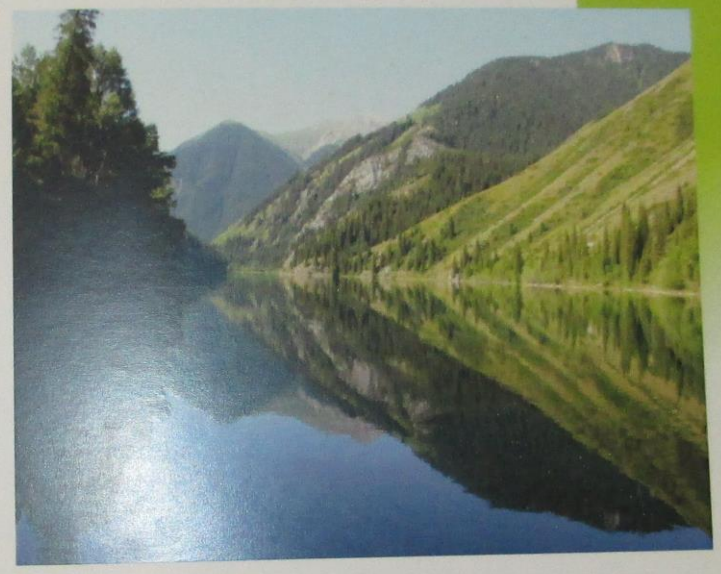
ӘЛ-ФАРАБИ АТЫНДАҒЫ
ҚАЗАҚ ҰЛТТЫҚ УНИВЕРСИТЕТІ
БИОЛОГИЯ ЖӘНЕ БИОТЕХНОЛОГИЯ ФАКУЛЬТЕТІ
БИОАЛУАНТҮРЛІЛІК ЖӘНЕ БИОРЕСУРСТАР
КАФЕДРАСЫ

КАЗАХСКИЙ НАЦИОНАЛЬНЫЙ УНИВЕРСИТЕТ
ИМЕНИ АЛЬ-ФАРАБИ
ФАКУЛЬТЕТ БИОЛОГИИ И БИОТЕХНОЛОГИИ
КАФЕДРА БИОРАЗНООБРАЗИЯ И БИОРЕСУРСОВ



«БИОАЛУАНТҮРЛІЛІКТІ САҚТАУ ЖӘНЕ БИОРЕСУРСТАРДЫ ҰТЫМДЫ ПАЙДАЛАНУ»

Республикалық ғылыми конференция

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«СОХРАНЕНИЕ БИОРАЗНООБРАЗИЯ И РАЦИОНАЛЬНОЕ ИСПОЛЬЗОВАНИЕ БИОРЕСУРСОВ»

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Алматы

4 СЕКЦИЯ

ЖОО-да биология және экология пәндерін оқыту әдістемесіндегі мәселелер: дәстүрлі және инновация

Проблемы методики преподавания биологических и экологических дисциплин в ВУЗе: традиции и инновации

TEACHING MOLECULAR BIOLOGY AT KAZAKH UNIVERSITIES IN ENGLISH: STRATEGY OF MINI-PROJECTS

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Introduction. Molecular biology is essential course requiring a substantial off-class activity. Each topic or process including DNA structure and replication, following transcription and RNA exit to cytoplasm, gene and genome stability, organization of protein synthesis as translocation of the newly synthesized product to intracellular organelles is supposed to be traced by a number of special websites, PC software sources, research and online research communities and separate journals. We have experienced half-an-year education process based on mini-projects tackling individual genes or whole genomes for specific organisms. This has enabled students'extensive self-education on DNA structure and functions, genome organization and gene clustering, gene regulation and related protein production issues.

Generally, biological mini-projects are currently used both as examination tools [1], and accounts on ongoing or accomplished research programmes [2] or with research popularization aims [3]. Our purpose is to attract students to the course onmolecular biology by inviting each of them to study the subject of own choice in a sharpened focus of the genome or individual gene. Such attitude would assist in acquairing the subject together with handling initial skills in project management.

Results and discussion

In 2015 there were 14 students of the 2-nd year of education in Biotechnology (Bachelor Studies) from Kazakh and Russian groups which have been later fused into a joint English-speaking group. The instructor has suggested the following guidelines to mini-projects to be predominantly focused on a range of releavant publications emphasized by the instructor:

Miniproject guidelines

The list of the sources:

Terence A Brown. Genomes. 2nd edition. Chapter 15. **How Genomes Evolve**

Oxford: Wiley-Liss; 2002.
ISBN-10: 0-471-25046-5
http://www.ncbi.nlm.nih.gov/books/NBK21112/

E. coli genome:

1) MicrobEcol (2010) 60:708–720
DOI 10.1007/s00248-010-9717-3
2) Proc. Nat. Acad. Sci. USA
Vol. 72, No. 6, pp. 2242-2246, June 1975

Fish genome:

1Current Genomics, 2006, 7, 43-57
2Jiang et al. BMC Genomics 2013, 14:780
http://www.biomedcentral.com/1471-2164/14/780
3 Genome Research 10:1890–1902 ©2000 by Cold Spring Harbor Laboratory Press ISSN 1088-9051/00
4 ARTICLE in BMC GENOMICS NOVEMBER 2013
Impact Factor: 3.99 DOI: 10.1186/1471-2164-14-780 ·

Bean genome:

1Kalavacharla et al. BMC Plant Biology 2011, 11:135
http://www.biomedcentral.com/1471-2229/11/135
2 http://www.beangenomics.ca/research/projects/view/draft-genome-sequence-for-common-bean-i-p-vulgaris-i
3 http://hudsonalpha.org/common-bean-genome-sequence-provides-powerful-tools-to-improve-critical-food-crop
4 doi:10.1038/ng.3008
5PhaseolusGenes
http://phaseolusgenes.bioinformatics.ucdavis.edu/

Primate genome:

1Comparative genomics of higher primates, including humans and Neandertals (SvantePääbo)
2http://www.genome.org/cgi/doi/10.1101/gr.3737405.
3 ILAR Journal, Volume 54, Number 2, doi: 10.1093/ilar/ilt042
4Nat Rev Genet. 2014 May ; 15(5): 347–359. doi:10.1038/nrg3707.

Dinosaurs genome:

http://rspb.royalsocietypublishing.org/content/276/1677/4303
http://people.eku.edu/ritchisong/554notes1.html
http://news.ucsc.edu/2014/12/crocodile-genomes.html
http://www.icr.org/article/dinosaur-protein-sequences-dino-bird/
http://jurassicpark.wikia.com/wiki/Dinosaur_DNA
http://scienceblogs.com/notrocketscience/2009/06/21/dinosaurs-provide-clues-about-the-shrunken-genomes-of-birds/
http://www.reasons.org/articles/dinosaur-genome-size-estimates-lagerstatten-of-design

http://news.harvard.edu/gazette/story/2007/03/despite-their-heft-many-dinosaurs-had-surprisingly-tiny-genomes/
http://www.world-science.net/othernews/070307_dinosaur.htm
http://www.ucmp.berkeley.edu/diapsids/saurischia/theropoda.html
http://www.ucmp.berkeley.edu/diapsids/avians.html
http://10e.devbio.com/article.php?ch=16&id=161
http://www.enchantedlearning.com/subjects/dinosaurs/Dinobirds.html
http://www.enchantedlearning.com/subjects/dinosaurs/allabout/Evolution.shtml
http://www.enchantedlearning.com/subjects/dinosaurs/Dinobirds.html
http://www.membrana.ru/particle/11216
http://elementy.ru/news/430477
http://naked-science.ru/article/nakedscience/mozhno-li-vernut-dinozavrov
https://brodude.ru/mozhno-li-voskresit-dinozavrov/
http://www.ufolog.ru/publication/3480/
Compiled by Z.G. Aytasheva

Then 5-6 weeks were given for seeking proper partnerships, team subdivisions and independent explorations of the topics of choice. That work has ended up by intermediate discussion on the state of mini-projects and related presentations.

On 14-th week the instructor has received final presentations which have been defended by each team in accordance with their topics.

The list of presentations has looked as follows:

1. A. Tamshibay. *E. coli*Genome.

2 A. Baibulatova, Yu. Genievskaya. *Aspergillusniger* as a Model Organism for Molecular and Genetic Investigations.

3A. Bertleuova, S. Mukhanbetzhanova, A. Sharipbay, G. Bekbaeva. Bean Genome.

4R. Kozhakhmet, S. Tolesh, D. Salimzhanova. The Primates.

5Yu. Pak, Abisheva A. From Dinosaurs to Birds.

Below is an itinerary content of mini-project:

1 Introduction
2 Genome characteristics
3 Application in biotechnology
4 Conclusion
5 References

However, some of the projects turned out to concludecomparative studies. For instance,AidanaTamshibay's *E. coli* project has comprised the comparison of *E. coli* and *Shigella spp.*genomes.

Evaluation items for mini-projects and related maximal scoring have been composed of:

1 Number of slides in presentation (1)
2 Quality of slides (3)
3 Accuracy in quoting (2)
4 Number and qulity of intermediate accounting. Number of presentations editions presented to the instructor (5)
5 Quality of final defence (10)
6 Team work. Individual impact (5)
7 Leadership in running a mini-project (4)

Maximal scoring is 30 for each participant throughout the whole term. It means, it would be reacheable by individual mini-project holders or leaders of the teams. However, there may be exclusions. For instance, one of the last projects out of submitted was mini-project 5 "From Dinosaurs to Birds" presented by Yuri Pak and AigerimAbisheva. It has impressed the instructor by a range of hypotheses and new views on evolutionary issues regarding inter-relationships of ancient dinosaurs and modern birds to be used in future lecturing on paleobiology, molecular biology, and developmental genetics. That is why both of the students were assessed equally high. Therefore, based on all forementioned, implication of mini-project methodology to molecular biology and other biological courses is obviously perspective tool for profound teaching, fostering student's independent and team work as the ability to seach and retrieve required databases,undertake small-scale comparative studies and put forward own hypotheses or far going conclusions.

REFERENCES

1. Mini-project examination.
http://www.stats.ox.ac.uk/__data/assets/pdf_file/0003/5691/Data_IG_and_GF_12_10_9_.pdf
2. Mechnistic Insights into P53-CYPD Interactions. Mini Project Report by V. R. Yanamala, A. Mathew, Ch. Cherian, M. James. 25 March 2013. Natl. Inst. Tech., Calicut.
http://www.slideshare.net/vijayrajnazzi/btech-mini-project-computational-biology-nitc
3. Split RNA extraction.
http://www.sciencefairadventure.com/ProjectDetail.aspx?ProjectID=123