

Tuesday, May 5, 2026 at 10:05:06 AM Eastern Daylight Time

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**Subject:** Dissertation Defense - Rebecca Evey, PhD in Biosciences  
**Date:** Monday, May 4, 2026 at 3:05:10 PM Eastern Daylight Time  
**From:** SSB Faculty List on behalf of Diane St. Germain  
**To:** SSB-FACULTY-LIST-L@LISTSERV.GMU.EDU

Dissertation Defense Announcement  
To: The George Mason University Community

**Candidate:** Rebecca Evey

**Program:** PhD in Biosciences

**Date:** May 11, 2026

**Time:** 11:00 A.M Eastern Time (US and Canada)

**Location:** In Person - Exploratory Hall #3301, Fairfax campus, Fairfax VA  
and via Zoom

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pwd=lv83ozlpvZCEkXzJOogdi50fr3HSjo.1](https://gmu.zoom.us/j/96650346170?pwd=lv83ozlpvZCEkXzJOogdi50fr3HSjo.1)

Meeting ID: 966 5034 6170

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**Committee Chair:** Dr. David Luther

**Committee members:** Dr. Kathleen Hunt, Dr. Elizabeth Freeman, Dr. Daniel Hanely

## **Title:** Knowledge from Keratin: Retrospective Analysis of Adrenal and Reproductive Hormones to Aid in Conservation

### **Abstract:**

Keratin tissues contain a record of past endocrine states as circulating hormones are deposited into the tissues as they grow. Long and slow growing keratin tissues, such as baleen from baleen whales and horns from rhinoceros, therefore, can contain years of endocrine data. Reproductive hormone and stress response hormone analyses in these structures can reveal past reproductive and stress states. The Rice's whale (*Balaenoptera ricei*) is critically endangered, and the white rhinoceros (*Ceratotherium simum*) and the black rhinoceros (*Diceros bicornis*) are threatened and critically endangered, respectively. First, we measured progesterone, testosterone, cortisol, and corticosterone in baleen plates of seven individual Rice's whales (four males — one of which was the holotype — and three females), including two individuals believed to have died from starvation and one known to have been killed by ship strike. In the two individuals that likely died of starvation, all four steroid hormones show increases in the most recently grown baleen, a pattern observed in other baleen whales in cases of prolonged illness or injury before death. A female with a known recent pregnancy had a sustained elevation of progesterone spanning the majority of her plate, indicating that baleen analysis in this species can detect recent pregnancies. No evidence of annual testosterone cycles was noted in three adult males, suggesting that this subtropical species might not have strong seasonal reproduction, which is atypical for baleen whales. While endocrine analysis has been proven in several baleen whales, it has never been done in horn from rhinoceros. The next goal was to perform assay validations and biological validations of steroid hormones in rhino horn and evaluate hormone patterns over time for 13 individual rhinos of known history. Progesterone analysis revealed peaks aligned with known pregnancies with samples from horn grown during pregnancies containing significantly higher progesterone concentrations, serving as a non-invasive biological validation. DHEA/S was also significantly higher in samples corresponding to pregnancies. Fluctuations in cortisol and DHEA/S across time were observed as well with increases in the cortisol:DHEA/S ratio seen in chronic illness cases prior to death. The good match of progesterone data to documented pregnancies suggests that rhino horn appears to be a viable and novel sample type to study longitudinal, retrospective hormone patterns in rhinoceros. Thus, we conclude that baleen and horn hormone analysis can be used to clarify life history patterns in these species.

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