

Table 1.1: A summary of studies demonstrating obligate effective multiple mating in recently studied ants (i.e. studies that could not be included in Strassmann 2001). All these species are exclusively monogynous. Only studies with several colonies per species are included. The observed (k_{obs}) and effective (m_e) queen mating frequencies are given together with normal colony sizes (as power of 10) and references (see online appendix for more detailed information).

Species	k_{obs}	m_e	Colony size	Reference
<i>Aenictus laeviceps</i>	17.8	18.8	5	Kronauer et al. (2007)
<i>Dorylus molestus</i>	17.8	15.9	6	Kronauer et al. (2004); Kronauer et al. (2006a)
<i>Eciton burchellii</i>	12.9	12.9	5	Kronauer et al. (2006b)
<i>Neivamyrmex nigrescens</i>	14.9	12.8	5	Kronauer et al. (2007)
<i>Pogonomyrmex badius</i>	11.0	6.7	3	Rheindt et al. (2004)
<i>Pogonomyrmex barbatus</i>	-	3.1; 3.3	4	Helms Cahan et al. (2002); Volny and Gordon (2002)
<i>Pogonomyrmex rugosus</i>	6.0	4.7	3-4	Gadau et al. (2003)
<i>Cardiocondyla elegans</i>	4.5	4.4	2	Lenoir et al. (2007)
<i>Cataglyphis cursor</i>	5.6	-	3	Pearcy et al. (2004)

Online Appendix Table: Queen mating frequencies, colony queen number, colony size, and mode of colony founding for 173 species of social Hymenoptera.

k_{obs}	Average observed mate number
m_e	Average effective mate number
Method	Method for estimation of m_e : p = pedigree analysis using the estimator of Starr 1984 (ps), Pamilo 1993 (pp) or Nielsen et al. 2003 (pn); r = estimated from genetic relatedness using codominant (rc) or dominant (rd) markers; * = maximum estimate assuming (1) that polyandry would be detected in the next group sampled (1), or based on the upper 95% C.L. of a binomial distribution (see source)
N	Number of single-mother broods or spermathecae analysed
Mating level	s = singly mated (< 10% multiple mating), d = facultatively multiply mated (10-90% multiple mating, mostly double); m = obligately multiply mated (>90% multiple mating, usually 3+ matings)
Gyny level	m = monogyny; p = polygyny
Colony size	Maximum worker population of colonies in power of 10
Colony founding	i = independent founding; p = founding by single queens as a social parasite; b = budding (polygynous species); f = fission (monogynous species).

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
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Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Apidae	Meliponini	<i>Austroplebeia australis</i>	1	1	p	2	s	m	3	f	Drumond et al. 2000; Hammond and Keller 2004 (A. Dollin, pers. comm.); Tóth et al. 2004
Apidae	Meliponini	<i>Austroplebeia symei</i>	1	1	p	4	s	m	3	f	Palmer et al. 2002; Hammond and Keller 2004 (A. Dollin, pers. comm.); Tóth et al. 2004
Apidae	Meliponini	<i>Lestrimellita limão</i>	?	1.22	rc	2	s?	?	?	f	Peters et al. 1999
Apidae	Meliponini	<i>Melipona beecheii</i>	?	1.16	?	10	s?	m	3	f	Paxton et al. 1999; Tóth et al. 2004
Apidae	Meliponini	<i>Melipona marginata</i>	1	1	p	5	s	m	2	f	Tóth et al. 2002; Hammond and Keller 2004
Apidae	Meliponini	<i>Melipona panamica</i>	?	0.96	rc	9	s	m	3	f	Peters et al. 1999; Tóth et al. 2004

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Apidae	Meliponini	<i>Melipona quadrifasciata</i>	1	0.86	rc	7	s	m	2	f	Peters et al. 1999; Tóth et al. 2002; Hammond and Keller 2004
Apidae	Meliponini	<i>Melipona scutellaris</i>	1	1	p	9	s	m	2	f	Tóth et al. 2002; Hammond and Keller 2004
Apidae	Meliponini	<i>Nannotrigona perilampoides</i>	?	1.19	rc	7	s?	m	3	f	Peters et al. 1999; Orlando Cauich et al. 2004
Apidae	Meliponini	<i>Paratrigona subnuda</i>	?	1.16	rc	11	s?	m	3	f	Peters et al. 1999; Tóth et al. 2002b; Tóth et al. 2004
Apidae	Meliponini	<i>Partamona near cupira</i>	1	0.91	rc	12	s	m	2-3	f	Peters et al. 1999; Slaa et al. 2003; Roubik 1979
Apidae	Meliponini	<i>Plebeia droryana</i>	1	1	p	2	s	m	3	f	Tóth et al. 2002; Hammond and Keller 2004; Tóth et al. 2004
Apidae	Meliponini	<i>Plebeia near minima</i>	?	1.43	rc	5	s?	m	?	f	Peters et al. 1999

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Apidae	Meliponini	<i>Plebeia remota</i>	1	1	p	7	s	m	3	f	Tóth et al. 2002; Hammond and Keller 2004; Tóth et al. 2004
Apidae	Meliponini	<i>Plebeia saiqui</i>	1	1	p	4	s	m	3	f	Tóth et al. 2002; Hammond and Keller 2004
Apidae	Meliponini	<i>Scaptotrigona barrocoloradensis</i>	1	0.85	rc	4	s	m	3	f	Peters et al. 1999; Tóth et al. 2004
Apidae	Meliponini	<i>Scaptotrigona mexicana</i>	1	1	p	5	s	m	3	f	Palmer et al. 2002; Sánchez et al. 2004
Apidae	Meliponini	<i>Scaptotrigona pectoralis</i>	1	1	p	7	s	m	3	f	Palmer et al. 2002; Slaa et al. 2003
Apidae	Meliponini	<i>Scaptotrigona postica</i>	?	1.14	ps, rc	26	s?	m	3-4	f	Peters et al. 1999; Paxton 2000; Tóth et al. 2002; Paxton et al. 2003; Hammond and Keller 2004; Tóth et al. 2004

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Apidae	Meliponini	<i>Schwarziana quadripunctata</i>	1	0.99	p, rc	22	s	m	3	f	Peters et al. 1999; Tóth et al. 2003; Tóth et al. 2004
Apidae	Meliponini	<i>Tetragona clavipes</i>	1	1	p, rc	17	s	m	3	f	Peters et al. 1999; Tóth et al. 2002; Hammond and Keller 2004; Tóth et al. 2004
Apidae	Meliponini	<i>Trigona carbonaria</i>	1	1	p	5	s	m	3-4	f	Green and Oldroyd 2002; Hammond and Keller 2004; Tóth et al. 2004
Apidae	Meliponini	<i>Trigona clypearis</i>	1	1	p	4	s	m	2	f	Palmer et al. 2002; Hammond and Keller 2004 (A. Dollin, pers. comm.); Tóth et al. 2004
Apidae	Meliponini	<i>Trigona collina</i>	1	1	p	27	s	m	?	f	Cameron et al. 2004
Apidae	Meliponini	<i>Trigona fulviventris</i>	?	1.16	rc	7	s?	m	3	f	Peters et al. 1999; Slaa et al. 2003

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Apidae	Meliponini	<i>Trigona hockingsi</i>	1	1	p	4	1	m	3	f	Palmer et al. 2002; Hammond and Keller 2004 (A. Dollin, pers. comm.); Tóth et al. 2004
Apidae	Meliponini	<i>Trigona mellipes</i>	1	1	p	4	1	m	3	f	Palmer et al. 2002; Hammond and Keller 2004 (A. Dollin, pers. comm.)
Apidae	Meliponini	<i>Trigona sapiens</i>	1	1	p	1	1	m	?	f	Palmer et al. 2002
Apidae	Apinini	<i>Apis andreniformis</i>	13.5	10.5	pn	4	m	m	?	f	Tarpy et al., 2004;
Apidae	Apinini	<i>Apis cerana</i>	18.8	14.1	pn	4	m	m	3	f	Tarpy et al. 2004; Hammond and Keller 2004
Apidae	Apinini	<i>Apis dorsata</i>	54.9	44.2	pn	23	m	m	4	f	Tarpy et al. 2004; Hammond and Keller 2004
Apidae	Apinini	<i>Apis florea</i>	11.6	7.9	pn	11	m	m	3	f	Tarpy et al. 2004; Hammond and Keller 2004
Apidae	Apinini	<i>Apis koschevnikovi</i>	16.2	13.3	pn	4	m	m	?	f	Tarpy et al. 2004

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Apidae	Apinini	<i>Apis laboriosa</i>	30.7	22.5	pp	7	m	m	?	f	Paar et al. 2004; Paar et al. 2004
Apidae	Apinini	<i>Apis mellifera</i>	12	11.6	pn	123	m	m	4	f	Tarpy et al. 2004; Michener 1974
Apidae	Apinini	<i>Apis mellifera carnica</i>	15.9	17.6	pp	41	m	m	4	f	Schlüns et al. 2005
Apidae	Apinini	<i>Apis nigrocincta</i>	54	40.3	pn	4	m	m	?	f	Tarpy et al. 2004
Apidae	Bombini	<i>Bombus affinis</i>	1	1	pp	1	s	?	2	i	Payne et al. 2003; Michener 1974
Apidae	Bombini	<i>Bombus auricomus</i>	1	1	pp	1	s	?	?	i	Payne et al. 2003
Apidae	Bombini	<i>Bombus bimaculatus</i>	1.25	1.06	pp	4	s-m?	?	1	i	Payne et al. 2003; Michener 1974
Apidae	Bombini	<i>Bombus citrinus</i>	2.5	2.1	pp	2	s-m	?	?	i	Payne et al. 2003
Apidae	Bombini	<i>Bombus fervidus</i>	1	1	pp	1	s	?	1-2	i	Payne et al. 2003; Michener 1974
Apidae	Bombini	<i>Bombus griseocollis</i>	1	1	pp	1	s	?	?	i	Payne et al. 2003

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Apidae	Bombini	<i>Bombus hortorum</i>	1	1	pp	5	s	m	2	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Michener 1974
Apidae	Bombini	<i>Bombus hypnorum</i>	1.71	1.18	pp	31	s-m	m	?	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Paxton et al. 2001; Westrich 1990
Apidae	Bombini	<i>Bombus impatiens</i>	1.38	1- 1.61	pp	21	s-m	?	2	i	Cnaani et al. 2002; Payne et al. 2003; Michener 1974
Apidae	Bombini	<i>Bombus insularis</i>	1	1	pp	3	s	?	?	i	Payne et al. 2003;
Apidae	Bombini	<i>Bombus lapidarius</i>	1	1	pp	11	s	m	2	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Westrich 1990

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Apidae	Bombini	<i>Bombus lucorum</i>	1	1	pp	12	s	m	2	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Michener 1974
Apidae	Bombini	<i>Bombus mixtus</i>	4	3.6	pp	1	s-m?	?	?	i	Payne et al. 2003
Apidae	Bombini	<i>Bombus pascuorum</i>	1	1	pp	6	s	m	2	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Westrich 1990
Apidae	Bombini	<i>Bombus pratorum</i>	1	1	pp	5	s	m	?	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Westrich 1990
Apidae	Bombini	<i>Bombus sicheli</i>	1	1	pp	2	s	m	?	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995

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Apidae	Bombini	<i>Bombus ternarius</i>	2	2.0	pp	1	s-m	?	2	i	Payne et al. 2003; Michener 1974
Apidae	Bombini	<i>Bombus terrestris</i>	1	1	pp	17	s	m	2	i	Schmid-Hempel and Schmid-Hempel 2000; Estoup et al. 1995; Schmid-Hempel 1998
Apidae	Bombini	<i>Bombus vagans</i>	1	1	pp	4	1	?	1	i	Payne et al. 2003; Michener 1974
Halictidae	Halictini	<i>Lasioglossum malachurum</i>	1.38	1.13	pp	17	s-m	m	1	i	Paxton et al. 2002; Michener 1974
Formicidae	Aenictinae	<i>Aenictus dentatus</i>	19	25.9	pn	1	m	m	5	f	Kronauer et al. 2007
Formicidae	Aenictinae	<i>Aenictus laeviceps</i>	17.8	18.8	pn	5	m	m	5	f	Kronauer et al. 2007
Formicidae	Dolichoderinae	<i>Conomyrma insana</i>	1	<1.09	pp*	34	s	m	2	?	Berkelhamer 1984; Jensen and Hooten 2000 (online ms)
Formicidae	Dolichoderinae	<i>Linepithema humile</i>	1	1	p	87	s	p	6+	b	Krieger and Keller 2000

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Formicidae	Dorylinae	<i>Dorylus (Anomma) molestus</i>	17.8	15.9	pn	16	m	m	6+	f	Kronauer et al. 2004; Kronauer et al. 2006a
Formicidae	Dorylinae	<i>Dorylus (Dichthadia) laevigatus</i>	?	?	?	?	m	m	5	f	Winter 2004; Berghoff et al. 2002
Formicidae	Ecitoninae	<i>Eciton burchellii</i>	12.9	12.9	pn	31	m	m	5	f	Kronauer et al. 2006b
Formicidae	Ecitoninae	<i>Neivamyrmex harrisi</i>	4.1	3.9	pn	1	m	m	5	f	Kronauer et al. 2007
Formicidae	Ecitoninae	<i>Neivamyrmex nigrescens</i>	14.9	12.8	pn	11	m	m	5	f	Kronauer et al. 2007
Formicidae	Ectatomminae	<i>Gnamptogenys striatula</i>	1.24	?	?	17	s-m	p	2-3	b	Giraud et al. 2000; Giraud et al. 2001
Formicidae	Ectatomminae	<i>Rhytidoponera sp. 12</i>	1.03	1.01	?	99	s	p	2	?	Tay and Crozier 2000; Tay and Crozier 2001; Peeters and Ito 2001
Formicidae	Formicinae	<i>Camponotus consobrinus</i>	1	1	p	29	s	m-p	?	i	Fraser et al. 2000

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Formicidae	Formicinae	<i>Camponotus</i> <i>festinatus</i>	1.03	1.02	r	37	s	m-p	?	i	Goodisman and Hahn 2005
Formicidae	Formicinae	<i>Camponotus</i> <i>floridanus</i>	1	1	p	15	s	m	4	i	Gadau et al. 1996; Endler et al. 2005
Formicidae	Formicinae	<i>Camponotus</i> <i>ligniperdus</i>	1.02	1.02	?	61	s	m-p	?	i	Gadau et al. 1998;
Formicidae	Formicinae	<i>Camponotus nawai</i>	1	1	p	?	s	m	?	i	Satoh et al. 1997 (cited in Brown and Schmid-Hempel 2003)
Formicidae	Formicinae	<i>Camponotus</i> <i>ocreatus</i>	1	1	p	15	s	m-p	?	i	Goodisman and Hahn 2004
Formicidae	Formicinae	<i>Cataglyphis cursor</i>	5.6	?	?	12	m	m	3	f	Pearcy et al. 2004
Formicidae	Formicinae	<i>Colobopsis</i> <i>nipponicus</i>	1	<1.03	pp*	59	s	m	2	?	Hasegawa 1994 (cited in Boomsma and Ratnieks 1996); Hasegawa 1993
Formicidae	Formicinae	<i>Formica aquilonia</i>	?	1.48	pp	113	s-m	p	5	b	Pamilo 1993; Sovari and Hakkarainen 2005

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Formicidae	Formicinae	<i>Formica exsecta</i>	1.34	1.3	pp, p	311	s-m	m-p	4	p,b	Pamilo and Rosengren 1983, 1984; Fortelius et al. 1987; Boomsma and Sundström 1998
Formicidae	Formicinae	<i>Formica fusca</i>	?	1.11	pp	21	s-m	m	2	i	Boomsma and Sundström 1998; Schmid-Hempel 1998
Formicidae	Formicinae	<i>Formica japonica</i>	1	1	p	?	s	m-p	3	?	Masuko et al. 1998 (cited in Brown and Schmid-Hempel 2003); Hölldobler and Wilson 1990
Formicidae	Formicinae	<i>Formica paralugubris</i>	?	1.10	pp	166	s-m	p	6	?	Chapuisat, 1998
Formicidae	Formicinae	<i>Formica podzolica</i>	1.07	1.07	rc	45	s	m-p	?	?	DeHeer and Herbers 2004
Formicidae	Formicinae	<i>Formica pressilabris</i>	1.15	1.12	pp	46	s-m	m-p	3	p,b	Pamilo 1982 (cited in Boomsma and Ratnieks 1996); Collingwood 1979

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Formicidae	Formicinae	<i>Formica rufa</i>	?	1.47	pp	79	s-m	p	4-5	i,b	Boomsma and Sundström 1998; Schmid-Hempel 1998; Hölldobler and Wilson 1990
Formicidae	Formicinae	<i>Formica sanguinea</i>	1.08	1.31	pp	24	s	m-p	3-4	p,b	Pamilo 1982; Pamilo and Varvio-Aho 1979; Czechowski et al. 2002
Formicidae	Formicinae	<i>Formica transcaucasica</i>	1.03	1.03	pp	60	s	m-p	3	?	Pamilo 1982
Formicidae	Formicinae	<i>Formica truncorum</i>	?	1.43	pp	116	s-m	m-p	4-5	p,b	Sundström 1989, 1993; Czechowski et al. 2002
Formicidae	Formicinae	<i>Lasius flavus</i>	1	<1.2	pp*	25	s	m-p	4	i	Boomsma et al. 1993; Schmid-Hempel 1998
Formicidae	Formicinae	<i>Lasius neglectus</i>	1	<1.36	pp*	11	s	p	6+	b	Boomsma et al. 1990

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Formicidae	Formicinae	<i>Lasius niger</i>	1.33	1.17	pp, rc	648	s-m	m	4	i	Boomsma and van der Have 1998; Fjerdingstad et al. 2002; Hammond and Keller 2004
Formicidae	Formicinae	<i>Myrmecocystus depilis</i>	1.41	1.18	pp	57	s-m	m	3	i	Kronauer et al. 2003; Bedir 1998
Formicidae	Formicinae	<i>Myrmecocystus mimicus</i>	1.13	1.11	pn, rc	36	s-m	m-p	3	i	Kronauer et al. 2003
Formicidae	Formicinae	<i>Oecophylla smaragdina</i>	?	1.1	?	?	s-m?	m	5	?	Fraser and Crozier (cited in Villesen et al. 2002); Hölldobler and Wilson 1990
Formicidae	Formicinae	<i>Plagiolepis pygmaea</i>	2.9	2.4	pn	18	s-m	p	2-3	b	Trontti et al. 2006; Trontti et al. 2005
Formicidae	Formicinae	<i>Polyergus rufescens</i>	1.0	1.0	rc	4	s	m	2	p	Brunner et al. 2005

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Formicidae	Formicinae	<i>Proformica longiseta</i>	3.5	1.23	pp	61?	s-m	m-p	2-3	b	Fernández-Escudero et al. 2002; Fernández-Escudero et al. 2001
Formicidae	Myrmicinae	<i>Acromyrmex echinator</i>	9.3	5.3	pp	10	m	m-p	4	i	Sumner et al. 2004
Formicidae	Myrmicinae	<i>Acromyrmex insinator</i>	1.15	1.09	pp	13	s-m	m-p	3	i	Sumner et al. 2004
Formicidae	Myrmicinae	<i>Acromyrmex octospinosus</i>	6.1	3.5	pp, rd	31	m	m	4	i	Boomsma et al. 1999; Murakami et al. 2000
Formicidae	Myrmicinae	<i>Aphaenogaster rudis</i>	1	<1.02	pp*	47	s	m	2-3	?	Crozier 1973, 1974; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Aphaenogaster smythiesi japonica</i>	1	1	p	14	s	m	2	?	Iwanishi et al. 2003
Formicidae	Myrmicinae	<i>Apterostigma collare</i>	1	<1.06	pp*	10	s	?	1-2	i	Villesen et al. 1999

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Formicidae	Myrmicinae	<i>Apterostigma mayri</i>	?	1.09	rd	6	s?	m	1	i	Murakami et al. 2000; Murakami et al. 2000
Formicidae	Myrmicinae	<i>Atta colombica</i>	2.6	2.1	pp, rd	41	s-m	m	6	i	Fjerdingstad et al. 1998; Murakami et al. 2000; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Atta sexdens</i>	2.7	2.3	pp	6	m	m	6	i	Fjerdingstad and Boomsma 2000
Formicidae	Myrmicinae	<i>Cardiocondyla batesii</i>	1.49	3.4	pp	43	s-m	m	1-2	i	Schrempf et al. 2005
Formicidae	Myrmicinae	<i>Cardiocondyla elegans</i>	4.5	4.4	pn	21	m	m	2	i	Lenoir et al. 2007
Formicidae	Myrmicinae	<i>Crematogaster smithi</i>	1.13	1.02	pp	4	s-m	m	2	?	Heinze et al., 2000
Formicidae	Myrmicinae	<i>Cyphomyrmex costatus</i>	?	1.04	rd	10	s?	m	2	i	Murakami et al. 2000; Hammond and Keller 2004

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Formicidae	Myrmicinae	<i>Cyphomyrmex longiscapus</i>	1	<1.04	pp*	11	s	m	2	i	Villesen et al. 1999; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Cyphomyrmex rimosus</i>	?	1.14	rd	7	s?	m	1-2	i	Murakami et al. 2000; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Epimyrma ravouxi</i>	1	1	p	7?	s	m	1	p	Hammond and Keller 2004 (Keller et al. unpublished)
Formicidae	Myrmicinae	<i>Harpagoxenus sublaevis</i>	1	<1.02	pp*	49	s	m	1	p	Bourke et al. 1988; Fischer- Blass et al. 2005
Formicidae	Myrmicinae	<i>Leptothorax acervorum</i>	1.06	1.06	pp	110	s	m-p	1	i,b	Hammond et al. 2001; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Leptothorax pergandei</i>	1.08	1.04	pp	12	s	m	1-2	i	Heinze et al. 1995
Formicidae	Myrmicinae	<i>Leptothorax unifasciatus</i>	1	1	p	10?	s	m	2	i	Hammond and Keller 2004 (Keller et al. unpublished data)

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Formicidae	Myrmicinae	<i>Myrmecina nipponica</i>	1	1	rd	20	s	m	1	i,b	Murakami et al. 2000
Formicidae	Myrmicinae	<i>Myrmica punctiventris</i>	?	1.06	rc	50	s-d?	m-p	1	?	Herbers and Mouser 1998; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Myrmica rubra</i>	1.18	1.21	pp	22	s-m	p	3	b	Boomsma and Ratnieks 1996; Seppä and Walin 1996; Collingwood 1979
Formicidae	Myrmicinae	<i>Myrmica ruginodis</i>	1.15	1.07	pp	34	s-m	m-p	3	i,b	Seppä 1994; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Myrmica sulcinodis</i>	1.35	1.06	pp	23	s-m	m-p	2	i,b	Pedersen and Boomsma 1999; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Myrmica tahoensis</i>	1	1	p	21	s	m-p	2	(i?),b	Evans 1998; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Myrmicocrypta ednaella</i>	1	1	pp, rd	16	s	m	1-2	i	Villesen et al. 1999; Murakami et al. 2000 (as cited in Strassmann 2001)

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Formicidae	Myrmicinae	<i>Pheidole pallidula</i>	1	1	p	32	s	m-p	4	i,b	Fournier et al. 2002
Formicidae	Myrmicinae	<i>Pogonomyrmex badius</i>	11	9.16	pp	15	m	m	3	i	Rheindt et al. 2004; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Pogonomyrmex barbatus</i>	?	3.3	rc	35	m	m	4	i	Helms Cahan et al. 2002; Volny and Gordon 2002; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Pogonomyrmex occidentalis</i>	6.3	6.7	pp	1555	m	m	3	i	Cole and Wiernasz 2000; Wiernasz et al. 2004; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Pogonomyrmex rugosus</i>	6	4.71	pp	20	m	m	3-4	i	Gadau et al. 2003; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Protomognathus americanus</i>	1	1	p	16	s	m	1	i	Foitzik and Herbers 2001; Hammond and Keller 2004

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Formicidae	Myrmicinae	<i>Sericomyrmex amabilis</i>	1	1.38	pp*, rd	20	s	m-p	2-3	i	Murakami et al. 2000; Villesen et al. 2002; Hammond and Keller 2004; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Sericomyrmex cf. amabilis</i>	1	<1.24	pp*	5	s	m-p	3	i	Villesen et al. 2002; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Solenopsis geminata</i>	1	<1.02	pp*	30	s	m-p	5	i	Ross et al. 1987, 1988
Formicidae	Myrmicinae	<i>Solenopsis invicta</i>	1	<1.01	pp*	55	s	m-p	5	i,b	Ross and Fletcher 1985; Schmid-Hempel 1998; Hölldobler and Wilson 1990
Formicidae	Myrmicinae	<i>Solenopsis richteri</i>	1	<1.02	pp*	58	s	m-p	5	i	Ross et al. 1987, 1988; Global Invasive Species Database (on the web)
Formicidae	Myrmicinae	<i>Temnothorax crassispinus</i>	1	1	p	24	s	m	1	i	Strätz and Heinze 2004

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Formicidae	Myrmicinae	<i>Temnothorax nylanderi</i>	1	1	p	12	s	m	1	i	Foitzik et al. 1997; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Trachymyrmex cf. zeteki</i>	1	<1.17	pp*	8	s	m	2	i	Villesen et al. 2002
Formicidae	Myrmicinae	<i>Trachymyrmex cornetzi sp. 1</i>	1	<1.21	pp*	6	s	m	2	i	Villesen et al. 2002; Hammond and Keller 2004
Formicidae	Myrmicinae	<i>Trachymyrmex cornetzi sp. 2</i>	1	<1.14	pp*	10	s	m	2	i	Villesen et al. 2002
Formicidae	Myrmicinae	<i>Trachymyrmex isthmicus</i>	1	0.94	rd	7	s	m	1-2	i	Murakami et al. 2000; Murakami et al. 2000
Formicidae	Nothomyrmeciinae	<i>Nothomyrmecia macrops</i>	1.43	1.37	pp	32	s-m	m	1	i	Sanetra and Crozier 2001
Formicidae	Ponerinae	<i>Diacamma cyaneiventre</i>	1	1	rc	53	s	m	2	f	André et al. 2001
Formicidae	Ponerinae	<i>Pachycondyla inversa</i>	3.1	2.4	pn	14	s-m	m-p	1	i	Kellner et al. in press

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Formicidae	Ponerinae	<i>Pachycondyla villosa</i>	3.4	1.7	pn	9	s-m	m-p	1	i	Kellner et al. in press
Formicidae	Ponerinae	<i>Platythyrea punctata</i>	1	1	p	4	s	m	1	?	Hartmann et al. 2005; Schilder et al. 1999
Vespidae	Polistinae	<i>Brachygastra mellifica</i>	1	1	?	43	s	p	3	b	Hastings et al. 1998; Hammond and Keller 2004
Vespidae	Polistinae	<i>Parachartergus colobopterus</i>	1	1	p	32	s	p	2	b	Goodnight et al. 1996
Vespidae	Polistinae	<i>Polistes annularis</i>	?	1.05	?	40	s-d?	m-p	?	i	Peters et al. 1995
Vespidae	Polistinae	<i>Polistes bellicosus</i>	1	1	?	63	s	m-p	1	i	Arévalo et al. 1998; Field et al. 1998; Hammond and Keller 2004
Vespidae	Polistinae	<i>Polistes carolina</i>	1	1	?	56	s	m-p	1	i	Seppä et al. unpublished
Vespidae	Polistinae	<i>Polistes chinensis antennalis</i>	1	1	rc	34	s	m-p	?	i	Tsuchida et al. 2003; Saigo and Tsuchida 2004
Vespidae	Polistinae	<i>Polistes dominulus</i>	1	1	?	60	s	m-p	1	i	Queller et al. 2000; Zacchi 1998; Liebig et al. 2005

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Vespidae	Polistinae	<i>Polistes dorsalis</i>	1	1	?	6	s	m-p	1	i	Arévalo et al. 1998; Hammond and Keller 2004
Vespidae	Polistinae	<i>Polistes gallicus</i>	1	1	?	19	s	m-p	1	i	Strassmann et al. 2003; Hammond and Keller 2004
Vespidae	Polistinae	<i>Polybioides tabidus</i>	1	1	?	48	s	p	3	b	Henshaw et al. 2000; Hammond and Keller 2004
Vespidae	Polistinae	<i>Ropalidia revolutionalis</i>	1.01	1.01	pp	163	s	m-p	1	i	Henshaw and Crozier 2004; Robson et al. 2000
Vespidae	Vespinae	<i>Dolichovespula arenaria</i>	1.29	1.10	pp	27	s-m	m	2	i	Freiburger et al. 2004; Ratnieks and Boomsma unpublished; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Dolichovespula maculata</i>	1	1	pp	10	s	m	2	i	Foster et al. 2001; Hammond and Keller 2004
Vespidae	Vespinae	<i>Dolichovespula media</i>	1.10	1.08	pp	10	s-m	m	1	i	Foster et al. 2001; Hammond and Keller 2004

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Vespidae	Vespinae	<i>Dolichovespula norvegica</i>	1.36	1.08	pp	10	s-m	m	1	i	Foster et al. 2001; Hammond and Keller 2004; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Dolichovespula saxonica</i>	1.7	1.35	pp	10	s-m	m	1	i	Foster et al. 2001; Hammond and Keller 2004
Vespidae	Vespinae	<i>Dolichovespula sylvestris</i>	1.36	1.15	pp	10	s-m	m	1	i	Foster et al. 2001; Hammond and Keller 2004
Vespidae	Vespinae	<i>Vespa analis</i>	1.1	1.05	?	20	s-m	m	?	i	Takahashi et al. 2003; Takahashi et al. 2004a
Vespidae	Vespinae	<i>Vespa crabro flavofasciata</i>	1.35	1.13	pp	20	s-m	m	2	i	Takahashi et al. 2004b; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Vespa crabro gribodi</i>	?	1.11	?	14	s-m?	m	2	i	Foster et al. 1999; Hammond and Keller 2004
Vespidae	Vespinae	<i>Vespa ducalis</i>	1	1	p	20	s	m	1	i	Takahashi et al. 2002; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Vespa mandarinia</i>	1.1	1.03	pp	20	s-m	m	2	i	Takahashi et al. 2004a; Wenseleers et al. 2005

Family	Subfamily / Tribe	Species	k_{obs}	m_e	Method	N	Mating level	Gyny level	Colony size	Colony founding	Source
Vespidae	Vespinae	<i>Vespula germanica</i>	2.7	2.4	rc	55	m?	m	3	i	Goodisman et al. 2002; Hammond and Keller 2004
Vespidae	Vespinae	<i>Vespula maculifrons</i>	?	7.1	pp	30	m	m	3	i	Ross 1985, 1986; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Vespula rufa</i>	1.69	1.5	pp	20	s-m	m	1	i	Wenseleers et al. 2005
Vespidae	Vespinae	<i>Vespula squamosa</i>	?	3.3	pp	17	m?	m	3	i	Ross 1986; Wenseleers et al. 2005
Vespidae	Vespinae	<i>Vespula vulgaris</i>	?	1.9	?	17	s-m?	m	3	i	Foster and Ratnieks 2001b; Hammond and Keller 2004