

## Supporting information:

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**Table S1.** List of the 28 plant-pollinator studies used to build the plant trait database. Each study is shown with the first author that conducted the study, number of networks or metawebs that contains, type of information that contains (weighted or unweighted), the structure (web or metaweb), year of publication and digital object identifier or permanent link for each study.

First author	Year	Web N.	Network type	DOI
Arroyo-Correa	2019	3	Weighted web	<a href="https://doi.org/10.1111/1365-2745.13332">https://doi.org/10.1111/1365-2745.13332</a>
Bartomeus	2008	6	Weighted web	<a href="https://doi.org/10.1007/s00442-007-0946-1">https://doi.org/10.1007/s00442-007-0946-1</a>
Bartomeus	2008	16	Weighted web	<a href="https://github.com/ibartomeus/BeeFunData">https://github.com/ibartomeus/BeeFunData</a>
Bek	2006	1	Unweighted web	Unpublished, Master thesis
Bundgaard	2003	1	Weighted web	Unpublished, Master thesis
Burkle	2013	1	Weighted web	<a href="https://doi.org/10.1126/science.1232728">https://doi.org/10.1126/science.1232728</a>
Dicks	2002	2	Weighted web	<a href="https://doi.org/10.1046/j.0021-8790.2001.00572.x">https://doi.org/10.1046/j.0021-8790.2001.00572.x</a>
Dupont	2003	3	Weighted web	<a href="https://doi.org/10.1111/j.1365-2656.2008.01501.x">https://doi.org/10.1111/j.1365-2656.2008.01501.x</a>
Elberling	1999	1	Weighted web	<a href="https://doi.org/10.1111/j.1600-0587.1999.tb00507.x">https://doi.org/10.1111/j.1600-0587.1999.tb00507.x</a>
Fang	2008	1	Weighted web	<a href="https://doi.org/10.1111/1749-4877.12190">https://doi.org/10.1111/1749-4877.12190</a>
Inouye	1988	1	Weighted web	<a href="https://doi.org/10.1111/j.1442-9993.1988.tb00968.x">https://doi.org/10.1111/j.1442-9993.1988.tb00968.x</a>
Inouye	1990	1	Weighted metaweb	<a href="http://hdl.handle.net/2433/156099">http://hdl.handle.net/2433/156099</a>

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First author	Year	Web N.	Network type	DOI
Kaiser-Bunbury	2017	8	Weighted web	<a href="https://doi.org/10.1038/nature21071">https://doi.org/10.1038/nature21071</a>
Kaiser-Bunbury	2011	6	Weighted web	<a href="https://doi.org/10.1111/j.1365-2745.2010.01732.x">https://doi.org/10.1111/j.1365-2745.2010.01732.x</a>
Kaiser-Bunbury	2010	2	Weighted web	<a href="https://doi.org/10.1016/j.ppees.2009.04.001">https://doi.org/10.1016/j.ppees.2009.04.001</a>
Kato	2000	1	Unweighted web	<a href="http://hdl.handle.net/2433/156116">http://hdl.handle.net/2433/156116</a>
Kevan	1970	1	Unweighted web	<a href="https://doi.org/10.2307/2258569">https://doi.org/10.2307/2258569</a>
Lundgren	2005	1	Weighted web	<a href="https://doi.org/10.1657/1523-0430(2005)037[0514:TDAHCW]2.0.CO;2">https://doi.org/10.1657/1523-0430(2005)037[0514:TDAHCW]2.0.CO;2</a>
McMullen	1993	1	Unweighted metaweb	<a href="https://biostor.org/reference/244737">https://biostor.org/reference/244737</a>
Olesen	2002	2	Weighted web	<a href="https://doi.org/10.1046/j.1472-4642.2002.00148.x">https://doi.org/10.1046/j.1472-4642.2002.00148.x</a>
Peralta	2006	4	Weighted web	<a href="https://doi.org/10.1111/ele.13510">https://doi.org/10.1111/ele.13510</a>
Primack	1983	3	Unweighted metaweb	<a href="https://doi.org/10.1080/0028825X.1983.10428561">https://doi.org/10.1080/0028825X.1983.10428561</a>
Ramirez	1989	1	Unweighted web	<a href="https://doi.org/10.2307/2388282">https://doi.org/10.2307/2388282</a>
Ramirez	1992	1	Unweighted metaweb	<a href="https://doi.org/10.1111/j.1095-8339.1992.tb00294.x">https://doi.org/10.1111/j.1095-8339.1992.tb00294.x</a>
Robertson	1929	1	Unweighted metaweb	<a href="https://doi.org/10.5962/bhl.title.11538">https://doi.org/10.5962/bhl.title.11538</a>
Small	1976	1	Weighted web	<a href="/13960/t4km08d21">/13960/t4km08d21</a>

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First author	Year	Web N.	Network type	DOI
Souza	2017	1	Weighted web	<a href="https://doi.org/10.1111/1365-2745.12978">https://doi.org/10.1111/1365-2745.12978</a>
Traveset	2013	1	Weighted metaweb	<a href="https://doi.org/10.1098/rspb.2012.3040">https://doi.org/10.1098/rspb.2012.3040</a>

**Table S2.** Loadings and explained variance of the first three principal components from the phylogenetically informed principal component analysis for the full set of species (N = 1,506).

	PC1	PC2	PC3
Autonomous selfing	0.03	0.85	-0.51
Flowers per plant	0.75	-0.27	-0.24
Flower width	-0.67	-0.38	-0.30
Style length	-0.34	-0.37	-0.66
Ovule number	-0.53	0.00	-0.02
Plant height	0.56	-0.40	-0.46
Explained variation	26.72	25.08	19.17

**Table S3.** Loadings and explained variance of the first three principal components from the phylogenetically informed principal component analysis for the subset of sepcies with quantitative information of nectar and pollen.

	PC1	PC2	PC3
Autonomous selfing	-0.23	-0.50	0.66
Flowers per plant	0.63	0.43	0.38
Flower width	-0.72	0.33	-0.19
Style length	-0.57	0.30	0.07
Ovule number	-0.60	0.02	-0.11
Plant height	0.41	0.65	0.29
Microlitres of Nectar per flower	-0.45	0.38	0.59
Pollen per flower	-0.03	0.66	-0.25
Explained variation	24.70	20.59	15.66

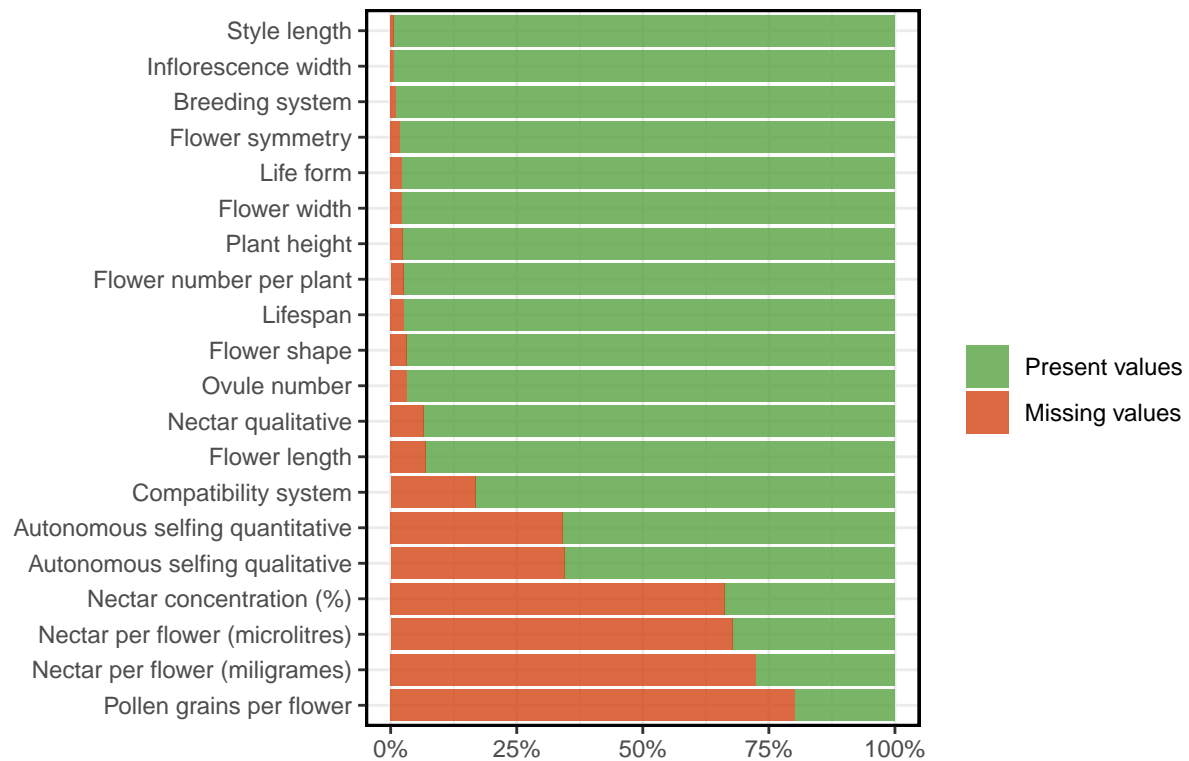
**Table S4.** Statistical association of the different categorical variables to the first two principal components from the pPPCA with the full set of species. For each categorical trait and principal component, sum of squares, F-value and P-value are provided.

Functional traits	Sum Sq	F value	Pr(>F)	PC
Breeding system	304.59	119.50	0.00	PC1
Compatibility system	89.12	23.31	0.00	PC1
Lifespan	35.65	27.97	0.00	PC1
Life form	565.87	222.00	0.00	PC1
Flower shape	132.24	20.75	0.00	PC1
Flower symmetry	0.37	0.29	0.59	PC1
Nectar provision	0.38	0.29	0.59	PC1
Breeding system	304.59	119.50	0.00	PC2
Compatibility system	89.12	23.31	0.00	PC2
Lifespan	35.65	27.97	0.00	PC2
Life form	565.87	222.00	0.00	PC2
Flower shape	132.24	20.75	0.00	PC2
Flower symmetry	0.37	0.29	0.59	PC2
Nectar provision	0.38	0.29	0.59	PC2

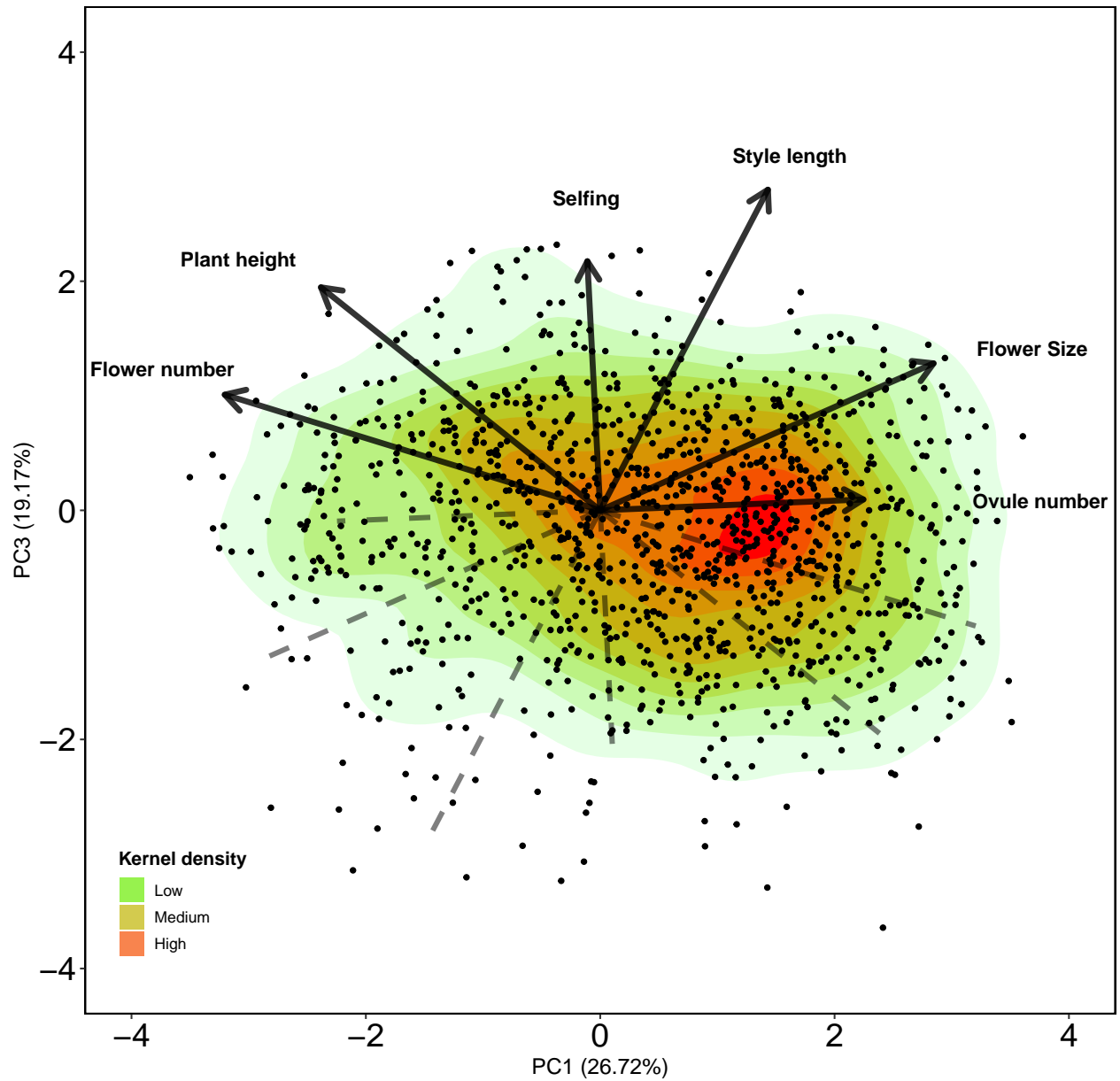


**Table S5.** Phylogenetic signal for all quantitative traits. Phylogenetic signal of nectar and pollen traits was calculated for the imputed dataset of the subset of species with quantitative information of nectar and pollen.

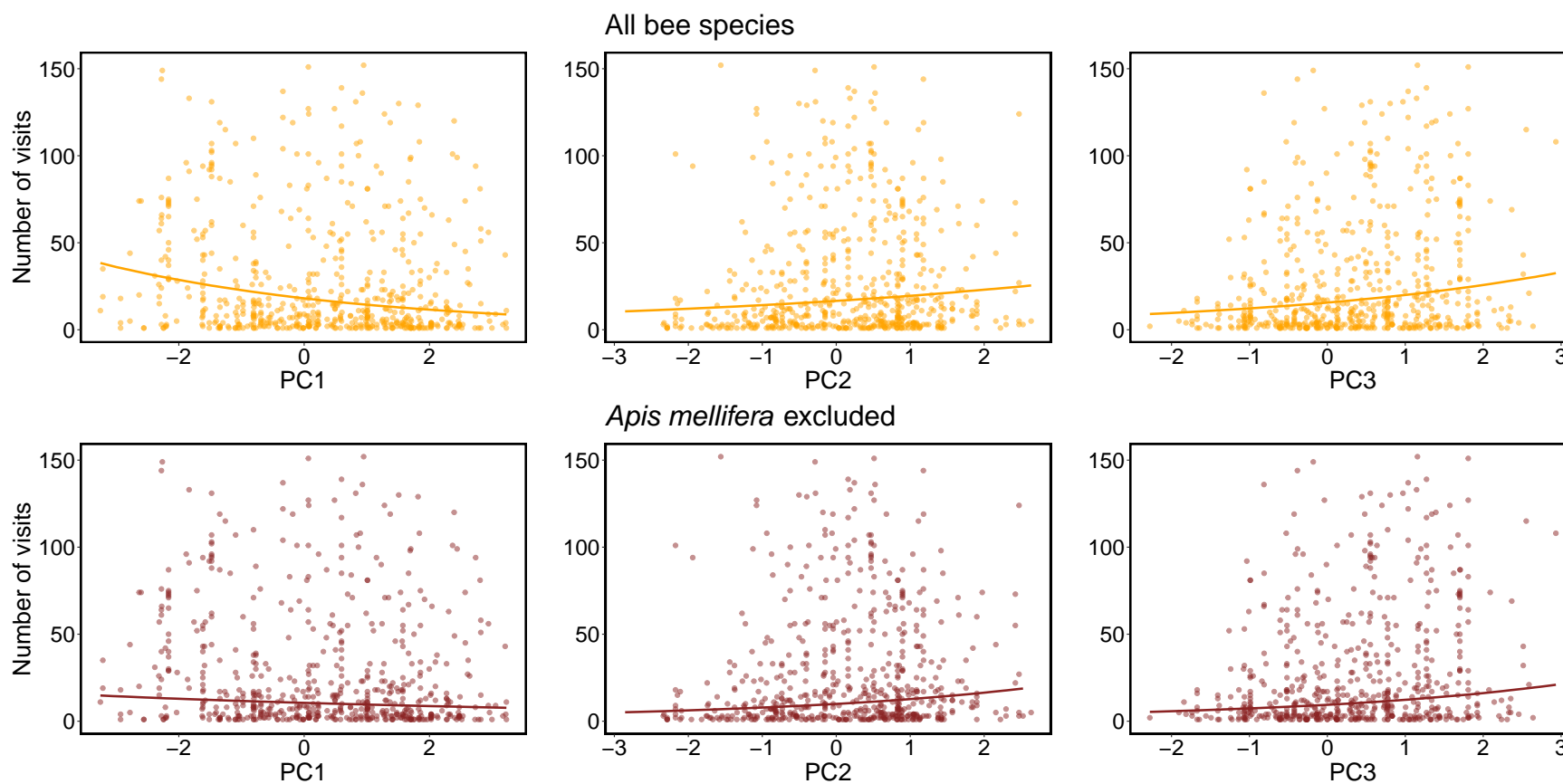
Functional traits	Lambda	P-value
Autonomous selfing	0.34	0.00
Flower number	0.69	0.00
Inflorescence width	0.57	0.00
Flower width	0.73	0.00
Flower length	0.75	0.00
Style length	0.49	0.00
Ovule number	1.00	0.00
Plant height	0.96	0.00
Nectar ( $\mu$ l) per flower	0.13	0.01
Nectar (mg) per flower	0.38	0.00
Nectar concentration (%)	0.61	0.00
Pollen grains per flower	0.84	0.00



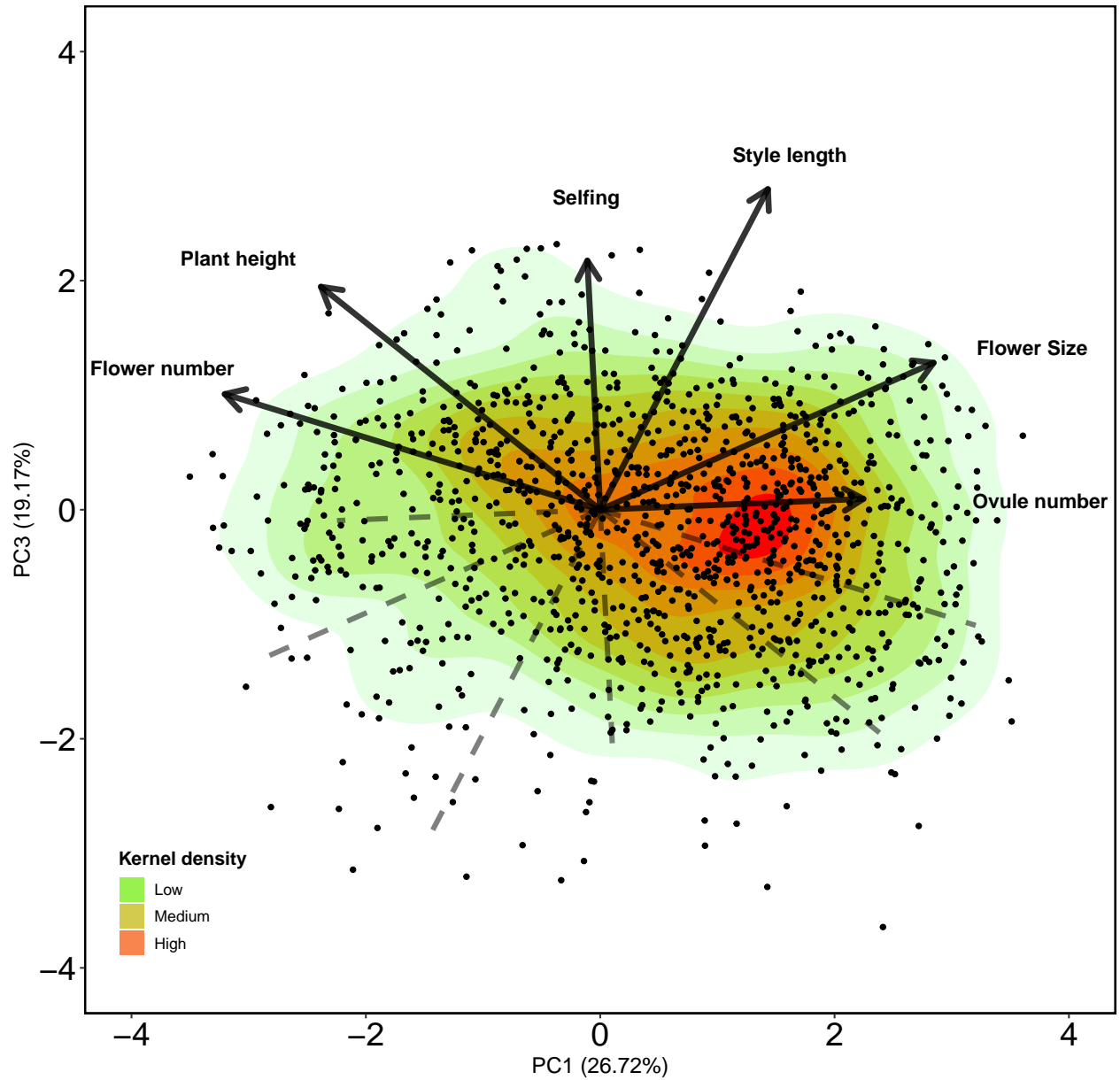
**Fig S1.** Percentage of present and missing values on the 20 traits compiled in this study (N = 1,506 species).



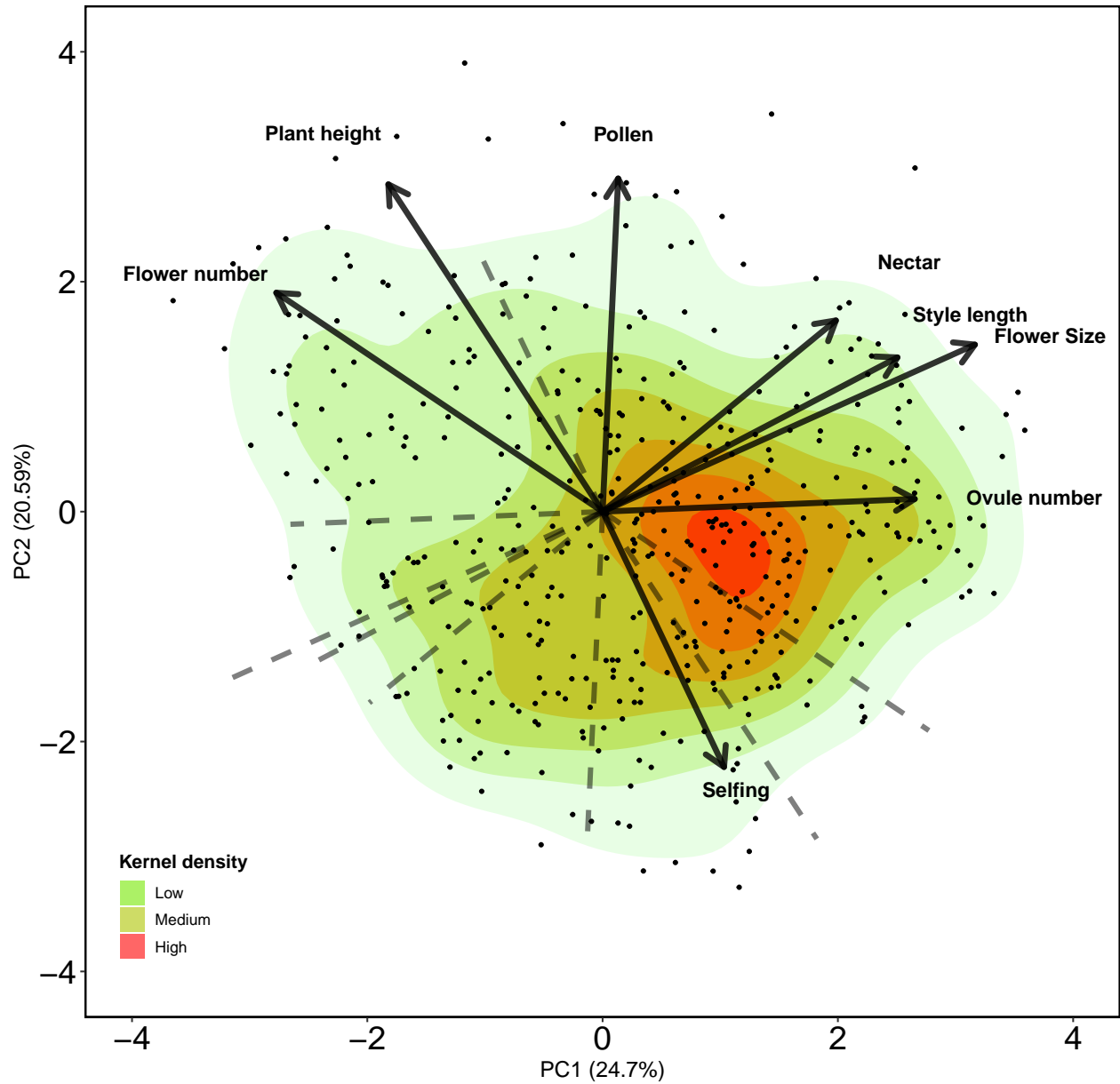
**Fig S2.** Phylogenetic informed principal component analysis for the species that did not have missing values (non-imputed dataset;  $N = 723$ ).



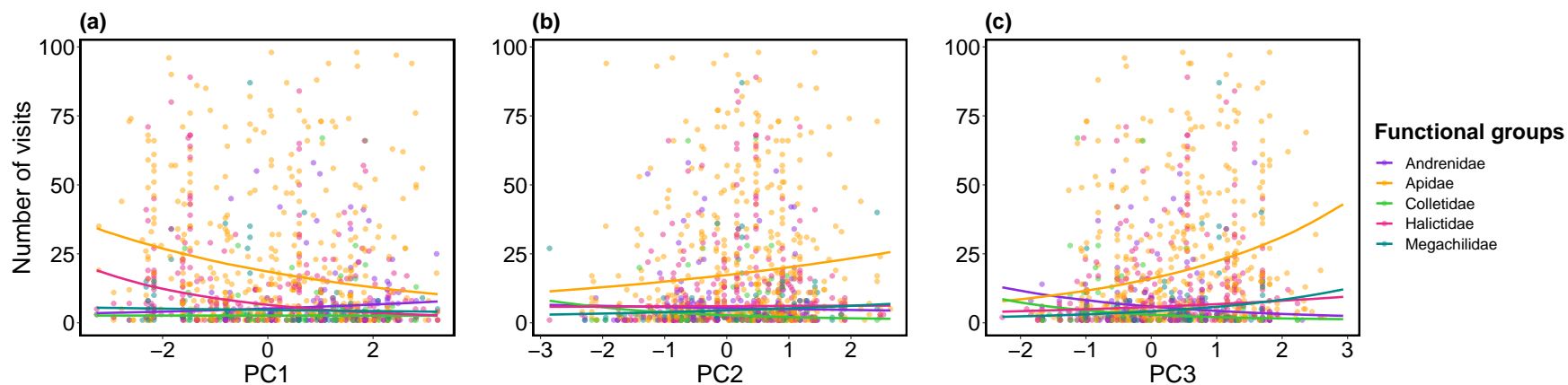
**Fig S3.** Fitted posterior estimates of the number of visits made by the functional group of Hymenoptera-Anthophila (bees) including (superior panel) and excluding (lower panel) *Apis mellifera* in relation to the main axes of trait variation (PC, PC2 and PC3).



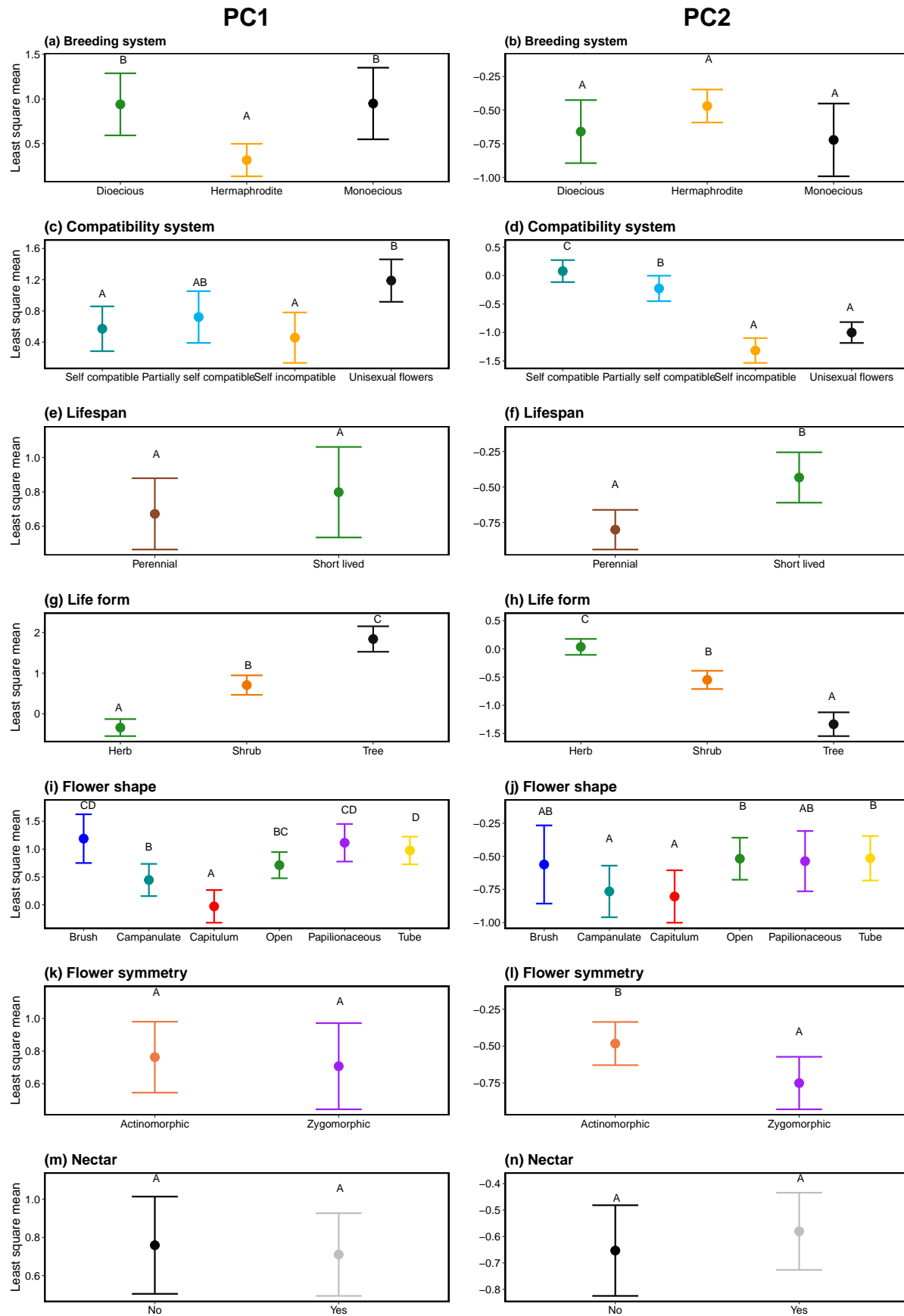
**Fig S4.** Phylogenetically informed principal component analysis showing the trait relationship with principal components one and three (PC1 and PC3) for the full set of species (N = 1,506).



**Fig S5.** First two main principal components from the phylogenetic informed principal component analysis for the imputed dataset of the subset of species with quantitative information of nectar and pollen ( $N = 467$ ).

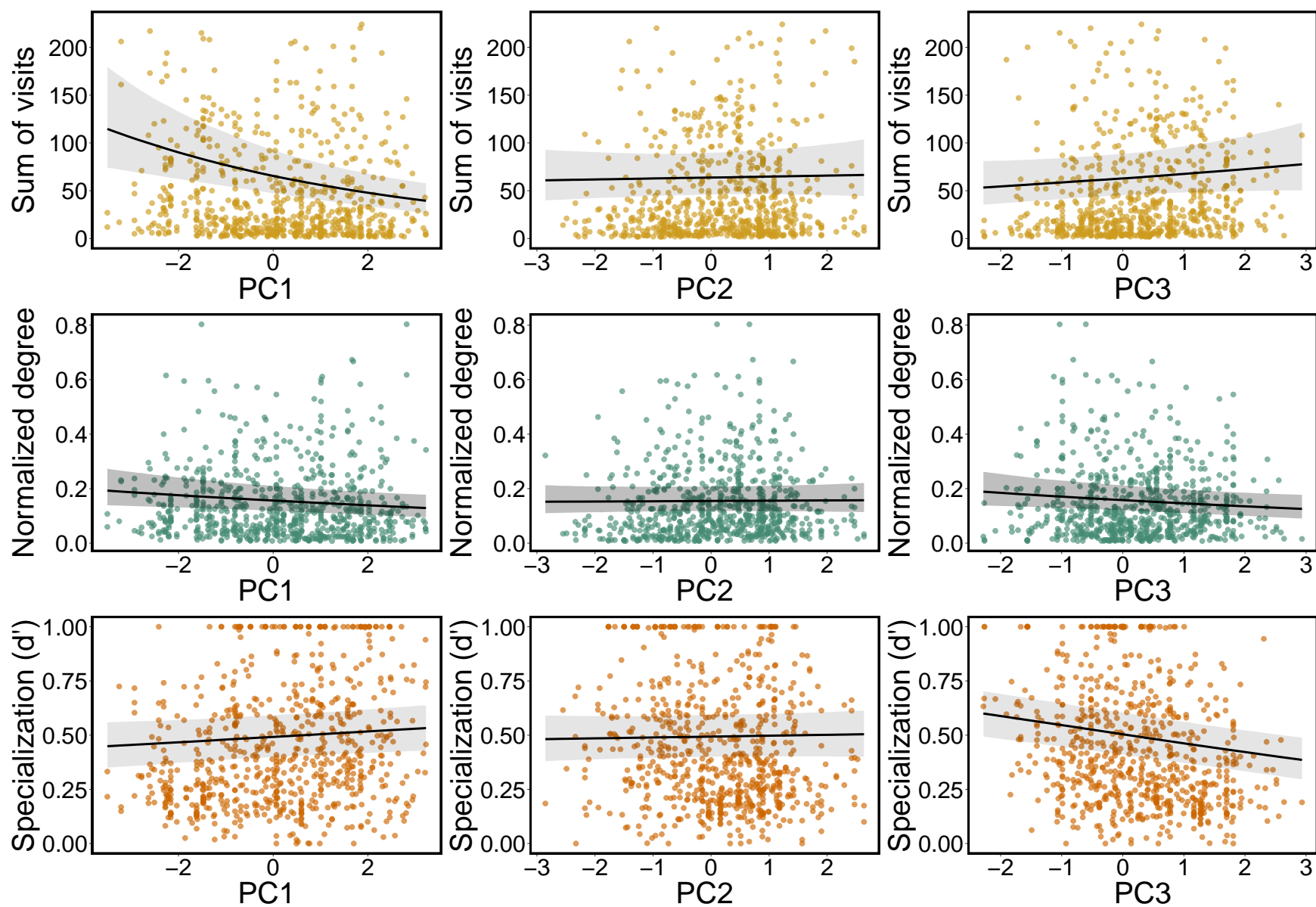


**Fig S6.** Fitted posterior estimates of the number of visits made by the different main visiting families of bees (Andrenidae, Apidae, Colletidae, Halictidae and Megachilidae) in relation to the main axes of trait variation (PC1, PC2 and PC3). We omitted in the plotting points over percentile 95 % percent due to extreme outliers.



**Fig S7.** Statistical comparison of the different categories of the categorical traits on the main two axes of trait variation (pPCA with the full set of species). Categories that differ significantly are denoted with a different letter.





**Fig S8.** Sum of visits per plant, normalized degree and speciliazation modelled in function of the first three main axes of trait variation.