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Supervisor's evaluation of Shaghayegh Sheikh

Nina, as Shaghayegh mercifully prefers to be called, joined my sub-group within the Lukeš lab in May 2018. As the title of Nina's thesis states, her original goal was to determine the role of the MICOS complex in the *Trypanosoma brucei* lifecycle stage presumed to be without mitochondrial cristae and its role in crista formation when the parasite undergoes differentiation into a lifecycle stage that utilizes this ultrastructure. However, there were a quite a few roadblocks in the way of this goal, as trypanosomal MICOS has proven to be a difficult and complicated topic of study on many different fronts. Plus, as Nina demonstrated, cristae are actually ever-present throughout the lifecycle, apparently undergoing maturation when *T. brucei* utilizes oxidative phosphorylation.

As the clock was ticking, and also to take advantage of some timely opportunities, Nina and I decided to venture outside of the confines of the trypanosomal MICOS complex. Nina took on several collaborative efforts, such as characterizing the aforementioned changes to cristae in *T. brucei* by FIB-SEM with Tomáš Bílý. In collaboration with Sergio Muñoz-Gomez, Nina addressed the origins of MICOS and cristae via investigation of molecules involved in the formation of bioenergetic sub-compartments in photosynthetic alphaproteobacteria. With Marek Eliáš and Tomáš Pánek, Nina demonstrated that a dynamin-like protein encoded in giant viral genomes have the capacity to remodel mitochondria. Nina did not completely give up on MICOS, trying to understand how two cryptic core subunits of trypanosomal MICOS work. Nina completed two research stays in Michael Meinecke's lab at the University of Heidelberg, where she made an excellent impression, trying to tackle a potential membrane-remodeling role of these proteins.

I admit that as her advisor, I could have done a much better job reigning in the diversification of Nina's collective projects, which in the end represented its own big challenge. However, neither Nina nor I could resist these very interesting projects with the possibility to collaborate with an array of inspiring researchers (and not only those named above). In my opinion, Nina coped with the resulting multi-headed beast as best as anyone could, yielding a thesis that is multifaceted instead of falling apart in complete discordance.

Nina engaged in her diverse topics with an equal distribution of her enduring enthusiasm and hard work. During her five years here, she became acquainted with a plethora of methods: genetic transformation of *T. brucei*, wrangling photosynthetic alphaproteobacteria, isolation of recombinant proteins from *E. coli*, reconstitution of proteoliposomes, running native and denaturing protein electrophoresis, to name a few. But I suspect what she loved the most was peering into cells by electron and light microscopy. She learned with particular gusto software packages for image analysis and how to de-segment and make 3D reconstructions of cellar structures from volumetric electron microscopy data. But the common denominator among all these methods is that she approached each of them diligently and meticulously, thus delivering results in a timely manner.

Looking back writing this evaluation, I am quite impressed by the substantial progress Nina made during her time here. I initially selected Nina because she was the sole applicant for an abruptly

vacated PhD student I desperately needed to fill. So, while Nina came with a solid yet not directly applicable background in microbe diagnostics developed in her native country Iran, it was clear upon arrival that she was a complete novice in basic research employing biochemistry and molecular cell biology approaches. Not just with her hands, but how she thought about experiments, interpreted her results and did troubleshooting. For example, I vividly recall in these very early days admonishing her once for not being able to properly mix a simple buffer. But the key word in the that sentence is 'once'.

It was apparent from when I started to advise Nina that she was not only motivated by the life sciences but also constantly bettering herself. She did so not just on the bench, but also how she thinks logically and expresses herself clearly and precisely. The reason underlying her self-improvement is because Nina is amenable to constructive criticism, listening to and implementing meaningful advice. In fact, Nina now frequently gives me and others valid scientific advice and suggestions and I have come truly value her insights and feedback.

While I think Nina has come a long way in her intellectual development, I encourage her to continue on her chosen path toward self-improvement. However, this is not advice that applies exclusively to her, but to pretty much everyone, myself included. I believe Nina will to improve and am confident she has the potential to have a lasting career in science. And science will not only benefit from the positive attributes I too briefly discussed here, but by her kind and pleasant nature. Also, Nina is tougher and more resilient than her sweet disposition ostensibly lets on. It has been a true pleasure to collaborate with you, Nina. Being a part of your considerable development has been a truly fulfilling experience for me and something I will always look back upon with pride and gratitude. Thank you so much for a wonderful collaboration.

I formally conclude that in my opinion, Nina's efforts on her projects and writing the thesis over the past five years fulfills the requirements for a PhD degree.

Doc. Hassan Hashimi, Ph.D.

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8 June 2023