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W P Ł Y N Ę Ł O

Review on PhD. theses

**TAXONOMY AND MOLECULAR PHYLOGENY OF MONORAPHID MARINE BENTHIC
DIATOMS WITH AN ACCOUNT ON THEIR OIL PRODUCTION POTENTIAL**

BY EWA GÓRECKA

PhD. theses under evaluation represent a lot of work and wide spectrum of methods and skills used.

I do not know how long were these data collected, but if it was done within 3-4 years (standard PhD. study in Czech Republic) it can be considered as admirable. PhD. theses are very complex from sampling, isolation, culturing, maintaining cultures, culture experiments, reproduction and life cycle studies, molecular methods, modern polyphasic taxonomy, LM, SEM, confocal microscopy and statistic. Such complex approach has lead to description of 10 new species for science and two combinations, 4 publications in impacted journals.

Introduction is well written with logical summarization of basic information relevant to aims of the study. Material and methods are instructive and complete. Results and conclusions are summarized clearly. Studied problems are discussed separately in attached papers.

Supplementary material consist of 4 already published papers, which went through reviewing proces of impacted journals (I was reviewer for one of them). That is why I did not find any fundamental problem and my questions below should be taken as contribution to discussion during defense and tend to give the chance to Ewa Górecka express her opinion on general problems in diatom research future.

Supplementary File S1. Górecka, E., Ashworth, M.P., Davidovich, N., Davidovich, O., Dąbek, P., Sabir, J.S.M. & Witkowski, A. 2021. Multigene phylogenetic data place monoraphid diatoms Schizostauron and Astartiella along with other fistula-bearing

genera in the Stauroneidaceae. *Journal of Phycology* 57(5):1472–1491.

<https://doi.org/10.1111/jpy.13192>.

Question 1:

I noticed that images of species *S. papilliareae* show an valve asymmetry, which was not mentioned in description. Are these valves abnormally developed (teratological) ? Deformed forms are also in other specimens from cultures (which is understandable). I tried to check, whether each new species have been documented by both wild and cultured material, but some described species seems to be illustrated in publication only from cultures. I would like to ask whether is possible that some of new species has been described exclusively from cultures. Similar practice can be found recently in literature (not only in diatoms). Isolated strains are sometimes very rare in source sample. Morphological changes in all cyanobacteria and algae in cultures, particularly long-time cultures are well known. **What is the opinion of Ewa on this problem (description of new taxa exclusively from cultured material without natural sample documentation)?**

Supplementary File S2. Riaux-Gobin, C., Saenz-Agudelo, P., Górecka, E., Witkowski, A., Daniszewska-Kowalczyk, G. & Ector, L. 2021 *Cocconeis vaiamanuensis* sp. nov. (Bacillariophyceae) from Raivavae (South Pacific) and allied taxa: ultrastructural specificities and remarks about the polyphyletic genus *Cocconeis* Ehrenberg. *Marine Biodiversity* 51:29. <https://doi.org/10.1007/s12526-020-01154-9>.

Supplementary file S3. Górecka, E., Gastineau, R., Davidovich, N., Davidovich, O., Ashworth, M.P., Sabir, J.S.M., Lemieux, C., Turmel, M. & Witkowski, A. 2021. Mitochondrial and Plastid Genomes of the Monoraphid Diatom *Schizostauron trachyderma*. *International Journal of Molecular Sciences* 22:11139. <https://doi.org/10.3390/ijms222011139>.

Question 2:

You tried cladistic analysis based on morphology and also molecular methods. Diatoms are maybe one of the latest groups of algae, where new taxa description based exclusively on LM and SEM morphology (without molecular data) can be published in impacted journals. **What is your opinion on this problem?**

Supplementary File S4. Górecka, E., Dąbek, P., Davidovich, N., Davidovich, O., Tremblay, R., Belzile, C., Gastineau, R. & Witkowski, A. 2022. Life history of the diatom *Schizostauron trachyderma*: cell size and lipid accumulation. *Frontiers in Marine Science* 8:793665. doi: 10.3389/fmars.2021.793665.

Question 3:

As far as we know from literature, are there any features in reproduction behaviour and structures, they can be considered as specific for genus or higher taxonomic levels or even diatom phylogenetic lineages?

Question 4:

Potential of diatoms in commercial production of lipids. We found quite recently in our lab (not published), that some green algae are producing quite a lot of lipids. Taking in account all problems connected with long term culturing of diatoms and extraction of lipids from silica frustules vs. well growing green coccal algae – is there any chance that diatoms will have real potential for commercial use?

Summing up I affirm that the reviewed thesis by Mgr Ewa Górecka can be accepted as a very good doctoral dissertation in the discipline of geosciences/oceanography and can be admitted to the public defense at the Institute of Marine and Environmental Sciences, University of Szczecin.

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