

Supplementary Information

Brady et al., Recent and simultaneous origins of eusociality in halictid bees

Table 2

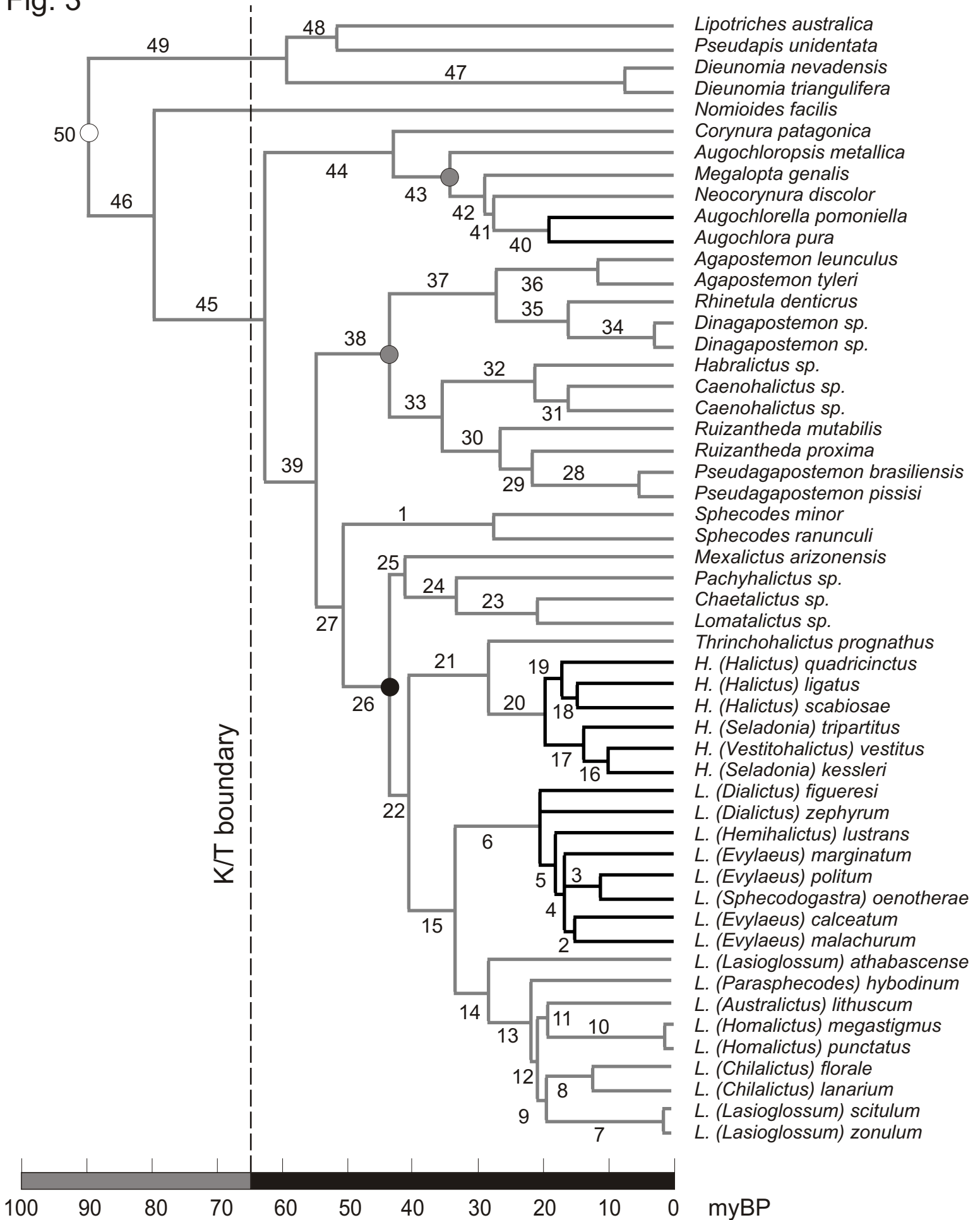
Taxa used in this study with DNA voucher codes (four letter abbreviation and number), subfamilial classification, locality data [and collector], and Genbank accession numbers for the three genes analyzed. For opsin, the sequences labeled with an asterisk (*) include only the upstream portion of the gene (using primers opsin For to opsin Rev). All other sequences are complete (spanning the region between primers opsin For and opsin Rev4).

Figure 3 and Table 3

Summary of results from phylogenetic and dating analyses. The figure is the tree resulting from Bayesian phylogenetic analysis (see text for details of analysis). For each numbered node, Table 3 lists: (1) the posterior value from this analysis; (2) parsimony bootstrap values; and (3) the mean, upper, and lower credibility intervals from Bayesian dating analysis using an *a priori* age of 80 ± 20 mya for the root node.

Taxon	abbrev	no.	Subfm	Locality data	Opsin (~1200bp)	Wingless (450bp)	EF1 (~1600bp)
<i>Conanthalictus wilmattae</i>	Cowi	351	Ro	USA: California [J. Neff]	AY227934	AY222553	AF435378
<i>Dufourea malacothricis</i>	Duma	235	Ro	USA: Michigan [P. Lincoln]	AY227917	AY222554	AF435382
<i>Dufourea mulleri</i>	Dumu	233	Ro	USA: Michigan [P. Lincoln]	AY227918	AY222555	AF435383
<i>Dufourea novaeangliae</i>	Duno	354	Ro	USA: New York, Cayuga Co.	AY227919	AY222556	AF435384
<i>Goeletapis peruensis</i>	Gope	569	Ro	Peru: Lima Dept. [J.G. Rozen, Jr.]	AY227923*	AY222560	AF435386
<i>Penapis moldenkei</i>	Pnpe	572	Ro	Chile: Huasco Prov. [J.G. Rozen, Jr.]	AY227921	AY222558	AF435401
<i>Penapis toroi</i>	Pnto	586	Ro	Chile: Region III [L. Packer]	AY227922	AY222559	AF435402
<i>Protodufourea parca</i>	Pfsp	237	Ro	USA: Arizona, Pima Co. [L. Packer]	AY227920	AY222557	AF435399
<i>Sphécodosoma pratti</i>	Sspr	355	Ro	USA: Texas, Mason Co. [J. Neff]	AY227924	AY222561	AF435410
<i>Systropha curvicornis</i>	Sycu	350	Ro	Austria: Vienna [M. Ayasse]	AY227925	AY222562	AF435411
<i>Systropha planidens</i>	Sypl	349	Ro	Austria: Vienna [M. Ayasse]	AY227926	AY222563	AF435412
<i>Xeralictus bicuspidariae</i>	Xrbi	566	Ro	USA: California, San Diego Co. [R. Snelling]	AY227927	AY222564	AF435413
<i>Xeralictus timberlakei</i>	Xrti	564	Ro	USA: California, Riverside Co. [R. Snelling]	AY227928	AY222565	AF435414
<i>Dieunomia nevadensis</i>	None	207	No	USA: Arizona, Cochise Co.	AY227931	AY222568	AF435396
<i>Dieunomia triangulifera</i>	Notr	286	No	USA: Kansas, Douglas Co.	AY227932	AY222569	AF435397
<i>Lipotriches (Austro.) australica</i>	Noau	754	No	Australia: South Australia, Cowell	AY227930	AY222567	AF435395
<i>Pseudapis unidentata</i>	Psun	241	No	Spain: Almería Prov.	AY227933	AY222570	AF435404
<i>Nomioides facilis</i>	Nmsp	243	Nm	Spain: Granada Prov.	AY227929	AY222566	AF435394
<i>Agapostemon leunculus</i>	Agle	336	Hah	Republic of Panama: Panama Prov. [W. Wcislo]	AY227939	AY222576	AF435371
<i>Agapostemon tyleri</i>	Agty	230	Hah	USA: Arizona, Cochise Co.	AY227940	AY222577	AF140320
<i>Caenohalictus sp. 2</i>	Cnsp	578	Hah	Chile: Region I, Socoroma [L. Packer]	AY227941	AY222578	AF435376
<i>Caenohalictus sp. 3</i>	Cnsp	788	Hah	Brazil: Minas Gerais [D. Yanega]	AY227942	AY222579	AF435377
<i>Chaetolictus sp. 2</i>	Chsp	603	Hah	South Africa: Kwazulu-Natal [L. Packer]	AY227952	AY222588	AF435374
<i>Dinagapostemon sp. 1</i>	Dnsp	573	Hah	Republic of Panama: Chiriquí Prov. [L. Packer]	AY227943	AY222580	AF435380
<i>Dinagapostemon sp. 2</i>	Dnsp	790	Hah	Republic of Panama: Coclé Prov. [L. Packer]	AY227944	AY222581	AF435381
<i>H. (Halictus) ligatus</i>	Hali	62/345	Hah	USA: New York, Tompkins Co.	AY455895	AY455899	AF140299
<i>H. (Halictus) quadricinctus</i>	Haqu	89	Hah	France: Dordogne [C. Plateaux-Quenu]	AY227956	AY222592	AF140334
<i>H. (Halictus) scabiosae</i>	Hask	365	Hah	Spain: Granada Prov.	AY455896	AY455900	AF140330
<i>H. (Seladonia) kessleri</i>	Hake	239	Hah	Austria: Vienna [M. Ayasse]	AY455894	AY455898	AF140306
<i>H. (Seladonia) tripartitus</i>	Hatr	93	Hah	USA: Arizona, Cochise Co.	AY227957	AY222593	AF140310
<i>H. (Vestitolictus) vestitus</i>	Veve	373	Hah	Spain: Granada Prov.	AY227958*	AY222594	AF140313
<i>Habralictus sp.</i>	Hasp	786	Hah	Brazil: Minas Gerais [D. Yanega]	AY227945	AY222582	AF435387
<i>L. (Australictus) lithuscum</i>	Auli	711	Hah	Australia: Victoria	AY227962	AY222598	AF435372
<i>L. (Chilalictus) florale</i>	Chfl	320	Hah	Australia: South Australia [S. Reyes]	AY227966	AY222602	AF264792
<i>L. (Chilalictus) lanarium</i>	Chla	316	Hah	Australia: Victoria [S. Reyes]	AY227967	AY222603	AF264793
<i>L. (Dialictus) figheresi</i>	Difi	341	Hah	Costa Rica: San José Province	AF448903	AY455901	AF264802
<i>L. (Dialictus) zephyrum</i>	Dizp	74	Hah	USA: New York, Seneca Co.	AF448918*	AY222607	AF435379
<i>L. (Evyllaes) calceatum</i>	Evca	105	Hah	France: Dordogne [C. Plateaux-Quenu]	AF448877*	AY222608	AF435385
<i>L. (Evyllaes) malachurum</i>	Evml	111	Hah	France: Dordogne [C. Plateaux-Quenu]	AF448890	AY455903	AF264826
<i>L. (Evyllaes) marginatum</i>	Evmg	108	Hah	France: Dordogne [C. Plateaux-Quenu]	AF448889	AY455902	AF264825
<i>L. (Evyllaes) politum</i>	Eupo	122	Hah	France: Dordogne [C. Plateaux-Quenu]	AF448895	AY455904	AF264831
<i>L. (Hemhalictus) lustrans</i>	Helu	186	Hah	USA: Texas, Bastrop Co. [J. Neff]	AF448904*	AY222609	AF435388
<i>L. (Homalictus) megastigmus</i>	Homg	360	Hah	Australia: Western Australia, Bluff Knoll [S. Reyes]	AY227964	AY222600	AF264839
<i>L. (Homalictus) punctatus</i>	Hopu	245	Hah	Australia: South Australia, Adelaide [S. Reyes]	AY227965	AY222601	AF435389
<i>L. (Lasioglossum) athabascense</i>	Laat	556	Hah	USA: New York, Tompkins Co.	AF448867	AY222604	AF435390
<i>L. (Lasioglossum) scitulum</i>	Lasc	550	Hah	Japan, Shimane Prefecture [R. Miyanaga]	AY227968	AY222605	AF435391
<i>L. (Lasioglossum) zonulum</i>	Lazo	284	Hah	USA: New York, Tompkins Co.	AY227969	AY222606	AF264855
<i>L. (Parasphecodes) hybodinum</i>	Pahy	299	Hah	Australia: South Australia [S. Reyes]	AY227963	AY222599	AF264857
<i>L. (Sphécodogastra) oenotherae</i>	Stoe	54	Hah	USA: New York, Tompkins Co.	AF448906	AY455905	AF264860
<i>Lomatalictus sp.</i>	Losp	604	Hah	South Africa: Gauteng [C. Eardley]	AY227953	AY222589	AF435393
<i>Mexalictus arizonensis</i>	Mxaz	98	Hah	USA: Arizona, Santa Cruz Co. [L. Packer]	AY227959	AY222595	AF140322
<i>Pachyalictus sp.</i>	Phsp	357	Hah	Vietnam: Ban Don [L. Packer]	AY227954	AY222590	AF435400
<i>Pseudagapostemon brasiliensis</i>	Psbr	347	Hah	Brazil: Minas Gerais [D. Yanega]	AY227946	AY222583	AF140323
<i>Pseudagapostemon pissisi</i>	Psps	576	Hah	Chile: Region VIII (nr. Temuco) [L. Packer]	AY227947	AY222584	AF435403
<i>Rhinotula denticrus</i>	Rhdn	799	Hah	Republic of Panama: Panama Prov. [D. Roubik]	AY227948	AY222585	AF435405
<i>Ruizantheda mutabilis</i>	Rumt	574	Hah	Chile: Region VIII (nr. Temuco) [L. Packer]	AY227949	AY222586	AF435406
<i>Ruizantheda proxima</i>	Rupr	575	Hah	Chile: Region VIII (nr. Temuco) [L. Packer]	AY227950	AY222587	AF435407
<i>Sphécodes minor</i>	Spmi	21	Hah	USA: New York, Tompkins Co.	AY227960	AY222596	AF140324
<i>Sphécodes ranunculi</i>	Spra	337	Hah	Canada: Nova Scotia [L. Packer]	AY227961	AY222597	AF140325
<i>Thrincohalictus prognathus</i>	Thpr	434	Hah	Israel: Golan Heights [L. Packer]	AY227955	AY222591	AF140326
<i>Augochlora (Augochlora) pura</i>	Aupu	333	Haa	USA: New York, Tompkins Co.	AY455893	AY455897	AF140314
<i>Augochlora pomoniella</i>	Aupo	592	Haa	USA: California, Inyo Co. [J. Ascher]	AY227935	AY222572	AF435373
<i>Augochloropsis metallica</i>	Aume	334/5	Haa	USA: New York, Tompkins Co.	AY227934	AY222571	AF140315
<i>Corynura (Cory) patagonica</i>	Copt	581	Haa	Chile: Region IX, near Temuco [L. Packer]	AY227936	AY222573	na
<i>Megalopta genalis</i>	Mgge	247	Haa	Republic of Panama: Panama Prov. [M. Engel]	AY227937	AY222574	AF140316
<i>Neocorynura discolor</i>	Ncdi	249	Haa	Colombia [M. Engel]	AY227938	AY222575	AF140317

Fig. 3



NODE	BAYES PP	BOOTSTRAP	MEAN AGE	LOWER	UPPER	Taxon
1	100	100	29	20	40	
2	80	<50	16	11	22	
3	100	97	12	7	18	
4	68	<50	17	12	24	
5	56	<50	19	13	26	
6	100	100	22	15	29	eusocial <i>Lasioglossum</i>
7	100	100	2	0	4	
8	100	100	13	8	19	
9	100	70	20	15	28	
10	100	100	1	0	3	
11	100	77	20	15	27	
12	100	61	22	16	29	
13	100	96	23	17	30	
14	100	84	30	24	38	
15	100	100	35	29	44	
16	100	98	10	6	17	
17	100	100	14	9	22	
18	100	73	16	10	22	
19	100	90	18	12	25	
20	100	100	21	15	28	<i>Halictus</i>
21	100	100	30	23	38	
22	100	75	43	38	51	
23	100	100	22	15	31	
24	100	97	35	28	44	
25	100	60	43	38	52	
26	100	100	46	42	54	
27	100	86	53	46	63	
28	100	100	5	2	11	
29	100	84	22	15	32	
30	100	96	27	19	37	
31	100	97	17	10	25	
32	100	100	22	14	31	
33	100	100	37	28	47	
34	100	100	3	0	7	
35	100	100	17	10	25	
36	100	100	12	6	20	
37	100	100	28	19	39	
38	100	100	45	36	56	
39	100	99	57	49	67	
40	100	100	20	12	29	eusocial Augochlorini
41	68	<50	28	20	39	
42	100	82	30	21	41	
43	100	77	35	25	48	
44	100	100	44	32	59	
45	100	100	64	54	76	
46	100	86	80	67	95	
47	100	100	7	2	16	
48	100	86	51	37	66	
49	100	100	59	45	74	
50	100	100	89	76	105	