

Table S1. Effective number of queen mating frequency for each bumblebee species.

Subgenus	Species name	No. of colonies	Effective number of mating#	Polyandrous queen/sampled queen	Reference
<i>Bombias</i>	<i>Bombus auricomus</i>	1	1		Payne <i>et al.</i> (2003)
<i>Bombus</i>	<i>B. affinis</i>	1	1		Payne <i>et al.</i> (2003)
	<i>B. florilegus</i>	14	1		Takahashi <i>et al.</i> (2008a)
	<i>B. ignitus</i>	7	1		Takahashi <i>et al.</i> (2008b)
	<i>B. lucorum</i>	20	1		Estoup <i>et al.</i> (1995b)
		12	1		Schmid-Hempel & Schmid-Hempel (2000)
	<i>B. terrestris</i>	45	1		Estoup <i>et al.</i> (1995b)
		17	1		Schmid-Hempel & Schmid-Hempel (2000)
		18	2.42	10/18	Inoue <i>et al.</i> (2012)
<i>Fervidobombus</i>	<i>B. fervidus</i>	1	1		Payne <i>et al.</i> (2003)
<i>Megabombus</i>	<i>B. diversus</i>	3	1		Kokuvo <i>et al.</i> (2009)
	<i>B. hortorum</i>	5	1		Schmid-Hempel & Schmid-Hempel (2000)
<i>Melanobombus</i>	<i>B. lapidarius</i>	20	1		Estoup <i>et al.</i> (1995b)
		11	1		Schmid-Hempel & Schmid-Hempel

	<i>B. sicheli</i>	2	1		(2000) Schmid-Hemple & Schmid-Hemple (2000)
<i>Pyrobombus</i>	<i>B. ardens</i>	5	1		Kokuvo <i>et al.</i> (2009)
	<i>B. bimaculatus</i>	4	1.06	1/4	Payne <i>et al.</i> (2003)
	<i>B. hypnorum</i>	54	----	16/54	Estoup <i>et al.</i> (1995b)
		17	1.13	4/17	Schmid-Hemple & Schmid-Hemple (2000)
		14	1.26	7/14	Paxton <i>et al.</i> (2001)
		10	1		Brown <i>et al.</i> (2003)
	<i>B. impatiens</i>	10	----	2/10	Cnaani <i>et al.</i> (2002)
		11	1.07	1/9	Payne <i>et al.</i> (2003)
	<i>B. mixtus</i>	1	3.57	1/1	Payne <i>et al.</i> (2003)
	<i>B. pratorum</i>	35	1		Estoup <i>et al.</i> (1995b)
		5	1		Schmid-Hemple & Schmid-Hemple (2000)
	<i>B. ternarius</i>	1	2.04	1/1	Payne <i>et al.</i> (2003)
	<i>B. vagans</i>	4	1		Payne <i>et al.</i> (2003)
	<i>B. wilmattae</i>	9	1.16	2/9	Huth-Schwarz <i>et al.</i> (2001)
<i>Separatobombus</i>	<i>B. griseocollis</i>	1	1		Payne <i>et al.</i> (2003)

<i>Thoracobombus</i>	<i>B. honshuensis</i>	1	1		Kokuvo <i>et al.</i> (2009)
	<i>B. pascuorum</i>	6	1		Schmid-Hempel & Schmid-Hempel (2000)
<i>Psithyrus</i> *	<i>B. citrinus</i>	2	2.13	2/2	Payne <i>et al.</i> (2003)
	<i>B. insularis</i>	3	1		Payne <i>et al.</i> (2003)

*: social parasite

#: effective number of mating calculated by one of the following methods of Starr (1984), Pamilo (1993), and Nilesen *et al.* (2003), all based on harmonic mean.