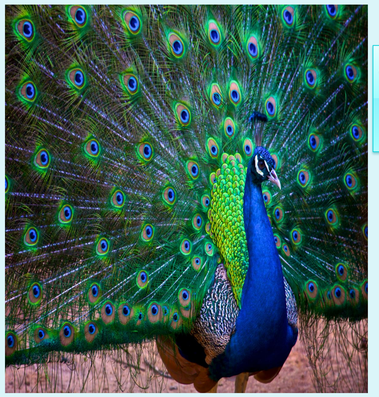

What causes variation in peacock feather color?

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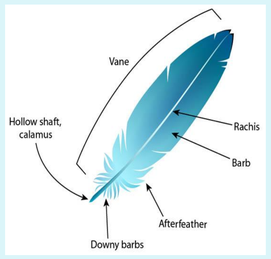
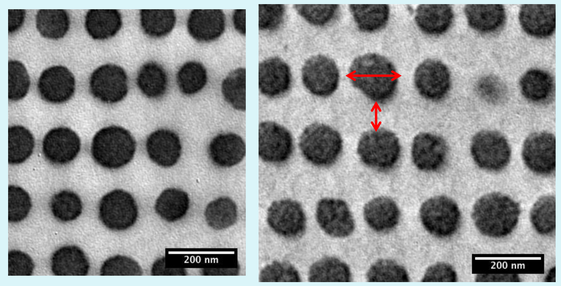
Background

•Color can be generated utilizing pigmentation, nanostructures, or a combination of both

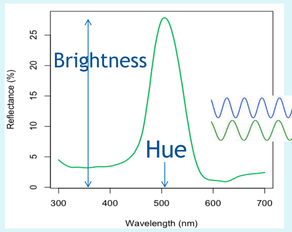
•Iridescent colors in male peacock tail feathers are produced by a nanostructured array of melanin-containing organelles (melanosomes)

•Variation in color of tail feathers plays a direct role in male peacock mating success



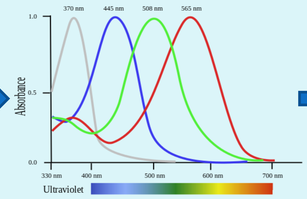


Two examples of the square color-producing nanostructure in peacock feathers, illustrating extremes in melanosome size.

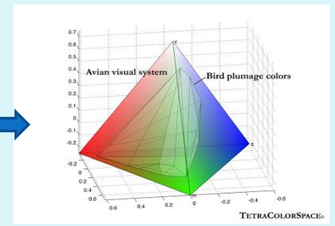


Typical reflectance spectrum of an eyespot from *Pavo cristatus*.

Wavelengths of light hit peacock retina.



Avian retinal cone sensitivity. Tetrachromatic vision.



Iridescence in avian tetrahedral colorspace.

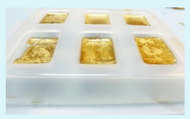
Objectives:

•To determine how variation in nanostructure relates to variation in color. Do males preferred by females have nanostructures that are more precisely arranged, potentially indicating higher quality?

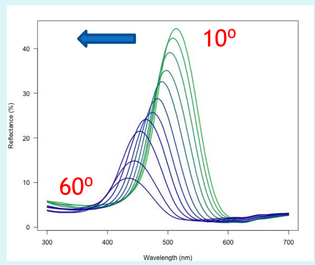
Methods and Materials

Measured feather color of 19 samples using a spectrophotometer and goniometer.

Visualized nanostructure using transmission electron microscopy (TEM).

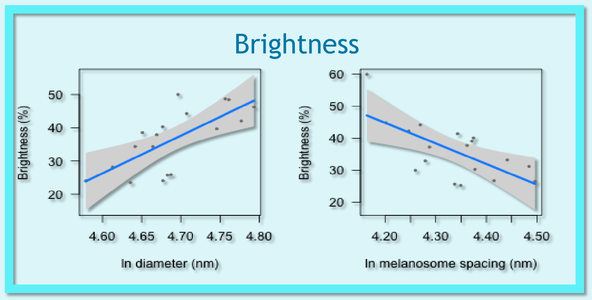


Measured relevant nanostructural variables (see above) using ImageJ.

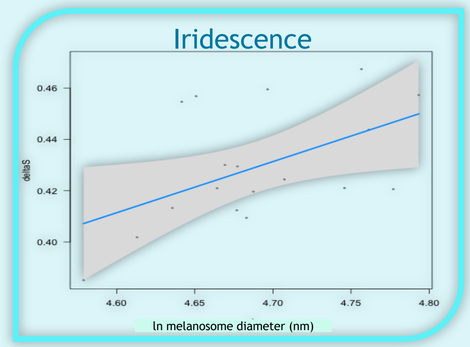


Correlated color and nanostructural variables using R.

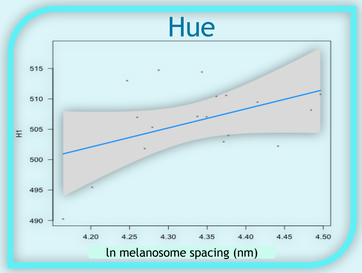
Results



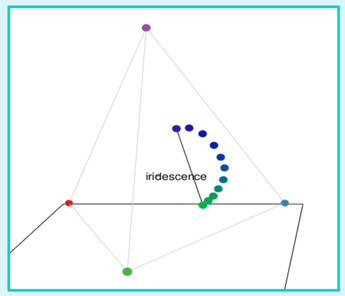
Brightness of feathers correlates positively with melanosome diameter ($p = 0.0033$) and negatively with melanosome spacing ($p = 0.0074$).



Melanosome diameter is a significant positive predictor of iridescence ($p=0.029$).



Melanosome spacing did not significantly *predict* hue ($p = 0.10$).



As angle of incidence changes from 10º to 60º, hue shifts toward UV and iridescence can be measured as the difference between them.

Conclusions

Previous work suggests that females prefer to mate with more iridescent males. Here, we show that these males likely have larger melanosomes than less iridescent males. Size of melanosomes is not known to be affected by condition (parasite load, nutritional condition, etc.), but genetic linkages between melanin production and other physiological variables suggest that females may obtain higher quality mates by mating with more iridescent males.