



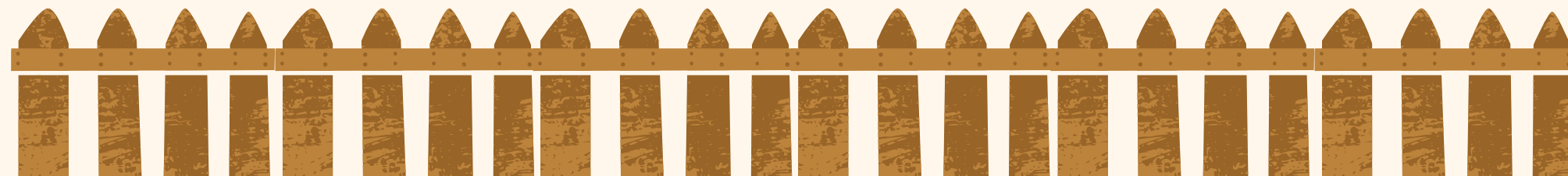
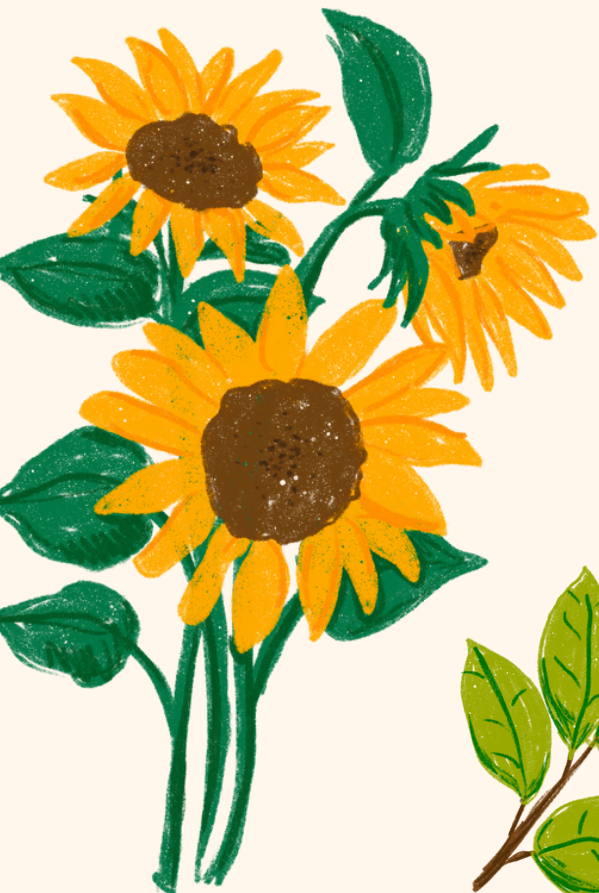
To Bee or Not to Bee Hairy:

A Quantitative Analysis of Pilosity

Among *Melissodes tepidus* Subspecies

Presented By Rachel Tang

Authors: Charles Thrift, Madeleine Ostwald, Katja Seltsmann



Arthropods

- Exoskeleton
- Chitin
- Armor
- Segmented bodies



Arthropods

- Exoskeleton
- Chitin
- Armor
- Segmented bodies



Hairy?!

Introduction

- **Bee pilosity** (hairiness, color, lightness)
 - Thermoregulation
 - Pollen collection
- Morphology
- Native conservation efforts



Genus

Melissodes

Species

tepidus

Subspecies

tepida

timberlakei

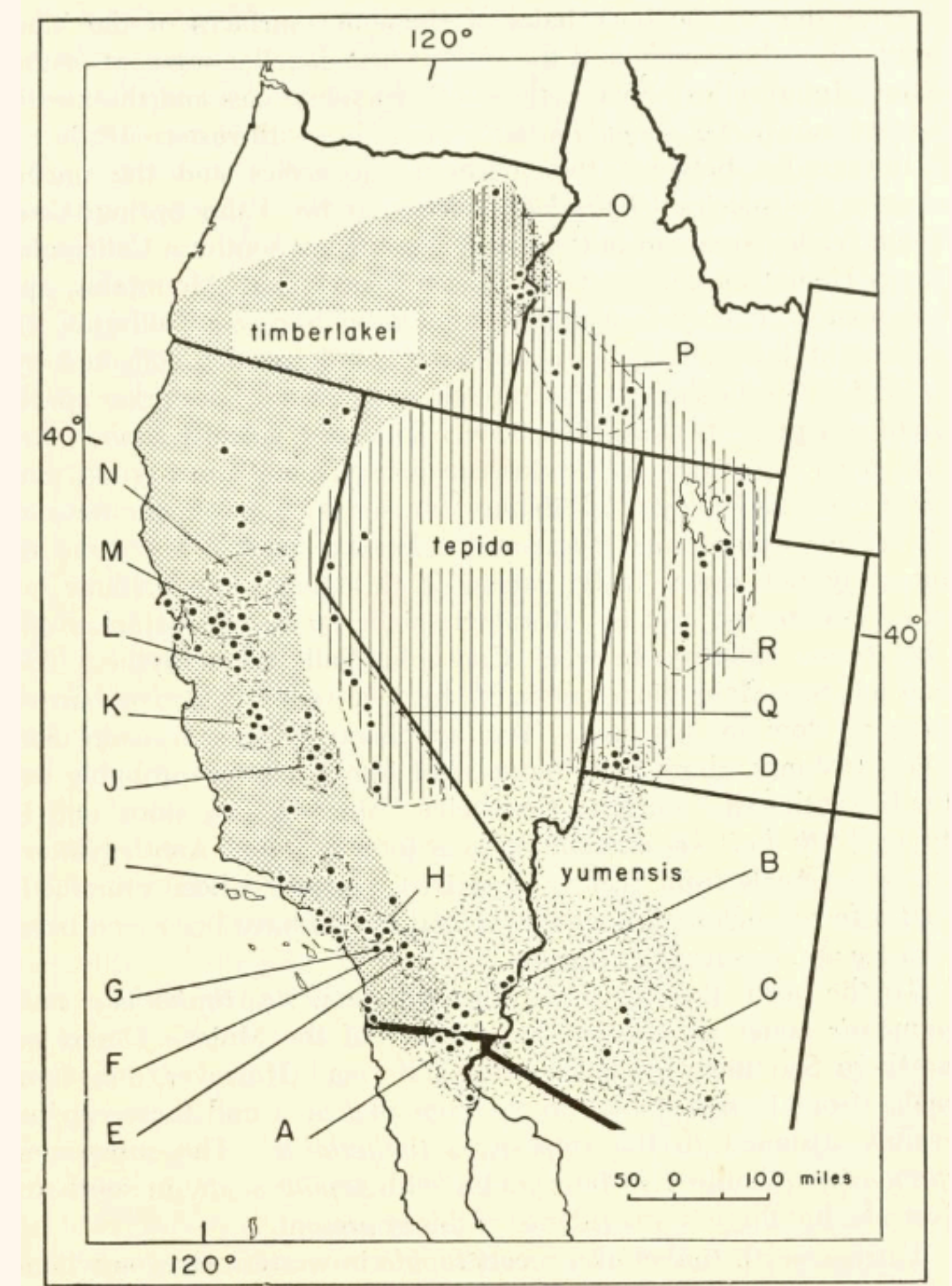
yumensis



Photo by Madeleine Ostwald



Photo by Katja Seltsmann, taken on campus



LaBerge WE. 1956. A revision of the bees of the genus *Melissodes* in North and Central America. Part I. (Hymenoptera, Apidae). Univ Kans Sci Bull. 37(18):1119.

Question

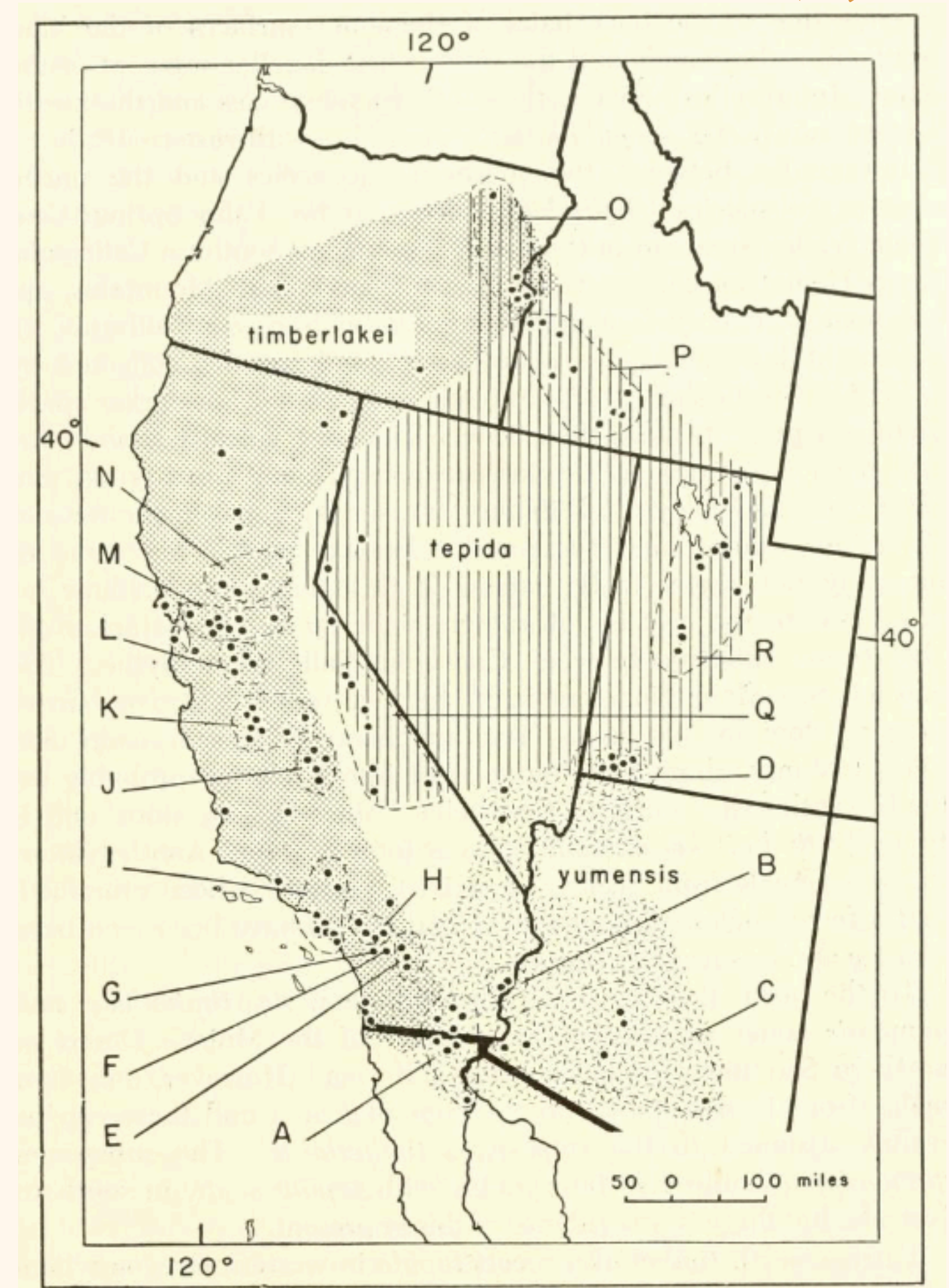


- Do the three *Melissodes tepidus* subspecies differ in their pilosity?

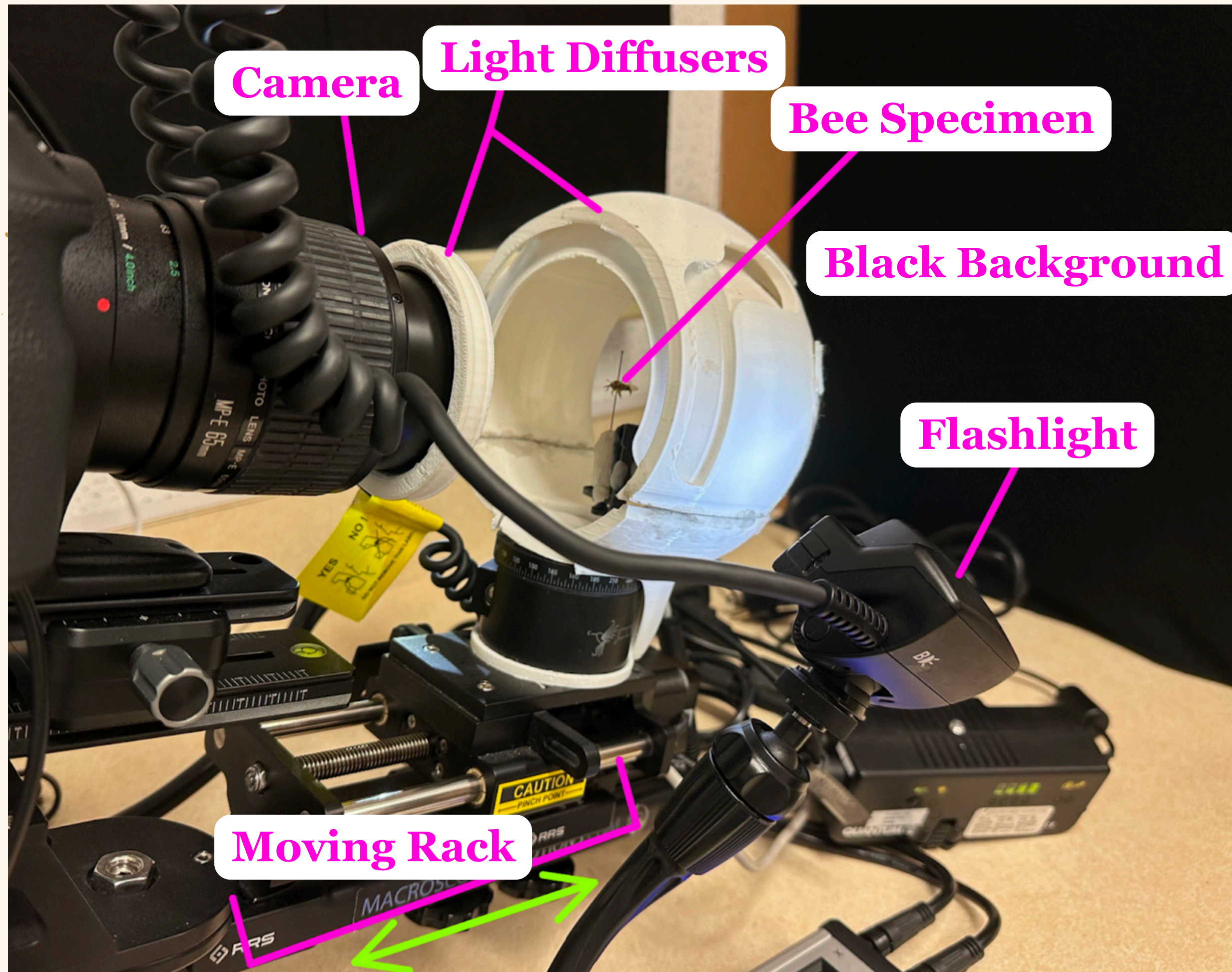
Hypothesis



- They differ significantly in **hair coverage** and **hair lightness** as adaptations.



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Methods

- Lateral images
- Multi-focal stacking
- $160\mu\text{m}$
- 90-110 images/bee

Sample Size = 30

- 3 subspecies $\times$ 5 specimens/subspecies $\times$ 2 images/specimen = **30 images**



UCSB-IZC00034443, an *M. tepidus timberlakei*.



UCSB-IZC00055235, an *M. tepidus timberlakei*.

Sample Size = 30

- 3 subspecies $\times$ 5 specimens/subspecies $\times$ 2 images/specimen = **30 images**



LACM ENT 541044, an *M. tepidus yumensis*.

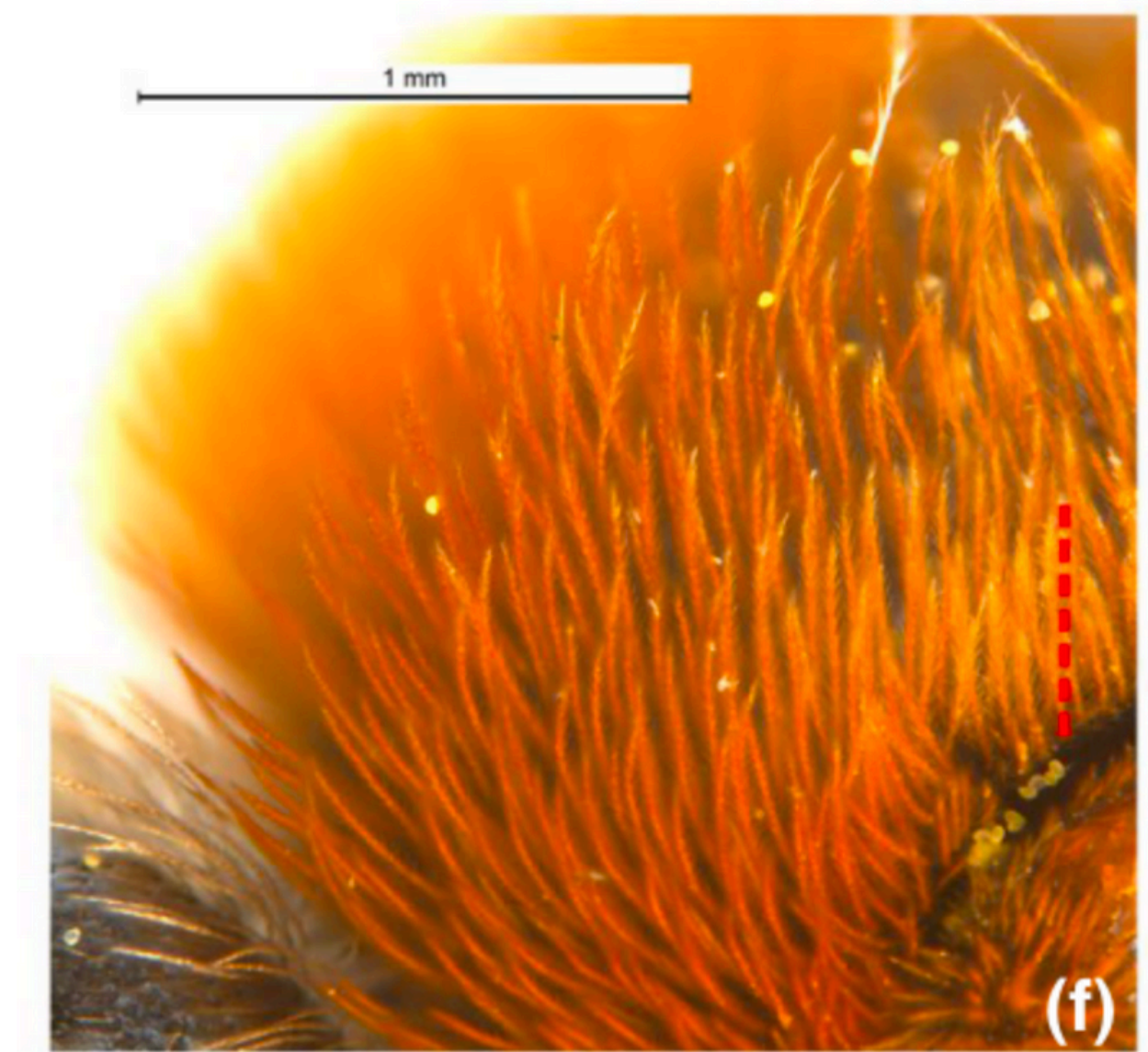
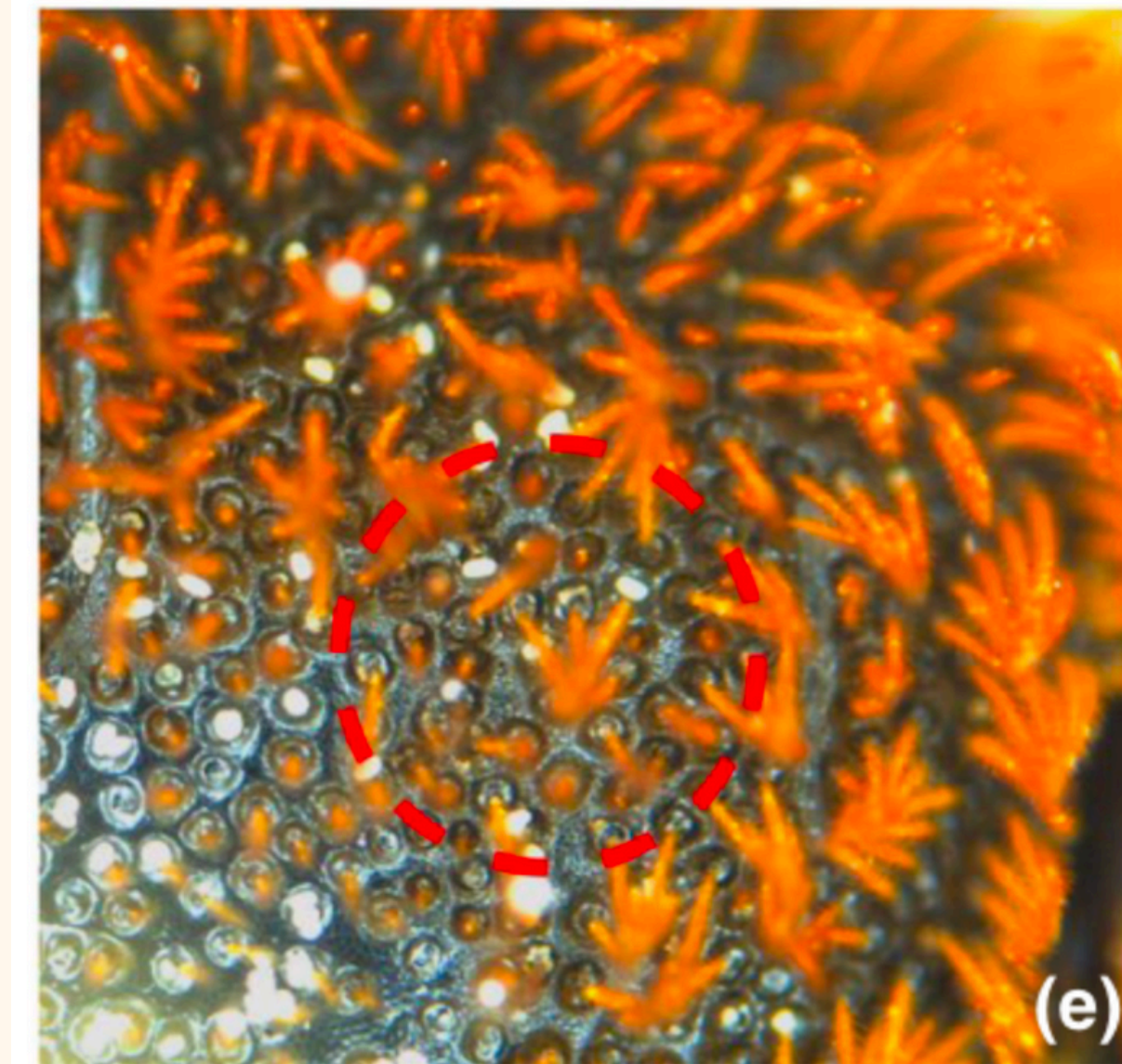


LACM ENT 540971, an *M. tepidus tepida*.



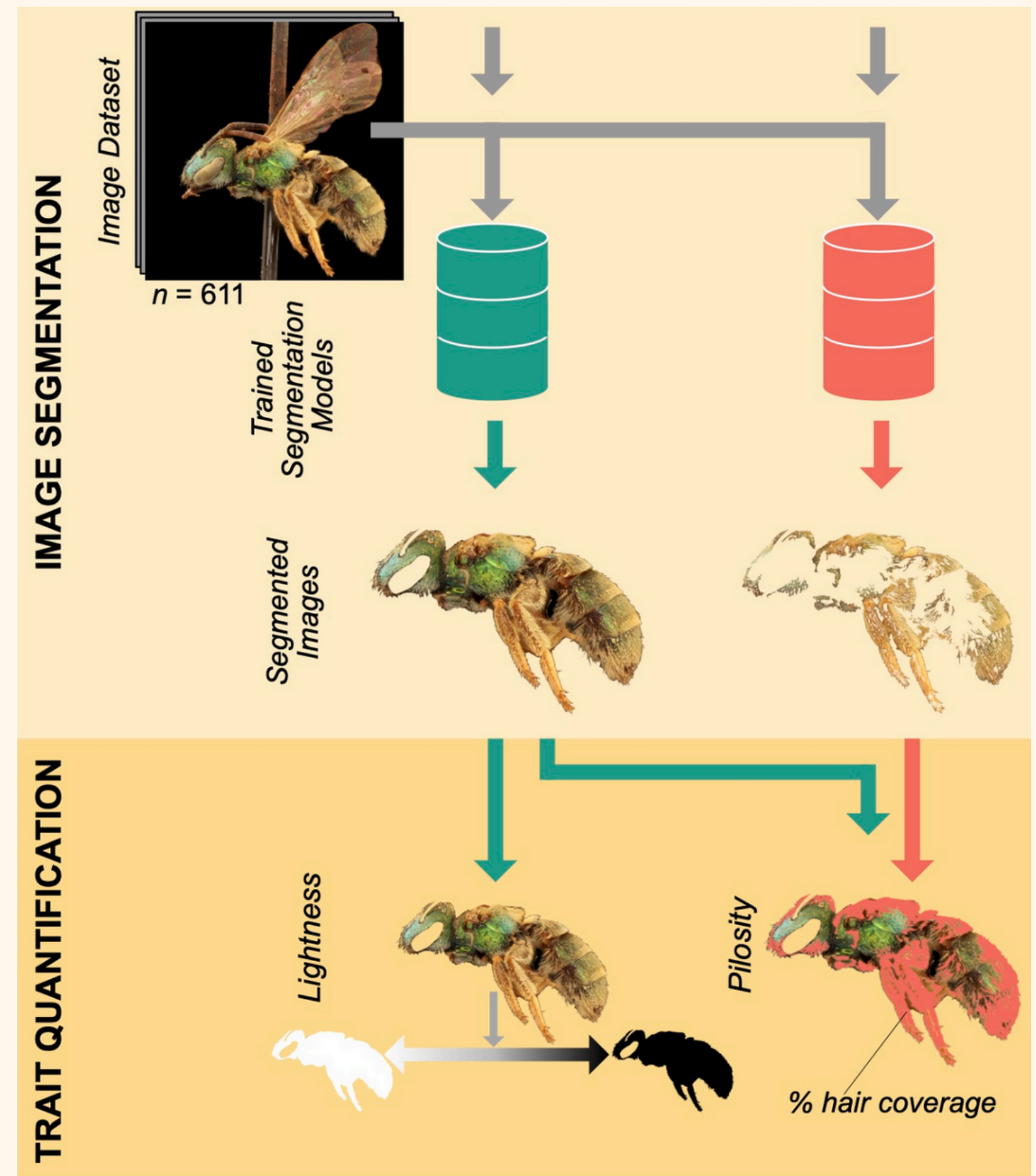
Pilosity Digitization - *In the past*

- Manual counting
- Hand-measuring
- Labor-intensive!



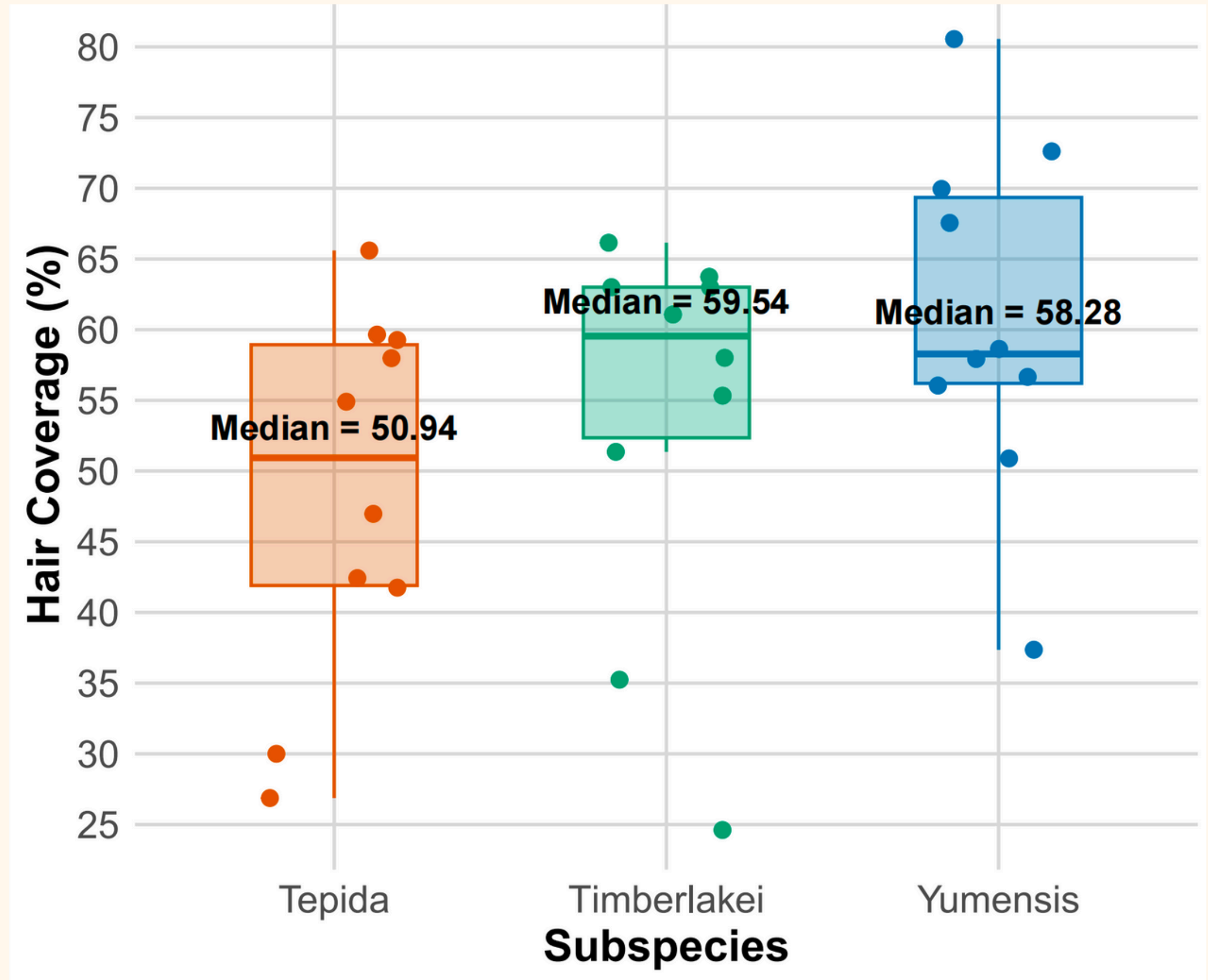
Pilosity Digitization - *Now*

- **Hair coverage** = % of hair pixels
- **Lightness** = 0~225 (black~white)



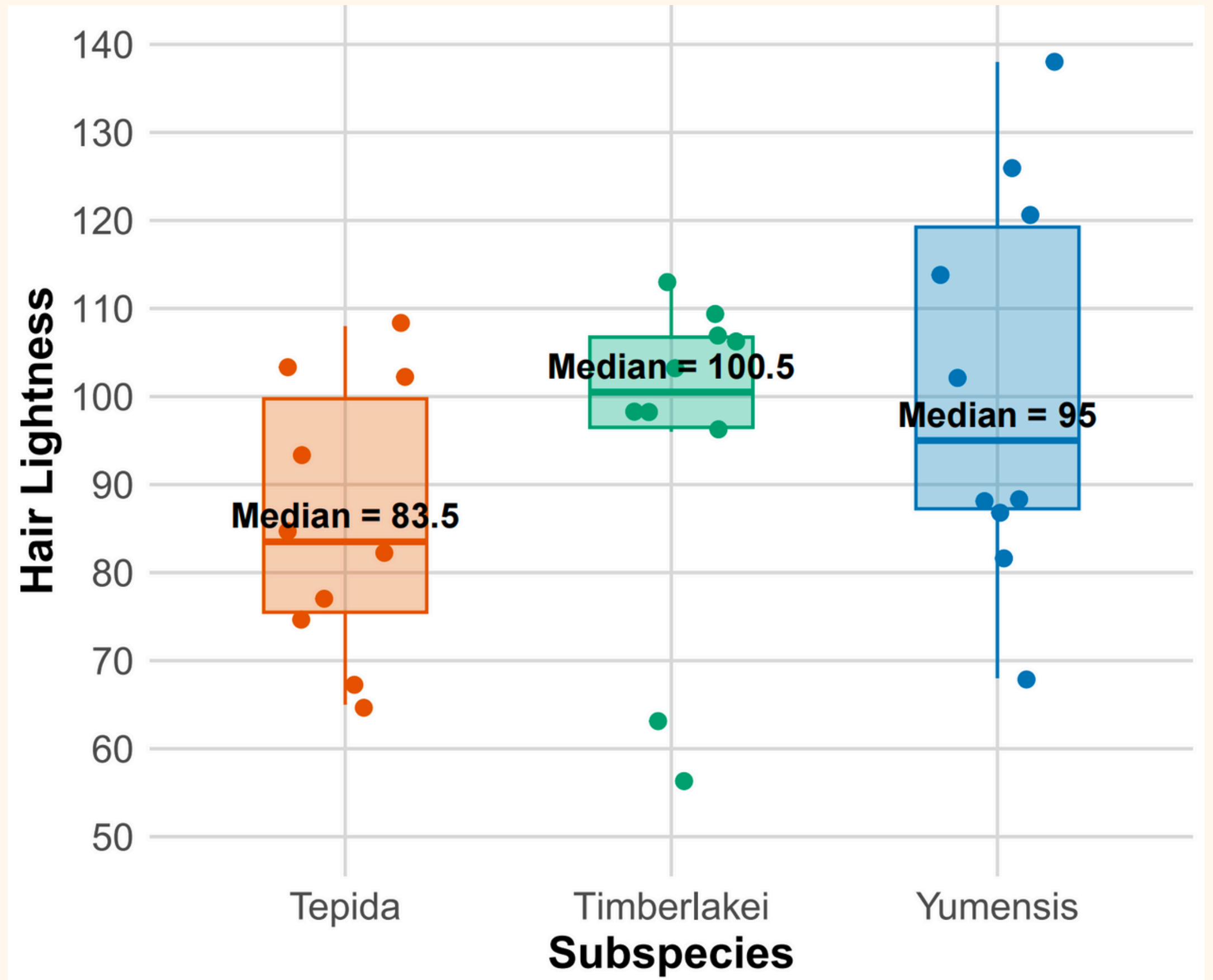
Results

- **Hair Coverage:**
 - ANOVA ($p = 0.129$)
 - Null not rejected
 - No statistical difference



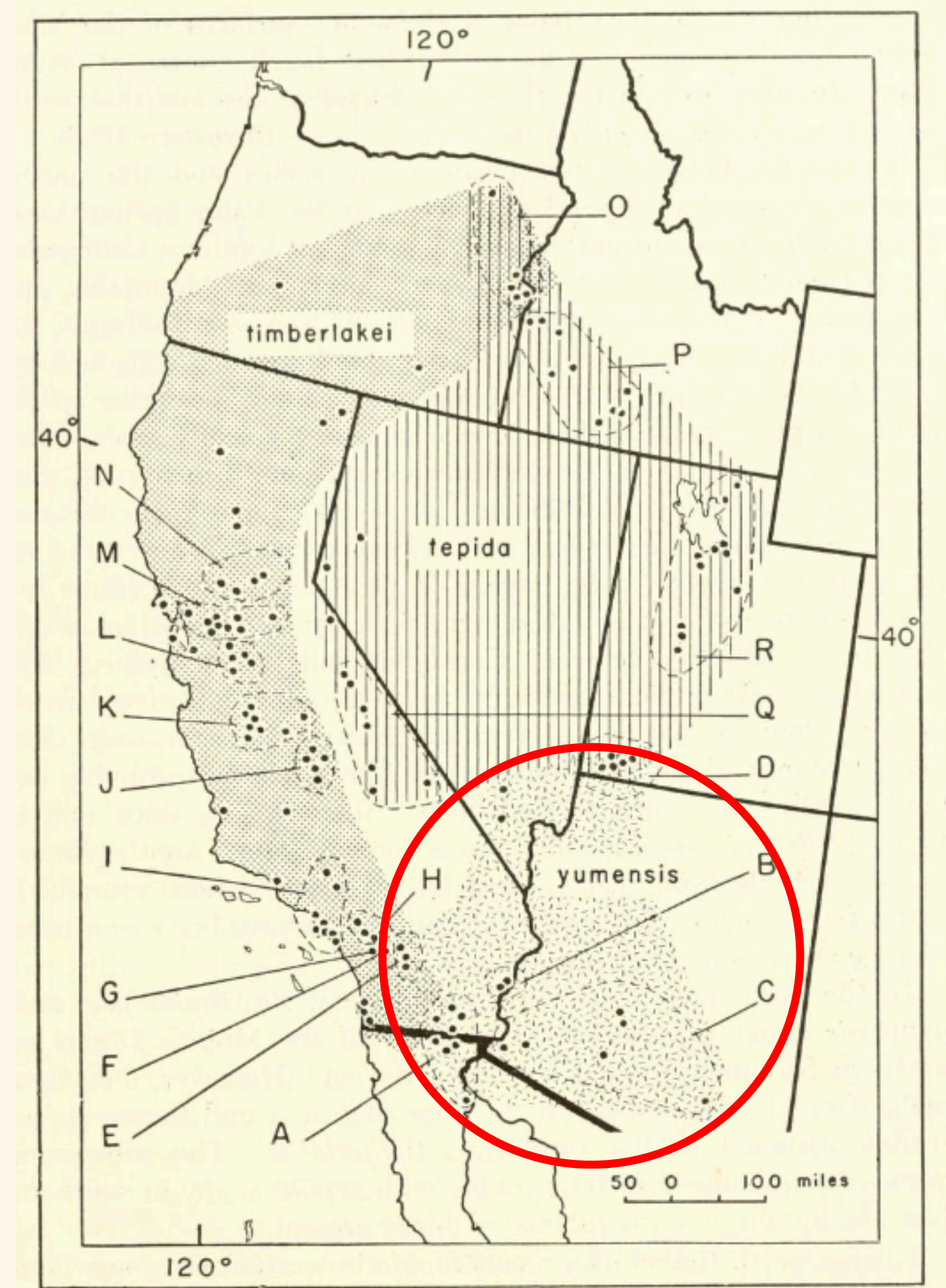
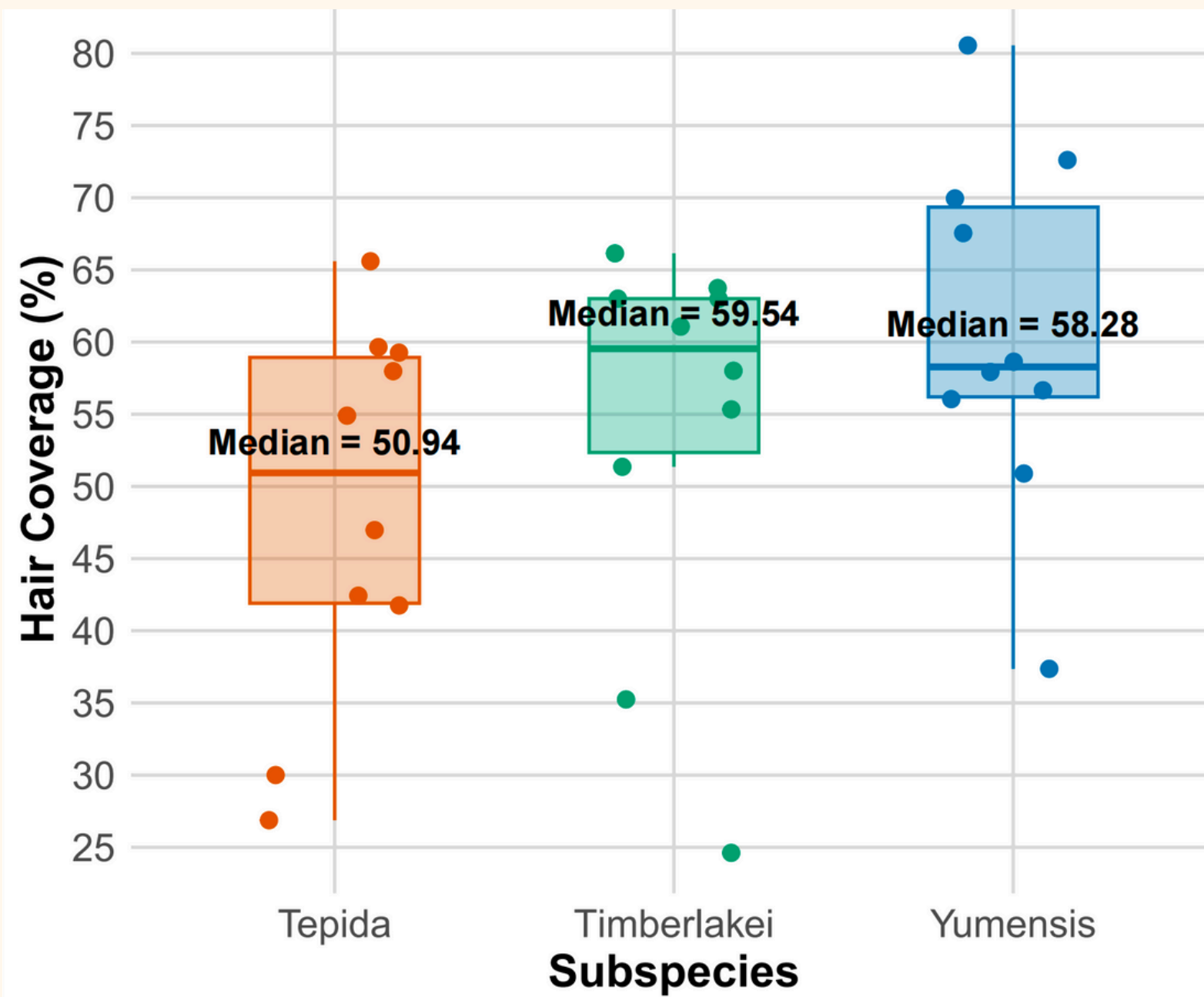
Results

- **Hair Lightness:**
 - ANOVA ($p = 0.207$)
 - Null not rejected
 - No statistical difference



Discussion

- *M. tepidus yumensis* are hairier
 - Arizona desert
 - UV protection + mitigate heat stress

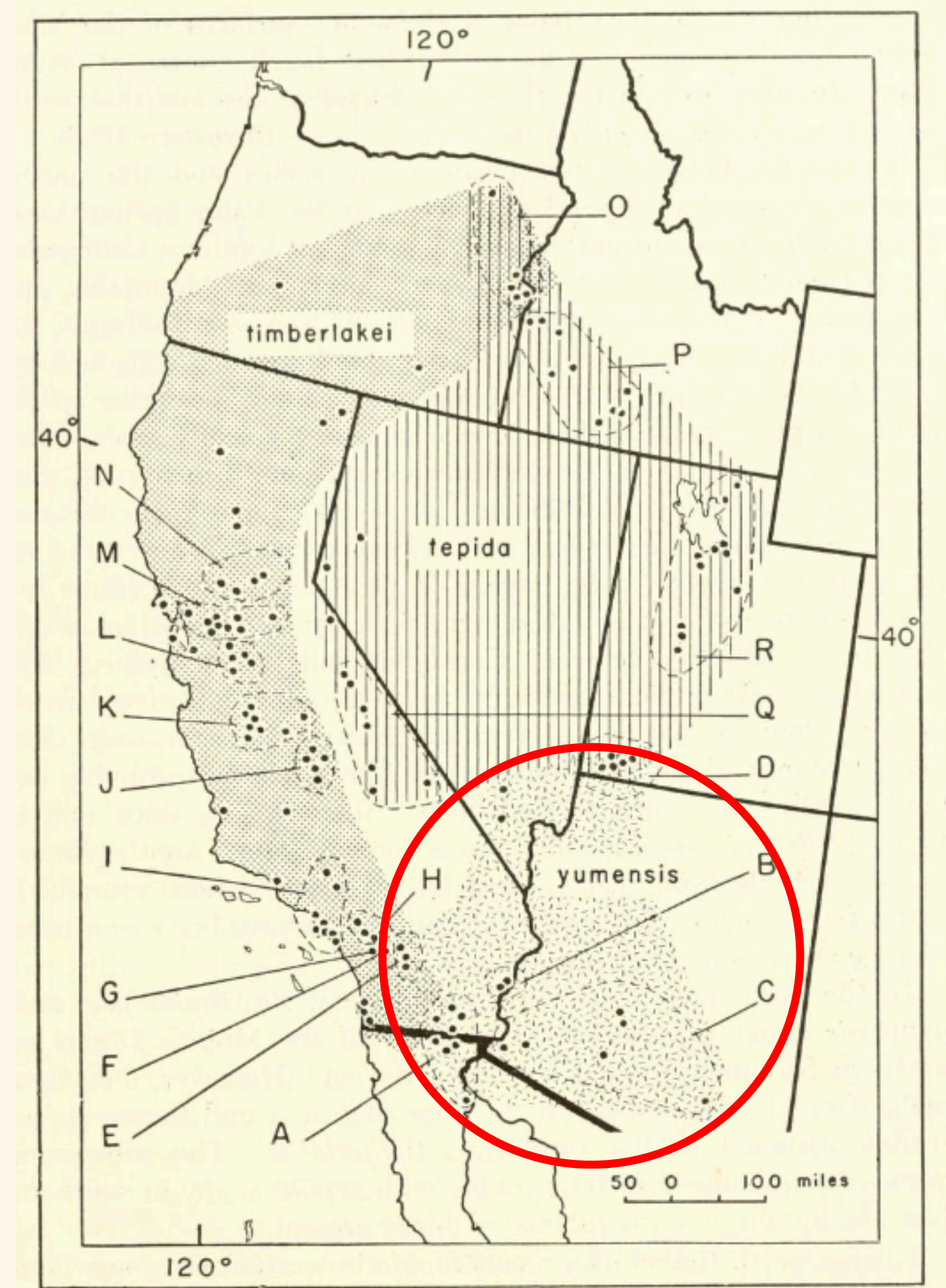


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Discussion

- *M. tepidus yumensis* are hairier
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★ Potential Solution:
Increasing the sample size?



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Discussion

- **Other factors:**

- Sex?
- Age?
- Specialization?

- **Obstacle:**

- Wings blocking?
- Dorsal and ventral?



**jagged
wing edges**

UCSB-IZC00055235, an *M. tepidus timberlakei*.



UC SANTA BARBARA

Cheadle Center for Biodiversity
& Ecological Restoration



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