

Using Case Histories to Teach Parasitology Labs

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BISC318 Parasitology

This course is a one semester course that has 3 hours of lecture and 3 hours of lab per week. In 2018 Case Histories were added to the lab component of the course. The Case Histories worked in conjunction with the lab specimens that we have in the Departments Teaching collection. The only change in the delivery of the course was the addition of the Case Histories and the format of the lab exams. We used the same specimens, lab handout, lab introductory talk and all the teaching staff was the same.

Lab 1 - Case History 8- Protozoan

Kevin has a five-year-old Rottweiler named Max. Kevin and Max are "city people" and they spend all their time in Vancouver. Kevin normally takes Max to an off-leash park that is near their home for his walks. During these outings, Kevin has to monitor Max carefully because Max will eat anything that he finds, which includes feces from other animals. Ever since Max was a puppy he has had periodic issues with diarrhea. The diarrhea would always start off with the stool being larger than usual and the second half of the stool would be softer than normal, pale in colour and contain a lot of mucus. As the diarrhea continued, the stool became watery and sometimes there would be blood in the stool. Kevin has taken Max to the vet many times for the diarrhea and has been given antibiotics, which seem to work for a short period of time. As this has been an ongoing condition, the vet has collected numerous fecal samples and only one of these samples contained something of note (see photograph).

Using the information provided above, identify the slide from the slide box provided that matches this case history the best. What is your diagnosis? How do you think that Max contracted this illness? What are your recommendations to Kevin?

Lab 5 - Case History 1 - Cestodes

A 55-year old male patient was admitted to the emergency department of a hospital in Montreal with a 2-day history of abdominal pain. He had a previous history of stage IV gastric cancer and was receiving palliative chemotherapy. The patient's medical condition was critical and his personal hygiene was poor. On physical examination, generalized abdominal tenderness, guarding and rebound tenderness were detected. His hemoglobin was 9.4 g/100 ml, total leucocyte count was 52000 cells/mm³, with an elevated count including 53.2% neutrophils, 0.2% eosinophils, 3.1% lymphocytes and 3.2% monocytes. Other laboratory values were normal.

A chest X-ray revealed subdiaphragmatic free air, so the patient underwent emergency laparotomy. During the surgery, perforation of the gastric wall was discovered where multiple burrs had invaded adjacent organs. The abdomen was extensively contaminated by digested food residues. A total gastrectomy was performed and a feeding tube inserted. The abdomen was closed. On the fifth day post-surgery a 2.4 m worm emerged from the incision.

Microscopic examination of the worm revealed the following result (see photograph to the right).

Identify the genus of the worm. Can you determine the species with the information you have been given? How did the man contract this parasite? Did the parasite cause symptoms that prompted the visit to the ER? What information should the doctors relate to the patient?

Figure 1. Examples of Case Histories.

Case Histories

Once the students had examined the specimens and completed all the material assigned in the lab handout, they were instructed to put everything away (no access to the internet was permitted). Each group of 3-4 students were given a randomly assigned Case History. When the group thought they could correctly answer all the questions included in the Case History, one of the instructors then discussed their answers with them. When this discussion was complete, the next Case History was then given to the group. Each week, the groups were given four Case Histories.

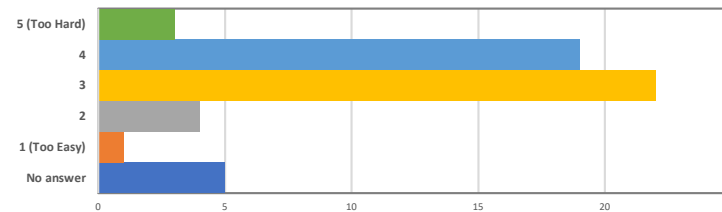
Format of Lab Exams

Prior to 2018 the lab material was evaluated based upon typical station exams. Each station would have a specimen and the students were required to identify the specimen and answer questions about its biology. In 2018, the two hour exam consisted of ten novel Case Histories that each student completed as an individual evaluation.

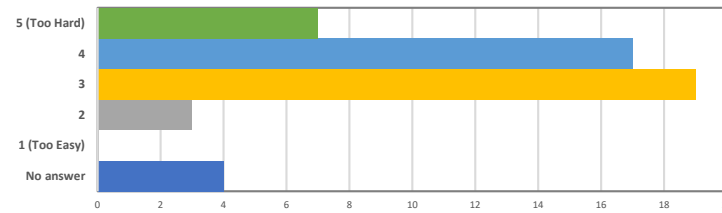
The week after the lab midterm exam, and before the students were allowed to see their graded exams, the students were asked to complete a voluntary anonymous survey.

Question 1 Have you ever written a 300 level station lab exam? **84.6% Yes**

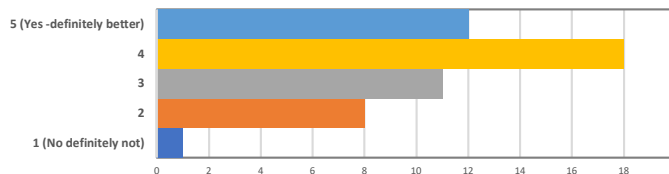
Question 2 On average how do you rate the 300 level station lab exams that you have written to this point in your academic career?



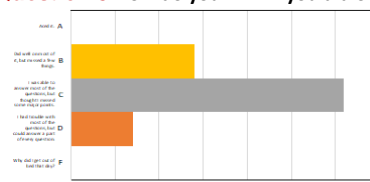
Question 3 When you compare the Case History Exam for BISC318 to the 300 level station lab exams that you have written up to this point, rate the difficulty of the Case History exam.



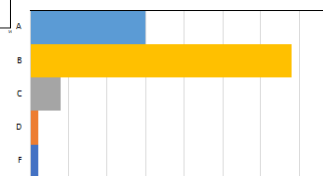
Question 4 Do you think that Case History exam was better at demonstrating your overall knowledge of the lab material than a typical station lab exam?



Question 5 How do you **THINK** you did on the Case History Exam?



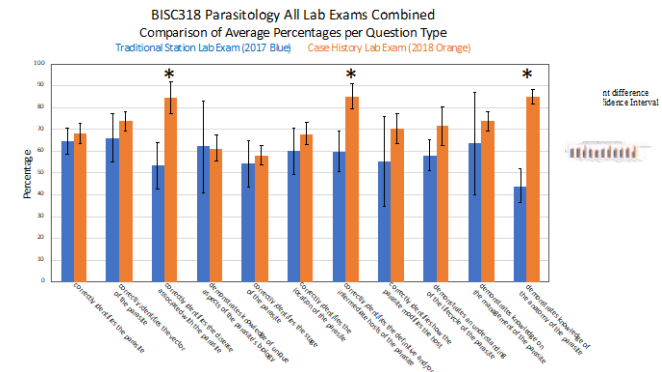
How the class **ACTUALLY** did on Case History I exam?



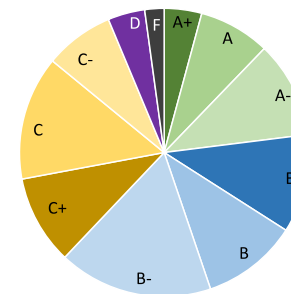
Final Analysis

The addition of the Case Histories to BISC318 Parasitology was a great success. In a volunteer anonymous survey before the Final Lab Exam **92.7%** of the students said that they would prefer to write an exam based on the Case Histories than a typical station lab exam.

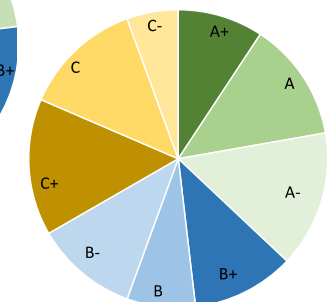
When the combined total for both lab exams was compared to the results of the 2017 exams, the **students did as well or better in all of the question categories**. The 2018 class had the highest average mark (%) for the lab component (2014-2018). The final letter grades were also higher than average (lowest mark was a C-).



Average Course Letter Grade Distribution with Traditional Station Lab Exams (2014-2017)



Course Letter Grade Distribution with Case History Lab Exams (2018)



Acknowledgments

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References

- Ahmet Cem Dural, Muhammet Ferhat Celik, Baha Temizgonul, Mustafa Gokhan Unsal, Cevher Akarsu, Murat Gonenc, Mustafa Uygur Kalayci, Hailis Alis (2015) Unusual clinical case: extraluminal manifestation of a tapeworm from the eviscerated midline incision in a post-surgery patient. J. of Infection in Developing Countries.
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