

Science AMA Series: I'm biological anthropologist Cheryl Knott and I study orangutans, primate reproduction, evolution, and conservation. AMA!

DrCherylKnott¹ and r/Science AMAs¹

¹Affiliation not available

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Abstract

Hi Reddit! I'm a biological anthropologist who works with wild orangutan populations in Indonesia. In particular I'm interested in what we can learn about the reproductive physiology of male and female orangutans using non-invasive methods. In other words, I observe mating behaviors and collect their urine - a job which once earned me honor of being in Popular Science's list of worst science jobs! This lets me learn about their nutrition, reproductive states, health, and lots of other interesting things without harming them. In the bigger picture, primate studies help us learn more about our own human evolution and reproduction. I'm also the executive director of the Gunung Palung Orangutan Conservation Program in Indonesia. I conduct my research here but I'm also passionate about conservation. Orangutans are endangered and experts think they may become extinct in the wild within 20 years. However, the worst fire in 20 years has recently hit the region and is critically threatening orangutan populations. You can see some of the heartbreaking photos that my husband Tim Laman took here. The fires threaten a third of the wild orangutan population. Considering the already dire situation this is very concerning. I'll be back at 12 pm ET (9 am PT, 5 pm UTC) to answer your questions, ask me anything! Edit: Thanks everyone for a great AMA! I have office hours now but if I have time I'll try to answer a few more questions. This was fun!

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DRCHERYLKNOTT [R/SCIENCE](#)

ABSTRACT

Hi Reddit!

[I'm a biological anthropologist who works with wild orangutan populations in Indonesia](#). In particular I'm interested in what we can learn about the reproductive physiology of male and female orangutans using non-invasive methods. In other words, I observe mating behaviors and collect their urine - a job which once earned me honor of being in [Popular Science's list of worst science jobs!](#) This lets me learn about their nutrition, reproductive states, health, and lots of other interesting things without harming them. In the bigger picture, primate studies help us learn more about our own human evolution and reproduction. I'm also the executive director of the [Gunung Palung Orangutan Conservation Program](#) in Indonesia. I conduct my research here but I'm also passionate about conservation. Orangutans are endangered and experts think they may become extinct in the wild within 20 years. However, the worst fire in 20 years has recently hit the region and is critically threatening orangutan populations. You can see some of the heartbreaking photos that my husband Tim Laman took [here](#). The fires [threaten a third of the wild orangutan population](#). Considering the already dire situation this is very concerning. I'll be back at 12 pm ET (9 am PT, 5 pm UTC) to answer your questions, ask me anything!
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Do they menstruate like humans?

[voracread](#)

Good question! I teach about this in my Behavioral Biology of Women class. External loss of blood and tissue at the end of what we call the luteal phase of the menstrual cycle is restricted to the old world monkeys (which includes humans). In most species, you don't see any visible signs of blood loss. Humans seem to have a much thicker endometrium (lining of the uterus), which leads to much heavier blood loss, what we call menstruation. Great apes, including orangutans, have some blood loss, but it's not very obvious. In zoos, in particular, they can collect urine and then test it for the presence of blood using dipsticks. (When they urinate, the urine comes in contact with some of the menstrual blood). We do this in the wild as well, but it seems harder to reliably detect menstruation. In the wild they are also more energetically stressed, as well as pregnant and lactating most of the time. Because orangutans only give birth every 6-9 years on average menstrual cycles are few and far between. More research needs to be done, though, on the thickness of the endometrial lining in humans compared to the great apes to see if the lining is really a lot thinner than we see in humans, and if so why.

Thank you for doing this AMA!

How similar or different are Orangutans to Humans in terms of their physical build and intelligence?

[GrandBuffet](#)

Orangutans share many similarities and differences with humans. We are both great apes and share general features such as a large body size, no tail, large brain, etc. Some of the things that I find most interesting are the life history features we share in common. For example, both humans and orangutans have what we call Concealed Ovulation (no visual sign of ovulation such as a sexual swelling). Orangutans only give birth once every 6-9 years on average. This is the longest of any mammal. Humans in what we call 'natural fertility populations' (those that don't use artificial birth control) give birth on average every 3 years or so (although there is a lot of variability).

Intelligence-wise humans are more encephalized – we have a larger brain for our body size – but orangutans are one of the most intelligent of primates. In tests of cognition between human children

orangutans do quite well in tests of the physical domain, but humans perform much better at what we call social cognition. Here's a link to an article about this
<http://www.sciencemag.org/content/317/5843/1360.short>

What can the average redditor do to help preserve these [amazing animals](#)?!

And if you had unlimited resources (time & money) what scientific question would you try to answer to help prevent their extinction?

Thanks for your dedication to such an important cause and for stopping by to share it with us!

[Jobediah](#)

Redditors can help orangutans by becoming informed about the issues that threaten their survival: habitat loss from logging, mining, fires and the establishment of oil palm plantations as well as poaching for the illegal pet trade and bushmeat. Try to buy products that are certified to not involve these practices. You can also contribute to organizations like the [Gunung Palung Orangutan Project](#) that help to protect orangutans in the wild.

There are a lot of ways that scientific research can help us better understand and protect orangutans. For example, we need better estimates of how many orangutans still exist in all the different forests in Sumatra and Borneo. This normally requires doing on the ground nest surveys that are quite labor and time intensive. New methods such as using drones to rapidly survey orangutan nests may help address this problem. We will be testing out these methods in Gunung Palung and comparing results from drone surveys to simultaneous ground surveys. Check out this article by Dr. Serge Wich for more information on this method <http://www.nrcresearchpress.com/doi/abs/10.1139/juvs-2015-0015#.Vk4FZ-nDN4M>. Additionally, we really don't know how far orangutans range. This is a hard question to answer because their ranges, especially the males, are bigger than any of our study areas. A few people have tried to solve this by staying with orangutans as they leave a study area and spending night after night camping out under their nest. One of my former students at Boston University and research assistants, Robert Rodriguez Suro, is doing this right now in Gunung Palung, supported by a National Geographic Young Explorer's Grant. Check out his blog: www.rrsuro.com/natgeo

What's the strangest (or funniest!) situation you have found yourself in while observing/investigating these animals?

[aworthyone](#)

One of the funniest things that happened was one of the first times I tried to collect urine from a wild orangutan. Since orangutans are arboreal they, of course, urinate and defecate from the top of the trees. So, one day after an orangutan urinated I went over to collect the sample. When I came back, my husband, [Tim Laman](#) (who is a lot taller than me) looked down and said there was a tiny dung beetle rolling a tiny piece of orangutan dung on the top of my head! It can be a messy job!

Can you give an example of a time where one of these guys really surprised you? Either with something they did that showed their intelligence or when one of them did something contrary to their normal behavior.

[zootrooper](#)

The orangutans are always surprising us! For example, they can be much more social in the wild than people might imagine. This particularly happens when there is a lot of food around and they can afford to be in groups. Once I saw a surprising example of allomothering. There were a couple of mothers with babies who were feeding in adjacent trees and the babies were playing together. One of the mothers moved off and left her baby with the other mother while she fed in a different tree. Eventually the first mother made a nest for her and her offspring, and the 'visitor' climbed in. Eventually this mother took the baby out and brought him back to his own mother!

Hi,,thank you for taking your time to do this! I'm Indonesian but I realize I know so little of Orangutans (which I think foreigners pronounce funnily) other than the generally agreed fact that they're fascinating.

So,I hope you don't mind me firing away. Is there some sort of hierarchy among orangutans like there are for other great apes? I've seen tons of documentaries about chimps or gorillas or bonobos (well,not so much on bonobos) but most that I've seen about orangutans just highlighted their mother-child

interactions or how they live in captivity.

How has the recent fire affected them? I'm a victim myself and just realized I haven't paid attention to how it affected them. Was there any research being done while the fires were still raging? If so, how difficult was it?

Is there any notable difference, physical or behavioral, between the ones in Sumatra and Borneo? How do the different people interact with them? I've seen a documentary about how some local made himself a hero by buying captured ones from poachers and released them, but such action ended up encouraging poachers. What are we supposed to do anyway, regarding their thinning population? My uncle lives in a more rural side of Sumatra, and he said the people there are more or less aware that they're endangered and decided to let them be. But being an Indonesian myself I think most locals are not so... considerate. There was even a news story about some people trying to lure away an orangutan with flare gun and ended up roasting it alive... Is there anything to be done with the people-orangutan situation?

[Daryl_McMexican](#)

Selamat Sore! Orangutans do seem to have some dominance rankings, but it's often not as obvious as with chimpanzees. Males compete with each other and thus we can see who is dominant by who wins these fights or who runs away. We usually don't see female-female aggression, but there are definitely some females that are dominant and that chase away incoming females. I published a paper about this a few years ago <http://link.springer.com/article/10.1007/s10764-008-9278-1#page-1>

Many orangutans lost their forest habitat during the fires, so I'm afraid that there were likely many deaths that resulted, or will result, from the fires. We didn't have any active fires at our site, the Cabang Panti Research Station in Gunung Palung National Park, but there was a lot of smoke in the air from fires burning in the areas surrounding the National Park. So, our research didn't stop during this period.

The future of the orangutan is really dependent on Indonesian people like yourself who care about the orangutan's future and can help to bring about social change. With my conservation program we work closely with local people to help educate them about the plight of orangutans and how their actions may impact orangutan survival. We help to introduce alternative livelihoods so that people do not have to rely on practices, such as logging, that cut down the forest. We also help local villages obtain legal title to their land – their hutan desa – so that they can control its fate and can continue to use it for forest gardens and extraction of non-timber forest products instead of having it converted to oil palm plantations. So, conservation practices can help both the orangutan and the local people!

How strong are orangs?

[iorgfeilkd](#)

Very strong! We haven't had any great ape olympics to compare them to humans! But, they have very long arms, hands and fingers and thus have incredible arm and grip strength. They can hang for a long time by one arm if they want, and can open up some large hard fruits that humans have to use a machete for (such as Neesia).

How close are orangutans to extinction in the wild? And how high are the risks of inbreeding at current population levels?

[Wonka_Raskolnikov](#)

In Sumatra there are only about 6,600 left, and in Borneo the best estimate we have for the population size is 45,000 individuals. This might sound like a lot, but with massive land clearing for agriculture and other human activities, it's really not that many orangutans. In healthy populations, such as in Gunung Palung, the risk of inbreeding is likely not very high, but it's hard to put an exact number on it because not many people have looked into the question of inbreeding.

Was there a time the orangutans tried to interact with you or a member of your team? How do you maintain being an 'observer' in their world?

[terracantia](#)

Orangutans have strong personalities and we have a couple of babies and juveniles in our study site that are very interested in the human observers. They spend a lot of time looking and sometimes even throw leaves and branches at us! In those situations we just don't react, except to move out of the way. Over time the orangutans who try to interact with us learn that we won't respond and just ignore our

presence. This is optimum, of course, because then the data we record are more representative of true wild behavior.

Hi Dr Knott! Thanks for doing this AMA. I have two questions:

1. Since we split with orangutans around 15 million years ago, how much can their reproductive strategies and physiology really tell us about ancient and modern humans? What kinds of data do you look at to study this?
2. Whenever I see your husband's photos of your children at the field site they look like magical experiences. ([example](#)) What is it like bringing your kids along for your fieldwork? Do they enjoy it? And what age did you start taking them?

[firedrops](#)

By comparing human and orangutan reproductive physiology we have learned, for example, that just like humans, female orangutan hormonal functioning responds to energy balance (whether she is gaining or losing weight). This is what I studied for my Ph.D. dissertation. Here's a link http://www.researchgate.net/profile/Cheryl_Knott/publication/230823409_The_ecology_of_reproduction_in_wild_orangutans/links/0fcfd505c Before that, people thought that this responsiveness of female ovarian function to energetics may be unique in humans. I studied this through collecting urine and analyzing the hormones, in urine, collecting detailed data on their food intake and collecting and analyzing the calories in their food and estimating their energy expenditure from detailed behavioral records.

I'm glad you like the pictures of our children at the field site! Our kids love going to the field with us – it's been an amazing experience for them growing up. Our son, Russell, first went when he was 11 months old. Then, we started taking both of them to the field when Jessica was about 4. Last summer the kids, as well as Tim and I, wrote blog posts for the National Geographic "Proof" blog. Here's a link to the first one, and at the bottom you'll see links to the others.

<http://proof.nationalgeographic.com/2014/07/01/postcards-from-borneo-a-family-adventure-begins-again/>

Is the following photo staged, or does it depict how you actually observe tree-dwelling orangutans?:

<http://savegorangutans.org/wp-content/uploads/2014/07/Cheryl-Knott-crew-w-binoc-slider-1200x500.jpg>

If that photo is for real, I'd like to know if you ever tried fitting a mirror to the front of your binoculars at a 45 degree angle in order to avoid severe neck damage.

[Flight714](#)

Yes, it's a real picture! Often we have to look basically straight up. In this picture you see my son, Russell (in the front), two of our Indonesian field assistants, and me. No, I've never tried that mirror technique, but sounds interesting! One thing I often do is lay down on the ground when I have to look straight up (and they're not moving!).

Thank you for making yourself available Dr Knott. These AMA's are a public service.

It has been widely reported that female apes of different species engage in same gendered sexual stimulation. Does this occur in Orangutans? Have you ever observed this behavior in male Orangutans?

[Pleurotus_Bibendum](#)

This does happen, but it's rare in the wild. A few instances of both female-female and male-male sexual stimulation have been observed. I only know of one instance of each, so it's not very common.

Are orangutans as gentle and laid back as they look?

[woowoo293](#)

Yes and no. Most of the time orangutans are laid back, as they spend a lot of time searching for food and resting. And mothers, of course, are very gentle with their babies! However, the males are very strong, and can be very aggressive with each other and with females. They push over trees, when they fight they tear holes in each other's faces and can rip off fingers and toes, and forced copulations are

common. We have several males who have died from the wounds they received during male-male fights. Females are rarely aggressive, but females will sometimes chase each other out of fruit trees, and sometimes this involves physical contact.

In some ways, I feel like your research invites the question of *what does it mean to be human?* Is this something you think about often? What are your thoughts on what makes humans so different from other primates?

[QueenofDrogo](#)

Yes, I think about this all the time! Most of the classes I teach at Boston University address this topic, especially one called, "The Ape Within". One of the things that is especially different about humans is the fact that we can have more than one dependent offspring at a time. So, humans have what we call 'overlapping nutritionally dependent offspring.' Although orangutan mothers may occasionally take food from their mothers, they don't really do active food sharing. Apes are self-provisioners. But, humans cooperate to share food, have sexual and age divisions of labor and cooperate in the raising of young. We show strong selection for pro-social behavior within our group. This may be one things that has contributed to the evolution of human intelligence.

Can orangutans crossbreed with other primate species to buffer the population? Or can they only breed with other orangutans?

[PinkestPieNA](#)

No, you can't crossbreed with other species. There have been some Sumatran and Bornean orangutan hybrids born in zoos. But since it was discovered that these are separate species this is not done anymore. In the wild, Sumatran and Bornean orangutan would never come into contact (they're on different islands).

Hi Dr. Knott!

I'm a huge fan of your work. A few years ago I did a comparative study of Orangutan behavior in Borneo at Danau Girang and a zoo environment and after that I fell in love them. It fascinates me the differences we see between islands. Since then I've decided I wanted to pursue my DVM to work on conservation programs (and hopefully orangutans!).

I have a question in regards to conservation: What do you think is the role of Veterinarians in conservation? More specifically for Orangutans are there gaps you see that veterinarians can fill in saving this species?

[Zebrasoma](#)

Thank you for your support of my work! Veterinarians are certainly needed, especially at rehabilitation centers where former pets orangutans are treated and then taught skills to help them return to the wild. Vets can also help us in our studies of the health status of wild orangutans.

Hello! Thank you for the AMA! I've wondered: What methods do they use to teach their youngs? Are they capable of sign language?

[PurplePlanetOrange](#)

Young orangutans learn from their mothers through observation. They stay with their mothers for about 7-10 years in the wild to learn everything they need to know. This is actually one reason why poaching is so bad, because when the babies are taken from their mothers they have no way of learning how to act in the wild, and are forced to learn from humans. This is obviously not a good situation. Orangutans are capable of learning some sign language in captivity.

I did my first unit in anthropology this semester and I was fascinated with the topic. My opinion on being a scientist completely changed within the course of a few months.

I dont really have a question, would just like if you could give some shoutouts to those who fund your work and give them the exposure they deserve.

Keep up the great work!

[bsignite](#)

We are funded by many organizations: the National Geographic Society, the National Science Foundation, the Arcus Foundation, the U.S. Fish and Wildlife, Woodland Park Zoo, the Disney Conservation Fund, the Conservation, Food and Health Foundation, Sea World-Busch Gardens Conservation Fund, the Wenner-Gren Foundation, the Leakey Foundation, the Houston Zoo, the Phoenix Zoo, the Seneca Park Zoo, the Keidanren Nature Conservation Fund, the Nacey Maggioncalda Foundation - just to name a few. For a complete list, check out our website at savegorangutans.org. We couldn't do our work without these generous supporters! We are also especially grateful to our private donors whose contributions are essential to our work.

How many hours per year do you spend watching orangutans?

[millicent_merde](#)

Since I am based in the U.S., I don't get to spend as much time in the field observing orangutans as I used to. I spend every summer in Borneo, though. My research team works 365 days a year, we've collected over 70,000 hours of data!

Two questions.

1. How do you collect their urine? Do you just stand under them with a bucket? Lol
2. In terms of reproduction, are orangutans monogamous? What is the most interesting aspect of their mating behavior? Do you see many similarities to humans?

Thank you!

[funkyfishs](#)

No, orangutans are not monogamous. Females will mate with multiple males, but often show mating preferences for particular males, especially dominant flanged males. Males will also mate with multiple females. Orangutans have high rates of forced copulations. I've written quite a bit about why this occurs. You can check out this article <http://rspb.royalsocietypublishing.org/content/277/1678/105.short> One thing people may not know is that orangutans mate for a long time – copulations take about 8 minutes on average compared to around 7 seconds for chimpanzees and they engage in many sexual behaviors that you might think only happened in humans. Just like in chimpanzees, orangutan males aren't very interested in young females who haven't reproduced yet. So often these young females work hard to get the male (usually a large flanged male) interested and may even use oral stimulation.