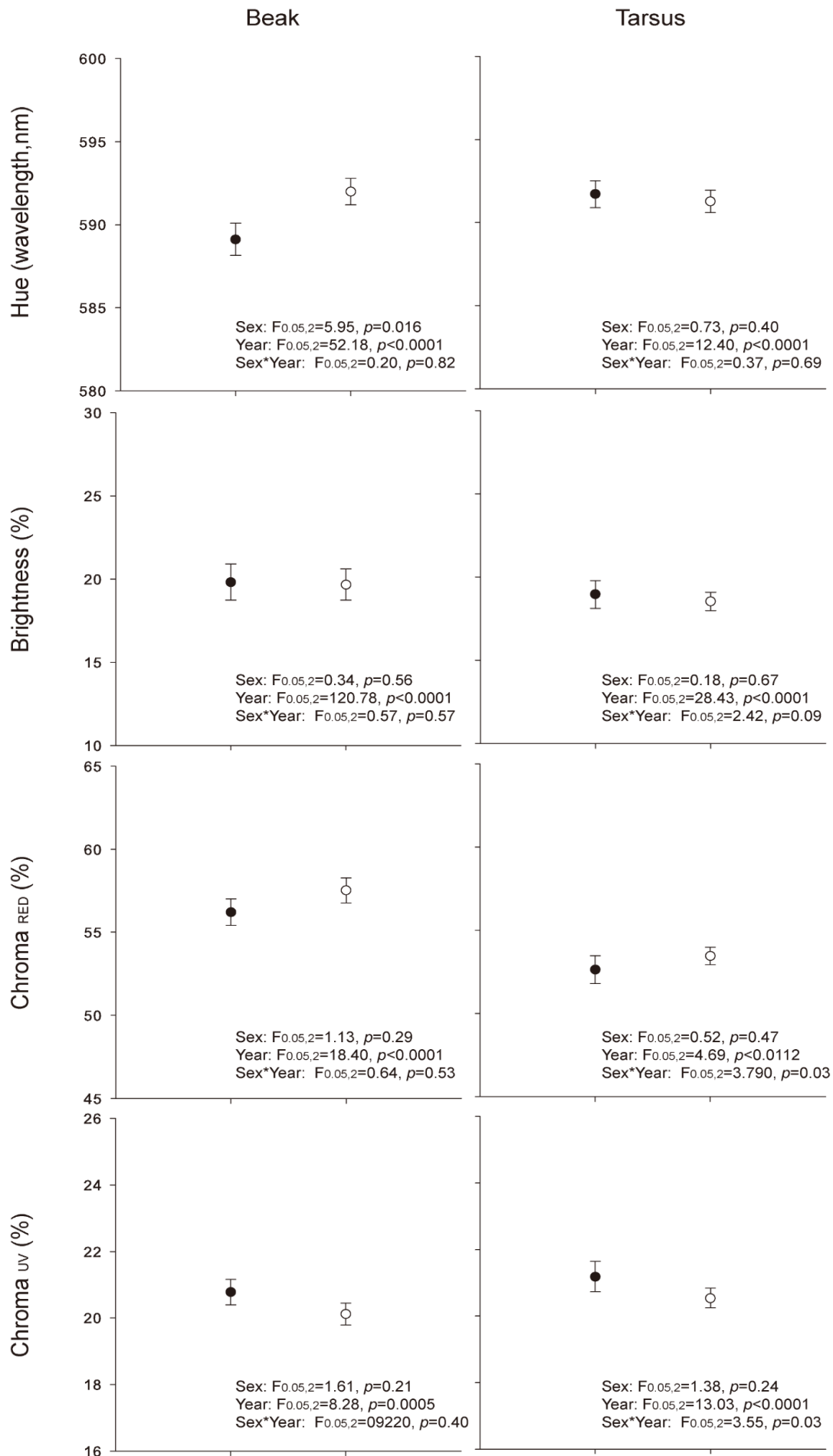


**Himalayan black bulbuls (*Hypsipetes
leucocephalus niggerimus*) exhibit sexual
dichromatism under ultraviolet light that is invisible
to the human eye
(SREP-16-43919A)**

Hsin-Yi Hung, Carol K. L. Yeung, Kevin E. Omland, Cheng-Te Yao, Chiou-Ju Yao
and Shou-Hsien Li*

Supplementary Figure S1 The colorimetric variables in carotenoid-based beak and tarsus between sexes in live birds. The hollow dots indicate males and the solid dots indicate females. Two-way ANOVA test, factor “Year” included three categories: 2008, 2009 and 2011, factor “Sex” included two categories: female and male.



Supplementary Table S1 Two-way ANOVA of different melanin-based parts between live birds and skin specimens

| Parts | Variables | Total brightness | | Chroma _{uv} | |
|----------|-----------|------------------|------------------|----------------------|------------------|
| | | <i>F</i> | <i>p</i> | <i>F</i> | <i>p</i> |
| Back | Item | 2.11 | 0.15 | 31.24 | <.0001 |
| | Sex | 2.48 | 0.12 | 8.95 | 0.003 |
| | Item*Sex | 2.78 | 0.10 | 8.93 | 0.003 |
| Belly | Item | 0.64 | 0.42 | 11.63 | 0.001 |
| | Sex | 7.18 | <0.001 | 13.76 | <0.001 |
| | Item*Sex | 0.02 | 0.90 | 1.05 | 0.31 |
| Nape | Item | 4.03 | 0.05 | 39.74 | <.0001 |
| | Sex | 0.05 | 0.83 | 9.32 | 0.003 |
| | Item*Sex | 0.01 | 0.96 | 4.31 | 0.04 |
| Breast | Item | 10.30 | <0.002 | 41.82 | <.0001 |
| | Sex | 0.34 | 0.56 | 13.10 | 0.0004 |
| | Item*Sex | 0.10 | 0.75 | 7.63 | 0.007 |
| Forehead | Item | 0.01 | 0.94 | 26.81 | <.0001 |
| | Sex | 0.17 | 0.68 | 9.41 | 0.003 |
| | Item*Sex | 0.72 | 0.40 | 5.53 | 0.02 |
| Remige | Item | 0.00 | 0.97 | 4.68 | 0.03 |
| | Sex | 2.77 | 0.10 | 2.16 | 0.14 |
| | Item*Sex | 0.19 | 0.66 | 0.09 | 0.76 |
| Scapular | Item | 8.64 | <0.004 | 21.40 | <.0001 |
| | Sex | 0.31 | 0.58 | 9.77 | 0.002 |
| | Item*Sex | 0.54 | 0.46 | 3.35 | 0.07 |
| Tail | Item | 19.52 | <.0001 | 9.42 | 0.003 |
| | Sex | 1.97 | 0.16 | 2.30 | 0.13 |
| | Item*Sex | 0.10 | 0.76 | 0.06 | 0.81 |

Item: live bird and specimen, df= 1

Sex: female and male, df= 1

Item*sex: df=2.

Bold type indicates statistic significant (Bonferroin adjusted $p = 0.005$).

Supplementary Table S2 Two-way ANOVA of different melanin-based parts in skin specimens

| Parts | Variables | Total brightness | | Chroma _{uv} | |
|----------|-----------|------------------|----------|----------------------|----------|
| | | <i>F</i> | <i>p</i> | <i>F</i> | <i>p</i> |
| Back | Sex | 0.79 | 0.38 | 1.99 | 0.17 |
| | Year | 1.44 | 0.26 | 1.73 | 0.20 |
| | Sex*Year | 1.65 | 0.22 | 0.99 | 0.39 |
| Belly | Sex | 1.94 | 0.18 | 3.20 | 0.09 |
| | Year | 0.79 | 0.47 | 2.52 | 0.10 |
| | Sex*Year | 0.07 | 0.94 | 0.11 | 0.90 |
| Nape | Sex | 0.08 | 0.79 | 0.71 | 0.41 |
| | Year | 0.38 | 0.69 | 0.99 | 0.39 |
| | Sex*Year | 0.51 | 0.61 | 1.15 | 0.34 |
| Breast | Sex | 0.05 | 0.84 | 4.37 | 0.05 |
| | Year | 0.94 | 0.41 | 0.88 | 0.43 |
| | Sex*Year | 0.14 | 0.87 | 0.11 | 0.90 |
| Forehead | Sex | 0.00 | 0.97 | 1.47 | 0.24 |
| | Year | 0.09 | 0.91 | 1.26 | 0.30 |
| | Sex*Year | 2.37 | 0.12 | 0.73 | 0.50 |
| Remige | Sex | 0.22 | 0.65 | 0.15 | 0.70 |
| | Year | 3.14 | 0.06 | 0.11 | 0.90 |
| | Sex*Year | 0.69 | 0.52 | 0.05 | 0.95 |
| Scapular | Sex | 0.03 | 0.86 | 0.72 | 0.41 |
| | Year | 3.70 | 0.04 | 0.34 | 0.71 |
| | Sex*Year | 2.68 | 0.09 | 0.11 | 0.89 |
| Tail | Sex | 0.39 | 0.54 | 0.96 | 0.33 |
| | Year | 0.39 | 0.68 | 0.24 | 0.79 |
| | Sex*Year | 0.35 | 0.71 | 0.98 | 0.39 |

df: year-2, sex-1, sex*year-2

Year: indicating the years after making into skin specimens, including within 5yrs, 10yrs and 15yrs.

Bold type indicates statistic significant (Bonferroin adjusted $p = 0.005$).