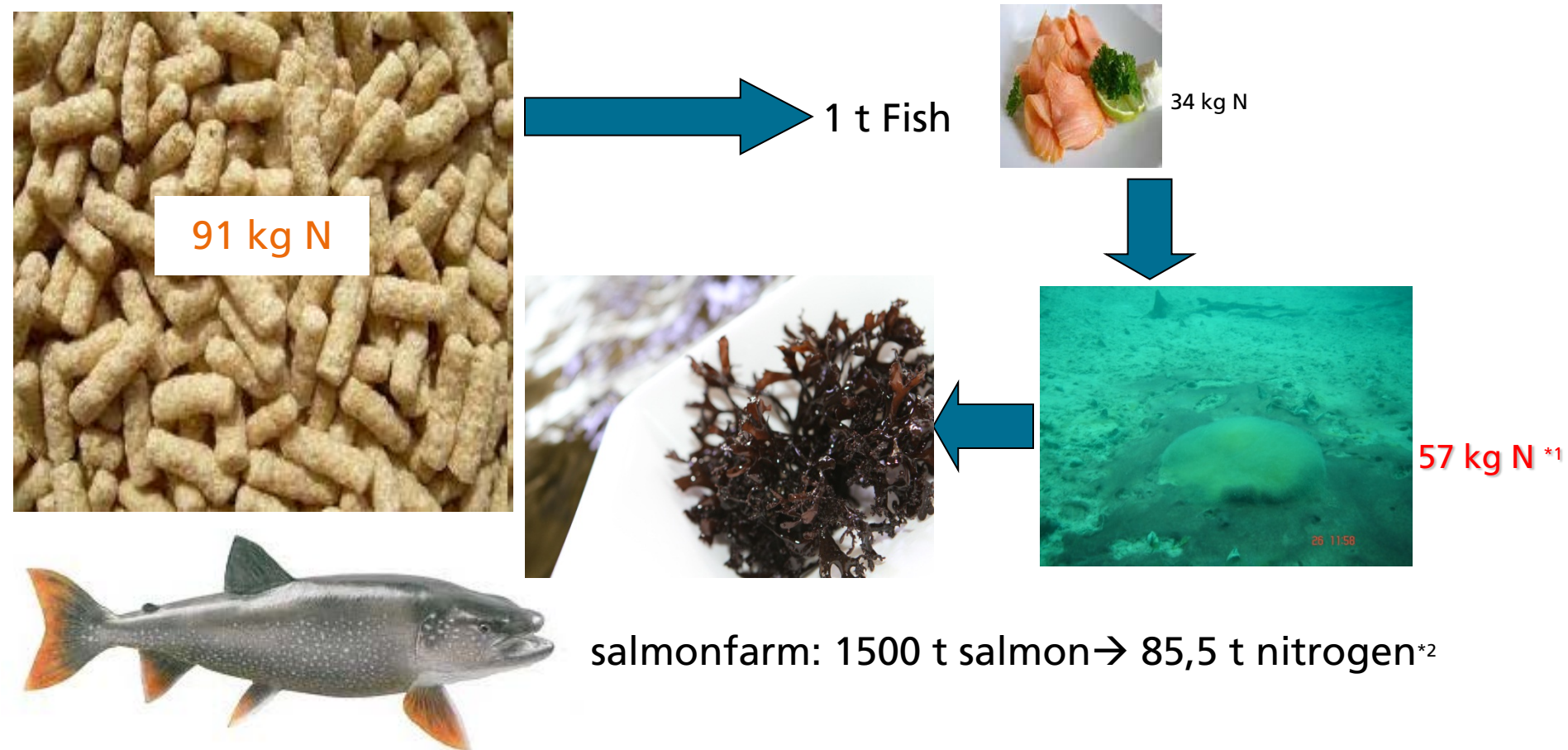


WORK GROUP „AQUACULTURE“

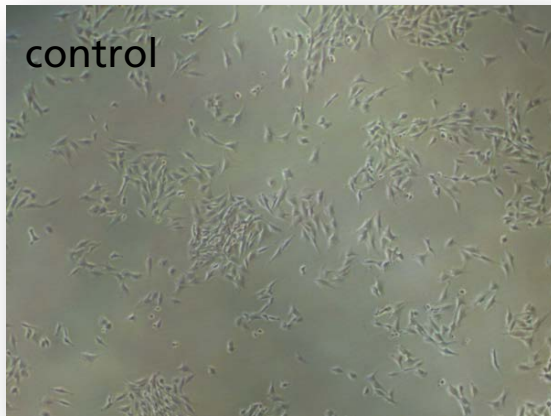
Landbased integrated multitrophic aquaculture



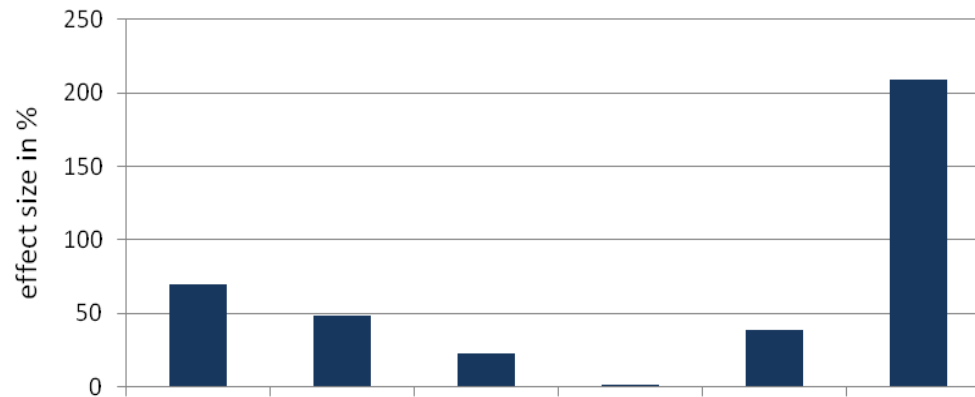
Benefits



Extracts from algae for cell culture media



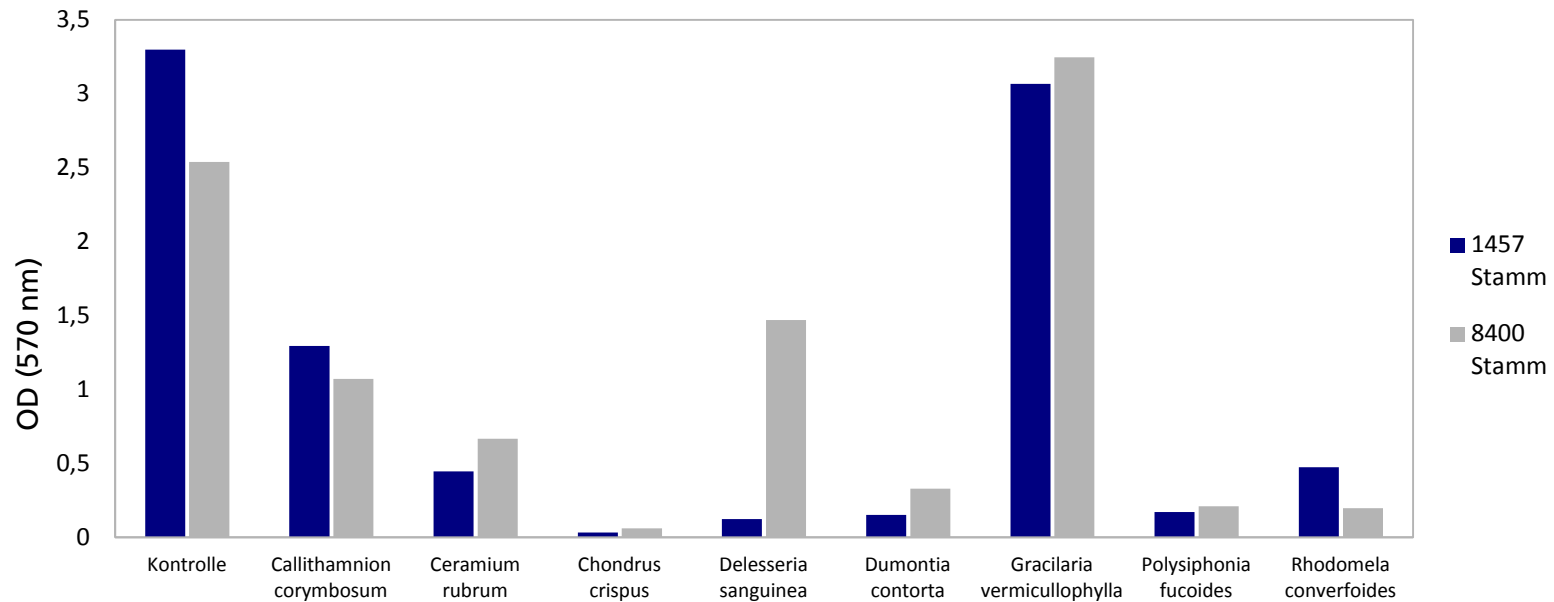
effects of extracts on rat cellculture (*Rattus norvegicus*) RApan 5bP8 ;



Extracts from different Baltic Algae with different effects on cell proliferation

Extracts from algae for medical uses

biofilm inhibition against *Staphylococcus epidermidis* via Rhodophyta



effects of metabolites of different Rhodophyta species on Biofilms: strong inhibition through *Chondrus crispus* (-99%, -98%), *Dumontia contorta* (-95%, -87%) und *Polysiphonia fucoides* (-95%, -92%).

THANKS

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