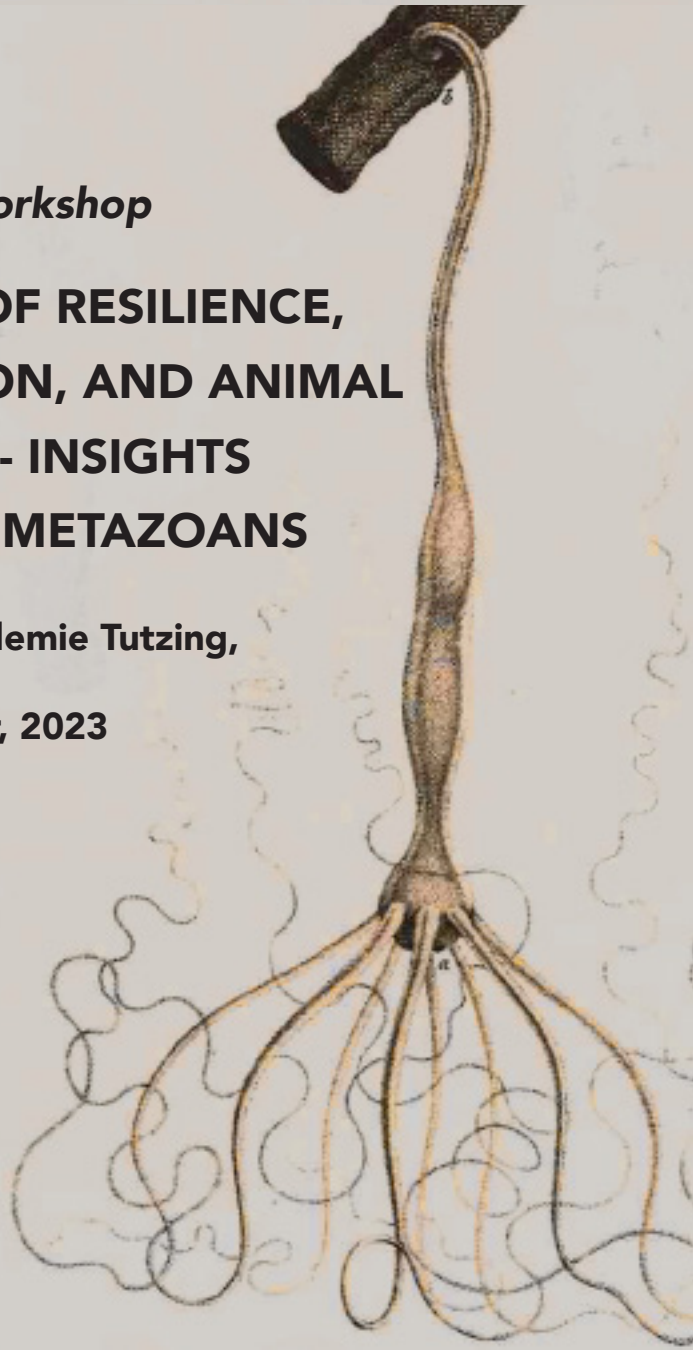


*International Workshop*

**EVOLUTION OF RESILIENCE,  
REGENERATION, AND ANIMAL  
COMPLEXITY - INSIGHTS  
FROM BASAL METAZOANS**

**Evangelische Akademie Tutzing,  
Germany  
18 - 21 September, 2023**



**Program  
List of participants**



International Workshop

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**Evolution of resilience, regeneration,  
and animal complexity - insights from  
basal metazoans**

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Evangelische Akademie Tutzing, Germany  
18. – 21. September, 2023

**ORGANIZERS**

Christian R. Voolstra (Konstanz), Ulrich Technau (Vienna)

**ORGANIZING MANAGER**

Irene Lenzenhuber (Konstanz) & Nina Znidaric (Vienna)

**ACKNOWLEDGMENT**

We want to thank Thomas CG Bosch and Thomas Holstein for support & guidance in the organization of the meeting. This Workshop is supported by the Deutsche Forschungsgemeinschaft (DFG).

Cover: A hydra from Abraham Trembley. *Mémoires, pour servir à l'histoire d'un genre de polypes d'eau douce, à bras en forme de cornes*. Leiden: Chez Jean and Herman Verbeek, 1744

# Content

<b>SCIENTIFIC PROGRAM</b>	<b>1</b>
<b>ABSTRACTS - TALKS</b>	<b>7</b>
Genome Regulation	8
Mechanics and morphogenesis	19
Ecology and symbiosis	24
Regeneration and self-organisation	37
Invited Lecture	45
Neuronal development and physiology	46
Pattern formation	59
<b>ABSTRACTS - POSTER PRESENTATIONS</b>	<b>70</b>
<b>LIST OF PARTICIPANTS</b>	<b>99</b>



# SCIENTIFIC PROGRAM

## Monday, September 18, 2023

10.00 – 14.00 Registration at Evangelische Akademie Tutzing

SET UP POSTERS

12.30 LUNCH

14.00 WELCOME by CHRISTIAN VOOLSTRA and ULI TECHNAU

### Genome regulation and evolution

(CHAIR: Evely Houliston)

14.15 **Iliana Baums** (Oldenburg): Role of somatic mutations and phenotypic plasticity in coral adaptation

14.30 **Julia Ramon Mateu** (Villefranche-sur-Mer): Neural and secretory cell types of the cnidarian planula larva

14.45 **Lucas Leclère** (Banyuls-sur-Mer): The genome of *Pelagia noctiluca* and the simplification of the scyphozoan life cycle

15.00 **Oliver Link** (Vienna): A cell-type atlas from a scyphozoan jellyfish *Aurelia sp. 1* provides insights into changes of celltype diversity in the transition from polyps to medusae

15.15 **Catriona Munro** (Villefranche-sur-Mer): Mechanisms of meiosis in *Clytia hemisphaerica* and implications for polyploidy

15.30 **Jacob Musser** (New Haven): Single-cell RNAseq in a sponge sheds light on the origin of animal cell types

15.45 COFFEE

16.15 **Tetsuo Kon** (Vienna): The dynamic genomic landscapes of the *Hydra* stem cells

16.30 **Yehu Moran** (Jerusalem): Make love, or war: genetic manipulation reveals that cnidarian venom shapes interspecific interactions, physiology and reproduction

16.45 **Bert Hobmayer** (Innsbruck): Stem cell exhaustion during ageing and genome sequencing in two novel *Hydra oligactis* lab strains

17.00 **Yael Admoni** (Jerusalem): Characterization of antiviral RNAi in the model sea anemone *Nematostella vectensis*

17.15 **Ulrich Technau** (Vienna): Sea anemone genomes reveal ancestral metazoan chromosomal macrosynteny

17.30 RELAX AND ENJOY THE PARK

18.30 DINNER

### EVENING SESSION

#### Mechanics and morphogenesis

(Chair: Maja Adamska)

20.00 **Gideon Bergheim** (Heidelberg): Dynamics of the mesoglea composition during the life history of *Nematostella vectensis*

20.15 **Birgit Lengerer** (Innsbruck): The *Hydra* glue: a sticky chitin-based hydrogel

20.30 **Albrecht Ott** (Saarbrücken): The microtubule cytoskeleton is involved in polarity generation and axis formation

20.45 **Bastien Salmon** (Banyuls sur Mer): Building the molecular map of a jellyfish sarcomere

21.00 **Anaïs Bailles** (Dresden): Axis formation in regenerating *Hydra* cell aggregates

21.15 MEET IN THE BAR

**Tuesday, September 19, 2023**

## **Ecology and symbiosis**

(CHAIR: Tamar Lotan)

- 9.00 **Adam Barno** (Thuwal): Changes to coral epigenomes due to microbiome manipulation and temperature stress
- 9.15 **Manabu Bessho-Uehara** (Nagoya): Biochemical characterization of photoproteins in *Pelagia*.
- 9.30 **Warren Francis** (Munich): We are what we eat: origins of bioluminescence in the medusa *Pelagia*
- 9.45 **Cristoph Giez** (Kiel): Microbes as part of ancestral neuronal circuits: Bacterial produced signals affect neurons controlling eating behavior in *Hydra*
- 10.00 **Jinru He** (Kiel): Resolving *Hydra*-microbe interactions at single-cell resolution
- 10.15 COFFEE
- 10.45 **David Miller** (Townsville): Host manipulation of the coral microbiome: quorum quenching by metazoan NtN hydrolase proteins
- 11.00 **Melanie Dörr** (Konstanz): Functional testing of microbiome bacterial isolates to increase thermal tolerance of the coral model *Aiptasia*
- 11.15 **Raquel Peixoto** (Thuwal): Exploring and restoring coral-associated microbiomes
- 11.30 **Sergio Vargas** (München): Insights into the gemmulation molecular toolkit of freshwater sponges
- 11.45 RELAX AND ENJOY THE PARK
- 12.30 LUNCH
- 14.00 **Christian Voolstra** (Konstanz): Integrating phenotype diagnostics with metagenomic interrogation to elucidate bacterial function and host interaction
- 14.15 **Ines Fournon-Berodia** (Bergen): A role of TNF/MAPK pathway to induce apoptosis during whole-body shrinkage in a sea anemone?
- 14.30 **Tamar Lotan** (Haifa): From initial infection to successful proliferation - the strategic program of a myxozoan parasite
- 14.45 **Thomas Holstein** (Heidelberg): The predatory gastrula of *Aiptasia* and its evolutionary implications

## **Regeneration and self-organisation**

(CHAIR: Celina Juliano)

- 15.00 **Eric Röttinger** (Nice): Whole body regeneration deploys a rewired embryonic gene regulatory network logic
- 15.15 **Aldine Amiel** (Nice): Tissue crosstalk is required to induce a stem cell based regenerative response in the Anthozoa Cnidaria *Nematostella vectensis*
- 15.30 COFFEE
- 16.00 **Sanjay Narayanaswamy** (Vienna): Germ layer morphogenetic behavior and boundary formation in self-organizing gastruloids of *Nematostella vectensis*
- 16.15 **Maja Adamska** (Canberra): Injury response in sponges: a single cell perspective
- 16.30 **Angelika Böttger** (München): Organising head and tentacle formation during head regeneration in *Hydra*
- 16.45 **Roger Revilla-i-Domingo** (Vienna): Sponge stem cell differentiation and the evolution of animal multicellularity
- 17.00 **Fabian Rentzsch** (Bergen): Ectopic head regeneration after nervous system ablation in *Nematostella*
- 17.15 **Claudia Tortiglione** (Pozzuoli): Advanced nanotools to enhance *Hydra* regeneration by hypethemia



17.30 RELAX AND ENJOY THE PARK

18.30 DINNER

## EVENING SESSION

### INVITED LECTURE

(CHAIR: Uli Technau)

20.00 **Linda Holland** (La Jolla): Why are Genomes of Cephalochordates and Anthozoans Evolving So Slowly? And why such slowly-evolving organisms are best for understanding the course of evolution

21.00 MEET IN THE BAR

## Wednesday, September 20, 2023

### Neuronal development and physiology

(CHAIR: Fabian Rentzsch)

9.00 **Raphael Aguillon** (Tel Aviv): Cellular sleep in cnidarian

9.15 **Fabian Ruperti** (Heidelberg): Molecular profiling of sponge movement reveals an ancient systemic contractile-inflammatory response

9.30 **Kathrin Garschall** (Bergen): Nutritional regulation of growth in *Nematostella vectensis*

9.45 **Evelyn Houlston** (Villefranche-sur-Mer): Neural cell origins during *Clytia hemisphaerica* planula development

10.00 **Celina Juliano** (Davis): Mechanisms of nervous system development and regeneration in *Hydra vulgaris*

10.15 COFFEE

10.45 **Michael Layden** (Bethlehem, PA): FoxD3-like regulates cnidocyte development independently of the PaxA pathway

11.00 **Simon Sprecher** (Fribourg): Associative learning in *Nematostella vectensis*

11.15 **Luis Alfonso Yanez-Guerra** (Exeter): Unraveling the Evolutionary Origins and Function of Neuropeptide Signaling: Insights from the Placozoan *Trichoplax adhaerens*

11.30 **Ryo Nakamura** (Okinawa): Cnidarian pharyngeal nervous system illustrates prebilaterian neurosecretory regulation of feeding

11.45 **Maria Sachkova** (Bristol): Dissecting the peptidergic nervous system of ctenophore *Mnemiopsis*

12.00 RELAX AND ENJOY THE PARK

12.30 LUNCH

14.00 **Emelie Brodrick** (Exeter): Insights to extraocular light-sensing for settlement decisions in brainless coral larvae

14.15 **Marion Lechable** (Innsbruck): Myc roles in interstitial stem cell decision making in *Hydra*

14.30 **Kelly Kim** (Houston): Phototaxis is a satiety-dependent behavioral sequence in *Hydra vulgaris*

14.45 COFFEE

15.15 - 20.00 **EXCURSION KLOSTER ANDECHS WITH DINNER**

20.00 - 22.00 **POSTER PRESENTATIONS**  
(WITH WINE AND BEER)

**Thursday, September 21, 2023**

**Pattern formation**

(CHAIR: Bert Hobmayer)

- 9.00 **Noriko Funayama** (Kyoto): Conceptually new mechanisms of morphogenesis: cells act as constructors that manipulate rigid materials
- 9.15 **Emmanuel Haillot** (Vienna): Crosstalk between  $\beta$ -catenin, MAPK and Notch signaling regulates mesoderm and endoderm initiation in the sea anemone *Nematostella vectensis*
- 9.30 **Emma Rangel-Huerta** (Kansas City): Building epithelial segmentation by a somitogenesis-like program in cnidarians
- 9.45 **Eleanor Gilbert** (Plymouth): Illuminating the gene regulatory networks underpinning apical organ evolution in the Cnidaria
- 10.00 **Jaap Kaandorp** (Amsterdam): Modelling symmetry breaking gene regulatory networks in *Nematostella vectensis*
- 10.15 **Paul Knabl** (Vienna): What does BMP signaling do in a cnidarian when it does not pattern its second body axis?
- 10.30 COFFEE
- 11.00 **Stanislav Kremnyov** (Jena): *Dynamena pumila* as a model to uncover evolution of developmental mechanisms in Hydrozoans.
- 11.15 **Moritz Mercker** (Heidelberg): Developmental pattern formation revised: how *Hydra* guides us beyond the activator-inhibitor concept
- 11.30 **Davis Mörsdorf** (Vienna): Chordin mobility is required for long-range activation of BMP signaling in *Nematostella vectensis*
- 11.45 **Grigory Genikhovich** (Vienna):  $\beta$ -catenin-driven endomesoderm specification is likely a Bilateria-specific novelty
- 12.00 **Marylène Bonvin** (Basel): *zic4* and *gata3* compete to determine the terminal axial cell identities in *Hydra*
- 12.15 POSTER PRIZE AWARDS sponsored by BMK  
GENERAL DISCUSSION AND CONCLUDING REMARKS
- Take down posters!**
- 12.45 LUNCH
- DEPARTURE**

## Poster Presentations

- 1 Achrainer, Matthias (Universität Innsbruck)  
An in vivo chitin based adhesive system
- 2 Al-Shaer, Layla (Lehigh University) sort alphabetically  
Regulators and mechanisms of reproduction in the sea anemone *Nematostella vectensis*
- 3 Bathia, Jay (Bathia, Jay)  
Ecological development in Hydra: crossover of unique peptide with conserved signaling pathways
- 4 Brauns, Fridtjof (Kavli Institute for Theoretical Physics, University of California Santa Barbara)  
Anisotropy patterning in developing and regenerating *Hydra*
- 5 Grausgruber Antonia (University of Vienna),  
Looking for the roots of animal multicellularity by investigating unicellular holozoans
- 6 Grüner, Kevin (Universität Innsbruck),  
A highly conserved *Hydra* Claudin protein family is involved in epithelial tissue dynamics, regeneration, and osmoregulation
- 7 Guzman, Christine (Okinawa Institute of Science and Technology (OIST) Graduate University)  
From diffusion to network: A Neurexin view of the Origin of Neural Synapse
- 8 Hassel, Monika (Philipps University Marburg),  
Movement versus morphogenesis: Multitasking in the ancestral epitheliomuscle cell is ensured by sub-cellular compartmentation of signaling pathways targeting the actin cytoskeleton
- 9 Hanson, Alison (Columbia University)  
Role of spontaneous neural activity in *Hydra vulgaris*
- 10 Nishizawa, Tetsuro (Kyoto University),  
What cells and mechanisms connect spicules to build up spiculous skeleton in sponges
- 11 Noack, Christopher (CAU Kiel),  
Formation and growth of first neuronal circuits in *Hydra* embryos
- 12 Nuninger, Clara (Friedrich Miescher Institute for Biomedical Research/ University of Basel)  
Understanding how new axial identities emerge during *Hydra* regeneration
- 13 Ohler, Kerstin (Philipps-Universität Marburg),  
Approaches to investigate cell migration and differentiation in *Hydra*
- 14 Pan, Qin (Ludwig Maximilian University of Munich),  
Notch signalling is involved in *Hydra* head patterning and regeneration
- 15 Pascual-Carreras, Eudald (Michael Sars Center / University of Bergen),  
Nutritional control of cell cycle dynamics of the sea anemone *Nematostella vectensis*
- 16 Pillai, Anirudh (Indian Institute of Science Education and Research, Pune),  
Deciphering the role of N<sup>6</sup>-methyladenosine in *Hydra* regeneration
- 17 Pontheaux, Florian (Observatoire Océanologique de Banyuls-sur-Mer, CNRS),  
Investigating the mechanical and transcriptional interplay during *Clytia* medusa repair.

- 18 Saha, Shagnik (Shiv Nadar University),  
Deciphering the role of N6-methyladenosine in *Hydra* regeneration
- 19 Sauermann, Lara (LMU Munich)  
Cell composition and morphology of *Craspedacusta sowerbii* polyps
- 20 Shikaya, Yuuki (UMR7009 LBDV CNRS/Sorbonne University)  
How peristalsis is controlled in vertebrate and *Clytia*
- 21 Thomas, Torsten (University of New South Wales)  
The role of eukaryotic-like proteins in the symbiosis of sponges
- 22 Ton, Sharoni (The Hebrew University of Jerusalem)  
Deciphering the evolution of the antiviral system via studying the roles of RLRs and MAVS homologs in Cnidaria
- 23 Tökölyi, Jácint (University of Debrecen)  
Temperature-dependent scaling of fitness traits with body size in *Hydra*
- 24 Tursch, Anja (University of Heidelberg)  
The dual roles of Wnt and  $\beta$ -catenin signaling upon injury and regeneration in *Hydra*
- 25 Ueda, Tomoyuki (Kyoto University)  
Mechanisms of spiculous skeleton construction of demosponges: Attempt to clarify the process from spicule production to spicule transport
- 26 Weevers, Sera (Friedrich Miescher Institute for Biomedical Research (FMI))  
A mechanochemical model for symmetry breaking in regenerating *Hydra* spheroids as alternative to the purely biochemical Gierer-Meinhardt model
- 27 Williams, Elizabeth (University of Exeter)  
Environmental cues influence metamorphic timing in the starlet sea anemone *Nematostella vectensis*
- 28 Yum, Seungshic (Korea Institute of Ocean Science and Technology (KIOST))  
A new ShK-like peptide, NnK-1, from the giant Nomura's jellyfish displays hKv1.3 channel blocking
- 29 Zang, Rong Xuan (Roy) (Yale University),  
Deciphering the origin of neurons: how synaptic machinery govern inter-cellular communication in sponges.







