Supplementary Table S1: Node dates from calibration models A, B and C

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Previously published estimatesa | |  | Hawai’i shield-completion datec | | | Hawai’i surface emergence dated | | |
| Dated nodes | Russo (1995) | Tamura (2004) | Mutation rateb | Model A2 | Model B2e | Model C2 | Model A1 | Model B1 | Model C1 |
| *simulans* complex | - | 0.9 [0-1.9] | 0.5 [0.3-0.7] | 0.4 [0.2-0.5] | 2.7 [1.2,4.3] | 1.3 [0.8-1.9] | 1.5 [0.6-2.6] | 2.8 [1.0-5.2] | 2.3 [1.4-3.2] |
| *melanogaster-simulans* | 2.3 [1-3.6] | 5.4 [3.2-7.5] | 1.4 [0.9-1.9] | 1.1 [0.7-1.4] | 7.4 [3.5-12] | 3.6 [2.4-5.0] | 4.2 [1.8-7.1] | 7.9 [3.0-14] | 6.3 [4.3-8.6] |
| *yakuba-erecta* | - | 10 [6-15] | 2.4 [1.6-3.3] | 1.9 [1.3-2.6] | 13 [6.5-21] | 6.4 [4.2-8.8] | 7.5 [3.0-12] | 14 [5.1-25] | 11 [7.4-15] |
| *melanogaster* subgroup | 6.1 [3.9-8.3] | 13 [8-17] | 3.3 [2.4-4.4] | 2.7 [2.0-3.5] | 19 [9.5-29] | 9.1 [6.6-12] | 11 [4.7-18] | 20 [7.6-35] | 16 [11-21] |
| *melanogaster-annanassae* | - | 44 [27-62] | 15 [11-21] | 12 [8.4-16] | 82 [41-128] | 40 [27-54] | 47 [20-79] | 88 [34-158] | 70 [49-93] |
| *virilis/repleta-hawaiian* | 32 [26-38] | 43 [26-60] | 13 [9.6-17] | 12 [8.8-15] | 82 [42-127] | 40 [30-54] | 47 [21-79] | 87 [32-153] | 70 [50-91] |
| *mel-obscura* groups | 25 [19-31] | 55 [33-76] | 24 [17-31] | 19 [14-24] | 128 [67-197] | 63 [46-82] | 73 [33-123] | 138 [55-245] | 109 [80-142] |
| *Drosophila-Sophophora* | 40 [33-46] | 63 [39-87] | 32 [25-40] | 26 [21-32] | 181 [97-275] | 89 [67-113] | 103 [47-170] | 192 [80-340] | 154 [120-193] |

Models A and C are as described in the main text. Model ‘B’ is the upper limit model illustrated by Figure 1c.

a – derived from two previously published papers. Bounds are ±2x the reported SE

b – using only fourfold codons, the prior of the rate of the 3rd position was constrained to the estimate provided by Keightley et al.

c – using all codons and a Hawaiian calibration that associates speciation dates with the estimated completion of the first shield for that island

d – using all codons and a Hawaiian calibration that associates speciation dates with the estimated emergence of the first volcano above the surface

e – this model appeared to converge on two very different stationary distributions in different runs, suggesting that mixing can sometimes be poor. The results presented here are the combined estimates from 6 independent runs (total >7x108 states) that converged on approximately the same standard deviation for the uncorrelated lognormal clock distribution (ucld-stdev of 0.27 [0.18-0.38]) as models A1, A2, B1, C1, C2 and Mutation-Rate. Other runs (not presented) tended to mix poorly, recover unexpected tree topologies, and converge on ucld-stdev ~0.97 (i.e. far from a strict clock), with root dates of either 50 or 70-80Mya.