

Supporting information

Title: Forest stratification shapes allometry and flight morphology of tropical butterflies

Running title: Stratification shapes butterfly morphology

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Appendix S1. Vertical distributions of the 64 most abundant nymphalid species in Reserva Río Canandé, captured in the years 2006–2007 and 2011–2013. Stratification values according to the Bayespfref analysis and results of the binomial analysis are shown.

| Species | Number of captures | | | Stratification (Bayespfref) | P-value (binomial analysis) | C/U |
|------------------------------|--------------------|-------------|-------|--------------------------------|-----------------------------------|-----|
| | Canopy | Understorey | Total | | | |
| Limenitidinae | | | | | | |
| <i>Adelpha barnesia</i> | 33 | 3 | 36 | 0.86 | <0.001 | C |
| <i>Adelpha cytherea</i> | 0 | 12 | 12 | 0.68 | <0.001 | U |
| <i>Adelpha erotia</i> | 34 | 1 | 35 | 0.92 | <0.001 | C |
| <i>Adelpha heraclea</i> | 19 | 4 | 23 | 0.76 | 0.003 | C |
| <i>Adelpha naxia</i> | 19 | 3 | 22 | 0.84 | 0.001 | C |
| <i>Adelpha phylaca</i> | 308 | 51 | 359 | 0.88 | <0.001 | C |
| Heliconiinae | | | | | | |
| <i>Dryas iulia</i> | 28 | 26 | 54 | 0.49 | 0.892 | CU |
| <i>Heliconius atthis</i> | 3 | 17 | 20 | 0.18 | 0.003 | U |
| <i>Heliconius cydno</i> | 11 | 68 | 79 | 0.16 | <0.001 | U |
| <i>Heliconius eleuchia</i> | 1 | 33 | 34 | 0.09 | <0.001 | U |
| <i>Heliconius hecale</i> | 9 | 3 | 12 | 0.69 | 0.146 | CU |
| <i>Heliconius hecalesia</i> | 31 | 1 | 32 | 0.94 | <0.001 | C |
| <i>Heliconius sara</i> | 25 | 18 | 43 | 0.59 | 0.360 | CU |
| <i>Heliconius doris</i> | 21 | 20 | 41 | 0.61 | 1.000 | CU |
| Nymphalinae | | | | | | |
| <i>Colobura annulata</i> | 9 | 7 | 16 | 0.50 | 0.804 | CU |
| <i>Colobura dirce</i> | 13 | 15 | 28 | 0.59 | 0.851 | CU |
| <i>Eresia alsina</i> | 6 | 12 | 18 | 0.27 | 0.238 | CU |
| <i>Eresia clara</i> | 2 | 32 | 34 | 0.10 | <0.001 | U |
| <i>Siproeta stelenes</i> | 6 | 9 | 15 | 0.43 | 0.607 | CU |
| <i>Smyrna blomfildia</i> | 82 | 3 | 85 | 0.95 | <0.001 | C |
| <i>Tigridia acesta</i> | 38 | 50 | 88 | 0.38 | 0.241 | CU |
| Biblidinae | | | | | | |
| <i>Callicore atacama</i> | 17 | 0 | 17 | 0.96 | <0.001 | C |
| <i>Callicore guatemalena</i> | 10 | 1 | 11 | 0.86 | 0.012 | C |
| <i>Catonephele numilia</i> | 79 | 22 | 101 | 0.77 | <0.001 | C |
| <i>Catonephele orites</i> | 7 | 12 | 19 | 0.39 | 0.359 | CU |
| <i>Diaethria marchalii</i> | 947 | 324 | 1271 | 0.82 | <0.001 | C |
| <i>Hamadryas amphinome</i> | 188 | 6 | 194 | 0.97 | <0.001 | C |
| <i>Hamadryas arinome</i> | 6 | 4 | 10 | 0.56 | 0.754 | CU |
| <i>Hamadryas laodamia</i> | 24 | 4 | 28 | 0.83 | <0.001 | C |
| <i>Nessaea aglaura</i> | 55 | 89 | 144 | 0.35 | 0.006 | U |
| <i>Pyrrhogyra amphihi</i> | 19 | 3 | 22 | 0.84 | 0.001 | C |
| <i>Pyrrhogyra crameri</i> | 94 | 36 | 130 | 0.73 | <0.001 | C |
| <i>Pyrrhogyra otolais</i> | 18 | 62 | 80 | 0.23 | <0.001 | U |
| <i>Temenis laothoe</i> | 76 | 18 | 94 | 0.79 | <0.001 | C |

| | | | | | | |
|---------------------------------|-----|-----|-----|------|--------|----|
| <i>Temenis pulchra</i> | 87 | 45 | 132 | 0.71 | <0.001 | C |
| Charaxinae | | | | | | |
| <i>Archaeoprepona camilla</i> | 9 | 36 | 45 | 0.22 | <0.001 | U |
| <i>Archaeoprepona demophon</i> | 46 | 47 | 93 | 0.55 | 1.000 | CU |
| <i>Archaeoprepona demophoon</i> | 10 | 2 | 12 | 0.66 | 0.039 | C |
| <i>Consul panariste</i> | 12 | 30 | 42 | 0.29 | 0.008 | U |
| <i>Fountainea ryphea</i> | 259 | 71 | 330 | 0.78 | <0.001 | C |
| <i>Memphis aulica</i> | 10 | 10 | 20 | 0.47 | 1.000 | CU |
| <i>Memphis chaeronea</i> | 90 | 19 | 109 | 0.83 | <0.001 | C |
| <i>Memphis cleomestra</i> | 395 | 138 | 533 | 0.75 | <0.001 | C |
| <i>Prepona laertes</i> | 24 | 5 | 29 | 0.81 | 0.001 | C |
| <i>Prepona philipponi</i> | 16 | 1 | 17 | 0.88 | <0.001 | C |
| <i>Zaretis isidora</i> | 36 | 30 | 66 | 0.61 | 0.539 | CU |
| Satyrinae | | | | | | |
| <i>Antirrhoea philaretos</i> | 0 | 12 | 12 | 0.05 | <0.001 | U |
| <i>Caerois gerdrudtus</i> | 6 | 17 | 23 | 0.29 | 0.035 | U |
| <i>Caligo atreus</i> | 0 | 50 | 50 | 0.01 | <0.001 | U |
| <i>Caligo eurilochus</i> | 1 | 43 | 44 | 0.04 | <0.001 | U |
| <i>Caligo zeuxippus</i> | 0 | 41 | 41 | 0.05 | <0.001 | U |
| <i>Catoblepia orgetorix</i> | 2 | 36 | 38 | 0.08 | <0.001 | U |
| <i>Catoblepia xanthicles</i> | 2 | 10 | 12 | 0.25 | 0.016 | U |
| <i>Cissia confusa</i> | 17 | 12 | 29 | 0.57 | 0.458 | CU |
| <i>Cithaerias pireta</i> | 0 | 28 | 28 | 0.04 | <0.001 | U |
| <i>Dulcedo polita</i> | 0 | 15 | 15 | 0.07 | <0.001 | U |
| <i>Haetera piera</i> | 1 | 55 | 56 | 0.04 | <0.001 | U |
| <i>Hermeuptychia sp.</i> | 10 | 50 | 60 | 0.17 | <0.001 | U |
| <i>Magneuptychia mycalesis</i> | 9 | 1 | 10 | 0.85 | 0.021 | C |
| <i>Manataria maculata</i> | 22 | 25 | 47 | 0.48 | 0.771 | CU |
| <i>Megeuptychia antonoe</i> | 123 | 33 | 156 | 0.79 | <0.001 | C |
| <i>Opsiphanes invirae</i> | 16 | 59 | 75 | 0.33 | <0.001 | U |
| <i>Pierella helvina</i> | 0 | 12 | 12 | 0.05 | <0.001 | U |

Placement in C= canopy, U= understorey or both= CU was done according to significance (if $P < 0.01$ at $\alpha = 0.05$) of two-tailed probabilities for the binomial tests.

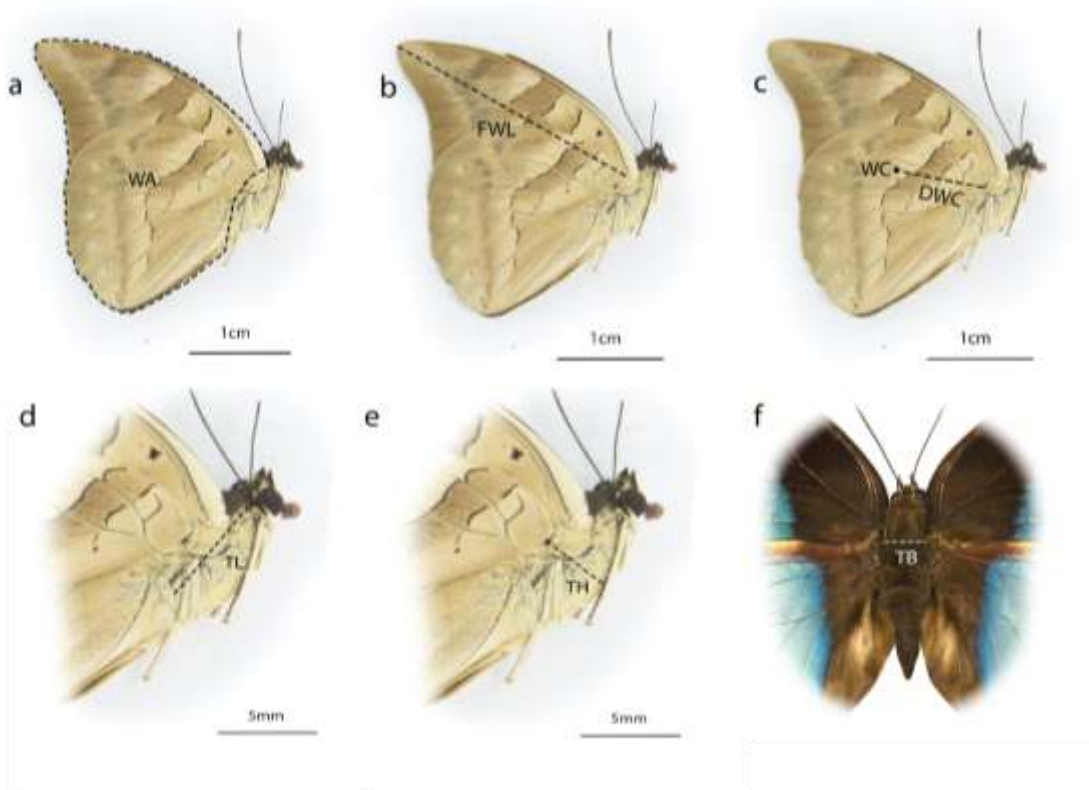
Appendix S2. List of morphological variables for each species measured in this study. Species means with standard deviations are shown. Asterisks indicates species with $n < 8$.

| Species | FWL[mm] | WA[cm ²] | DC[mm] | TV[cm ^{3*(2/3)}] | WA:TV | AR | RDC |
|------------------------------|---------|----------------------|--------|----------------------------|-------|------|-------|
| Limenitidinae | | | | | | | |
| <i>Adelpha barnesia</i> | 29.77 | 6.67 | 12.24 | 0.32 | 21.13 | 2.67 | 13.57 |
| <i>Adelpha cytherea</i> | 24.56 | 4.51 | 10.52 | 0.14 | 33.40 | 2.68 | 10.71 |
| <i>Adelpha erotia</i> | 32.63 | 8.18 | 13.81 | 0.54 | 15.21 | 2.61 | 14.78 |
| <i>Adelpha heraclea</i> | 28.24 | 5.99 | 11.73 | 0.30 | 19.98 | 2.68 | 12.71 |
| <i>Adelpha naxia*</i> | 30.65 | 6.25 | 13.23 | 0.33 | 18.69 | 3.01 | 11.77 |
| <i>Adelpha phylaca</i> | 29.34 | 6.38 | 12.20 | 0.33 | 19.11 | 2.70 | 13.05 |
| Heliconiinae | | | | | | | |
| <i>Dryas iulia</i> | 41.47 | 8.03 | 17.79 | 0.23 | 35.64 | 4.29 | 10.54 |
| <i>Heliconius atthis</i> | 37.24 | 7.55 | 17.36 | 0.21 | 36.64 | 3.71 | 10.02 |
| <i>Heliconius cydno</i> | 40.36 | 8.81 | 18.56 | 0.26 | 34.26 | 3.71 | 11.11 |
| <i>Heliconius eleuchia</i> | 37.67 | 8.02 | 17.65 | 0.26 | 31.44 | 3.54 | 10.65 |
| <i>Heliconius hecale*</i> | 42.19 | 8.22 | 19.56 | 0.26 | 31.97 | 4.33 | 9.11 |
| <i>Heliconius hecalesia</i> | 43.23 | 8.29 | 19.81 | 0.27 | 31.14 | 4.52 | 8.97 |
| <i>Heliconius sara</i> | 35.96 | 5.99 | 16.26 | 0.18 | 33.13 | 4.33 | 8.21 |
| <i>Heliconius doris</i> | 39.76 | 8.18 | 18.13 | 0.24 | 33.96 | 3.88 | 10.45 |
| Nymphalinae | | | | | | | |
| <i>Colobura annulata</i> | 35.18 | 8.20 | 15.49 | 0.44 | 18.50 | 3.02 | 13.13 |
| <i>Colobura dirce</i> | 31.27 | 6.68 | 14.03 | 0.35 | 19.26 | 2.93 | 11.80 |
| <i>Eresia alsina</i> | 27.38 | 3.87 | 12.76 | 0.11 | 33.95 | 3.89 | 6.90 |
| <i>Eresia clara</i> | 18.45 | 1.84 | 9.08 | 0.07 | 26.39 | 3.73 | 4.47 |
| <i>Siproeta stelenes*</i> | 41.52 | 12.05 | 17.78 | 0.34 | 35.30 | 2.87 | 16.91 |
| <i>Smyrna blomfieldia</i> | 37.56 | 11.07 | 16.64 | 0.62 | 17.82 | 2.56 | 16.61 |
| <i>Tigridia acesa</i> | 26.26 | 4.84 | 12.50 | 0.19 | 25.26 | 2.86 | 9.48 |
| Biblidinae | | | | | | | |
| <i>Callicore atacama</i> | 25.93 | 4.70 | 11.89 | 0.25 | 19.00 | 2.87 | 9.79 |
| <i>Callicore guatemalena</i> | 22.26 | 3.46 | 10.42 | 0.16 | 21.37 | 2.88 | 8.16 |
| <i>Catonephele numilia</i> | 34.44 | 9.38 | 15.17 | 0.42 | 22.17 | 2.53 | 15.45 |
| <i>Catonephele orites</i> | 34.52 | 8.69 | 15.34 | 0.44 | 19.65 | 2.76 | 14.09 |
| <i>Diaethria marchalii</i> | 21.99 | 3.49 | 10.39 | 0.15 | 22.57 | 2.78 | 8.28 |
| <i>Eunica pomona</i> | 33.68 | 7.59 | 14.95 | 0.31 | 24.85 | 3.00 | 12.59 |
| <i>Hamadryas amphinome</i> | 34.92 | 8.47 | 15.70 | 0.41 | 20.79 | 2.89 | 13.38 |
| <i>Hamadryas arinome*</i> | 34.37 | 8.45 | 14.96 | 0.45 | 18.59 | 2.80 | 14.10 |
| <i>Hamadryas laodamia</i> | 33.01 | 8.37 | 14.65 | 0.47 | 17.79 | 2.61 | 14.25 |
| <i>Nessaea aglaura</i> | 33.74 | 9.00 | 15.78 | 0.39 | 23.26 | 2.54 | 14.20 |
| <i>Pyrrhogyra amphiro</i> | 33.09 | 8.62 | 14.47 | 0.33 | 25.96 | 2.54 | 14.87 |
| <i>Pyrrhogyra crameri</i> | 26.20 | 5.06 | 11.69 | 0.14 | 36.72 | 2.71 | 10.80 |
| <i>Pyrrhogyra otolais</i> | 28.38 | 6.05 | 12.72 | 0.14 | 42.24 | 2.67 | 11.85 |
| <i>Temenis laothoe</i> | 28.46 | 5.60 | 14.16 | 0.31 | 18.27 | 2.91 | 9.47 |
| <i>Temenis pulchra</i> | 26.59 | 4.87 | 12.90 | 0.27 | 18.26 | 2.93 | 9.12 |
| Charaxinae | | | | | | | |

| | | | | | | | |
|---------------------------------|-------|-------|-------|------|-------|------|-------|
| <i>Archaeoprepona camilla</i> | 58.11 | 22.24 | 22.50 | 1.17 | 19.00 | 3.07 | 24.47 |
| <i>Archaeoprepona demophon*</i> | 52.77 | 17.67 | 23.35 | 1.53 | 11.58 | 3.16 | 18.66 |
| <i>Archaeoprepona demophon</i> | 55.53 | 20.96 | 21.74 | 1.19 | 17.58 | 2.97 | 23.84 |
| <i>Consul panariste</i> | 36.80 | 10.48 | 15.83 | 0.29 | 36.04 | 2.59 | 16.53 |
| <i>Fountainea ryphea</i> | 30.40 | 7.69 | 12.60 | 0.36 | 21.38 | 2.40 | 15.14 |
| <i>Memphis áulica*</i> | 31.26 | 8.31 | 14.19 | 0.44 | 19.01 | 2.36 | 14.62 |
| <i>Memphis chaeronea</i> | 31.76 | 8.69 | 14.49 | 0.50 | 17.56 | 2.32 | 14.99 |
| <i>Memphis cleomestra</i> | 30.16 | 7.26 | 12.77 | 0.63 | 11.47 | 2.51 | 14.16 |
| <i>Memphis glauce</i> | 30.21 | 7.57 | 13.16 | 0.35 | 21.90 | 2.44 | 14.31 |
| <i>Memphis mora</i> | 29.30 | 7.38 | 13.02 | 0.39 | 19.03 | 2.33 | 14.14 |
| <i>Memphis moruus</i> | 29.95 | 7.34 | 13.10 | 0.38 | 19.47 | 2.45 | 13.98 |
| <i>Memphis nenia</i> | 31.54 | 8.36 | 14.33 | 0.39 | 21.39 | 2.38 | 14.58 |
| <i>Prepona laertes</i> | 44.63 | 12.03 | 17.44 | 0.88 | 13.70 | 3.32 | 17.23 |
| <i>Prepona philipponi</i> | 48.46 | 14.85 | 18.96 | 1.03 | 14.35 | 3.17 | 19.50 |
| <i>Zaretis isidora</i> | 33.26 | 8.91 | 13.70 | 0.45 | 19.89 | 2.50 | 16.12 |
| Satyrinae | | | | | | | |
| <i>Antirrhea philaretos</i> | 46.79 | 16.93 | 20.16 | 0.43 | 39.25 | 2.59 | 20.95 |
| <i>Caerois gerdrudtus</i> | 45.86 | 16.30 | 19.11 | 0.26 | 62.04 | 2.60 | 21.19 |
| <i>Caligo atreus</i> | 77.83 | 54.32 | 30.22 | 1.42 | 38.31 | 2.24 | 43.45 |
| <i>Caligo eurilochus</i> | 79.75 | 55.66 | 30.51 | 1.47 | 37.93 | 2.29 | 44.03 |
| <i>Caligo zeuxippus</i> | 63.15 | 33.34 | 24.98 | 0.86 | 38.59 | 2.40 | 32.74 |
| <i>Catoblepia orgetorix</i> | 49.63 | 22.39 | 22.09 | 0.55 | 40.91 | 2.20 | 25.22 |
| <i>Catoblepia xanthicles*</i> | 49.87 | 23.26 | 21.07 | 0.57 | 40.98 | 2.14 | 27.14 |
| <i>Cissia confusa</i> | 24.69 | 4.75 | 11.26 | 0.10 | 47.99 | 2.59 | 10.49 |
| <i>Cithaerias pireta</i> | 27.58 | 5.38 | 11.99 | 0.12 | 45.26 | 2.84 | 11.18 |
| <i>Dulcedo polita</i> | 32.81 | 7.75 | 15.01 | 0.16 | 48.68 | 2.79 | 12.79 |
| <i>Haetera piera</i> | 38.93 | 10.60 | 16.76 | 0.26 | 41.37 | 2.86 | 15.78 |
| <i>Hermeuptychia sp.</i> | 17.08 | 2.23 | 7.86 | 0.07 | 33.45 | 2.51 | 7.38 |
| <i>Magneuptychia mycalesis*</i> | 28.83 | 6.39 | 13.06 | 0.13 | 47.50 | 2.61 | 12.19 |
| <i>Manataria maculata</i> | 38.41 | 10.81 | 18.98 | 0.32 | 33.61 | 2.73 | 13.89 |
| <i>Megeuptychia antonoe</i> | 34.60 | 9.64 | 15.02 | 0.26 | 37.39 | 2.49 | 16.02 |
| <i>Opsiphanes cassiae</i> | 48.10 | 17.63 | 20.55 | 1.07 | 16.42 | 2.63 | 21.43 |
| <i>Opsiphanes invirae</i> | 35.56 | 10.42 | 15.39 | 0.63 | 16.63 | 2.43 | 16.87 |
| <i>Pierella helvina</i> | 38.01 | 12.20 | 17.49 | 0.30 | 40.70 | 2.38 | 17.36 |

FWL=forewing length, WA=wing area, DC=distance to centroid, TV=thoracic volume, WA:TV=wing-area to thoracic-volume, AR= aspect ratio, RDC= relative distance to wing centroid.

Appendix S3. Measurements used for the calculation of morphological parameters. See Warren et al. (2012) for a guide to butterfly anatomy.



- a. Wing area (WA) calculation corresponded to the area of both the forewing and the hindwing overlapped in a position similar to that in flight, simulating the aerodynamic active surface.
- b. The forewing length (FWL) corresponded to the distance from the base of the costal vein to the apex (between R4 and R5).
- c. Wing centroid (WC) was located by ImageJ software as an average of x and y pixels inside the wing area. Relative distance to centroid (RDC) was measured as the distance between WC and the base of 1A.
- d. Thoracic length (TL) corresponded to the distance from the patagium to the scutellum 3.
- e. Thoracic height (TH) corresponded to the distance from the coxa 2 to the scutum 2.
- f. Thoracic breadth (TB) corresponded to the space between left and right postmedian wing levers.

NOTE: Measurements were done with both wings closed, overlapped in a position similar to that seen in flight. Wing melanisation was used as a proxy to estimate wing overlap:



Appendix S4. Results of the SIMPER analysis using Morisita distance matrix.

| Species | Average dissimilitude | Contribution % | Cumulative % | Mean Understorey | Mean Canopy |
|-----------------------------------|-----------------------|----------------|--------------|------------------|-------------|
| <i>Hamadryas amphinome</i> | 0.4821 | 3.832 | 3.832 | 2.15E+09 | 7.47E+08 |
| <i>Haetera piera</i> | 0.4776 | 3.797 | 7.629 | 7.47E+08 | 2.15E+09 |
| <i>Memphis cleomestra</i> | 0.4764 | 3.787 | 11.42 | 1.49E+09 | 1.87E+08 |
| <i>Diaethria marchalii</i> | 0.4707 | 3.742 | 15.16 | 2.05E+09 | 7.47E+08 |
| <i>Smyrna blomfieldia</i> | 0.4576 | 3.637 | 18.79 | 1.96E+09 | 7.47E+08 |
| <i>Phyrrhogyra crameri</i> | 0.4307 | 3.424 | 22.22 | 1.96E+09 | 8.40E+08 |
| <i>Archaeoprepona demophon</i> | 0.4248 | 3.376 | 25.59 | 1.68E+09 | 7.47E+08 |
| <i>Megeuptychia antonoe</i> | 0.4036 | 3.208 | 28.8 | 1.87E+09 | 9.34E+08 |
| <i>Tigridia acesta</i> | 0.3716 | 2.954 | 31.76 | 1.21E+09 | 8.40E+08 |
| <i>Cissia confusa</i> | 0.3603 | 2.864 | 34.62 | 1.31E+09 | 1.12E+09 |
| <i>Opsiphanes cassina</i> | 0.36 | 2.861 | 37.48 | 1.12E+09 | 1.21E+09 |
| <i>Archaeoprepona camilla</i> | 0.3569 | 2.837 | 40.32 | 1.12E+09 | 1.49E+09 |
| <i>Cithaerias pireta</i> | 0.3504 | 2.785 | 43.1 | 1.12E+09 | 2.15E+09 |
| <i>Catoblepia orgetorix</i> | 0.349 | 2.774 | 45.88 | 1.12E+09 | 2.15E+09 |
| <i>Callicore atacama</i> | 0.3243 | 2.577 | 48.45 | 2.15E+09 | 1.21E+09 |
| <i>Nessaea aglaura</i> | 0.2943 | 2.34 | 50.79 | 7.47E+08 | 4.67E+08 |
| <i>Prepona laertes</i> | 0.293 | 2.329 | 53.12 | 2.05E+09 | 1.31E+09 |
| <i>Zaretis isidora</i> | 0.292 | 2.321 | 55.44 | 2.15E+09 | 1.31E+09 |
| <i>Memphis glauce</i> | 0.2602 | 2.068 | 57.51 | 2.15E+09 | 1.40E+09 |
| <i>Memphis mora</i> | 0.2385 | 1.896 | 59.41 | 2.05E+09 | 1.49E+09 |
| <i>Chloreuptychia amaca</i> | 0.219 | 1.741 | 61.15 | 1.49E+09 | 2.15E+09 |
| <i>Caeris gerdrudius</i> | 0.2139 | 1.7 | 62.85 | 1.87E+09 | 1.68E+09 |
| <i>Colobura dirce</i> | 0.2122 | 1.687 | 64.54 | 2.05E+09 | 1.59E+09 |
| <i>Colobura annulata</i> | 0.1991 | 1.583 | 66.12 | 1.96E+09 | 1.68E+09 |
| <i>Phyrogrya otolais</i> | 0.1949 | 1.549 | 67.67 | 1.59E+09 | 2.15E+09 |
| <i>Pierella helvina</i> | 0.1947 | 1.547 | 69.21 | 1.59E+09 | 2.15E+09 |
| <i>Antirhea philaretas</i> | 0.1931 | 1.535 | 70.75 | 1.59E+09 | 2.15E+09 |
| <i>Dulcedo polita</i> | 0.1926 | 1.531 | 72.28 | 1.59E+09 | 2.15E+09 |
| <i>Temenis laothoe</i> | 0.1924 | 1.529 | 73.81 | 2.15E+09 | 1.59E+09 |
| <i>Callicore guatemalena</i> | 0.1842 | 1.464 | 75.27 | 2.05E+09 | 1.68E+09 |
| <i>Hamadryas laodamia</i> | 0.1785 | 1.419 | 76.69 | 2.05E+09 | 1.68E+09 |
| <i>Archaeoprepona demophoon</i> | 0.1634 | 1.299 | 77.99 | 2.15E+09 | 1.68E+09 |
| <i>Pierella luna</i> | 0.1595 | 1.268 | 79.26 | 1.68E+09 | 2.15E+09 |
| <i>Heliconius doris</i> | 0.1302 | 1.035 | 80.3 | 2.15E+09 | 1.77E+09 |
| <i>Phyrogrya amphiro</i> | 0.128 | 1.018 | 81.31 | 2.15E+09 | 1.77E+09 |
| <i>Consul panariste</i> | 0.1264 | 1.005 | 82.32 | 1.77E+09 | 2.15E+09 |
| <i>Caligo zeuxippus</i> | 0.09931 | 0.7893 | 83.11 | 1.87E+09 | 2.15E+09 |
| <i>Archaeoprepona amphimachus</i> | 0.09895 | 0.7865 | 83.89 | 2.15E+09 | 1.87E+09 |
| <i>Caligo brasiliensis</i> | 0.0986 | 0.7837 | 84.68 | 1.87E+09 | 2.15E+09 |
| <i>Zaretis isidora</i> | 0.09582 | 0.7617 | 85.44 | 1.87E+09 | 2.15E+09 |
| <i>Memphis moruus</i> | 0.09401 | 0.7472 | 86.19 | 2.15E+09 | 1.87E+09 |
| <i>Catoblepia xanthicles</i> | 0.0933 | 0.7416 | 86.93 | 1.87E+09 | 2.15E+09 |
| <i>Adelpha leuceria</i> | 0.06785 | 0.5393 | 87.47 | 2.15E+09 | 1.96E+09 |
| <i>Adelpha phylaca</i> | 0.06689 | 0.5317 | 88 | 1.96E+09 | 2.15E+09 |
| <i>Adelpha erotia</i> | 0.06561 | 0.5215 | 88.52 | 2.15E+09 | 1.96E+09 |
| <i>Eresia alsina</i> | 0.06555 | 0.5211 | 89.04 | 2.15E+09 | 1.96E+09 |
| <i>Adelpha messana</i> | 0.06513 | 0.5177 | 89.56 | 2.05E+09 | 2.05E+09 |
| <i>Eunica chlororhoa</i> | 0.06412 | 0.5097 | 90.07 | 1.96E+09 | 2.15E+09 |
| <i>Catobephele orites</i> | 0.06412 | 0.5097 | 90.58 | 1.96E+09 | 2.15E+09 |
| <i>Hmadryas amphichloe</i> | 0.06385 | 0.5075 | 91.09 | 2.15E+09 | 1.96E+09 |
| <i>Pareuptychia occirhoe</i> | 0.06341 | 0.504 | 91.59 | 1.96E+09 | 2.15E+09 |
| <i>Callicore lyca</i> | 0.06292 | 0.5001 | 92.09 | 2.15E+09 | 1.96E+09 |
| <i>Heliconius cydno</i> | 0.06281 | 0.4992 | 92.59 | 2.05E+09 | 2.05E+09 |
| <i>Memphis nenia</i> | 0.0614 | 0.488 | 93.08 | 1.96E+09 | 2.15E+09 |
| <i>Manataria maculata</i> | 0.06104 | 0.4852 | 93.56 | 2.05E+09 | 2.05E+09 |
| <i>Fountainea ryphaea</i> | 0.03448 | 0.274 | 93.84 | 2.05E+09 | 2.15E+09 |
| <i>Heliconius atthis</i> | 0.03446 | 0.2739 | 94.11 | 2.15E+09 | 2.05E+09 |
| <i>Adelpha barnesia</i> | 0.03392 | 0.2696 | 94.38 | 2.15E+09 | 2.05E+09 |
| <i>Ectyma erycinoides</i> | 0.03392 | 0.2696 | 94.65 | 2.15E+09 | 2.05E+09 |
| <i>Adelpha heraclea</i> | 0.0334 | 0.2654 | 94.92 | 2.15E+09 | 2.05E+09 |

| | | | | | |
|-----------------------------|---------|--------|-------|----------|----------|
| <i>Hermeuptychia hermes</i> | 0.0334 | 0.2654 | 95.18 | 2.15E+09 | 2.05E+09 |
| <i>Hamadryas chaeronea</i> | 0.03264 | 0.2595 | 95.44 | 2.15E+09 | 2.05E+09 |
| <i>Adeplha fabricia</i> | 0.03264 | 0.2595 | 95.7 | 2.15E+09 | 2.05E+09 |
| <i>Hyposcada illinissa</i> | 0.03242 | 0.2577 | 95.96 | 2.05E+09 | 2.15E+09 |
| <i>Antirrhea pterocopa</i> | 0.03242 | 0.2577 | 96.47 | 2.05E+09 | 2.15E+09 |
| <i>Memphis aulica</i> | 0.03242 | 0.2577 | 96.73 | 2.05E+09 | 2.15E+09 |
| <i>Adelpha cocala</i> | 0.03216 | 0.2556 | 96.99 | 2.15E+09 | 2.05E+09 |
| <i>Memphis aureola</i> | 0.03192 | 0.2537 | 97.24 | 2.15E+09 | 2.05E+09 |
| <i>Prepona dexamenus</i> | 0.03192 | 0.2537 | 97.49 | 2.15E+09 | 2.05E+09 |
| <i>Prepona philipponi</i> | 0.0317 | 0.252 | 97.75 | 2.05E+09 | 2.15E+09 |
| <i>Magneuptychia inani</i> | 0.0317 | 0.252 | 98 | 2.05E+09 | 2.15E+09 |
| <i>Siproeta stelenes</i> | 0.0317 | 0.252 | 98.25 | 2.05E+09 | 2.15E+09 |
| <i>Caligo atreus</i> | 0.0317 | 0.252 | 98.5 | 2.05E+09 | 2.15E+09 |
| <i>Eresia eunice</i> | 0.03169 | 0.2519 | 98.75 | 2.15E+09 | 2.05E+09 |
| <i>Morpho cypris</i> | 0.03169 | 0.2519 | 99 | 2.15E+09 | 2.05E+09 |
| <i>Hmadryas arinome</i> | 0.03169 | 0.2519 | 99.26 | 2.15E+09 | 2.05E+09 |
| <i>Taygetis puritana</i> | 0.03125 | 0.2484 | 99.51 | 2.05E+09 | 2.15E+09 |
| <i>Opsiphanes tamarindi</i> | 0.03125 | 0.2484 | 99.75 | 2.05E+09 | 2.15E+09 |
| <i>Historis acheronta</i> | 0.03101 | 0.2465 | 100 | 2.15E+09 | 2.05E+09 |

Appendix S5. Calibrations used for Tree ultrametrization.

!MRCA='Heliconius eleuchia-Heliconius doris' TaxonA='Heliconius eleuchia'
TaxonB='Heliconius doris' MinTime=10.50000000 MaxTime=13.40000000
calibrationName='Heliconius eleuchia-Heliconius doris-split';

!MRCA='Heliconius eleuchia-Dryas iulia' TaxonA='Heliconius eleuchia'
TaxonB='Dryas iulia' MinTime=24.80000000 MaxTime=30.00000000
calibrationName='Heliconius eleuchia-Dryas iulia-split';

!MRCA='Heliconius eleuchia-Adelpha cytherea' TaxonA='Heliconius eleuchia'
TaxonB='Adelpha cytherea' MinTime=50.00000000 MaxTime=70.00000000
calibrationName='Heliconius eleuchia-Adelpha cytherea-split';

!MRCA='Adelpha naxia-Adelpha cytherea' TaxonA='Adelpha naxia' TaxonB='Adelpha
cytherea' MinTime=8.60000000 MaxTime=9.10000000 calibrationName='Adelpha
naxia-Adelpha cytherea-split';

!MRCA='Catonephele orites-Nessaea aglaura' TaxonA='Catonephele orites'
TaxonB='Nessaea aglaura' Time=17.70000000 calibrationName='Catonephele orites-
Nessaea aglaura-split';

!MRCA='Colobura annulata-Smyrna blomfieldia' TaxonA='Colobura annulata'
TaxonB='Smyrna blomfieldia' MinTime=33.60000000 MaxTime=39.00000000
calibrationName='Colobura annulata-Smyrna blomfieldia-split';

!MRCA='Pyrrhogyra otolais-Diaethria marchalii' TaxonA='Pyrrhogyra otolais'
TaxonB='Diaethria marchalii' MinTime=27.10000000 MaxTime=34.10000000
calibrationName='Pyrrhogyra otolais-Diaethria marchalii-split';

!MRCA='Opsiphanes invirae-Catoblepia orgetorix' TaxonA='Opsiphanes invirae'
TaxonB='Catoblepia orgetorix' MinTime=16.50000000 MaxTime=26.10000000
calibrationName='Opsiphanes invirae-Catoblepia orgetorix-split';

!MRCA='Opsiphanes invirae-Caligo atreus' TaxonA='Opsiphanes invirae'
TaxonB='Caligo atreus' MinTime=26.00000000 MaxTime=35.40000000
calibrationName='Opsiphanes invirae-Caligo atreus-split';

!MRCA='Opsiphanes invirae-Pierella helvina' TaxonA='Opsiphanes invirae'
TaxonB='Pierella helvina' MinTime=32.50000000 MaxTime=55.70000000
calibrationName='Opsiphanes invirae-Pierella helvina-split';

!MRCA='Anitirreha pterocopa-Caerois gerdrudtus' TaxonA='Anitirreha pterocopa'
TaxonB='Caerois gerdrudtus' MinTime=28.10000000 MaxTime=37.80000000
calibrationName='Anitirreha pterocopa-Caerois gerdrudtus-split';

!MRCA='Eresia alsina-Siproeta stelenes' TaxonA='Eresia alsina' TaxonB='Siproeta
stelenes' MinTime=46.70000000 MaxTime=50.80000000 calibrationName='Eresia
alsina-Siproeta stelenes-split';

!MRCA='Magneuptychia mycalesis-Megeuptychia antonoe' TaxonA='Magneuptychia
mycalesis' TaxonB='Megeuptychia antonoe' MinTime=16.50000000
MaxTime=28.00000000 calibrationName='Magneuptychia mycalesis-Megeuptychia
antonoe-split';

!MRCA='Cithaerias pireta-Haetera piera' TaxonA='Cithaerias pireta' TaxonB='Haetera
piera' MinTime=15.10000000 MaxTime=28.60000000 calibrationName='Cithaerias
pireta-Haetera piera-split';

!MRCA='Dulcedo polita-Pierella helvina' TaxonA='Dulcedo polita' TaxonB='Pierella
helvina' MinTime=27.50000000 MaxTime=44.70000000 calibrationName='Dulcedo
polita-Pierella helvina-split';

!MRCA='Consul panariste-Archaeoprepona demophon' TaxonA='Consul panariste'
TaxonB='Archaeoprepona demophon' MinTime=41.00000000 MaxTime=51.00000000
calibrationName='Consul panariste-Archaeoprepona demophon-split';

!MRCA='Consul panariste-Fountainea ryphea' TaxonA='Consul panariste'
TaxonB='Fountainea ryphea' MinTime=21.50000000 MaxTime=32.40000000
calibrationName='Consul panariste-Fountainea ryphea-split';

!MRCA='Heliconius eleuchia-Heliconius hecalesia' TaxonA='Heliconius eleuchia'
TaxonB='Heliconius hecalesia' MinTime=5.70000000 MaxTime=6.70000000
calibrationName='Heliconius eleuchia-Heliconius hecalesia-split';