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|  | ***Using the ERDG Horseshoe Crab Research Data Base as a resource for teaching students how to read a scientific paper***  Sharon Kreamer, The Tatnall School, Wilmington, DE USA (2015) |

One of the more challenging things a high school or college student faces is reading a scientific paper, making sense of the contents, and extracting the relevant facts and information from it. It can be a daunting task to wade through a paper and pull out the key information, especially when a student is not familiar with the terminology or experimental procedures involved.

This activity provides a way for high school or college-level science instructors to make use of the vast array of scientific papers uploaded to ERDG’s Horseshoe Crab Research Data Base ([www.horseshoecrab.org/research/](http://www.horseshoecrab.org/research/)) to learn about current research involving horseshoe crabs. Through this activity, students will learn how to read and “mine” a scientific paper, and then share what they have learned with their classmates. As such, the products of these efforts can take the form of a jigsaw activity, where each student chooses a paper of interest from the HSC Research Data Base, reads through the paper following the guidelines below, answers the guiding questions, and prepares a presentation based on the information they have gleaned from the article. The students then share their knowledge seminar-style via PowerPoint or Prezi presentations. Alternatively students can prepare and present their findings in a poster format. The student handouts to follow are offered to guide students through the process.

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|  | ***Remarkable Creatures, Remarkable Discoveries: Horseshoe Crab Research around the World*** |

**Goal:** To learn about current research involving horseshoe crabs by choosing, reading, and reporting on a scientific paper found in the ERDG Horseshoe Crab Research Data Base.

**Directions:**

1. Go to [www.horseshoecrab.org/research/](http://www.horseshoecrab.org/research/). Look through the list of research paper topics located on the left-hand side of the page. Your teacher may instruct you as to what topic to focus on. Then click on the tab for that topic or use one of the search options to choose an author or keyword to look at specific papers. Choose a paper that interests you. Open the paper directly from the website, or if the citation is not a live link, copy and paste the title and author into a search engine (e.g. Google) to find it online.

2. Follow the instructions on the next page to read the scientific paper.\* Carefully answer the questions. These answers will be the basis of the PowerPoint or Prezi that you prepare and present to your class. You may need to look up information from other sources to understand portions of the scientific paper.

3. Once you have read the paper and answered the questions, put together your presentation. Remember to use in-text citations, include images, and have a concluding works cited slide.

**How to Read your Scientific Paper on Horseshoe Crabs**

Reading a scientific paper is very different than reading a textbook, novel, or magazine article. In order to get the most out of a scientific paper, it is not necessary that you read the sections in the order they appear in the paper. It is also important to focus on key questions as you read each section. Below is a guide to both the order in which to read the sections of your paper, along with a description of each section and questions you need to answer as you read them.

**As you read the scientific paper, you will need the following to help you:**

* an online scientific dictionary to look up any terms that you don’t know. The following is a good one to use: [www.accessscience.com](http://www.accessscience.com)
* a notebook to write down key points and answers to assigned questions as you read. You may also want to write down any questions that you have as you work through the paper. You can ask your teacher for help with answering these questions.

\* For a quick online tutorial on how to read a scientific paper, go to:

[www.lib.purdue.edu/help/tutorials/scientific-paper](http://www.lib.purdue.edu/help/tutorials/scientific-paper)

**Read the sections of a scientific paper in the following order** (Fosmire)

**1. Abstract**

* This is a description of the research in a “nutshell.” This section includes a brief description of what experiment was done and the results of the experiment.

**2. Discussion**

* This section summarizes the important results of the experiment
* Also gives the supporting reasons for conclusions that were made based on the experimental results

**3. Introduction**

* This section gives background information on the topic that is being researched.
* Includes the motivation behind the experiment and the importance of the experiment
* May include historical information on the topic and information from prior experiments and studies

**4. Results**

* This section contains the raw data collected in the experiment and the analysis of that data
* Often the data is presented in tables and figures, which allows the reader to more easily see trends and important results

**5. Experiment/Procedure**

* This section contains the specific procedures and techniques that were used to conduct the experiment
* This information is very useful if you are planning to also conduct similar experiments

**Use this information to answer the questions on the following page and in preparing your presentation about the article you read.**

**Works Cited**

Fosmire, Michael. “Tutorials – Scientific Paper. *Purdue University*, Purdie Libraries, 2015.

Web. 4 June 2015. <https://www.lib.purdue.edu/help/tutorials/scientific-paper>.

**Answer the following questions as you read your assigned paper.**

**This is the information you will use to construct your presentation.**

1. Title of the paper:

2. Author(s):

3. Date Published:

4. Journal that the paper is published in:

5. As you read the **Abstract**, answer the following:

* What **questions** does the paper address?
* What are the **main conclusions** of the paper?

6. As you read the **Discussion**, answer the following:

* What **experimental evidence** (i.e. results) support the conclusions of the author(s)?

7. As you read the **Introduction**, answer the following:

* What **background** does the reader need to know to understand the topic and research?
* What **key words** or **terms** does the reader need to know the definition of?

8. As you read the **Results** section, answer the following:

* What are the most important results? Is there a table or figure that is most significant?

9. As you scan the **Experimental Procedures** section, answer the following:

* What was the primary experimental procedure(s) used in the research?
* Give a one or two sentence description/definition of the procedure(s)

10. Why are the **Conclusions** of this research important?

**Remember: Cite your sources - both the paper you are reading and any additional resources you use.**

**Creating Your PowerPoint Presentation**

**Use the following template as a guide for creating your PowerPoint presentation from the questions that you answered as you read the scientific paper.**

**Slide # 1:** The title of your paper, the authors and the citation for the paper, along with your name and the words “Scientific Paper Review”

**Slide #2:** The primary question addressed in the paper and the background information. Include two to three key points that will help your audience understand the context of the paper.

**Slide #3:** Brief summary of the procedure.

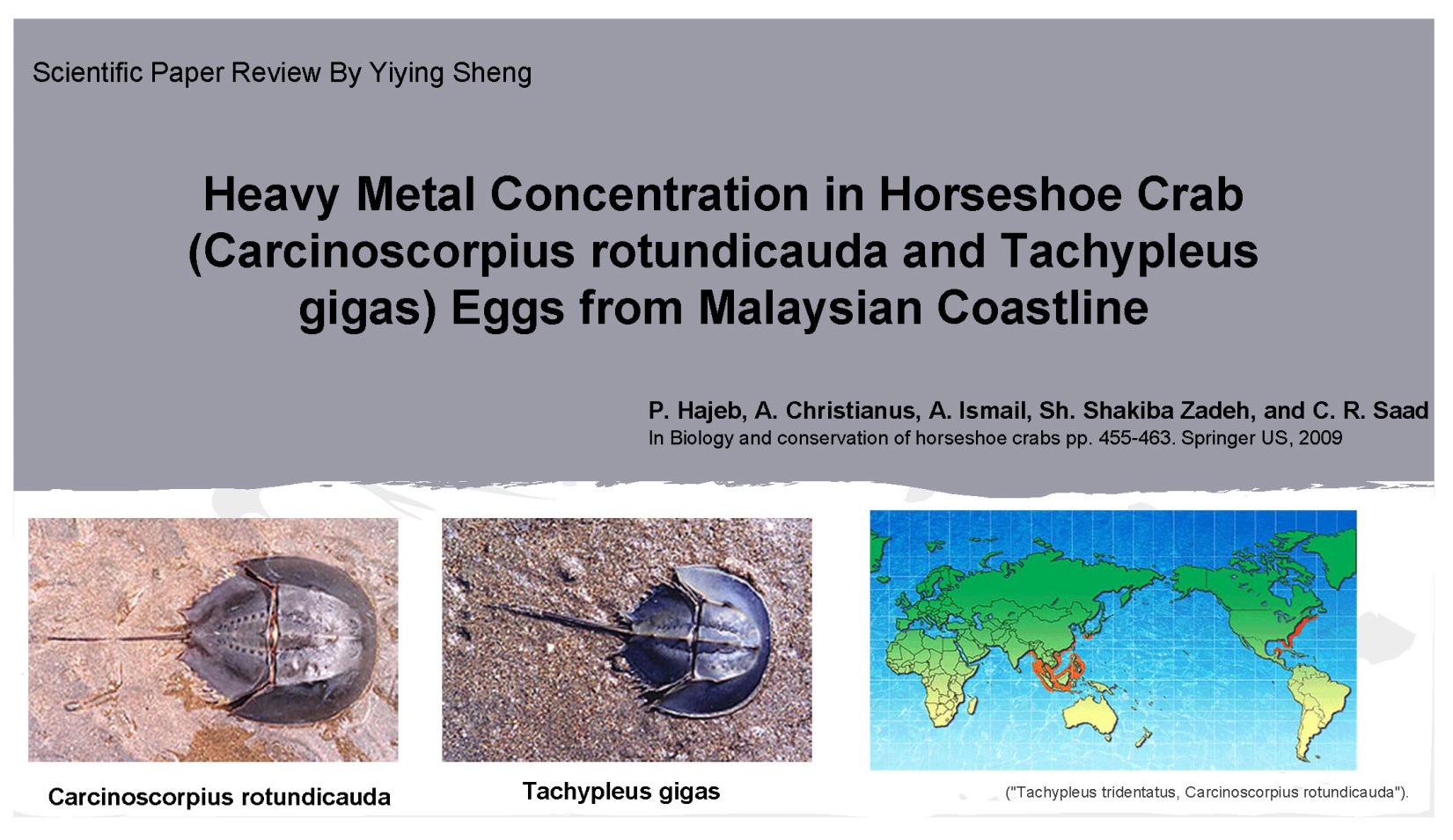
**Slide #4:** The most important data/results. You may copy and paste one or two relevant data tables here if appropriate.

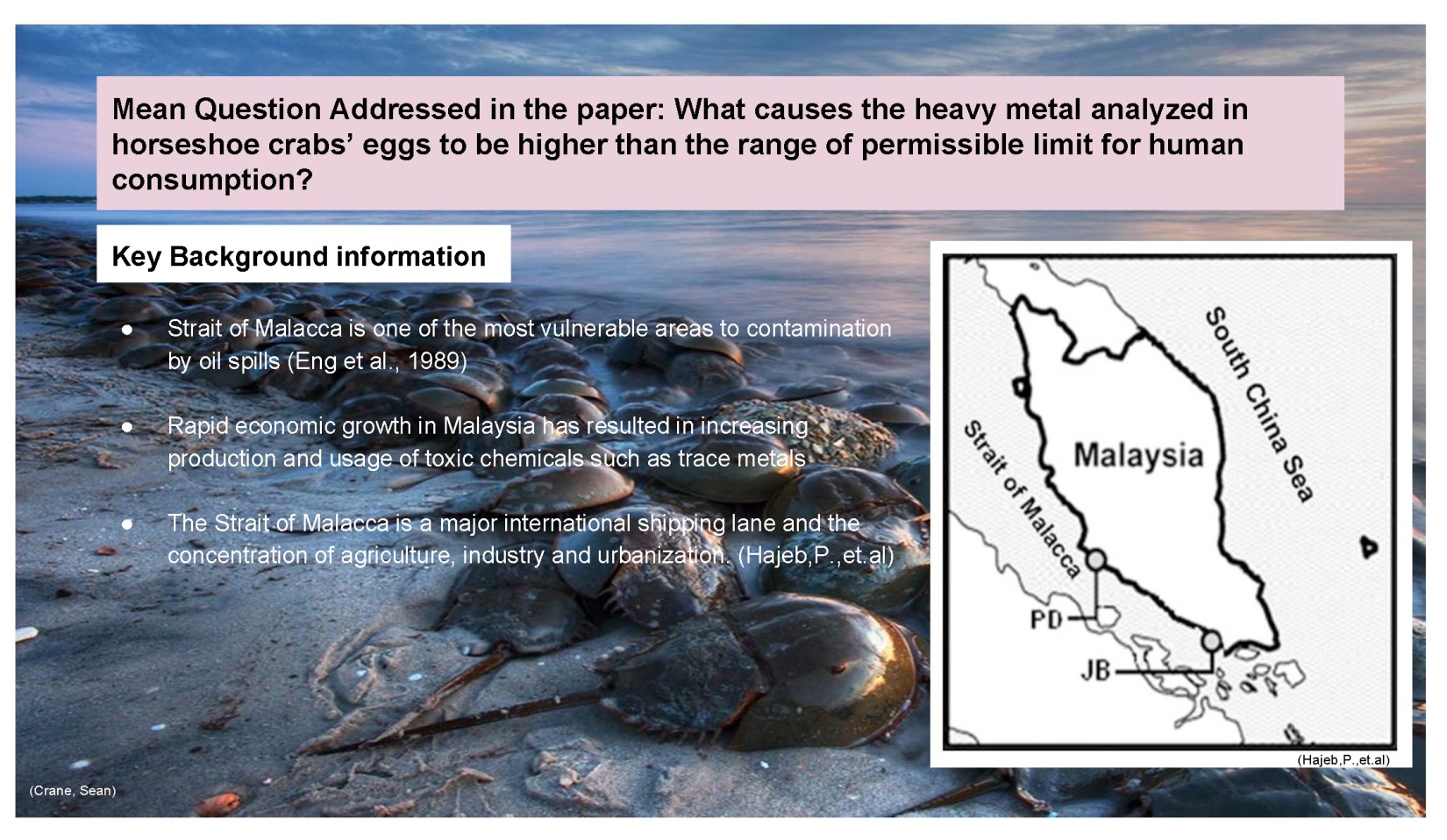
**Slide #5:** Discussion and Conclusion. The most important relevant outcome of the study.

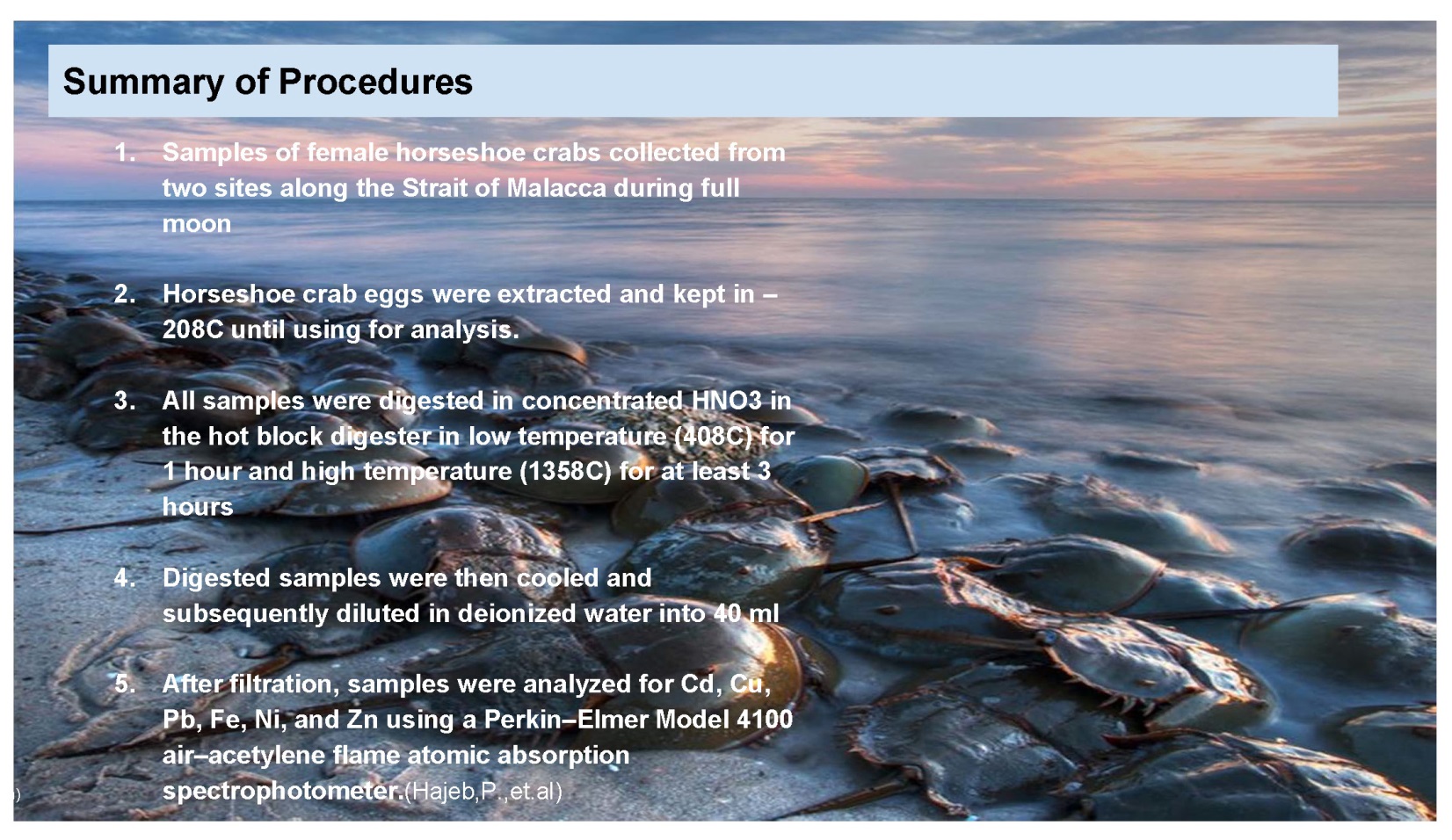
**Slide #6:** References/works cited.

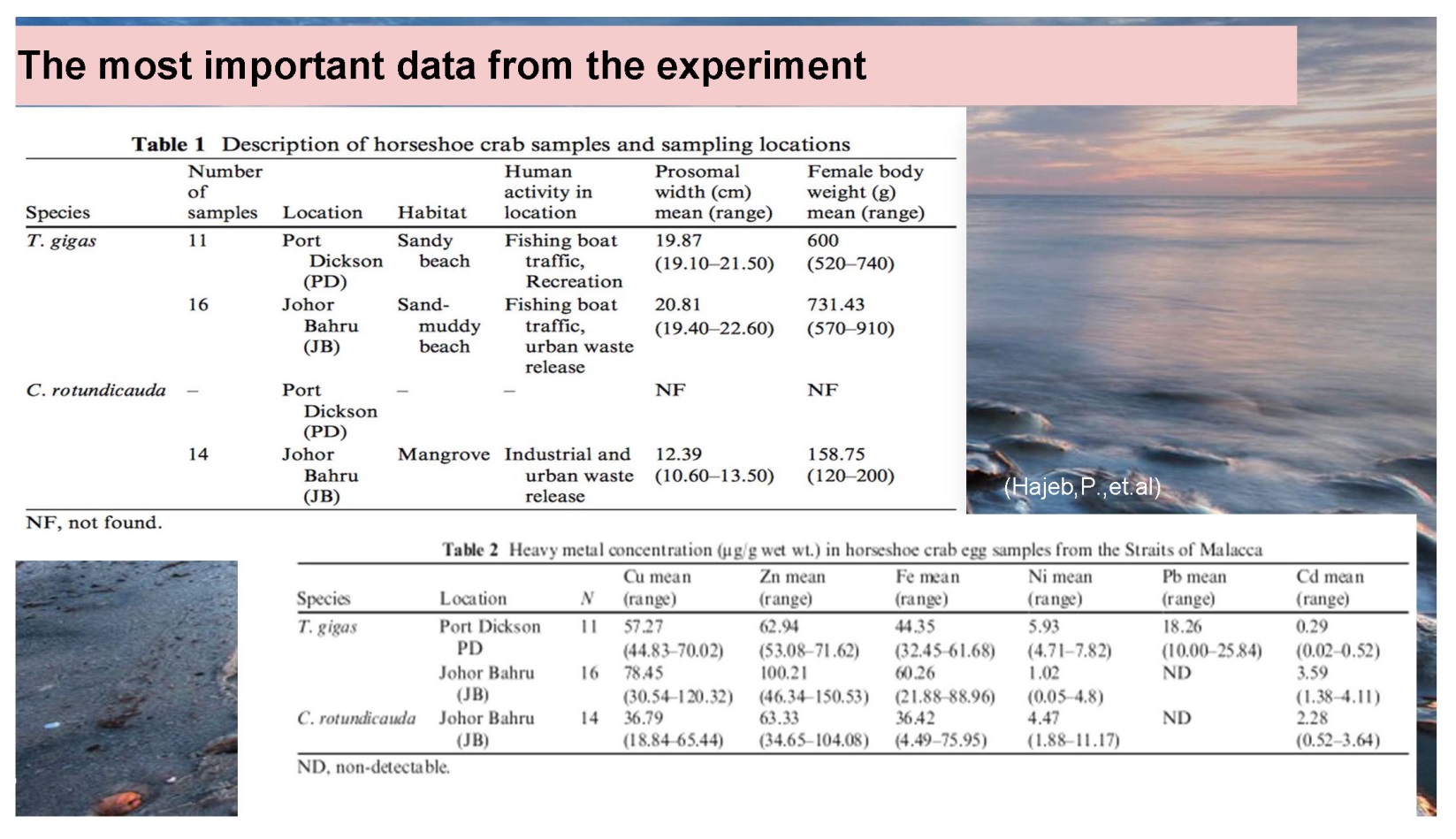
**The pages following provide an example of a student product resulting from use of this process.**

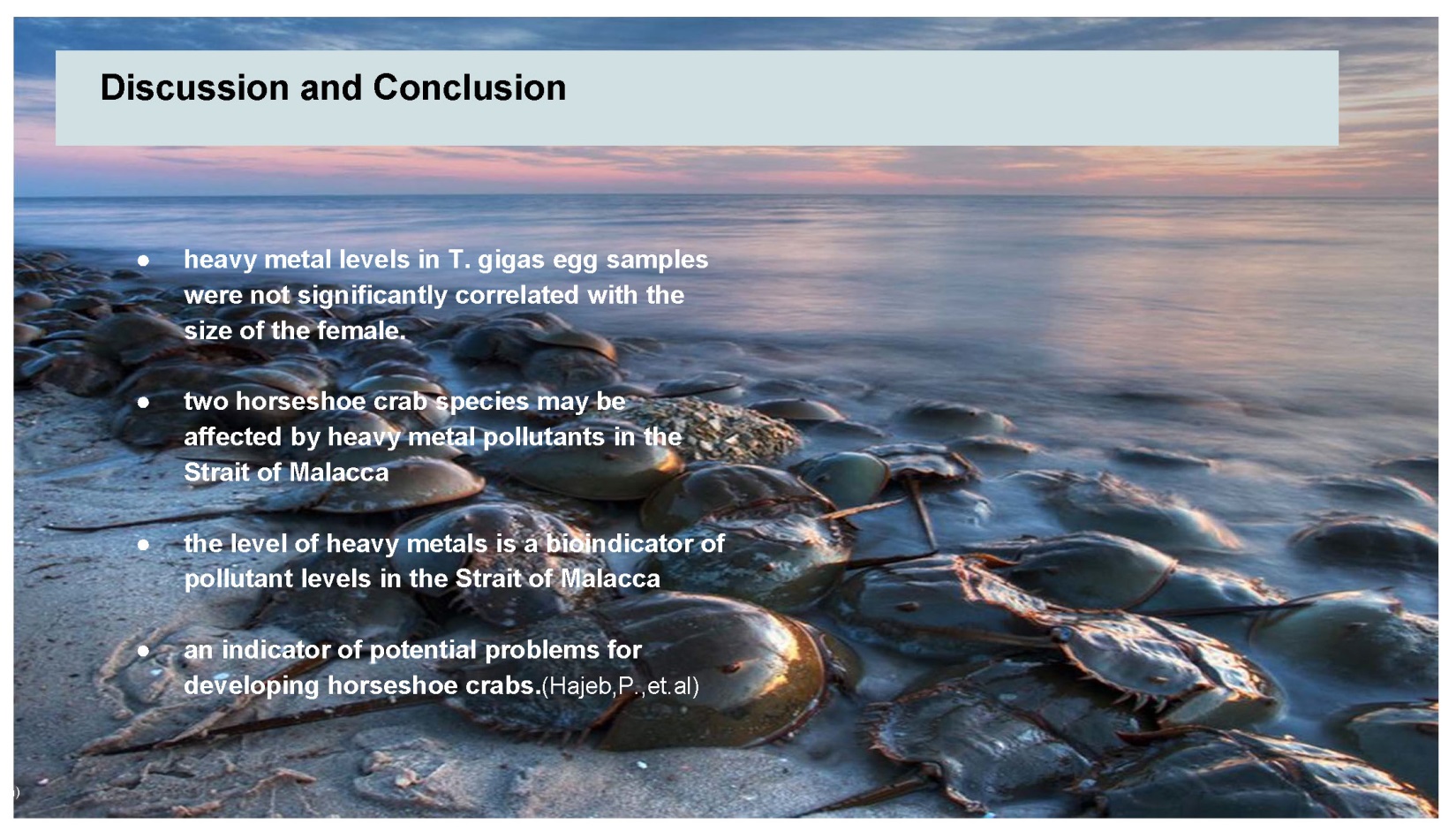
**Example of a student product - prepared by Yiying Sheng (The Tatnall School, 2015) - from applying the “reading a scientific paper” lesson to an HSC research data base article**

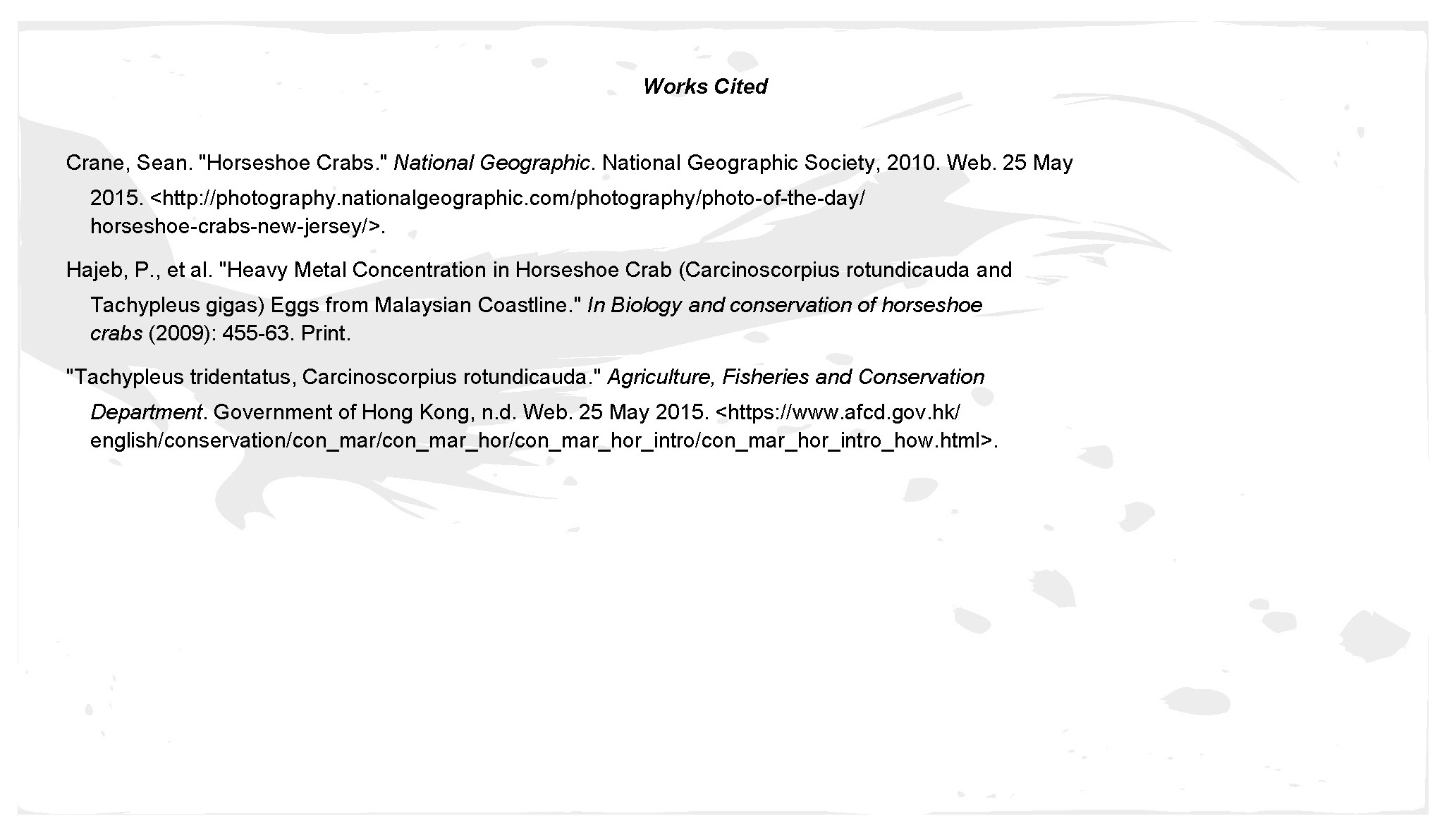
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