

# Monkey Brains: Predicting Capacity from Structure

by

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## Part I – *Callicebus imagini*\*

Recently, researchers discovered a previously unknown species of titi monkey in the Amazon rainforest. The monkey was observed and named *Callicebus imagini*. This monkey is rare and extremely endangered, and therefore difficult to study, both practically and ethically. They live in small family groups consisting of a mated pair and offspring, but little else is known about their behavior.

You are part of a team working in the Amazon, studying new world primate behavior and cognition. Unfortunately, as in most parts of the Amazon, there is a great deal of illegal logging happening in the area. Coming upon an area cleared by an illegal logging operation, you happen across the body of a recently killed *Callicebus imagini*.

Your team immediately freezes the body and sends it back to the lab for analysis.

### Questions

1. What tests would you want to perform on the body to get a better understanding of the anatomy and general physiology of this species?
2. Given the body that you have, how could you use it to better understand its behavior and cognition? What would you want to study about this body and how could you learn about behavior from the anatomy and physiology?
3. Research other species of new world monkeys. What do you expect the brain to be like in *Callicebus imagini* and what does that tell you about its cognition and other abilities?

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\* *Callicebus imagini* and the story presented in this case study are fictional; the monkey pictured above is an adult coppery titi (*Callicebus cupreus*), an actual member of the same genus to which *Callicebus imagini* is imagined to belong. Case copyright held by the **National Center for Case Study Teaching in Science**, University at Buffalo, State University of New York. Originally published July 5, 2019. Please see our **usage guidelines**, which outline our policy concerning permissible reproduction of this work. Licensed photo ©Lukas Blazek | Dreamstime.com, ID40920861.

## Part II – Size Matters

In studying the brain of this monkey, you discover that the brain is almost 10% larger than you would expect for a primate of this size.

### Questions

4. How does brain size generally vary with body size in mammals? What allows us to make this prediction?
  
5. For each possible enlargement listed below, describe what it would tell you about the monkey. Divide these up among your group members, then come back together and teach each other about what you found before going on to the next question.
  - Ventral premotor area:
  
  - Primary visual cortex:
  
  - Olfactory cortex:
  
  - Posterior parietal cortex:
  
  - Prefrontal cortex:
  
  - Frontal lobe:
  
6. What parts of the brain do you most expect to be enlarged and why?
  
7. What are the disadvantages of this increase in brain size?
  
8. If the increase is primarily in the prefrontal cortex and V1 area, what advantage would it provide for the monkey?
  
9. If the increase is primarily in the ventral premotor area, what advantage would it provide for the monkey?