JULIA COLTRANE CASE

Julia Coltrane case: to tell or not to tell?

Julia Coltrane is a first-year graduate student who just began her graduate work in behavioral ecology at Wrenwood State, a major research university. She is interested in how experimental factors in young mammals can affect later mating behaviors and mating preferences. She is working in the laboratory of Dr. Adrianna Shepp, a researcher with a long history of publication and grant support for her work in the relationships between sexual selection and hormones in mammals. Julia is given a small study to do her first-year project that is part of the work Dr. Shepp is conducting with her senior graduate student, William Rollins. Rollins directs day-to-day work on the project, as it is part of his PhD dissertation. Dr. Shepp has offered Julia several different projects on which the lab was working; Julia was most interested in the work with Mr. Rollins, as it was closest to her research interests. Rollins will defend his dissertation next year, and already has four papers that have been accepted for publication in major journals. He is considered to be a rising star in the field by all in the department.

The work Julia will conduct involves housing young green-backed voles in groups of different densities and obtaining blood samples from the animals each week to determine concentrations of certain hormones. When the young voles reach sexual maturity, they are tested in a mate-choice apparatus to determine their mating preferences. The mating behaviors and preferences are video-recorded for later analyses. The housing and testing facilities for the voles are in a small lab building off campus. The vole project is the only study taking place currently at this lab building. Rollins is the one who has been maintaining and testing the animals up to this point, and is happy to get some assistance with data collection and animal care.

When Rollins brings Julia to the lab building to show her the voles and the testing facility, she is shocked. The cages are filthy and look like they have not been cleaned in several weeks. The animals are housed in much higher densities than she had read in the research protocol Dr. Shepp had given her. When Rollins is off checking some video tapes, she looks closely into several of the cages. In some of them she notices dead voles, and in all of them she sees voles that are injured with bite marks. When Rollins returns, Julia asks him what he does with the voles that die or that are injured in the cages prior to testing. "Usually I just let the others finish them off-it's what they do in the wild, and it's a good extra source of protein for them," he tells her. "I know the cages look pretty dirty right now, but the inspection isn't for another month, so I'll clean them all in a few weeks-we'll have all our testing done by then anyway." Rollins says. Just before leaving the lab building, Julia is stunned to find a dead vole in the mate-choice testing cage. "I must have forgotten that one during last week's test," Rollins explains.

When Rollins and Julia return to the university, she does not feel at ease. She tells Dr. Shepp her concerns about the state of the animals in the off-campus lab building. Dr. Shepp tells her, "Look, Rollins is a solid researcher, and the animals are doing alright in the study. He gets great data, so don't worry about it. Just do what you are supposed to do on this project, and once it's finished, we can start thinking about your dissertation project. I just go the news that it will be funded, so you have support for three years without having to be a teaching assistant!" Julia is torn after her discussion with Dr. Shepp, and wonders whether she should contact the head of the Wrenwood State Animal Care and Use Committee. She does not want to get Rollins or Dr. Shepp in trouble, but is disturbed about the housing conditions of the voles.

Should Julia tell the head of the Animal Care and Use Committee about Rollin's project? Why or why not?

MARTY BROWN CASE

Marty Brown, a plant biologist at a major research university, is investigating the potential utility of transgenic tobacco plants as "factories" for the production of foreign proteins. The potential benefit of this research to human medicine is clear. For instance, the non-plant gene that Brown is working with right now is human Factor VIII, a protein essential for blood clotting and the protein that most people with hemophilia lack. In his current experiment, Brown has introduced a construct of the Factor VIII gene into tobacco and has 100 transgenic plants that he is studying in a developmental time course. He is following both Factor VIII production and the plants' growth to assess the effect of the foreign gene on the plant's development, and vice versa. Brown is excited about the success of his experiment thus far, and he feels that the potential uses for his findings make it imperative that he publish as soon as possible. A disease-free, inexpensive source of Human Factor VIII would be of great benefit to hemophiliacs, who run the risk of contracting disease from plasma-derived sources and who must find a way to pay about$100,000 per year for their treatment. The urgency is all the more real to Brown, whose infant son is a hemophiliac. The sooner Brown's promising results are published, the sooner other scientists will be able to follow his line of work, and the sooner his discovery can have a practical, clinical impact.

One Friday, late in January, Brown checks on the 100 transgenic tobacco plants that have now been in the greenhouse for about a month. He discovers that twelve of them are beginning to look sickly. Their leaves are drooping a bit and turning yellow on the edges. He records this in his notebook, and also notes that all of these plants are close to the door. Later, in the lab, when he checks his previous results, he finds that these twelve plants have been producing Factor VIII at a consistently higher level than the other plants. Only one other plant had Factor VIII in this range, although quite a few came close. Feeling pressed for time, Brown decides not to investigate the cause of the poorer growth of the twelve plants any further. He concludes that because they happen to be near the greenhouse door, they have been repeatedly exposed to lower temperatures than the other plants, and that this is the problem. He records this conclusion in his notebook along with the other entries.

Early the following week, Brown is working on integrating his most recent transgenic plant data into the first draft of the manuscript on which he is working. He has entitled it "Human Factor VIII Production in Transgenic Tobacco Has No Deleterious Effect on Plant Growth." When Brown comes to the data on the twelve sickly plants, he considers whether he should exclude these plants from his analysis. He thinks that doing so would be justified because of the plants' proximity to the greenhouse door. In addition, the paper would be more impressive without the uncertainty associated with the data from these plants. He weighs the relevance of the data from those twelve plants against the principle that there is nothing wrong with excluding outliers and irrelevant data. Besides, he thinks these results are too important to risk letting them get held up in the review process.

The Molly Waters case: an unintended effect?

Molly Waters is an Assistant Professor in the Ecology, Evolution, and Behavior Program at North State University. She is in her third summer of fieldwork. Last month, her yearly review with the Chair of her department did not go well. The Chair made it clear to her that she was not meeting departmental expectations. Although her teaching evaluations were strong, she had not published much since arriving at North State, and in fact she had had considerable difficulty establishing her field project. She is confident, however, that in her third summer of work, things will take a sharp turn for the better.

Waters studies parental care in two species of birds. These two species are closely related to one another, yet differ in their mating systems. The Honeybee Sparrow is monogamous, and both parents contribute roughly equally to raising the young. The Still-a-Fool Sparrow is polygynous, and the male parent leaves the female shortly after the last egg is laid, leaving the female parent to raise the young alone. Molly Waters's work aims to understand the major environmental factors that influence parental care in these two species.

To conduct her studies, she has marked each individual in her study site with unique combinations of leg bands, under approved federal and state permits and IACUC protocols. Waters and a large number of graduate and undergraduate students will spend the summer collecting data on parental care in these two species. Each morning for at least 30 minutes at each nest, observers will collect a large and diverse array of data, including feeding rates, types of food delivered, vocalizations produced by the parent(s) during feeding, and begging behavior of the young. For some of these measures, the observers have to be positioned within 5m of the nest to collect the data.

About midway through the summer, Waters finds that the data seem to be supporting her hypotheses for the two species. If the trends for the data for the remainder of the summer are even remotely like what she's obtained for the first half of the summer, she will have a major and important research paper to submit in the fall. On the other hand, she finds that a high number of nests in her study site are failing. Normal rates of nest failure for these two species (based on data from older published studies) are around 20%; Waters is finding that over 40% of the nests she and her students have been monitoring have failed. The failed nests by and large show the signs of blue jay or raccoon depredation.

Adjacent to her main study site, Waters has another site of banded birds that she and her students monitor only once every 10 days. At this site, she finds that nest failure rates are only around 15%. Waters begins to think that the daily rates of intensive data collection at each nest on her main study site may be attracting predators to the nests. At this point, midway through the summer, she contemplates two options. One option is to push on and accept the nest (and nestling) losses, knowing that her final sample size will very likely be large enough to obtain statistically significant results to address her hypotheses. The other option is to begin a slower rate of data collection at the nests at her main study site – she thinks this will result in fewer failed nests due to predation, but also knows that this likely will mean she won't obtain enough data to address her hypotheses adequately unless she repeats the entire study again next summer. Optimistic that both options will ultimately result in a study that will be accepted for publication in the major journal in her field, Waters nonetheless realizes that the second option will delay any possible publication an additional year. This will not look good at next year's review with the Chair of her department.

Which option should Molly Waters take and why?

The Walter Guthrie case: handling the outliers?

Walter Guthrie is a fifth-year graduate student in an experimental psychology program at the City College Graduate School. He is in the midst of his last year of data collection for his dissertation research. He is working in a well-known and respected laboratory that has studied physiological mechanisms of learning for many years.

Guthrie has been trying to understand the relationships between corticosterone, learning, and memory in different animal species. He has focused his experiments on three well-studied species – stump-tailed rats, rough-legged pigeons, and gold-toothed anoles. In one of his last experiments, Guthrie plans to implant adult males and females of each species with small silastic tubes of corticosterone, to control the amount of circulating corticosterone in the subjects. He then will expose each individual to a series of learning trials and long-term memory tests. After the behavioral testing, the tubes are easily removed from the animals and they show no long-term effects of the manipulation. All of his experiments are conducted under study protocols approved by City College's Animal Care and Use Committee.

Guthrie prepares a set of tubes and implants them into his study subjects. He discovers on the day of implanting that he has miscalculated the number of tubes he needed, and is short of tubes for 12 anoles. He carefully makes an additional set of tubes, following the same procedures he has always followed, and implants the last 12 anoles later that day.

As he is running the subjects in the trials, he can tell that the experiment is going well. The animals are all behaving normally and appear extremely healthy, and he is obtaining quality data. After completing the trials, he removes the silastic tubes – the animals recover quickly and appear normal in the weeks and months that follow the study.

When Guthrie begins analyzing the data, he notices that data for eight of the anoles appear to be strong outliers relative to the bulk of the anoles. He runs both parametric and non-parametric significance tests of the results, and finds no effect of corticosterone level on anole behavior. He also finds no difference between anoles and the other two species in the influence of corticosterone on behavior. When he removes these eight outliers from the data set, he finds significant differences for both the corticosterone and species comparisons. He traces these eight data points back to the individual subjects, and finds that six of them are from that group of 12 anoles for which he had to make an additional set of tubes.

Guthrie thinks that he must have made a mistake during the preparation of the tubes for the last set of 12 anoles, and wonders if he should remove these individuals from the data set. He confers with a postdoctoral researcher in the lab, who tells him he should leave them out of the study completely, and not mention them at all in the methods section of his dissertation. Another senior graduate student in a different lab thinks Guthrie should leave the data for those 12 anoles in the study, since there is no reason to believe Guthrie made a mistake in preparing the tubes.

Should Walter Guthrie remove the outliers? Why or why not? Which option should Molly Waters take and why?