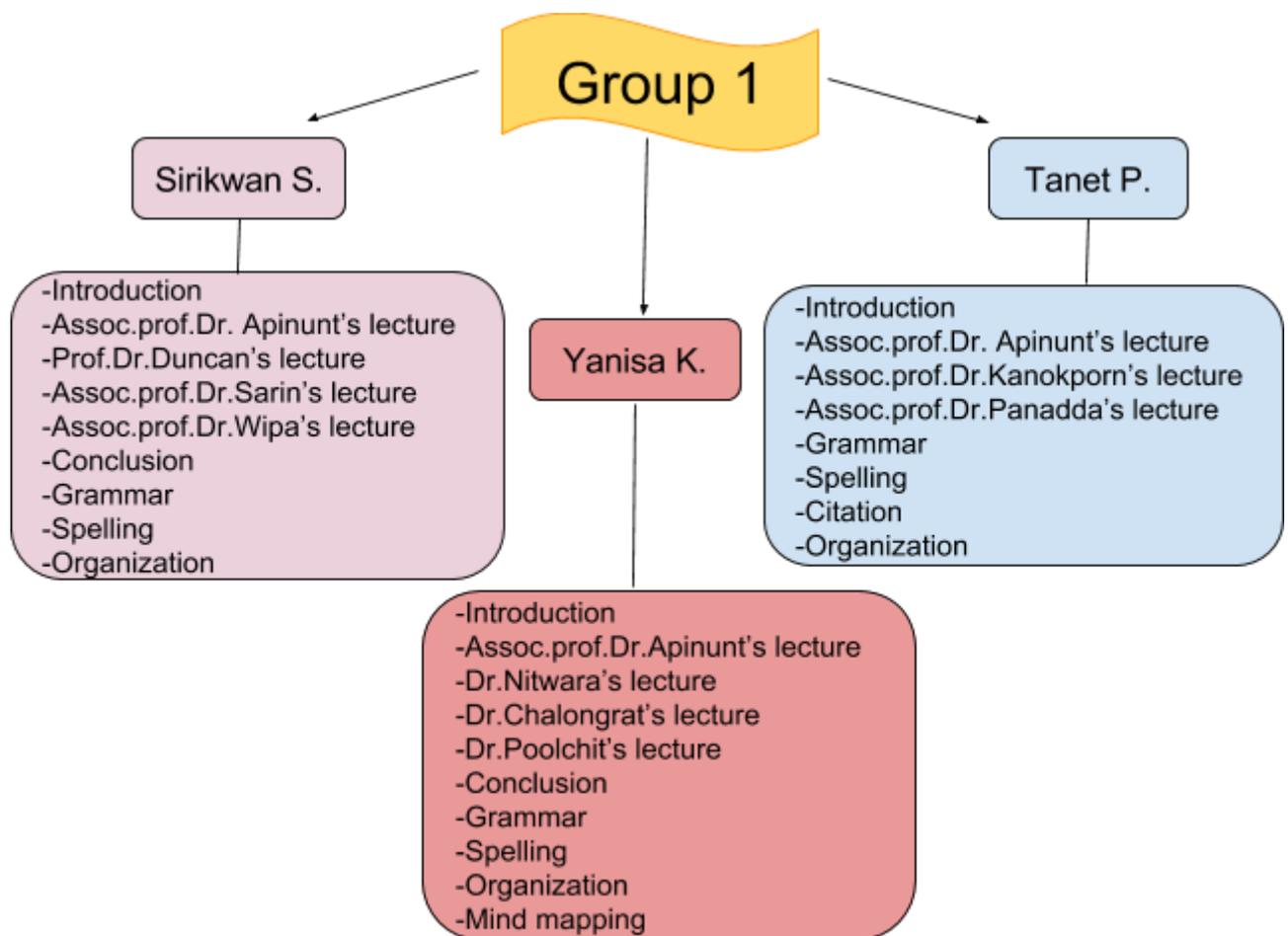


What have we learned from Current Topics in Molecular Biology Class

• Group member

1. Sirikwan Siriworadetskun 5835036 MBMG/M
2. Yanisa Ketngamkum 5836374 MBMG/M
3. Tanet Patchamongkolrat 5836375 MBMG/M

Mind mapping



Introduction

“Why we have to learn this class?” this is the first question when we know that we have to study **Current Topics in Molecular Biology** in this semester. The answers are quite clear because of the reading of research papers are very complicated and difficult to understand. We want to know what is the key point or the purpose of authors that they want to tell us, why they used this method, what does

the figure mean, how to further apply the knowledge of this study, what is the meaning of these words. The papers already have some information on this field; however, we also have several questions when we skim through these research papers. Therefore, this class can solve these problems and all the teachers will guide us on how to read the papers correctly, why the researchers thought that way, what is the important point of this paper, what is the discussion of this paper, what is the negative point in each research. Therefore, this class has an objective to make us clearly understand the papers and also learning in other aspects that it does not show in the paper. Because of these reasons, the writing of **“What have we learned from Current Topics in Molecular Biology Class”** are one of the tools that make us understand more about research papers by brainstorming.

In scientist life, we have to read a lot of papers in order to correctly understand the essence and the basic knowledge of our work from these papers. We can not refuse that paper reading is so important. Therefore, this subject is very important to improve reading skills, to interpret the result and methods and to guide the thinking processes for several research of our students.

Research Ethics

Instructor: Assoc. Prof. Dr. Apinunt Udomkit

Date: 5 October 2016

The topic is “ Ethics in biological research”

If someone ask you “What does ethics mean to you?”, what will your answer? someone will answer

"Ethics has to do with what my feelings tell me is right or wrong."

"Ethics has to do with my religious beliefs."

"Being ethical is doing what the law requires."

"Ethics consists of the standards of behavior our society accepts."

"I don't know what the word means."

So in the truth, the definition of “ethics” is hard to pin down. So what is the meaning of ethics? The many definition of ethic were legislated such as Velasquez M, et al. (2015) reported that “Ethic refer to well-founded standards of right and wrong that prescribe what humans ought to do, usually in terms of rights, obligations, benefits to society, fairness, or specific virtues.” (from: <https://www.scu.edu/ethics/ethics-resources/ethical-decision-making/what-is-ethics/> [last date accessed October 13, 2016])

From Oxford dictionary, ethic is “Moral principles that govern a person’s behaviour or the conducting of an activity”

“The principles of right and wrong that are accepted by an individual or a social group; as, the Puritan ethic.” (from : <https://dict.longdo.com/search/ethic> reference to The Collaborative International Dictionary of English v.0.48 [gcide])

The objective of writing a scientific paper is to transmit an innovation, to report the study or original ideas. Therefore, the message should be clear, correct, brief and uncorrupted. Nowadays, one of the most solemn forms of scientific misconduct frequently found is plagiarism. Plagiarism means using another's opinion or work as your own with inappropriate attribution/no appreciation. Thus text must be clearly stated without plagiarism because that is one such malfeasance in ethical writing.

From the text above, it is significant to prevent rejection or retraction of published articles. The meaning of plagiarism originated from Latin word "Plagiarius" that means a kidnapper. In addition the meaning by The World Association of Medical Editors (WAME), plagiarism can mean:

"The using of other published and unpublished ideas or words (or other intellectual property) without attribution or permission, and presenting them as new and original rather than derived from an existing source"

For the flow chart of the research, first we should to review the literature, understand, digest and summarize the articles. So the ethics, honesty and acknowledgment are important. To avoid plagiarism, the author should understand, digest and summarize the main ideas in one's own word such as paraphrasing, use quotation marks and citing those papers.

Ethics in biological research refers to a well-founded standard of right and wrong that guides what human ought to do, usually in terms of rights, obligations, benefits to society, fairness or specific virtues. Ethics in research and writing should be followed strictly throughout our research. That means no plagiarism in the steps of literature review, proposal, scope of research, experimental design, performing experiment, interpretation, discussion. During writing thesis, proceedings and publishing paper, scientific research misconduct composed of fabrication such as made up the data when the expected result did not work out are prohibited. Falsification is another form of misconduct by produces and distorts experimental to achieve the desired results, while plagiarism referred as the act of taking someone else's word or idea as one's own work without citation. These misconducts should be prohibited at all cost. Examples of research misconduct was adjusting image to show just some band or some lane resulting in some band disappearing, adjusting over brightness and contrast, removing the background, cropping the image just some lane for presentation. When combining images, we should draw the black line between image to show that it's not come from same image or same gel.

There are various types of plagiarism. Firstly, intentional plagiarism known as cheating such as copy some word from original source without citation or copy and paste. Secondly, unintentional plagiarism was when the writer does not give a proper credit for someone else ideas such as incorrect paraphrasing, failure to cite the source properly. Either intentionally or unintentionally, claiming the work of another for one's own benefit is unethical. Therefore, to prevent plagiarism, write a summary in your own words, cite properly, give credit and rewrite with your own words which is called paraphrasing.

Moreover, we were taught how to write paraphrases. After reading the statement, try to understand all of the passage then list the main ideas or phrases. Next, sum up and select the material that can assist you to make a point of your paper. Try to think with “your own words” as if you were telling someone who does not know your subject well and try to understand what the original data source said. In addition, quotation marks can be used to cite the phrases from the original within your paraphrase. (from : http://writing.wisc.edu/Handbook/QPA_paraphrase2.html [last date accessed October 13, 2016])

Evaluation of genetic diversity in chinese wild apple species along with apple cultivars using SSR marker

Instructor: Assoc. Prof. Kanokporn Triwitayakorn

Date: 12 October 2016

One of the most economic cultivated fruit crops is apple (*Malus x domestica* Brokh) which has been subjected to breeding and selection in order to improve some characteristic or phenotype in this plants. A few selected *Malus* species were used in breeding apple for disease resistance. In apple, it is highly desirable to develop a new cultivars with greater genetic diversity, breeding for disease resistance, more fruit productivity and good quality as a fruit. *Malus* wild species is the most widely distributed breed.

The most widely used technique that for the analysis of genetic diversity is SSR (simple sequence repeat) marker. SSRs are co-dominant, reproducible, abundantly distributed in the genome, highly polymorphic and easy to interpret. Hence, SSRs officiate as valuable tools for genetic analysis. These SSR markers are the one of most successfully used techniques to assess genetic diversity and relationships among different apple varieties. Nowadays, approximately 400 SSR markers of apple and other fruit crops have been developed and genetically mapped.

The purpose of this research was to study genetic diversity for the genus *Malus*. Scientists used 29 *Malus* species, 4 Chinese landraces, and 13 import apple cultivars as samples. 19 SSR primers were developed. 16 unique alleles were identified. Ten out of these 16 unique alleles (62.5%) were detected only in wild species, which indicated that these Chinese wild apple species have a considerable genetic diversity and can be used in plant breeding to increase the genetic diversity of apple cultivars. The results from dendrogram showed that all of cultivars were clustered in the same group, except for EðpeMeBckoe. So the EðpeMeBckoe was closely related to the Chinese crabapple named Baihaitang (*M. prurifolia*). Of the two *M. sieversii* accessions used, one accession showed a close relationship to apple cultivars, while the other accession was closely related to wild apple species, which

suggested the presence of a wider genetic diversity in Chinese *M. sieversii* species. The influence of SSR marker selection on genetic diversity analysis in this *Malus* collection was also discussed.

An infectious cDNA clone of Zika virus to study viral virulence, mosquito transmission, and antiviral inhibitors

Instructor: Dr.Nitwara Wikan

Date: 19 October 2016

The topic that we studied was “An infectious cDNA clone of Zika virus to study viral virulence, mosquito transmission, and antiviral inhibitors”. The Zika virus (ZIKV) is causing devastating epidemics with its disease severity and also its mechanisms resulting in increased viral transmissibility. To study the severity of the disease, it requires an experimental system. Therefore, they studied the pathogenesis of ZIKV in mouse A129 or AG129, viral determinant of human virulence, transmission of mosquito and find out antiviral inhibitors such as vaccine or therapeutic strategies using drug screening. In this paper, they showed a notable divergence in host dependency factor between DENV and HCV and illuminated new host target for antiviral therapy. The infectious cDNA clone of Zika virus and luciferase reporter virus were developed and recombinant Zika virus is found to be virulent in A129 and AG129 mice. The recombinant Zika virus is highly infectious for *Aedes aegypti* mosquitos and the luciferase Zika virus can be used for antiviral drug discovery. This paper contained direct purposes of study and the results are easy to understand.

In this class, the instructor gave the number for everyone to discuss and explain all the figures and experiments in the paper. While we are listening, the instructor always ask the questions and if we can answer correctly we will get the score. We think it helps us to catch up and become more active in the class.

Genetic dissection of Flaviviridae host factors through genome-scale CRISPR screens

Instructor: Asst.Prof.Sarin Chimnaronk

Date: 26 October 2016

For this class, the paper is “Genetic dissection of Flaviviridae host factors through genome-scale CRISPR screens”. This paper studied the different of Flaviviridae family genome by using CRISPR. The instructor introduced the benefit of CRISPR-Cas as it can cut genomic DNA and can knockout target gene. For research concept of this study, they showed an investigation of the genome by detection from large scope to small scope. So, they can observe an overall picture of

their study. However, this study has weak points for some result, e.g. an evidence that when they used different detector the results showed to be different depending on an observer effect of the method. The instructor discussed about advantages and disadvantages between RNAi pathway and CRISPR-Cas9. They are different because RNAi pathway can knockdown the target gene and has major function to target mRNA transcript while CRISPR-Cas9 can knockout the gene and perform its function on genomic DNA.

The opportunistic marine pathogen *Vibrio parahaemolyticus* becomes virulent by acquiring a plasmid that expresses a deadly toxin

Instructor: Assoc. Prof. Dr. Panadda Boonserm

Date: 2 November 2016

Acute hepatopancreatic necrosis disease (AHPND) is also known as early mortality syndrome. The production of shrimp that have AHPND-affected region dropped and this is the one of reasons that caused global losses to the shrimp farming industry. The AHPND is caused by *Vibrio parahaemolyticus*, that is a gram-negative halophilic marine bacterium. AHPND makes sloughing of the HP tubule epithelial cells into the HP tubule lumens. The *V. parahaemolyticus* has 70-kbp plasmid with a post segregational killing system. The disease causing ability is abolished by natural absence or experimental deletion of the plasmid-encoded homologs of the *Photobacterium* insect-related (Pir) toxins. Therefore, the scientists determined the crystal structure of PirA and PirB proteins from *V. parahaemolyticus*. They found that the overall structure topology of these proteins is very similar to *Bacillus* Cry insecticidal toxin-like proteins even though there was a low sequence identity (<10%). This results suggested that the putative PirABvp heterodimer might emulate the functional domains of the Cry protein, and in particular its pore forming activity.

In this class, we are separated into 3 groups and each group brainstormed in order to understand the figures and results in the paper. Then, we presented the results of this paper to friends in class and discussed the results together.

Altered lipid composition and enhanced lipid production in green microalga by introduction of brassica diacylglycerol acyltransferase 2

Instructor: Assoc. Prof. Wipa Chungjatupornchai

Date: 9 November 2016

In class of Assoc.Prof.Wipa, we studied on a paper entitled “Altered lipid composition and enhanced lipid production in green microalga by introduction of brassica diacylglycerol acyltransferase 2”. This study aims to utilize the lipid obtained from microalga to solve problems on alternative source of oil or renewable diesel. First of all, they compared homologues of DGATs as enzyme to synthesize neutral lipid which are highly expressed in canola. Then, they did multiple alignments of the DGAT gene from various *micro alga spp.* After that, they transformed the DGAT gene into microalga because algae are one of the best prokaryotic hosts. The result showed that recombinant DGAT-2 in microalga can express neutral oil. However, their stability were not good. The instructor suggested that the results of this study are not complicate. Even though, there is some similarity with other papers; this paper was chosen because the writing skills of author are the best. Initially in introduction parts, they wrote an application of the study for the mankind by using simple words first. The results of this study were not better than other papers either, but for the discussion are very good. The writer suggested that gene silencing lead to reduce stability of transformed DGAT gene in microalga. So, good research should stand out with good communication skills.

Spatial colocalization and functional link of purinosomes with mitochondria

Instructor: Dr. Chalongrat Noree

Date: 16 November 2016

The topic that we studied was “Spatial colocalization and functional link of purinosomes with mitochondria”. This paper was short and the content was concised but it is mostly difficult to understand. In this paper, they considered that *de novo* biosynthesis can provide the nucleotide precursors which are essential for ATP production in mitochondria. The hypothesis was that purinosome and mitochondria might contain a synergistic relationship between them. The key findings was on the investigating the relationship, both of physically and functionally, between purinosome and mitochondria using 3D STORM imaging method, immunostaining, human kinome screen, etc. To investigate the purinosome-mitochondria colocalization, they induced purinosome formation by purine starvation and found that purinosome are present closely in a spatial of mitochondria observed by 3D STORM imaging. While observing a physical link between purinosome and mitochondria by Western blot, they found that purinosome co-precipitated with mitochondria. To observe a functional link, they also found that the purinosome have an effect on mitochondria metabolism and purinosome formation is linked to mitochondria. Next, they want to know that what is an intracellular signaling pathway that controls the relationship between purinosome and mitochondria? They found

that mTOR affected both functional link and colocalization between mitochondria and purinosome.

In this paper, I think they should give statistical values for more reliability such as p -value to know the significance of the result. If there is more background about paper for us so we could understand easily, that would be useful. Interestingly, this class is very fun and exciting because the instructor has a lot of activities for us. In the game, each of us would throw an individual dice and the score from dice will be written on the board. Then, the instructor gave the questions about this paper and gave us just 1 minute for thinking about the answer. After that, we wrote the answer on our board. If the answer was correct, that meant we would get the score depended on score that we threw a dice earlier. If it was incorrect, our score would be subtracted, depending on score from we threw a dice, too. Finally, the instructor discussed and explained the answers in each question of this paper with us and it helps us clearly understand the paper better than before class.

TarO-specific inhibitors of wall teichoic acid biosynthesis restore β -lactam efficacy against methicillin-resistant staphylococci

Instructor: Dr. Poochit nonejuie

Date: 16 November 2016

The topic that we studied was “TarO-specific inhibitors of wall teichoic acid biosynthesis restore β -lactam efficacy against methicillin-resistant staphylococci”. Due to methicillin-resistant *Staphylococcus aureus* (MRSA) had quickly wide spreaded and became tolerant with current β -lactam antibiotics, it leads to reduced susceptibility and efficacy of this drug because MRSA is able to synthesize wall teichoic acid. The researchers wanted to find out the TarO-specific inhibitors (Tarocin A,B) that can help alleviate the MRSA efficiently and it must contain synergistic activity with β -lactam antibiotics. They found that the TarO-specific inhibitors which are tarocin A and tarocin B could effectively and specifically abolish *S. aureus*, which meant they were able to inhibit the first step in wall teichoic acid biosynthesis (TarO) lead to absent of wall teichoic acid polymer production. TarO-specific inhibitors were able to restore efficacy and contain synergistic activity with β -lactam antibiotics to improve drug susceptible to against MRSA and MRSE.

In this paper, we think they should add the experiment that determined the mortality or mobility in *in vivo* assay to provide more illustrated results. The knowledge gained from this paper may be used for drug development and for improvement of the drug efficiency in the future.

In this class, the instructor discussed each figures with us and gave the reasons why the results became like that. He explained in details on what we did not understand. The instructor said that he selected this paper because it was a completely planned investigation and easy to understand. Before the beginning of

this class, everyone have to submit one page summary. we think it was good because it was more understandable when having some concept in our mind and catch up throughout the class.

Novel piperazine core compound induces death in human liver cancer cells: possible pharmacological properties

Instructor: Prof. Dr. Duncan R. Smith

Date: 30 November 2016

In this class, the paper entitled “Novel piperazine core compound induces death in human liver cancer cells: possible pharmacological properties” was what we learned from the instructor. This paper was taken from scientific reports that have a high impact factor. For the aims and overall goals of this study, it was interesting. They showed a possible pharmacological effects of anti-cancer harbouring piperazine core compound. Unfortunately, when we looked closely on each figures of the results, there were falsification such as duplication the pattern of cell line, editing of the band from Western blot, copy and paste and stolen of the data from other paper without citation. Therefore, this paper was retracted. Moreover, we can observe from other studies from the authors which we found some falsification too. All the results from those published paper were completely fabricated. The bottom line was, paper that was published does not means it was RIGHT. So, the research ethics are very importance.

For the program use to detect scientific misconduct, we can use www.retractionwatch.wordpress.com. For the program to find misconduct of figure, we can go to www.owl.englishd.purdue.edu/owl which can be used to detect plagiarism and we can also use the program Déjà vu.

Conclusion

From the Current Topics in Molecular Biology class, we got a lot of knowledges in several fields that we cannot learn from our research work such as genetic diversity in plant, study about pathogens and transmission of virus, testing the effective of some drug based on techniques of molecular genetic, learning about relative functions in some organelles like mitochondria and purinosome in term of biochemical knowledge, etc. This class helps and improves us on English speaking and reading skills to digest and clearly understand the paper that we got every week.

Moreover, for all the studies we learned, the research ethics are very important. Acknowledgment, anti-fabrication, anti-falsification and anti-plagiarism are the common thinking on our mind. So, not only the results or knowledge that we

learned for all researcher that we gained. In our opinion, the true purposes of this class are the application of this knowledge to the benefit for patients, farmer, other people or even our country. It also follows H.R.H. Prince Mahidol of Songkla's philosophy for higher education that "True success is not in the learning but in its application to the benefit of mankind".

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