

This supplement contains additional information useful for considering the changing dimorphism hypothesis for the Hawaii akepa and other potential birds.

Male fledglings were determined to be older than female fledglings captured in June because they were larger and tended to have less fat. Freed et al. (2007) distinguished young June fledglings from older June fledglings (without regard to sex and using a larger sample) based on bill length differences more extreme than those just using fledglings of known sex. Mass and fat decreased during the transition from nestlings to younger to older June fledglings, while wing length and bill length increased. The current study shows that the “young” June fledglings were mostly females and the “older” June fledglings were mainly males.

It is possible that initial differences in growth during the nestling period could account for males being larger than females of the same age. However, limited data from nestlings do not support this. The largest nestlings were from two accessible nests in May, third of the four nesting months, within 3 days of fledging. The bill length of a female and another nestling of unknown sex in one nest was 8.5 mm, while that of a male in the second nest was 7.2 mm. The male and female had comparable tarsus length (19.8 and 19.7 mm), so the shorter bill is inconsistent with more rapid growth.

In general, several other alternatives to seasonal variation in sex allocation exist for interpreting the changing sexual dimorphism. We use the akepa to illustrate them, because other species that might have changing dimorphism may not have an environmental change that indicates seasonal variation in sex allocation. Maternal effects are known to influence growth in

birds (Groothuis et al. 2005, Badyaev et al. 2008). Faster male growth could be based on such a sex-specific effect. However, a maternal effect would have to be in addition to, not an alternative to, seasonal variation in sex allocation. By itself, a maternal effect without seasonal variation in sex allocation does not account for the rarity of male June fledglings with short bills and wings, associated with later fledging, nor for the greater growth of female bills between June and July, which would be less if more females had fledged earlier.

Differential mortality by sex could also generate changing sexual dimorphism in fledglings (Badyaev et al. 2001). In the absence of seasonal variation in sex allocation, differential mortality assumes that the observed pattern of sexual dimorphism arises because young females die at a higher rate than young males before June, and young males die at a higher rate than young females between June and July. The Hawaiian hawk (*Buteo sandwichensis*) has been observed taking akepa fledglings. However, if there was differential predation of female fledglings leading up to June, we predict that there should have been more males than females captured. Instead, more females were captured. Differential mortality by starvation of male and female fledglings could also lead to changing sexual dimorphism. However, more females would have to starve leading up to June, during a time of greater food availability (Freed et al. 2007), and grow bills more rapidly during the seasonal low in food availability, while males with the longest bills in June would have to starve during a time of more rapid female growth in bill. The facts do not support differential predation or differential starvation as an alternative to seasonal variation in sex allocation.

In general, enough needs to be known about food availability, growth patterns, and temporal patterns of capturing fledglings of different sex to apply the changing dimorphism hypothesis.

Literature Cited

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