**Supplementary File 1a.** Phylogenetic signals for mbCHCs in *Drosophila* species.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Sex** | **2MeC24** | **2MeC26** | **2MeC28** | **2MeC30** | **2MeC32** | **Pagel’s *λ*** |
| Female | 92.2% | 87.9% | 90.9% | 90.4% | 88.8% | 0.75 |
| Male | 93.1% | 90.1% | 91.9% | 91.8% | 92.0% | 0.82 |

**Supplementary File 1b.** Phylogenetic signals for desiccation resistance in *Drosophila* species.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sex** | **Pagel’s *λ*** | **LogLikelihood (*λ)*** | **Likelihood\_Ratio (*λ* = 0)** | ***P*-value** |
| Female | 0.91 | -22.4 | 45.2 | < 0.001 |
| Male | 0.97 | -25.4 | 61.7 | < 0.001 |

**Supplementary File 1c.** Summary of the Phylogenetic Generalized Linear Square (PGLS) models between the longest mbCHCs and desiccation resistance for females and males in 50 *Drosophila* and related species.

|  |  |  |  |
| --- | --- | --- | --- |
| **Sex** | **Term** | **t value** | **P value** |
| Female | Length | 3.2 | 0.002 |
| Quantity | -3.6 | < 0.001 |
| Interaction | 3.5 | < 0.001 |
| Male | Length | 1.9 | 0.08 |
| Quantity | -2.3 | 0.03 |
| Interaction | 2.3 | 0.03 |

**Supplementary File 1d.** List of species used in this study

|  |  |  |
| --- | --- | --- |
| **Genus** | **Species** | **Sources and strain code from NDSSC** |
| *Drosophila* | *D. mojavensis* | 15081-1352.10 |
| *Drosophila* | *D. arizonae* | 15081-1271.41 |
| *Drosophila* | *D. aldrichi* | 15081-1251.23 |
| *Drosophila* | *D. mulleri* | 15081-1371.01 |
| *Drosophila* | *D. buzzatii* | 15081-1291.63 |
| *Drosophila* | *D. mercatorum* | 15082-1521.38 |
| *Drosophila* | *D. repleta* | 15084-1611.13 |
| *Drosophila* | *D. americana* | 15010-0951.00 |
| *Drosophila* | *D. novamexicana* | 15010-1031.14 |
| *Drosophila* | *D. lummei* | 15010-1011.01 |
| *Drosophila* | *D. virilis* | 15010-1051.87 |
| *Drosophila* | *D. littoralis* | 15010-1001.11 |
| *Drosophila* | *D. lacicola* | 15010-0991.13 |
| *Drosophila* | *D. borealis* | 15010-0961.00 |
| *Drosophila* | *D. montana* | 15010-1021.23 |
| *Drosophila* | *D. flavomontana* | 15010-0981.00 |
| *Drosophila* | *D. nasuta* | 15112-1781.00 |
| *Drosophila* | *D. albomicans* | 15112-1751.00 |
| *Drosophila* | *D. sulfrigaster* | 15112-1811.04 |
| *Drosophila* | *D. immigrans* | 15111-1731.03 |
| *Drosophila* | *D. equinoxialis* | 14030-0741.00 |
| *Drosophila* | *D. paulistorum* | 14030-0771.11 |
| *Drosophila* | *D. willistoni* | 14030-0811.24 |
| *Drosophila* | *D. nebulosa* | 14030-0761.06 |
| *Drosophila* | *D. prosaltans* | 14045-0901.07 |
| *Drosophila* | *D. saltans* | 14045-0911.01 |
| *Drosophila* | *D. sturtevanti* | 14043-0871.16 |
| *Drosophila* | *D. azteca* | 14012-0171.03 |
| *Drosophila* | *D. affinis* | 14012-0141.02 |
| *Drosophila* | *D. persimilis* | 14011-0111.46 |
| *Drosophila* | *D. pseudoobscura* | 14011-0121.94 |
| *Drosophila* | *D. bipectinata* | 14024-0381.21 |
| *Drosophila* | *D. ananassae* | 14024- 0371.13 |
| *Drosophila* | *D. serrata* | 14028-0681.00 |
| *Drosophila* | *D. kikkawai* | 14028-0561.14 |
| *Drosophila* | *D. birchii* | 14028-0521.00 |
| *Drosophila* | *D. elegans* | Gift from the P. Wittkopp Lab (U. Michigan) |
| *Drosophila* | *D. gunungcola* | Gift from the P. Wittkopp Lab (U. Michigan) |
| *Drosophila* | *D. biarmipes*  | 14023-0361.09 |
| *Drosophila* | *D. suzukii* | Gift from the R. Isaacs Lab (MSU) |
| *Drosophila* | *D. erecta* | 14021-0224.01 |
| *Drosophila* | *D. teissieri* | 14021-0257.01 |
| *Drosophila* | *D. yakuba* | 14021-0261-01 |
| *Drosophila* | *D. mauritiana* | 14021-0241.151 |
| *Drosophila* | *D. simulans* | W501 (14021-0251.195) |
| *Drosophila* | *D. melanogaster* | Gift from the S. Carroll Lab (U. Maryland) |
| *Scaptodrosophila* | *S. latifasciaeformis* | 11030-0061.01 |
| *Scaptodrosophila* | *S. lebanonensis* | 11010-0011.00 |
| *Scaptodrosophila* | *S. rufifrons* | 11040-0071.00 |
| *Chymomyza* | *C. procnemis* | 20000-2631.01 |