



UNIVERSITY OF SOUTH BOHEMIA  
IN ČESKÉ BUDĚJOVICE

Faculty of Science



STATEMENT OF THE BACHELOR/DIPLOMA \* THESIS REVIEWER

Name of the student: Lukas Penz

Thesis title: Role of methanogens in biogas production plants

Supervisor: Ing. Jiří Bárta, Ph.D.

Reviewer: RNDr. Alica Chroňáková, Ph.D.

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	Point scale <sup>1</sup>	Points
<b>(1) FORMAL REQUIREMENTS</b>		
<b>Extent of the thesis</b> (for bachelor theses min. 18 pages, for masters theses min. 25 pages), <b>balanced extents of the thesis divisions</b> (recommended extent of the theoretical part is max. 1/3 of the total extent), <b>logical structure of the thesis</b>	0-3	3
<b>quality of the theoretical part (review)</b> (number and relevancy of the references, recency of the references)	0-3	2
<b>Accuracy in citing of the references</b> (presence of uncited sources, uniform style of the references, use of correct journal titles and abbreviations)	0-3	2
<b>Graphic layout of the text and of the figures/tables</b>	0-3	2
<b>Adequacy and clarity of the results and conclusions</b>	0-3	2
<b>Quality of the annotation</b>	0-3	2
<b>Language and stylistics, complying with the valid terminology</b>	0-3	2
<b>Accuracy and completeness of figures/tables legends</b> (clarity even without reading the rest of the text, explanation of the symbols and labeling, indicating the units)	0-3	3
<b>Formal requirements – points in total</b>		18
<b>(2) PRACTICAL REQUIREMENTS</b>		
<b>Clarity of the aims</b>	0-3	
<b>Fulfillment of the aims</b>	0-3	
<b>Discussion quality – interpretation of results and their discussion with the literature</b>	0-3	
<b>Logic in the course of the experimental work</b>	0-3	
<b>Completeness of the description of the used techniques</b>	0-3	
<b>Experimental difficulty of the thesis, independence in experimental work</b>	0-3	

\* Choose one

<sup>1</sup> Mark as: 0-unsatisfactory, 1-satisfactory, 2-average, 3-excellent.

Quality of experimental data presentation	0-3	
The use of up-to-date techniques	0-3	
Contribution of the thesis to the knowledge in the filed and possibility to publish the results (after eventual supplementary experiments)	0-3	
Formal requirements – points in total		
<b>POINTS IN TOTAL (MAX/AWARDED)</b>	<b>24</b>	<b>18</b>

**Suggestions and questions, to which the student has to answer during the defense:**

Generally, I will suggest to improve the quality of review (mainly Chapter 3) and to include more detailed informations about methanogens diversity, community structure and factors influencing their abundance, community structure or activity in anaerobic biogas plant. There are nice studies, from which author can draw information. F. e. Demirel and Scherer (2008) – Rev Environ Sci and Bio/Technol 7(2), p. 173-190. The detailed description of methanogenesis and interactions of methanogens with syntrophic bacteria, which is highly important criterion in biomethanogenic degradation, could be mentioned. It will be also beneficial to provide more details about biology, physiology and ecology of methanogens, f.e. the role of hydrogenotrophic and acetotrophic methanogens during the anaerobic conversion of biomass to methane. In Chapter 2, the possibilities how to operate biogas plants and the impact of operation on degradation processes as well as on microbial community could be provided.

**Q1:** Can you please describe the three possible pathways for methanogenesis and their specific aspects (the groups of methanogens involved)?

**Q2: (concerning p.9, §3)** What was the real amount of biomass supplied to biogas reactor? Is it really needed to supply 25-30 tons of biomass **each day**? Or it is a mistake and you thought to state that this is the amount needed per one year or other time unit? It seems to me really impossible to fulfill such requirement.

**Q3: (concerning p.13-15)** What are advantages and disadvantages of using 16S rRNA and/or *mcrA* genes as target genes for study of methanogens in the environment? Are all techniques you listed in this part of thesis applicable for both genes of interest?

**Q4: (concerning p.16, §1)** How the presence of autofluorescence of F<sub>420</sub> is related to drawbacks of FISH technique? I did not understand the expression (last sentence in the paragraph).

**Q5: (concerning p.16, §2):** Why do you think that 454-pyrosequencing technique could be assigned as “ultrafast”? What does it mean in comparison to other NGS techniques? In future, avoid such comparative evaluation in the scientific text without providing strong arguments. I think that you did not consider the statement postulated in 2005 is not actual today. I mean, of course it is fast technique, but it does not mean that there are not faster or better ones nowadays.

**Eventual mistakes, which have to be corrected:**

**p.1, §3:** „has to occur inside the biogas digester under set up conditions“ – Should not be more adequate the following expression:“ under anaerobic condition“?

p.3, §3: the citation: Öchsner or Oechsner? (disagreement between citation and reference list, maybe it is the same, I'm not familiar with German, but should be written in the same way)

p.4, §3: keying mistake in the name of microorganism: *Clostridium aceticum* is the correct one.

p.4, §5: please rewrite "utter importance" by "upper importance" (I guess)

p.6, §3: the same as above - the citation: Maehnert or Mähner? (disagreement between citation and reference list)

p.10 – Recently, the seventh order of methanogens has been proposed, called *Methanoplasmatales* (Paul et al., 2012, Appl Environ Microbiol, published in September).

p.11, §1: the citation: Rastogi et al., 2007 or 2008? (disagreement between citation and reference list)

p.12, §1: rewrite "ammuniom" by "ammonium"

p.13, §2: the citation should be as follows: Gorris & van der Drift, 1994.

p.13, §2: It will be nice if you provide also the more detailed information about cofactor F<sub>420</sub> (I mean emission and excitation spectra, etc.)

p.15, §2: "abundance of *Methanomicrobiales spp.*" – Methanomicrobiales is not valid name for genera, so you could not use it for recognition of multiple species of one genera. It is a mistake.

**Eventual additional comments of the supervisor on the student and the thesis:**

**Conclusion:**

**In conclusion, I**

**r e c o m m e n d / ~~do not recommend~~\***

**the thesis for the defense and I suggest the grade average (2) .<sup>2</sup>**

In **České Budějovice**, date **January 21th, 2013**

  
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signature

<sup>2</sup> You can suggest a grade, which can be modified during the defense based on the presentation. However, if the reviewer is not present at the defense, the grade will not be counted.