Evaluation of Martin Strnad PhD Thesis
By
Brandon Jutras, Ph.D.

**Summary and recommendation**

Simply put, this is an outstanding body of work. Mr. Strnad synthesized existing information, while adding additional data, to a growing body of literature in the geospatial distribution of Lyme disease-causing *Borrelia.* In addition, Martin created and adapted several cutting-edge approaches to understand the *Borrelia* cell envelope and its' interaction with host cells. These methods and techniques will push the field forward and truly demonstrate strong command of biophysics, cell biology, and bacteriology. The creativity to implement novel approaches and the ability to troubleshoot these technology challenging experiments are the hallmark of an outstanding Ph.D thesis. I strongly support this thesis and fully expect a successful defense.

**Minor comments**

Page 5: It maybe just be required formatting, but it is odd to me that there is a list of manuscripts supporting each aim, but the reader is unaware of each aim at this juncture in the text.

Page 5-6: There are some contradictory statements here regarding tissue tropism in various genospecies.

Page 13: To me, it's hard to argue about the importance of studying spirochete diversity and omitting some of the more fascinating members. e.g. Brachyspira, termite treponemes. A few sentences on each may help round out this section.

Page 36: This legend is confusing to me. For instance, what do you mean by entries? A bit more detail will help. Figures and legends should stand on their own.

Page 39: The labeling (in legend vs figure ($R^2$)) is different. They should be consistent.

Page 87: What type of micrographs are being shown? This should be in the legend.

Page 110: Is this a results section? It could a bit more detail in terms of interpretation of results.

Page 117: Where this section falls short is in providing a bigger, more comprehensive explanation as to what this works means in the context of spirochetes and more broadly in the field of bacteriology. What lessons have we learned? How can this fantastic work help our overall understanding of the physical properties of bacterial cell envelopes?

Page 120: This point is unclear to me (see PDF for details).