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DIPARTIMENTO DI SCIENZE BIOLOGICHE,  
GEOLOGICHE E AMBIENTALI

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Concern: Habilitation Thesis

TITLE: **What can morphology tell us about the evolution and ecology of diatoms?**

AUTHOR: **Jana Kulichová**

### **Referee's report**

The present report is based on the careful examination of Dr Jana Kulichová's Habilitation Thesis, as well as her Curriculum Vitae and list of publications. Moreover, information retrieved online, and direct knowledge, also based on meeting her at international Congresses, were relied upon to write this assessment.

With her Habilitation research Dr Kulichová significantly contributed to an expanded application of geometric morphometrics for a deeper understanding of diatom ecology, evolution, distribution, and diversification. Moreover, these important topics were tackled applying, whenever possible, a polyphasic approach within the framework of a unified species concept (*sensu de Queiroz 2005*).

The valuation of morphology-based approaches is particularly timely and needed in a time in which rapid and continuous progress of molecular techniques causes many to forget about the relevance of the other components of a polyphasic approach. This applies in particular to morphological approaches that demonstrate the great utility of methodologies allowing the quantitative and rigorous assessment of subtle shape variations in the context of integrated approaches to show their utility as signals which improve our understanding of important features in diatom ecology and evolution.

The most original feature of Dr Kulichová's Habilitation research has probably been to keep the focus on the ecological signals in the morphology of diatom cell walls that can be captured by means of geometric morphometrics. In our time of rapid, and often dramatic, environmental and

climate change, it is more important than ever to be able to fully exploit the great potential of diatoms as indicators and proxies.

Dr Kulichová included thirteen selected papers as an integral part of her Habilitation Thesis. Examples of particularly significant features and patterns unveiled in these investigations are as follows: the presence of two pseudocryptic, sympatric, widely-distributed (European and Australian lakes) species within the *Navicula cryptocephala* species complex; *Frustulia* species cannot currently be resolved with molecular markers alone, i.e. additional non-molecular evidence is necessary; description of two species new to science (*Frustulia curvata* and *F. paulii*) with an integrated morphological and molecular approach; occurrence of some diatom lineages within a narrow pH range; extensive cryptic diversity in the aerial diatom *Pinnularia borealis*; differential size structure of diatoms and desmids in mire microphytobenthos; the widespread *Frustulia crassinervia-saxonica* species complex reflects the ombro-minerotrophic gradient in mires; allometry acts as a constraint on morphological plasticity and is channeling microevolutionary morphological differentiation.

The number of papers published by Dr Kulichová in international, mostly phycological, journals of good quality is reasonable according to age and academic rank. She has successfully participated in important diatom meetings, and carried out research stays abroad in excellent labs (IGB in Berlin & Johansen Lab at the John Carroll University in Cleveland).

There is a good amount of information on Dr Kulichová's teaching activity available in the attached documents and online. She appears to have carried out / be planning a remarkable number and variety of phycological lectures and (practical) courses. Also noticeable is the number of supervised theses.

All in all, I have no doubts in submitting a strongly positive evaluation of Dr Kulichová's Thesis to gain formal University teaching Habilitation, certifying the holder as a qualified researcher and lecturer at Faculty of Science of Charles University in Praha.

Sincerely

Prof. Dr Marco Cantonati

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