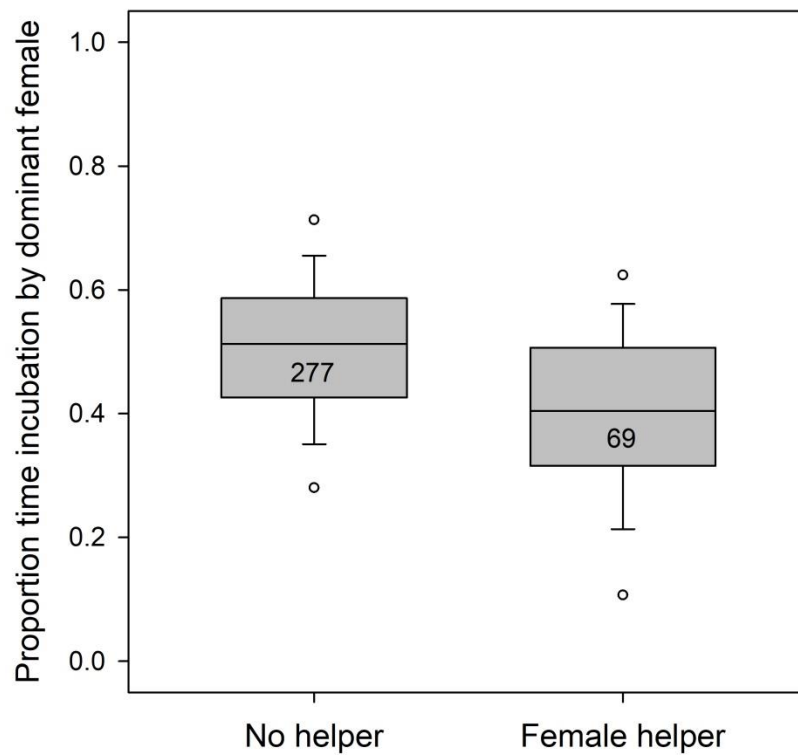


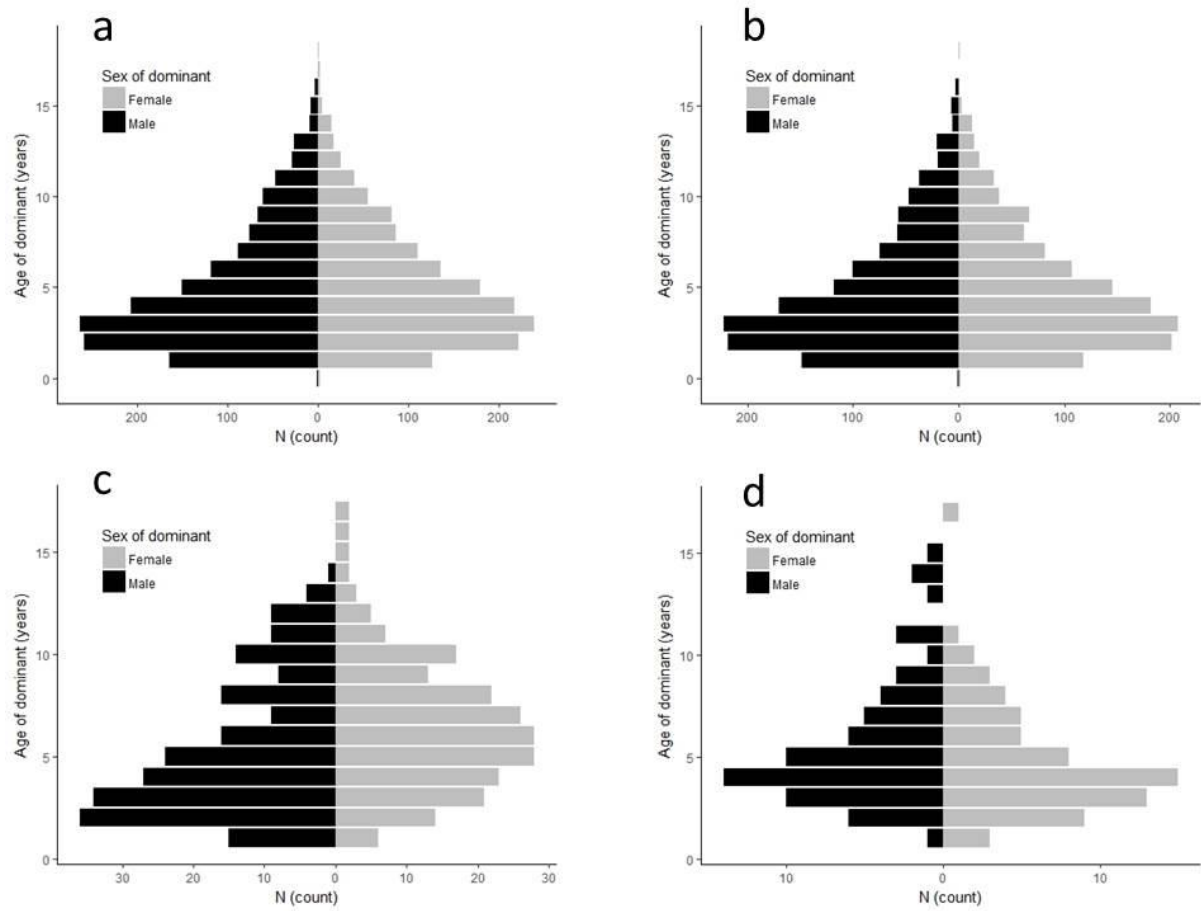
Supplementary Information

**Breeders that receive help age more slowly in a cooperatively breeding bird**

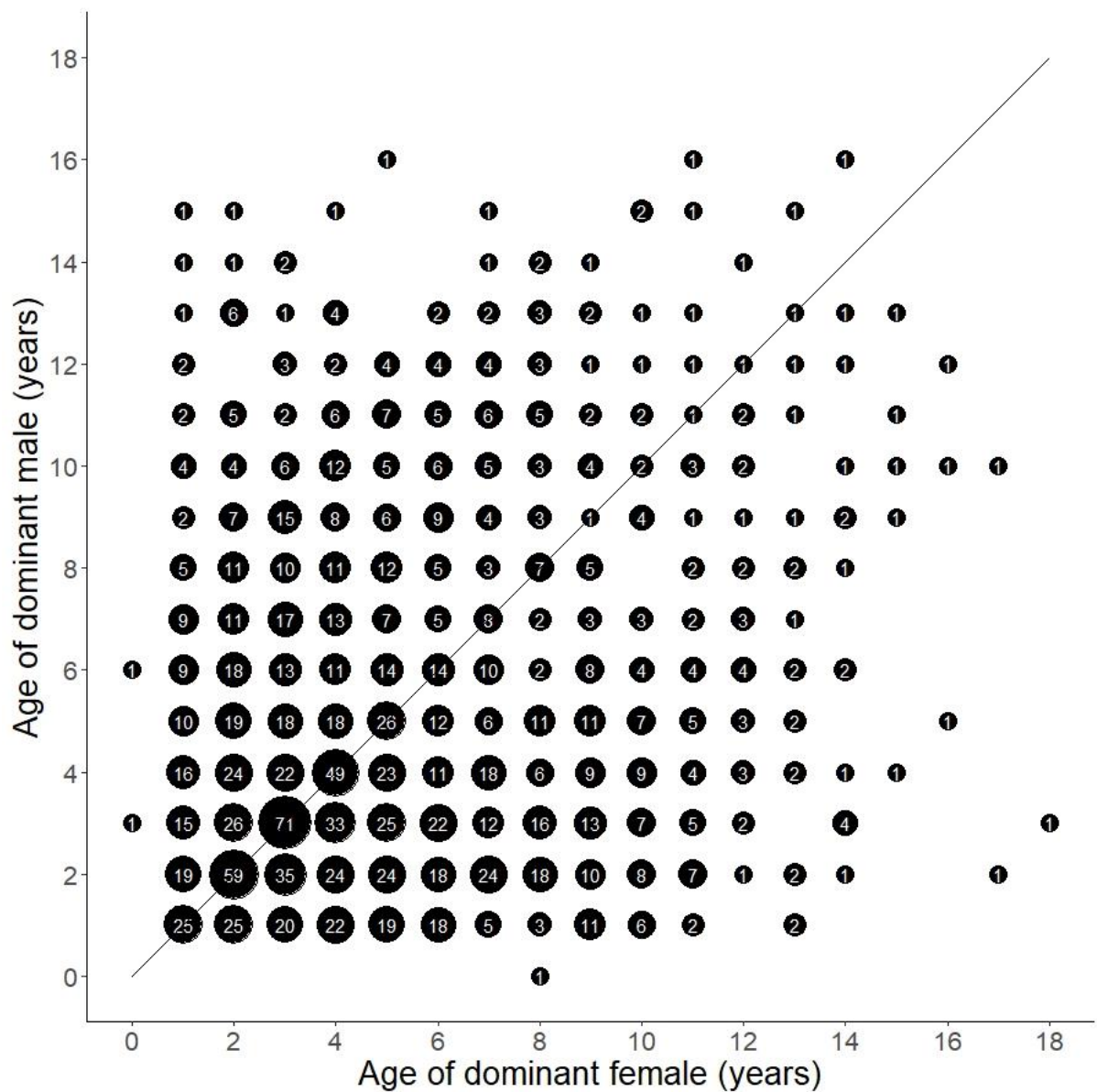
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**Supplementary Figure 1. Incubation attendance by dominant females in relation to helper presence.** Boxplots show median and 5%, 10%, 25%, 75%, 90% and 95% quantiles. Numbers are sample sizes. Source data are provided as a Source Data file.



**Supplementary Figure 2. Age distribution of female and male dominants.** (a) irrespective of helper presence; (b) without helpers; (c) with female helpers; (d) with male helpers. Source data are provided as a Source Data file.



**Supplementary Figure 3. The ages of the male and the female dominant within a pair.**

The  $x = y$  slope is given for reference. The size of the data points is proportional to the number of occurrences of each combination of male and female age. Numbers are sample sizes. Source data are provided as a Source Data file.

**Supplementary Table 1. Incubation attendance in relation to helper presence and age.**

| <b>(a) Incubation attendance dominant female</b> |                 |           |                  |                 | <b>(b) Incubation attendance all incubating females</b> |           |                  |                 |
|--------------------------------------------------|-----------------|-----------|------------------|-----------------|---------------------------------------------------------|-----------|------------------|-----------------|
| <b>Variable</b>                                  | <b>Estimate</b> | <b>SE</b> | <b><i>t</i></b>  | <b><i>P</i></b> | <b>Estimate</b>                                         | <b>SE</b> | <b><i>t</i></b>  | <b><i>P</i></b> |
| Intercept                                        | 0.50            | 0.02      | 30.23            | 0.000           | 0.50                                                    | 0.02      | 29.89            | <0.001          |
| Age                                              | -0.01           | 0.01      | -0.49            | 0.626           | -0.01                                                   | 0.02      | -0.45            | 0.652           |
| Age <sup>2</sup>                                 | 0.04            | 0.05      | 0.66             | 0.510           | 0.06                                                    | 0.06      | 1.06             | 0.292           |
| Territory quality                                | 0.00            | 0.02      | 0.09             | 0.932           | 0.00                                                    | 0.02      | 0.01             | 0.992           |
| Helper (Y/N)                                     | -0.10           | 0.02      | -4.97            | <0.001          | 0.23                                                    | 0.02      | 10.91            | <0.001          |
| Number of subordinates                           | 0.00            | 0.02      | 0.11             | 0.911           | -0.01                                                   | 0.02      | -0.35            | 0.726           |
| Age x helper                                     | 0.02            | 0.04      | 0.46             | 0.647           | 0.02                                                    | 0.04      | 0.55             | 0.584           |
| Age x number of subordinates                     | 0.00            | 0.02      | 0.26             | 0.797           | -0.01                                                   | 0.03      | -0.15            | 0.883           |
| Random                                           | <b>Variance</b> |           |                  |                 | <b>Variance</b>                                         |           |                  |                 |
| Individual ID                                    | <0.01           |           | 346 observations |                 | <0.01                                                   |           | 346 observations |                 |
| Year                                             | <0.01           |           | 192 individuals  |                 | <0.01                                                   |           | 192 individuals  |                 |
| Residual                                         | 0.02            |           | 12 years         |                 | 0.02                                                    |           | 12 years         |                 |

(a) incubation attendance by dominant females, (b) incubation attendance by all incubating females (dominants and female helpers). Final models contained all main effects.

**Supplementary Table 2. Age-dependent survival probability in relation to female and male helper presence.**

| (a) Dominant female          |          |      |                   |        | (b) Dominant male |                   |       |        |
|------------------------------|----------|------|-------------------|--------|-------------------|-------------------|-------|--------|
| Variable                     | Estimate | SE   | z                 | P      | Estimate          | SE                | z     | P      |
| Intercept                    | 1.98     | 0.14 | 14.07             | <0.001 | 1.75              | 0.17              | 10.26 | <0.001 |
| Age                          | -0.51    | 0.25 | -2.04             | 0.041  | -0.09             | 0.19              | -0.49 | 0.623  |
| Age <sup>2</sup>             | -0.64    | 0.22 | -2.87             | 0.004  | -0.59             | 0.22              | -2.71 | 0.007  |
| Territory quality            | 0.41     | 0.17 | 2.44              | 0.015  | 0.06              | 0.16              | 0.35  | 0.725  |
| Female helper (Y/N)          | -0.04    | 0.27 | -0.16             | 0.876  | 0.23              | 0.23              | 1.00  | 0.315  |
| Male helper (Y/N)            | -0.63    | 0.34 | -1.84             | 0.066  | 0.30              | 0.36              | 0.83  | 0.407  |
| Number of subordinates       | 0.26     | 0.19 | 1.34              | 0.179  | -0.26             | 0.16              | -1.66 | 0.098  |
| Age x female helper          | 0.94     | 0.41 | 2.28              | 0.023  | 0.76              | 0.38              | 1.97  | 0.049  |
| Age x male helper            | 0.63     | 0.74 | 0.85              | 0.398  | -0.18             | 0.64              | -0.28 | 0.778  |
| Age x number of subordinates | -0.02    | 0.36 | -0.05             | 0.959  | -0.13             | 0.28              | -0.46 | 0.649  |
| Random                       | Variance |      | 1571 observations |        | Variance          | 1581 observations |       |        |
| Individual ID                | 0.21     |      | 463 individuals   |        | <0.01             | 491 individuals   |       |        |
| Year                         | 0.10     |      | 15 years          |        | 0.29              | 15 years          |       |        |

(a) dominant females, (b) dominant males. Final models contained all main effects and significant interaction terms.

**Supplementary Table 3. Annual change in relative telomere length (RTL) in relation to the presence of helpers of either sex.**

| (a) Dominant female      |                 |      |                 |          | (b) Dominant male |      |                 |          |
|--------------------------|-----------------|------|-----------------|----------|-------------------|------|-----------------|----------|
| Variable                 | Estimate        | SE   | <i>t</i>        | <i>P</i> | Estimate          | SE   | <i>t</i>        | <i>P</i> |
| Intercept                | -0.21           | 0.04 | -4.73           | <0.001   | -0.07             | 0.07 | -0.95           | 0.351    |
| Initial RTL              | -0.78           | 0.07 | -11.90          | <0.001   | -0.56             | 0.08 | -6.74           | <0.001   |
| Age                      | 0.10            | 0.07 | 1.46            | 0.154    | -0.08             | 0.09 | -0.86           | 0.397    |
| Territory quality        | -0.02           | 0.06 | -0.26           | 0.794    | 0.12              | 0.08 | 1.46            | 0.150    |
| Offspring produced (Y/N) | -0.01           | 0.07 | -0.20           | 0.847    | 0.08              | 0.08 | 0.96            | 0.341    |
| Helper (Y/N)             | 0.50            | 0.12 | 4.27            | <0.001   | 0.03              | 0.10 | 0.25            | 0.802    |
| Number of subordinates   | -0.37           | 0.09 | -3.99           | <0.001   | -0.01             | 0.09 | -0.12           | 0.905    |
| Random                   | <b>Variance</b> |      | 45 observations |          | <b>Variance</b>   |      | 74 observations |          |
| Individual ID            | <0.01           |      | 39 individuals  |          | 0.02              |      | 58 individuals  |          |
| Cohort                   | <0.01           |      | 18 cohorts      |          | 0.02              |      | 16 cohorts      |          |
| Year                     | <0.01           |      | 11 years        |          | <0.01             |      | 9 years         |          |
| Residual                 | 0.04            |      |                 |          | 0.07              |      |                 |          |

(a) Dominant females, (b) dominant males. Final models contained all main effects.

**Supplementary Table 4. The likelihood that a female subordinate reproduced (co-breeding) in relation to the age of the dominants.**

| (a) Dominant female    |                 |                  |          |          | (b) Dominant male |                  |          |          |
|------------------------|-----------------|------------------|----------|----------|-------------------|------------------|----------|----------|
| <b>Variable</b>        | <b>Estimate</b> | <b>SE</b>        | <b>z</b> | <b>P</b> | <b>Estimate</b>   | <b>SE</b>        | <b>z</b> | <b>P</b> |
| Intercept              | -4.13           | 0.53             | -7.84    | <0.001   | -3.87             | 0.45             | -8.56    | <0.001   |
| Dominant age           | 0.01            | 0.05             | 0.24     | 0.808    | 0.00              | 0.04             | -0.05    | 0.961    |
| Territory quality      | 0.45            | 0.35             | 1.26     | 0.207    | 0.21              | 0.30             | 0.72     | 0.473    |
| Subordinate age        | 3.10            | 0.44             | 7.10     | <0.001   | 2.97              | 0.41             | 7.21     | <0.001   |
| Number of subordinates | 0.40            | 0.30             | 1.36     | 0.174    | 0.22              | 0.27             | 0.80     | 0.422    |
| Random                 | <b>Variance</b> | 571 observations |          |          | <b>Variance</b>   | 569 observations |          |          |
| Group                  | <0.01           | 465 groups       |          |          | <0.01             | 464 groups       |          |          |
| Individual ID          | 0.3             | 226 individuals  |          |          | <0.01             | 239 individuals  |          |          |
| Year                   | 0.16            | 15 years         |          |          | 0.09              | 15 years         |          |          |

(a) Dominant females, (b) dominant males. Final models contained all main effects.



**Supplementary Table 5. Relative telomere length (RTL) in dominant Seychelles warblers in relation to the presence of a helper of either sex.**

| (a) Dominant female    |                 |      |                 |          | (b) Dominant male |      |                 |          |
|------------------------|-----------------|------|-----------------|----------|-------------------|------|-----------------|----------|
| Variable               | Estimate        | SE   | <i>t</i>        | <i>P</i> | Estimate          | SE   | <i>z</i>        | <i>P</i> |
| Intercept              | 0.93            | 0.07 | 12.48           | <0.001   | 0.84              | 0.05 | 15.48           | <0.001   |
| Age                    | -0.17           | 0.12 | -1.48           | 0.148    | 0.07              | 0.08 | 0.88            | 0.385    |
| Territory quality      | -0.02           | 0.12 | -0.20           | 0.846    | -0.06             | 0.07 | -0.84           | 0.403    |
| Helper (Y/N)           | -0.28           | 0.20 | -1.37           | 0.178    | -0.07             | 0.10 | -0.77           | 0.443    |
| Number of subordinates | 0.26            | 0.15 | 1.71            | 0.096    | 0.11              | 0.08 | 1.41            | 0.164    |
| Random                 | <b>Variance</b> |      | 45 observations |          | <b>Variance</b>   |      | 74 observations |          |
| Individual ID          | <0.01           |      | 39 individuals  |          | <0.01             |      | 58 individuals  |          |
| Cohort                 | <0.01           |      | 18 cohorts      |          | 0.02              |      | 16 cohorts      |          |
| Year                   | 0.02            |      | 11 years        |          | <0.01             |      | 9 years         |          |
| Residual               | 0.13            |      |                 |          | 0.08              |      |                 |          |

(a) Dominant females, (b) dominant males. Final models contained all main effects.

**Supplementary Table 6. Pre-breeding (July) body mass in dominants in relation to helper presence.**

| (a) Dominant female                |          |      |                  |          | (b) Dominant male |      |                  |          |
|------------------------------------|----------|------|------------------|----------|-------------------|------|------------------|----------|
| Variable                           | Estimate | SE   | <i>t</i>         | <i>P</i> | Estimate          | SE   | <i>t</i>         | <i>P</i> |
| Intercept                          | 15.34    | 0.17 | 92.34            | <0.001   | 16.54             | 0.12 | 135.91           | <0.001   |
| Age                                | 0.86     | 0.56 | 1.54             | 0.126    | 0.46              | 0.38 | 1.23             | 0.221    |
| Age <sup>2</sup>                   | -0.61    | 0.55 | -1.12            | 0.266    | -0.45             | 0.38 | -1.18            | 0.239    |
| Territory quality                  | 0.09     | 0.18 | 0.48             | 0.629    | 0.02              | 0.12 | 0.13             | 0.896    |
| Time of day (midday vs afternoon)  | -0.28    | 0.20 | -1.41            | 0.160    | -0.12             | 0.13 | -0.91            | 0.364    |
| Time of day (morning vs afternoon) | -0.30    | 0.20 | -1.52            | 0.132    | -0.30             | 0.16 | -1.91            | 0.058    |
| Tarsus length                      | 0.36     | 0.18 | 2.06             | 0.041    | 0.33              | 0.12 | 2.73             | 0.007    |
| Helper (Y/N)                       | -0.16    | 0.23 | -0.73            | 0.467    | 0.03              | 0.14 | 0.21             | 0.836    |
| Random                             | Variance |      |                  |          | Variance          |      |                  |          |
| Individual ID                      | 0.52     |      | 147 observations |          | 0.40              |      | 213 observations |          |
| Year                               | 0.06     |      | 129 individuals  |          | 0.05              |      | 175 individuals  |          |
| Residual                           | 0.48     |      | 14 years         |          | 0.28              |      | 14 years         |          |

(a) Dominant females, (b) dominant males. Final models contained all main effects.

**Supplementary Table 7. Changes in the likelihood that a subordinate helped in relation to the dominant's age and the subordinate's sex.**

| (a) Dominant female            |                 |      |                  |          | (b) Dominant male |      |                  |          |
|--------------------------------|-----------------|------|------------------|----------|-------------------|------|------------------|----------|
| Variable                       | Estimate        | SE   | <i>z</i>         | <i>P</i> | Estimate          | SE   | <i>z</i>         | <i>P</i> |
| Intercept                      | -0.97           | 0.44 | -2.20            | 0.028    | -1.14             | 0.37 | -3.10            | 0.002    |
| Dominant age                   | 0.28            | 0.33 | 0.85             | 0.393    | -0.03             | 0.31 | -0.08            | 0.936    |
| Territory quality              | 0.06            | 0.26 | 0.23             | 0.822    | 0.21              | 0.24 | 0.88             | 0.382    |
| Subordinate sex (male)         | -1.05           | 0.23 | -4.61            | <0.001   | -0.94             | 0.21 | -4.57            | <0.001   |
| Subordinate age (older)        | 1.66            | 0.22 | 7.45             | <0.001   | 1.46              | 0.21 | 7.08             | <0.001   |
| Number of subordinates         | 0.09            | 0.21 | 0.45             | 0.652    | -0.23             | 0.20 | -1.18            | 0.240    |
| Longevity                      | -0.09           | 0.31 | -0.29            | 0.773    | 0.10              | 0.31 | 0.31             | 0.757    |
| Dominant age * Subordinate sex | -1.29           | 0.48 | -2.67            | 0.008    | 0.46              | 0.39 | 1.18             | 0.239    |
| Random                         | <b>Variance</b> |      | 694 observations |          | <b>Variance</b>   |      | 707 observations |          |
| Group ID                       | <0.01           |      | 497 groups       |          | <0.01             |      | 516 groups       |          |
| Individual ID                  | 0.23            |      | 226 individuals  |          | 0.21              |      | 244 individuals  |          |
| Year                           | 0.34            |      | 14 years         |          | 0.13              |      | 15 years         |          |

(a) Dominant females, (b) dominant males. The analysis is similar to the analysis in Table 3, except that longevity of the dominant is included here to account for selective disappearance (i.e. individuals for which longevity was unknown were removed). Longevity was not significant and models that included longevity had a slightly higher AICc than the same models without this variable ( $\Delta\text{AICc}$  dominant females = 1.98,  $\Delta\text{AICc}$  dominant males = 1.92). Final models contained all main effects and significant interaction terms.