
GPOCP: May 2023 - My First Experience in the Peat Swamp & A Non-Invasive Method to Study Orangutans



Dear Friends and Supporters,

The academic year has wound to a close and I now find myself busy making preparations for my yearly trip back to Indonesia.

Our first article this month comes from Mahendra, who is the Office Assistant at our Bentangor Environmental Education Center. He has been involved with our program for many years and expressed an interest in becoming involved in a larger capacity. So, this month, Mahendra was invited to join other staff on a week-long biodiversity survey in the Padu Banjar Village Forest. He writes about the data he collected and the surprises he encountered on his first experience in the peat swamp forest of Indonesia.

IN THIS ISSUE:

My First Experience Entering the Peat Swamp Forest of Hutan Desa Padu Banjar

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Liquid Gold: Urine as a Non-Invasive Method to Study Orangutan Physiology

Join Save Wild Orangutans

The second article was written by Dr. Faye Harwell. I'm excited to share that Faye, one of my advisees, graduated with her PhD from Boston University this month, after successfully defending her dissertation on an "Investigation of the Life History, Male Bimaturism and Sex Differences of Orangutans" in April. Here, Faye writes about some of her analyses of orangutan urine samples and how urine can be "liquid gold" to help researchers understand orangutan health, reproduction and metabolic function.

I wish you all a happy and healthy June!

Sincerely,



Cheryl Knott, PhD
Executive Director

[Gunung Palung Orangutan Conservation Program \(GPOCP\)](#)

My First Experience Entering the Peat Swamp Forest of Hutan Desa Padu Banjar

By Mahendra, Bentangor Office Assistant/Guard

My name is Mahendra and I am the Office Assistant and Security Guard at the Bentangor Environmental Education Center. My daily activities involve maintaining the facility and security of Bentangor, located in Pampang Harapan Village, Sukadana District, Kayong Utara Regency. During my time working for Yayasan Palung/GPOCP I have been involved in a few different capacity building activities. YP/GPOCP values increasing the capacity of all of the staff, both within the conservation and research teams, and this month I had the opportunity to have a totally new experience and increase my knowledge and skills.

This month, starting on May 8th, I took part in the biodiversity survey of the Padu Banjar Village Forest (*Hutan Desa*) for one week. I gained experience collecting data on a variety of factors, including canopy density, orangutan nest classes, tree diameters, tree height and GPS data point collection.



Mahendra takes a data point during the biodiversity survey in Padu Banjar.

Before I entered the forest, I assumed it would probably be no different from the other forests I have seen in Kalimantan. I assumed this peat swamp forest had an ample water supply, dense soil, and easy access routes. However, I turned out to be very wrong! I quickly realized this was different when I entered a peat swamp for the first time. The path to the first forest transect had not been traversed in a year (since the last annual biodiversity survey) and was so overgrown that it was not even visible at the start! A distance of 100 meters, that previously felt easy to walk in an open field, felt like 300 meters in the peat swamp because of the difficult terrain! We also brought a lot of heavy logistical items needed for the week, which made the trip even more difficult.

Not only that, I fell into holes on the surface of calm water several times and also fell on flat ground! This is due to the texture of the peat soil which looked flat but was very soft when I stepped on it. My feet were easily trapped or sucked in to the peat. Sometimes I waded through water that was up to my thighs! This made the boots we wore heavier, coupled with the weight of the goods we carried, so that my energy was quickly drained. Under these conditions, I found that I needed a lot of water and become thirsty quickly. Fortunately, on the way to the forest transects, we found peat water that we could drink. This was my first experience voluntarily drinking peat water.



Mahendra wades in water up to his thighs during the journey to get to the survey transects.

Despite feeling tired from this long journey, I was excited to see beautiful plants along the way, such as “kantong semar” (pitcher plants) and “sirih hutan” (forest spiked pepper). I learned from staff Botanist, Gunawan Wibisono, that the red color of the peat water is due to accumulated tannins and that the plants that have secondary metabolites, which are believed locally to have potential as medicinal plants. Animal Protection Manager, Erik Sulidra, taught me to listen closely to the sounds of various birds to try to identify them. We saw swamp frogs and turtles too. I also got to see, first-hand, various types of orangutan nests. Most of the nests I saw were class “C”, but I even saw one class “A” nest (the newest) with orangutan feces right underneath! I felt so lucky to be able to make this observation in person.

Throughout this week, I gained an in depth understanding of the peat swap forest habitat and an increased awareness of the potential of peat swamps with their rich plant and animal diversity. This really emphasized for me the importance of our joint efforts in preserving these forests.



The survey team trek into the Village Forest of Padu Banjar.

Liquid Gold: Urine as a Non-Invasive Method to Study Orangutan Physiology

By Faye Harwell, PhD, Recent Boston University Graduate

As my fellow lab mates headed to Gunung Palung National Park last summer, I made my way to Virginia with several coolers of orangutan urine in tow. Instead of trekking through the jungle in search of wild orangutans, I would be studying orangutan physiology from the comfort of a wildlife endocrinology laboratory at the Smithsonian's Conservation Biology Institute.



Author Faye Harwell conducts lab work at the Smithsonian Conservation Biology Institute.

Endocrinology is the study of hormones. Many people get endocrine analyses done when they are trying to get pregnant or experiencing kidney or thyroid issues. Just as hormones are important to human physiology, they are similarly informative of orangutan health and reproduction. **Hormones** are molecules produced by endocrine glands that coordinate physiological processes within the body. Lucky for primatologists, orangutans and the other great apes are closely related to humans meaning that endocrine analyses developed for human studies often work on the other great apes.

Hormones can be studied using a number of biological samples. These include blood, urine, feces, saliva, and even hair. Each of these different samples can be analyzed to examine hormones or biomarkers at various time scales. Blood and saliva samples convey information about a human or animal at the moment of collection. Urine and fecal samples, on the other hand, show cumulative levels of hormones for several hours prior to urination or defecation, respectively.

Because orangutans are largely solitary and arboreal, they can be a challenging species to study in the wild. With creative non-invasive methods, though, we are able to study nearly all aspects of their biology. Just as there is a chance of getting pooped on by a seagull at the beach, orangutan researchers are continually at risk of getting showered or pelted by pee and poop as these tree-dwellers go about their business high up in the trees. We have learned to take advantage of our position on the ground as researchers, though.

We collect orangutan urine either by preparing tarps on the ground for a void to fall on, or by positioning a plastic bag on a forked fishing rod under the stream of urine. As for the poop, we simply search for it off the ground if it hasn't already clocked us in the head (not an uncommon event).



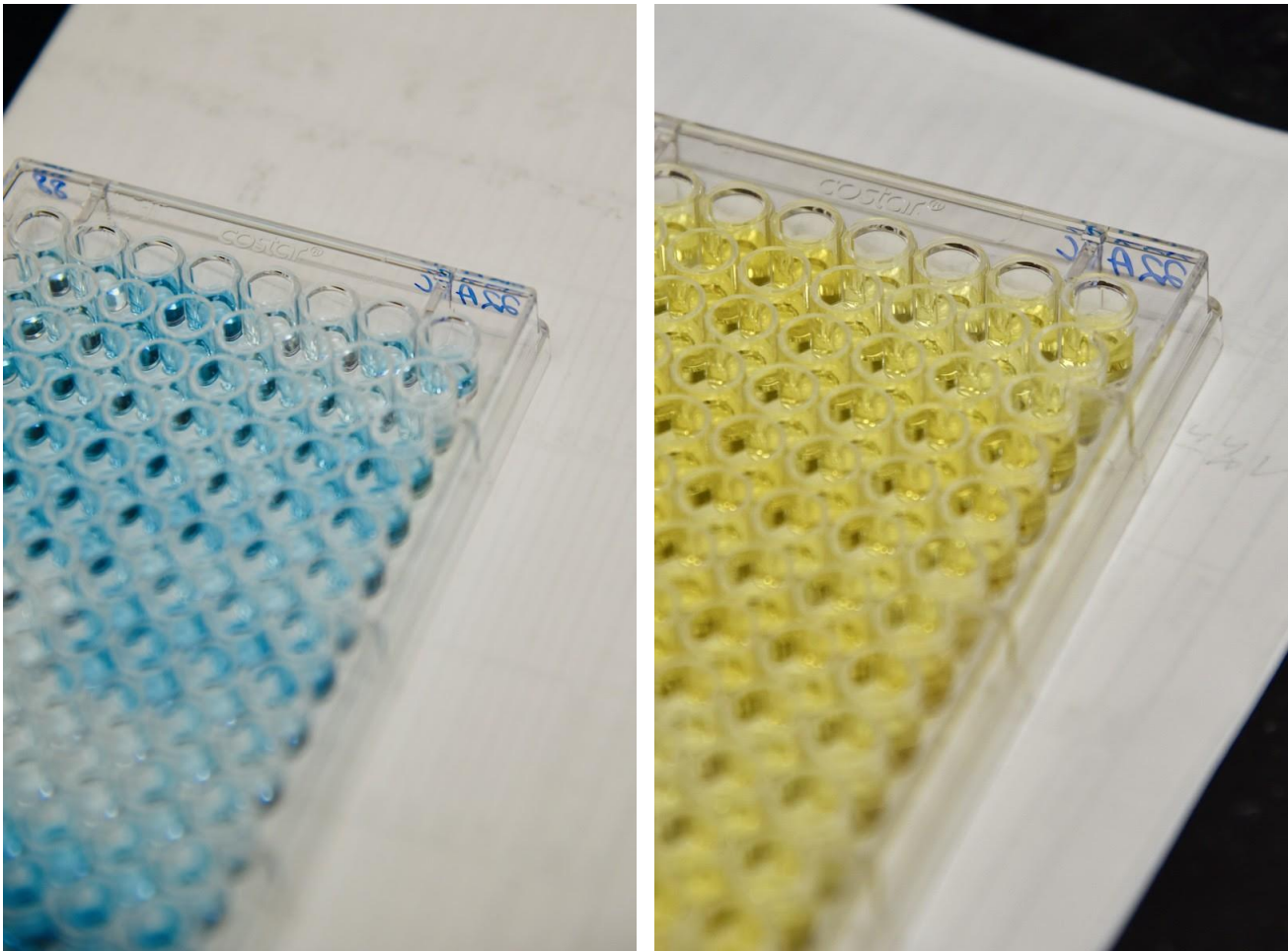
Field Research Assistant, Sahril, transfers wild orangutan urine to a tube to be frozen and later analyzed.

In the field, we test urine for the presence or absence of ketones. **Ketones** are released into blood and eventually urine when the body is breaking down fat for energy (ketosis). For females, we can also run a pregnancy test — the same test women all over the world use! Lastly, we measure the density of the urine (**specific gravity**), which we use to index urine samples of different concentrations. Once we are done with all of these tests, we place our samples in freezers powered by generators until they can be brought out of the forest. Freezing urine samples can preserve samples for several years. Our most recent set of samples underwent a transatlantic journey in order to make it to the United States.



Orangutan urine samples that survived the journey from West Borneo to Jakarta to Boston to Virginia.

Urine from humans and other mammals contain water, salts, and urea along with hormones and other biomarkers that are excreted from the bloodstream. Urine provides a wealth of information related to an animal's overall health, reproductive state, and metabolic functions. In this sense, urine from any wild animal is like liquid gold to researchers! To measure hormones and biomarkers in urine, we run tests called immunoassays. **Enzyme immunoassays** utilize the mechanisms of our body's antibodies, which bind to foreign substances, such as bacteria and viruses. During an enzyme immunoassay, reagents are added that will eventually result in a color change depending on the concentration of antibodies bound to the hormone/biomarker of interest. For the tests that primatologists typically run, the color change is from blue to yellow.



Plates of urine sample change from blue to yellow during an enzyme immunoassay.

In our most recent set of samples, there were some very cool findings. For instance, we documented the hormonal changes that the orangutan Walimah underwent during her pregnancy with Winnie. We also looked at the testosterone levels amongst unflanged and flanged males.

Endocrine lab work certainly does not involve the numerous physical and mental challenges of carrying out fieldwork, but it can be intense work at times. The tests require extreme focus and organization. Prior to starting a plate, you need to record your samples on paper or excel spreadsheets. At one time, you might be running as many as 42 samples, since that is how many duplicate samples can fit on a single plate. Reagents must then be added at specific times. So, if you miss a reagent or add something to your plate at the wrong time, you may need to start all over. Even after you get the results of your analysis, you must then look at the coefficient of variations (CVs) of your duplicates and redo any samples with high CVs. Lastly, you must record the final quantities along with how much you diluted the urine sample (dilution factor), which will be used in calculations for the final value.

Endocrinology is just one example of how primatology takes place beyond the jungle. Primatology is an inter-disciplinary field that intersects with many other STEM fields. Our research on wild orangutans intersects with a wide span of fields, such as genetics, microbiology, and conservation. It requires the collaboration and coordination of many people's time and effort. From collecting the sample in the field to monitoring the shipping progress of the samples (on dry ice!) to obtaining grant money to analyze the samples, endocrine studies of wild primates are a collective effort requiring many people's involvement. The somewhat laborious process is worth it, though. By working with experts in other STEM fields like endocrinology, primatologists are able to more deeply understand the relationship organisms have with their environment.

Management of Cabang Panti Research Station is conducted by the Gunung Palung National Park Office (BTN-GP) in collaboration with GPOCP/YP. Scientific research is carried out in conjunction with the Universitas Nasional (UNAS) and Boston University.

"Research is formalized curiosity. It is poking and prying with a purpose."

– Zora Neale Hurston



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