

Supporting Information

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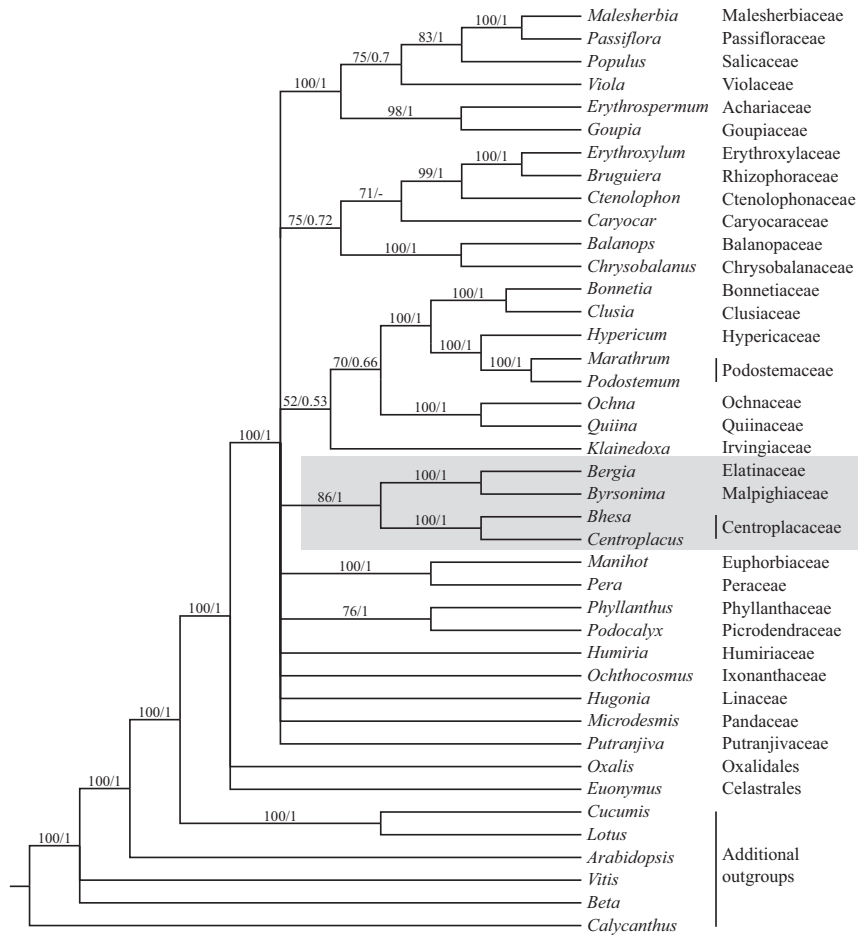


Fig. S1. Malpighiales phylogeny inferred from nucleotide sequences of the plastid inverted repeat region. Fifty-percent maximum-likelihood majority-rule consensus phylogeny is shown here. Well-supported relationships between Centroplacaceae, Elatinaceae, and Malpighiaceae are highlighted in gray. Values are maximum-likelihood bootstrap percentages and Bayesian posterior probabilities, respectively.

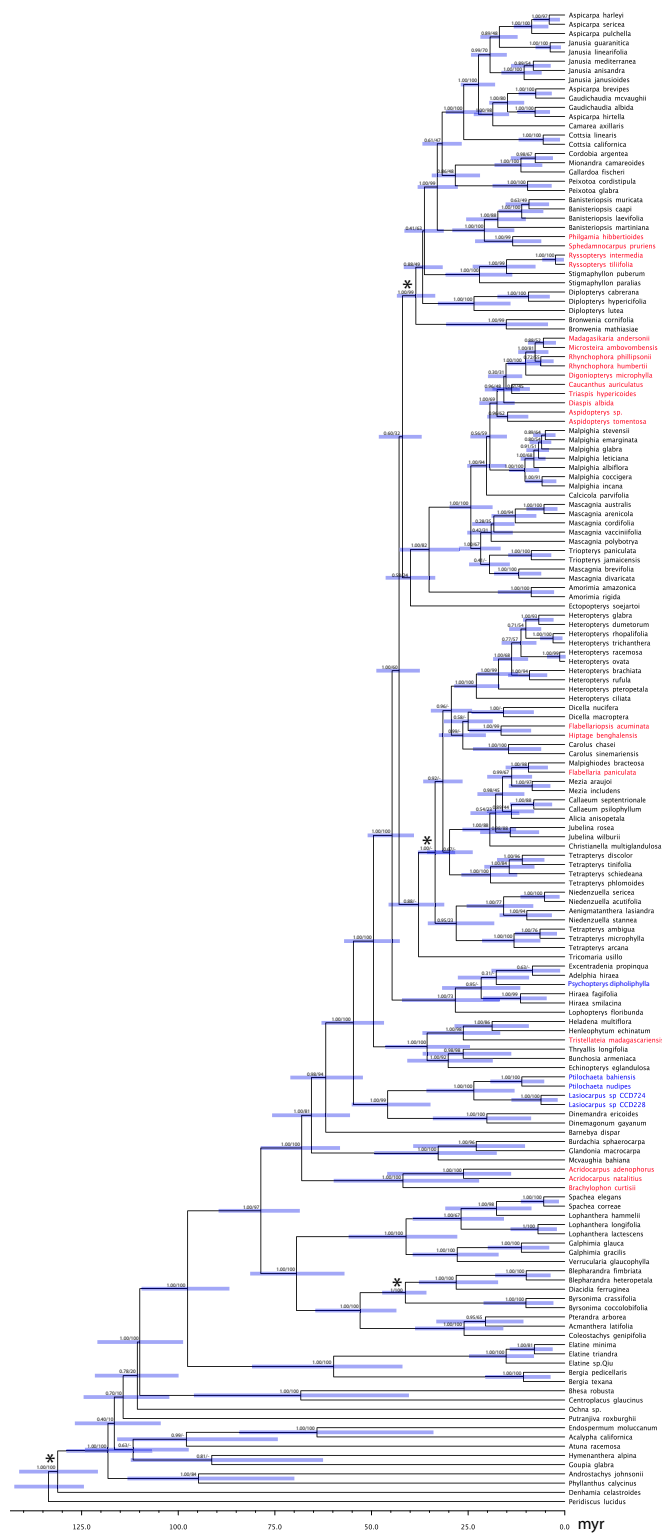


Fig. S2. Phylogeny and divergence time estimates of Malpighiaceae inferred using BEAST. The three fossil calibration points described in the main text are starred. Old World clades that have lost the oil-bee association are shown in red; New World clades that have lost the oil-bee association are shown in blue. Numbers near nodes are Bayesian posterior probabilities/maximum-likelihood bootstrap percentages; a hyphen indicates that the node is not present in the maximum-likelihood 50% majority-rule consensus tree. Divergence time estimates in million years with associated confidence intervals are shown in blue.

Table S1. Morphological characters scored by Davis and Anderson (1)

Traits	Score
1. Habit	0: tree or woody shrub; 1: erect suffrutex; 2: trailing suffrutex; 3: vine; 4: herb
2. Stems rooting at nodes	0: no; 1: yes
3. Vegetative hairs	0: unicellular; 1: multicellular
4. Vegetative hairs	0: 2-branched; 1: basifixed; 2: stellate
5. Phyllotaxy	0: opposite or whorled; 1: alternate
6. Stipule position	0: stem between petioles or beside petiole; 1: petiole margin; 2: petiole inner face; 3: not present
7. Stipule connation	0: distinct; 1: connate, same leaf; 2: connate, opposite leaves; 3: connate, opposite and same leaves; 4: not present
8. Stipule persistence	0: long-persistent; 1: soon-deciduous; 2: not present
9. Stipules enclosing buds	0: no; 1: yes
10. Petiole glands	0: absent; 1: present
11. Lamina margin	0: without true teeth; 1: toothed
12. Lamina glands	0: absent; 1: abaxial surface; 2: margin or v. sl. within; 3: adaxial surface
13. Inflorescence position	0: terminal or terminal and axillary; 1: axillary
14. Inflorescence ultimate units	0: pseudoraceme or thyrse; 1: umbel of (2)4(6) flowers; 2: umbel of >six flowers; 3: 1(2) flower(s); 4: verticil of four flowers; 5: spike; 6: consistently two flowers
15. Inflorescence decussate	0: mostly not; 1: all or mostly yes; 2: proximally decussate, distally not; 3: too tight to tell; 4: single flowers
16. Cincinni	0: one-flowered; 1: two to several-flowered
17. Bract and bracteole size	0: full-sized leaves; 1: much reduced; 2: apparently absent
18. Bracts and bracteoles scalelike	0: no; 1: yes; 2: absent
19. Bract persistence	0: persistent; 1: deciduous; 2: absent
20. Peduncle	0: 0–1 mm long; 1: >1 mm long
21. Pedicel	0: well developed, > bracteoles; 1: absent or very short, < bracteoles
22. Bracteole glands	0: eglandular; 1: one or both glandular; 2: bracteoles absent
23. Bracteole persistence	0: persistent; 1: deciduous; 2: absent
24. Bracteoles enclosing buds	0: no; 1: yes; 2: absent
25. Cleistogamous flowers	0: absent; 1: present
26. Breeding system	0: bisexual; 1: morphologically bisexual, functionally unisexual; 2: morphologically bisexual or male; 3: unisexual, dioecious
27. Sepal number	0: 5; 1: 2–4
28. Sepal aestivation	0: imbricate; 1: valvate
29. Sepal margin, glands	0: absent; 1: present
30. Calyx in anthesis	0: erect or appressed; 1: revolute; 2: reflexed
31. Calyx in fruit	0: hardly enlarged; 1: enlarged, papery
32. Calyx glands	0: none; 1: 10 on five sepals; 2: eight on lateral four sepals; 3: four (fused) on lateral four sepals; 4: up to five glands; 5: six on lateral four sepals
33. Calyx gland attachment	0: completely on free sepals; 1: half or more on free sepals; 2: mostly below free sepals; 3: not present
34. Calyx glands long-stalked	0: no; 1: yes; 2: not present
35. Petal number	0: five; 1: two to four
36. Petals in bud	0: exposed; 1: concealed by sepals
37. Petal color	0: yellow; 1: pink (+white); 2: white; 3: lilac
38. Petals clawed	0: yes; 1: no
39. Petal hairs	0: absent; 1: present, abaxial surface; 2: present, adaxial surface; 3: present, margin
40. Corolla symmetry	0: nearly radial; 1: bilateral, NW type; 2: bilateral, <i>Acridocarpus</i> type
41. Disk	0: absent; 1: present
42. Stamen number (in bisexual or male flowers)	0: >10; 1: 10; 2: 7–9; 3: six opposite sepals + posterior petal; 4: five opposite sepals; 5: 1–4
43. Stamens sterile (in bisexual or male flowers)	0: none; 1: staminodes opposite five sepals; 2: staminodes opposite anterior-lateral sepals; 3: posterior three staminodes; 4: filament opposite posterior petal without anther; 5: staminodes opposite posterior-lateral sepals; 6: staminodes opposite petals, posterior-lateral sepals; 7: staminodes opposite three anterior sepals; 8: staminodes opposite five petals
44. Filament sizes (fertile)	0: subequal; 1: longer opposite sepals; 2: longer opposite some or all petals; 3: longer opposite sepals, posterior-lateral petals; 4: anterior three shorter; 5: posterior three shorter; 6: shorter opposite posterior-lateral petals; 7: very long opposite anterior sepal; 8: stouter opposite posterior-lateral petals; 9: anterior one shorter
45. Filament fusion	0: distinct; 1: connate at base or higher
46. Anther hairs	0: absent; 1: present
47. Anther bristles, apex	0: absent; 1: present
48. Anther wings	0: absent; 1: present

Table S1. Cont.

Traits	Score
49. Anther dehiscence	0: longitudinal slits; 1: apical or subapical pores
50. Connective extended, fleshy (fertile anthers)	0: no; 1: yes
51. Anther size (fertile)	0: subequal; 1: larger opposite sepals; 2: larger opposite petals; 3: larger opposite posterior-lateral petals; 4: posterior three smaller; 5: smaller opposite anterior-lateral petals; 6: anterior three smaller; 7: anterior one larger; 8: larger opposite three anterior sepals; 9: anterior three larger
52. Androecium symmetry	0: nearly radial; 1: strongly bilateral
53. Pollen symmetry	0: radial; 1: global
54. Pollen ectoapertures	0: present; 1: absent
55. Endoapertures, number	0: 3; 1: 4–12
56. Pollen diameter (μm)	0: ≤ 22 ; 1: >22
57. Receptacle hairs between filaments and gynoecium	0: absent or nearly so; 1: present, abundant
58. Carpel number (chasmogamous flowers)	0: three; 1: two; 2: five
59. Ovules per locule	0: one (or none); 1: two or more
60. Carpels sterile	0: none; 1: anterior; 2: one posterior; 3: anterior +one posterior
61. Carpel fusion in ovary	0: distinct or connate at base only; 1: connate whole ventral face or axis
62. Style number (chasmogamous flowers)	0: as many as carpels; 1: one on anterior carpel; 2: two on posterior carpels; 3: two on anterior carpel + one posterior carpel
63. Style fusion	0: distinct; 1: connate in styles; 2: connate in stigmas
64. Gynoecium symmetry	0: nearly radial; 1: strongly bilateral
65. Style thickness	0: subulate, slender; 1: uniform, thick; 2: uniform, slender
66. Stigma	0: terminal or nearly so, tiny; 1: internal, short, large; 2: internal, long-decurrent, large; 3: internal, tiny; 4: terminal, large, capitate or truncate; 5: terminal, large, reniform; 6: terminal, large, elongated
67. Style dorsal extension	0: none; 1: angle to hook; 2: foliole
68. Styles distally	0: entire; 1: bifid
69. Fruit texture	0: dry; 1: fleshy
70. Fruit dehiscence	0: schizocarpic, not releasing seed; 1: indehiscent; 2: loculicidally dehiscent, releasing seeds; 3: septicidally dehiscent, releasing seeds
71. Fruit wall	0: smooth; 1: setiferous; 2: dorsal wing dominant; 3: lateral wing(s) dominant; 4: winglets, ruffles; 5: aculeate; 6: dorsal or dorsal+lateral crest(s)
72. Carpophore	0: absent; 1: present
73. Eumascagnoid disk	0: absent; 1: present
74. Aril	0: absent; 1: present
75. Endosperm	0: absent; 1: present

Characters with significant difference between oil-bee pollinated clades are highlighted in bold. An acceleration in trait diversification in oil-bee clades is indicated in blue; a deceleration in oil-bee free clades are in bold and italics.

1. Davis CC, Anderson WR (2010) A complete generic phylogeny of Malpighiaceae inferred from nucleotide sequence data and morphology. *Am J Bot* 97(12):2031–2048.