CURRICULUM VITAE

Dr. Grażyna Małgorzata Durak

PERSONAL INFORMATION

Email: grazyna.durak@biologie.uni-freiburg.de

EDUCATION

2010 - 2014: Ph.D. in Algal Biomineralisation at The University of Plymouth (UK)/Marine Biological Association UK/Station Biologique Roscoff (France)

Thesis title: Cellular and molecular mechanisms of biomineralisation in a silicifying haptophyte *Prymnesium neolepis*

The project examined the cellular and molecular mechanisms of biomineralisation in haptophyte algae, comparing the biochemistry and physiology of the only silicifying haptophyte described to date, *Prymnesium neolepis,* with that of calcifying coccolithophores. I have used a combination of CLSM and SEM techniques to elucidate the role of the cytoskeleton in silicification and calcification within the haptophytes. I have also purified and characterised novel long-chain polyamines and novel proteins from the silica scales of *P. neolepis* that are likely to play an important role in biomineralisation. These findings provide valuable insight into the evolution of biomineralisation processes in marine phytoplankton and other Eucarya as well as contributing publications in high ranking journals.

Supervisors: Prof. C. Brownlee, Dr. I. Probert, Prof. J. Hall-Spencer
Submission: August 28th 2013, ***Viva voce*:** February 6th 2014, **Awarded:** 21st July 2014

2006–2009: BSc (Hons) Marine Biology and Oceanography at The University of Plymouth (First Class)

Dissertation title: pH influence on calcification and *in-vivo* monitoring of coccolith formation in *Coccolithus pelagicus* - (in collaboration with the Marine Biological Association, UK.)

The investigation involved development and utilization of novel confocal and polarised light imaging techniques enabling *in-vivo* observation of intracellular coccolithogenesis. The novel methods were then used to examine the influence of short-term fluctuations in extracellular pH on the internal calcite biomineralisation.

Supervisors: Prof. C. Brownlee, Dr. G. Wheeler, Dr. M. Donkin

WORK EXPERIENCE

01.06.2020 - present Postdoctoral Researcher at the University of Freiburg, Botanical Gardens, Department of Biology, AG Plant Biomechanics lead by Prof. Thomas Speck. BioElast project entitled "Kinematic principles and motion design in shape shifting plant structures as concept generators for bioinspired material systems and building elements in architecture".

01.08.2017-31.10.2017: Independent postdoctoral researcher affiliated with the Department of Physical Chemistry under mentoring of Prof. Helmut Cölfen and funded as an extension of the original Bridging Stipend for Young Female Scientists.

01.10.2016-30.06.2017: Independent postdoctoral researcher affiliated with the Electron Microscopy Centre, Department of Biology. Project funding acquired from the University of Konstanz within the framework of the Bridging Stipends for Young Female Scientists.

01.03.2017-30.06.2017: Teaching Assistant at the Electron Microscopy Centre at the University of Konstanz. Funding acquired from University of Konstanz via the DAAD STIBET program.

01.11.2014-30.09.2016: Postdoctoral Researcher at the University of Konstanz (AG Dr. Böttcher, Biological Chemistry joint with AG Prof. Gebauer, Department of Chemistry).

RESEARCH INTERESTS

- Modification and application of biologically derived systems in biomaterial synthesis, especially to do with optical applications.
- Use and development of novel microscopy techniques in scientific investigations.
- Biomineralisation systems in eukaryotes - particularly silicification and calcification systems in marine algae and other microorganisms.

RESEARCH EXPERIENCE

- **Silica and calcium carbonate biomineralisation:** extensive use of light and electron microscopy imaging techniques (FESEM, ESB, EDX, TEM) for analysis of the interactions between the organic and inorganic phases in the system as well as physicochemical description of the systems using FT-IR, XRD and TGA techniques.
- **Cell Biology and Physiology:** *In-vivo* cell imaging utilizing confocal, multiphoton, fluorescence, light and polarising microscopes in conjunction with application of a variety of fluorescent probes and immunolabelling, flow cytometry analysis, preparation of appropriate media and maintenance of bacterial and algal cultures.
- **Biochemistry**: Extraction and biochemical analysis of organic material, involving SDS-PAGE, amino acid, NMR and mass spectrometry analysis of the organics.
- **Molecular Biology:** DNA/RNA extraction, PCR, RT-PCR, RACE, transformation and cloning *(E. coli)*, ligation, gel purification, primer design, phylogenetic tree construction etc.

LANGUAGES: English (fluent, as native), German (advanced), Polish (native)

CONFERENCES AND MEETINGS ATTENDED

- **Gordon Research Conference in Biomineralisation**: Poster Presentation. New London, USA, August 2012
- **Marine Biological Assoc. Council Meeting**: Poster Presentation. Plymouth, UK, April 2012
- **Marinexus Meeting:** Poster Presentation, Plymouth, UK, July 2011
- **Marine Biological Assoc. Council Meeting**, Poster Presentation, Plymouth, UK, April 2010
- **Marinexus Meeting**: Oral Presentation "Silicification and calcification in marine haptophyte algae", Roscoff, France, January 2010.

PUBLICATIONS

DURAK, G. M., LAUMANN, M., WOLF, S. L. P., PAWAR, A., GEBAUER, D., & BOETTCHER, T. Pseudo-biomineralisation: complex mineral structures shaped by microbes. ***ACS Biomaterials Science & Engineering 5***, 5088-5096 **(2019)**

WALKER, C.E, TAYLOR, A.R., LANGER, G., **DURAK, G.M.**, HEATH, S., PROBERT, I., TYRRELL, T., BROWNLEE, C., & WHEELER, G.L. The requirement for calcification differs between ecologically important coccolithophore species. ***New Phytologist 220****, 147-162,* **(2018)**

DURAK, G.M., BROWNLEE, C. & WHEELER G.L. The role of the cytoskeleton in biomineralisation in haptophyte algae. ***Scientific Reports 7****,* 15409*,* **(2017)**

FARHADI-KHOUZANI, M., SCHÜTZ, C., **DURAK, G. M.,** FORNELL, J., SORT, J., SALAZAR-ALVAREZ, G., BERGSTRÖM, L. & GEBAUER, D. 2017. A $CaCO_3$/nanocellulose-based bioinspired nacre-like material. ***Journal of Materials Chemistry A***. **5**, 16128-16133, **(2017)**

DURAK, G. M., TAYLOR, A. R., WALKER, C. E., PROBERT, I., DE VARGAS, C., AUDIC, S., SCHROEDER, D., BROWNLEE, C. & WHEELER, G. L. A role for diatom-like silicon transporters in calcifying coccolithophores. ***Nature Communications*** **7**, 10543, **(2016)**