Online Material

Table I. Review of mating strategies and morphological traits possibly associated with mating behaviour observed in *Xylocopa* grouped by subgenus. Abbreviations: NRD: Non Resource Defence; RD: Resource Defence; P: Patrolling; y: yes; n: no. References are represented by numbers in the table, which correspond to references given below.

Xylocopa subgenus	Species	Mating strategy	Refs. mating strategy	Mesosomal gland type[32,37]	Male eyes enlarged?[20]	Sexual colour dimorphism[37]
Afroxylocopa	*nigrita*	NRD	3	5	n	y
Alloxylocopa	*albinotum*	?		5	y	n
Apoxylocopa	*lugubris*	?		3	n	n
Biluna	*tranquebarorum*	?		5	n	n
Copoxyla	*iris*	RD	34	0	n	n
Ctenoxylocopa	*sulcatipes*	P, RD	37, 11, 34, 29	3	n	n
Cyphoxylocopa	*ocularis*	?		5	y	n
Diaxylocopa	*truxali*	?	26	3	?	?
Gnathoxylocopa	*sicheli*	?		5	n	n
Hoploxylocopa	*acutipennis*	RD	23	5	y	n
Koptortosoma	*aruana*	NRD	12, 19, 29	5	n	y
	caffra	?		5	n	y
	cf.confusa	?		5	n	y
	disconata	?		5	n	y
	flavicollis	?		5	n	y
	leucocephala	?		5	n	y
	lieftincki	NRD	29	5	n	y
	nigroclypeata	?		5	n	y
	nobilis.tricolor	?		5	n	y
	parvula	?		5	n	y
	provida	?		5	n	y
	perversa	NRD	18	5	n	y
	pubescens	NRD	11, 29	5	n	y
	scioensis	?		5	n	y
	sp. India	?		5	n	y
	unicolour	NRD	19	5	n	y
	waterhousi	?		5	n	y
	watmoughi	?		5	n	y
Lestis	*aeratus*	P, RD, NRD	17	2	y	n
	bombylans	NRD	17	4	y	n
Lieftinckiella	*smithii*	?		?	y	n

Table I. Continued.

Xylocopa subgenus	Species	Mating strategy	Refs. mating strategy	Mesosomal gland type[32,37]	Male eyes enlarged?[20]	Sexual colour dimorphism[37]
Megaxylocopa	*frontalis*	NRD	8, 16, 33	5	n	y
	fimbriata	NRD	16, 41, 38	5	n	y
Mesotrichia	*flavorufa*	P, RD	40, 3	5	y	n
	torrida	P, RD	3, 28	5	y	n
Neoxylocopa	*aurulenta*	NRD	8	5	n	y
	darwini	NRD	21, 22	5	n	y
	gualanensis	NRD	24, 41, 39	5	n	y
	hirsutissima	NRD	35, 36	5	n	y
	mordax	NRD	6	5	n	y
	nigrocincta	NRD	33	5	n	y
	varipuncta	NRD	14, 24, 1, 2,43	5	n	y
Notoxylocopa	*guatamalensis*	P	13	0	y	n
	t.s illota	RD	15	0	y	n
	t.s melanosoma	RD, NRD	15	0	y	n
	t. orpifex	RD	7	0	y	n
Nyctomelitta	*tranquebarica*	?		3	y	n
Perixylocopa	*erythrina*	?		3	n	n
Platynopoda	*latipes*	RD	28	2	y	n
	perforator	RD	28	2	y	n
	tenuiscapa	RD	28	2	y	n
Proxylocopa	*rufa*	P	29	2	n	n
Schoenherria	*micans*	RD, NRD	9	3	y	n
	macrops	RD	32	3	y	n
	muscaria	RD?	32	3	y	n
Stenoxylocopa	*m micheneri*	NRD	2	5	n	n
Xylocopa ss	*violacea*	P, RD	38	2	n	n
Xylocopoides	*c. arizonensis*	P, RD	13, 27, 42	1	y	n
	c. californica	RD	7	1	y	n
	v. virginica	RD	30, 4, 31, 10, 5	1	y	n
Xylomelissa	*albifrons*	?		3	n	n
Zonohirsuta	*collaris*	?		4	y	y

References 1: Alcock and Smith, 1987; 2: Andersen et al., 1988; 3: Anzenberger, 1977; 4: Balduf, 1962; 5: Barrows, 1983; 6: Bennet, 1966; 7: Cruden, 1966; 8: Ducke, 1901; 9: Frankie et al., 1979; 10: Gerling and Hermann, 1978; 11: Gerling et al., 1983; 12: Houston, 1974; 13: Hurd and Moure, 1963; 14: Hurd, 1958; 15: Janzen, 1964; 16: Janzen, 1966; 17: Leys, 2000b; 18: Lieftinck, 1955; 19: Lieftinck, 1956; 20: Lieftinck, 1957; 21: Linsley, 1965; 22: Linsley, 1976; 23: Malyshev, 1931; 24: Marshall and Alcock, 1981; 25: Minckley, 1994; 26: Minckley pers comm; 27: O'Brien and O'Brien, 1966; 28: Osten, 1989; 29: pers obs ; 30: Rau, 1933; 31: Sabrosky, 1962; 32: Sage, 1968; 33: Scholz, 1988; 34: Stark, 1990; 35: Velthuis and Camargo, 1975a; 36: Velthuis and Camargo, 1975b; 37: Velthuis and Gerling, 1980; 38: Vicidomini, 1998; 39: Vinson and Frankie, 1990; 40: Watmough, 1974; 41: Williams et al., 1987; 42: Alcock, 1991; 43: Alcock, 1993.

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Table II. Parameter estimates of Bayesian phylogenetic analysis.

Run	Arithmetic mean	Harmonic mean
1	–19675.05	–19733.32
2	–19674.99	–19737.05
TOTAL	–19675.02	–19736.38

Model parameter summaries over the runs sampled in files
"XylocopaCorr.run1.p" and "XylocopaCorr.run2.p":
(Summaries are based on a total of 34070 samples from 2 runs)
(Each run produced 47035 samples of which 17035 samples were included)

			95% Cred. Interval			
Parameter	Mean	Variance	Lower	Upper	Median	PSRF *
TL{all}	8.779483	0.687544	7.219000	10.420000	8.752000	
r(A< – >C){1}	0.112369	0,000621	0.069289	0.164658	0.111548	1.010
r(A< – >G){1}	0.051007	0.000422	0.021393	0.102631	0.047685	1.001
r(A< – >T){1}	0.013063	0.000041	0.003677	0.028720	0.012014	1.000
r(C< – >G){1}	0.021660	0.000263	0.001731	0.063810	0.018279	1.000
r(C< – >T){1}	0.794912	0.001701	0.706104	0.867219	0.796851	1.013
r(G< – >T){1}	0.006989	0.000013	0.002167	0.015557	0.006296	1.001
r(A< – >C){2}	0.096272	0.001016	0.044802	0.169145	0.092903	1.000
r(A< – >G){2}	0.255903	0.004784	0.133134	0.408959	0.251509	1.000
r(A< – >T){2}	0.177007	0.001907	0.095485	0.266608	0.175866	1.002
r(C< – >G){2}	0.208175	0.003862	0.106625	0.347642	0.200665	1.008
r(C< – >T){2}	0.224610	0.002222	0.142442	0.326634	0.221255	1.003
r(G< – >T){2}	0.038034	0.000422	0.008934	0.086124	0.034424	1.003
r(A< – >C){3}	0.013211	0.000034	0.003452	0.025669	0.012825	1.000
r(A< – >G){3}	0.613002	0.003497	0.492473	0.718462	0.615827	1.002
r(A< – >T){3}	0.014893	0.000004	0.011223	0.019204	0.014830	1.003
r(C< – >G){3}	0.063412	0.002861	0.002438	0.196259	0.051643	1.000
r(C< – >T){3}	0.234765	0.001916	0.155871	0.324267	0.231882	1.024

Table II. Continued.

Parameter	Mean	Variance	95% Cred. Interval Lower	95% Cred. Interval Upper	Median	PSRF *
r(G< − >T){3}	0.060716	0.000428	0.022300	0.104037	0.060407	1.001
r(A< − >C){4}	0.062820	0.000564	0.022659	0.114832	0.060479	1.030
r(A< − >G){4}	0.375706	0.004909	0.254136	0.521033	0.372457	1.006
r(A< − >T){4}	0.082565	0.001743	0.018229	0.178472	0.076618	1.001
r(C< − >G){4}	0.092084	0.000339	0.057797	0.130533	0.091245	1.005
r(C< − >T){4}	0.363019	0.003908	0.239945	0.485248	0.363004	1.001
r(G< − >T){4}	0.023807	0.000230	0.001737	0.059532	0.021357	1.002
r(A< − >C){5}	0.040681	0.001605	0.000991	0.149261	0.027360	1.006
r(A< − >G){5}	0.200097	0.010910	0.047166	0.433351	0.183449	1.000
r(A< − >T){5}	0.084731	0.003795	0.009080	0.233286	0.071700	1.012
r(C< − >G){5}	0.044020	0.001820	0.001236	0.159704	0.030565	1.007
r(C< − >T){5}	0.589048	0.015706	0.319630	0.811595	0.596169	1.000
r(G< − >T){5}	0.041423	0.001851	0.001049	0.163538	0.027983	1.019
r(A< − >C){6}	0.081490	0.000399	0.046834	0.124267	0.079896	1.000
r(A< − >G){6}	0.407030	0.002136	0.318991	0.499779	0.406476	1.001

Table II. Continued.

Parameter	Mean	Variance	95% Cred. Interval Lower	95% Cred. Interval Upper	Median PSRF *	
r(A< – >T){6}	0.050203	0.000224	0.025091	0.083121	0.048919	1.006
r(C< – >G){6}	0.050844	0.000296	0.022321	0.089896	0.048986	1.001
r(C< – >T){6}	0.381123	0.002132	0.294647	0.476833	0.379447	1.000
r(G< – >T){6}	0.029309	0.000154	0.009693	0.057428	0.027967	1.006
r(A< – >C){7}	0.037773	0.000379	0.009256	0.084751	0.034703	1.000
r(A< – >G){7}	0.169124	0.005341	0.053785	0.329398	0.162051	1.000
r(A< – >T){7}	0.074377	0.001246	0.022607	0.158782	0.069160	1.021
r(C< – >G){7}	0.033613	0.000316	0.008199	0.074750	0.030584	1.011
r(C< – >T){7}	0.671894	0.011300	0.455748	0.857869	0.678300	1.006
r(G< – >T){7}	0.013220	0.000210	0.000308	0.052949	0.008386	1.025
r(A< – >C){8}	0.048663	0.000102	0.030929	0.070850	0.047918	1.004
r(A< – >G){8}	0.423534	0.002438	0.327377	0.523401	0.422860	1.000
r(A< – >T){8}	0.038660	0.000053	0.025624	0.054482	0.038173	1.000
r(C< – >G){8}	0.080449	0.000380	0.045761	0.122542	0.079069	1.000
r(C< – >T){8}	0.352954	0.002123	0.265318	0.445379	0.351967	1.001
r(G< – >T){8}	0.055741	0.000163	0.033524	0.082830	0.054637	1.000
pi(A){1}	0.428037	0.000529	0.383241	0.473599	0.427800	1.001

Table II. Continued.

& Parameter	Mean	Variance	95% Cred. Interval Lower	Upper	Median PSRF *	
pi(C){1}	0.038358	0.000021	0.030387	0.048404	0.038124	1.006
pi(G){1}	0.111994	0.000257	0.083206	0.145683	0.110975	1.001
pi(T){1}	0.421610	0.000494	0.377582	0.466440	0.421511	1.003
pi(A){2}	0.242157	0.000450	0.202538	0.285620	0.241576	1.001
pi(C){2}	0.194525	0.000526	0.149748	0.239084	0.194705	1.001
pi(G){2}	0.114903	0.000290	0.083922	0.149458	0.114232	1.000
pi(T){2}	0.448415	0.000726	0.395589	0.501658	0.447774	1.003
pi(A){3}	0.404215	0.000711	0.355534	0.454808	0.404472	.1001
pi(C){3}	0.035908	0.000009	0.030344	0.042173	0.035846	1.003
pi(G){3}	0.009735	0.000001	0.007921	0.011793	0.009744	1.000
pi(T){3}	0.550141	0.000647	0.501308	0.596874	0.549151	1.001
pi(A){4}	0.146698	0.000304	0.113993	0.183037	0.145792	1.003
pi(C){4}	0.347579	0.000611	0.300667	0.397268	0.347347	1.001
pi(G){4}	0.321533	0.000603	0.275524	0.371519	0.321403	1.001
pi(T){4}	0.184190	0.000377	0.148775	0.224521	0.183522	1.001
pi(A){5}	0.323336	0.001502	0.250276	0.402432	0.322468	1.000
pi(C){5}	0.158196	0.000854	0.103939	0.218940	0.156910	1.003

Table II. Continued.

Parameter	Mean	Variance	95% Cred. Interval Lower	95% Cred. Interval Upper	Median	PSRF *
pi(G){5}	0.332876	0.001545	0.258305	0.412160	0.332285	1.004
pi(T){5}	0.185593	0.000979	0.127806	0.250591	0.184299	1.000
pi(A){6}	0.290421	0.000468	0.249253	0.333817	0.290136	1.001
pi(C){6}	0.204093	0.000354	0.168607	0.241517	0.203425	1.001
pi(G){6}	0.235874	0.000425	0.196190	0.277738	0.235236	1.001
pi(T){6}	0.269612	0.000477	0.227634	0.312887	0.269387	1.001
pi(A){7}	0.260945	0.001079	0.198707	0.325811	0.260582	1.001
pi(C){7}	0.256270	0.000915	0.199644	0.317484	0.255451	1.000
pi(G){7}	0.292924	0.001084	0.231231	0.360152	0.291757	1.001
pi(T){7}	0.189861	0.000695	0.139949	0.243389	0.188870	1.002
pi(A){8}	0.355836	0.000312	0.321834	0.390724	0.355916	1.000
pi(C){8}	0.180193	0.000165	0.156054	0.205723	0.180128	1.000
pi(G){8}	0.127815	0.000146	0.105416	0.152289	0.127215	1.001
pi(T){8}	0.336156	0.000269	0.304747	0.369591	0.335750	1.003
alpha{1}	0.374723	0.001001	0.320808	0.445366	0.371787	1.000
alpha{2}	0.249544	0.001008	0.196770	0.323391	0.246126	1.001
alpha{3}	0.649272	0.008335	0.487113	0.842118	0.644745	1.000

Table II. Continued.

Parameter	Mean	Variance	95% Cred. Interval Lower	95% Cred. Interval Upper	Median	PSRF *
alpha{4}	0.217063	0.000866	0.168658	0.285333	0.213694	1.000
alpha{5}	0.084999	0.002159	0.058555	0.217518	0.072806	1.003
alpha{6}	0.181063	0.000479	0.147253	0.232184	0.178055	1.002
alpha{7}	0.233658	0.002005	0.150098	0.324325	0.233085	1.002
alpha{8}	0.425522	0.003315	0.328848	0.557341	0.419544	1.005
pinvar{1}	0.371875	0.001559	0.291913	0.444438	0.373336	1.008
pinvar{2}	0.591231	0.001979	0.488309	0.666592	0.594942	1.000
pinvar{3}	0.163154	0.004724	0.029792	0.303027	0.163397	1.000
pinvar{4}	0.427249	0.002326	0.331804	0.521197	0.427681	1.008
pinvar{5}	0.861554	0.002266	0.756254	0.940949	0.866164	1.002
pinvar{6}	0.219999	0.002272	0.123029	0.310939	0.220676	1.005
pinvar{7}	0.321978	0.006379	0.156628	0.467567	0.325644	1.000
pinvar{8}	0.011613	0.000124	0.000333	0.041088	0.008251	1.001

* Convergence diagnostic (PSRF = Potential scale reduction factor [Gelman and Rubin, 1992], uncorrected) should approach 1 as runs converge. The values may be unreliable if you have a small number of samples. PSRF should only be used as a rough guide to convergence since all the assumptions that allow one to interpret it as a scale reduction factor are not met in the phylogenetic context.

Table III. BayesTraits parameters: Harmonic mean of likelihood values of Dependent and Independent BayesTraits Discrete analyses.

Mean parameter values calculated from all visted models for each pairwise analysis									
	Eyes-dimorph harmonic mean	Glands-eyes harmonic mean	Glands-dimorph harmonic mean	Mating-glands harmonic mean	Mating-glands *	Mating-dimorph harmonic mean	Mating-dimorph *	Mating-eyes harmonic mean	Mating-eyes *
Dependent	–44.12	–40.774	–38.732	–27.239	–31.147	–30.667	–31.912	–35.006	–35.597
Independent	–47.691	–44.468	–43.296	–34.556		–38.066		–38.675	
BayesFactor	7.142	7.388	9.128	14.634		14.798		7.338	
	rates	rates	rates	rates	rates	rates	rates	rates	
q12	1.174	0.68	3.797	9.219	8.555	0.0367	0.275	12.854	7.809
q34	4.156	8.925	0.203	0.03546	0.0364	11.318	5.235	0.303	0.413
q21	0.702	5.995	2.262	8.855	7.783	9.805	5.001	12.204	8.297
q43	16.647	8.279	4.781	6.522	9.054	1.32	1.214	11.077	5.654
q13	10.627	0.08077	5.444	8.581	5.483	3.802	4.422	3.79	3.637
q24	1.075	9.071	0.0664	0.519	6.931	8.279	4.984	7.19	7.208
q31	11.3	6.236	6.008	2.168	2.775	9.726	5.42	1.348	1.064
q42	17.555	9.973	4.328	7.263	8.246	0.678	0.456	13.105	7.537
Root P(0,0)	0.461	0.01966	0.309	0.308	0.367	0.754	0.764	0.399	0.351
Root P(0,1)	0.01457	0.336	0.0385	0.492	0.328	0.125	0.05735	0.368	0.408
Root P(1,0)	0.43	0.255	0.603	0.06943	0.0751	0.105	0.16	0.03313	0.03268
Root P(1,1)	0.09066	0.386	0.04577	0.127	0.0227	0.01128	0.01488	0.196	0.204

* Green shaded areas, repeat analyses where mating state in Lestis aeratus and Schoenherria micans were set to NRD

Mean ancestral state probabilities for the most visited model for each pairwise analysis								
dimorphy	M=0	dimorphy		glands		eyes		
	D=1	M	D	L	S	X	E	grand average
mating	R=0	0.812	0.099	0.229	0.54	0.504	0.401	0.862
	N=1	0.061	0	0	0.231	0	0.094	0.129
glands	L=0	0.416	0.029	P(0.0)	P(0.1)	0	0.309	
	S=1	0.51	0.045	P(1.0)	P(1.1)	0.152	0.54	
eyes	X=0	0.747	0					
	E=1	0.24	0.012					
	grand average	0.929	0.062	0.328	0.672	0.468	0.532	