

**Table S1a.** Sampling localities for the *Megabombus* species (*B. consobrinus*, *B. gerstaeckeri* and *B. hortorum*) and distribution of haplotypes for three loci. (S) and (G) refer to a specialist or generalist species (or group of sampled populations in the case of *B. consobrinus*). The number of analysed individuals is indicated beside each number of haplotypes (“m” refers to male individuals and “f” to female individuals). (\*) refers to phased haplotypes associated to a low reconstruction probability ( $p < 0.9$ ).

Population Locality	Geographical coordinates	n (COI)	Haplotypes (no. of copies) COI	n (EF-1 $\alpha$ )	Haplotypes (no. of copies) EF-1 $\alpha$	n (PEPCK)	Haplotypes (no. of copies) PEPCK
<b><i>B. consobrinus</i> (S)</b>							
Fjällnäs (Sweden)	62.60°N, 12.18°E	4 (4m)	30(2), 31, 35	4 (4m)	11(3) 19	4 (4m)	9(3), 15
Skärkdalen (Sweden)	62.82°N, 12.81°E	1 (1m)	30	1 (1m)	11	1 (1m)	9
Skärvången (Sweden)	63.77°N, 14.33°E	1 (1m)	27	1 (1m)	21	1 (1m)	9
Rørros (Norway)	62.65°N, 11.86°E	9 (9m)	30(8), 32	9 (9m)	11(6), 15, 19, 21	8 (8m)	9(4), 15(4)
Nikitskaija (Russia)	60.57°N, 40.29°E	1 (1m)	28	1 (1m)	18	1 (1m)	9
Abramtsevo (Russia)	50.82°N, 37.82°E	1 (1m)	33	1 (1m)	19	1 (1m)	15
Naro-Fominsk (Russia)	55.38°N, 36.76°E	2 (1f)	34	2 (1f)	11*, 13*	2 (1f)	9, 15
Mondy (Russia)	51.66°N, 101.16°E	14 (14m)	23(2), 24(6), 25, 27(5)	14 (14m)	11(3), 12(2), 15(2), 17, 18(4), 19(2)	10 (10m)	9(2), 10, 15(6), 16
Novosibirsk (Russia)	54.83°N, 83.12°E	4 (4f)	24(4)	2 (1f)	11(2)	-	-
<b><i>B. consobrinus</i> (G)</b>							
Yuzhny Sakhalin (Russia)	49.95°N, 124.78°E	6 (6m)	26, 29(5)	1 (1m)	11	-	-
Anisimovka (Russia)	43.17°N, 132.77°E	14 (5m, 9f)	38(11), 39(2), 40	17 (5m, 6f)	10, 11(3), 12(4), 14, 15, 16, 18(5), 20	10 (3m, 3f)	9(4), 12, 13(2), 15(2), 17
Kamenushka (Russia)	43.64°N, 132.20°E	8 (8f)	38(8)	8 (4f)	11, 12(4), 18(3)	8 (4f)	9(2), 10(3), 15*, 17, 18*
Nodong Valley (South Korea)	37.70°N, 128.48°E	15 (7m, 8f)	36(4), 37, 38(8), 41(2)	17 (7m, 5f)	11(3), 14, 15, 16, 18(11)	19 (7m, 6f)	9(8), 10, 11, 14(2), 17(7)
<b><i>B. gerstaeckeri</i> (S)</b>							
Gavarnie (France)	42.70°N, 0.02°W	10 (6m, 4f)	14(1), 17(9)	12 (6m, 3f)	5(12)	12 (6m, 3f)	1(12)
Gèdre (France)	42.73°N, 0.05°E	1 (1f)	17	2 (1f)	5(2)	2 (1f)	1(2)
Lac de l'Oule (France)	42.83°N, 0.20°E	1 (1f)	14	2 (1f)	5(2)	-	-
Eyne (France)	42.46°N, 2.10°E	5 (4m, 1f)	14(2), 17(3)	6 (4m, 1f)	5(6)	2 (2m)	1(2)
Forêt d'Egat (France)	42.51°N, 2.02°E	10 (3m, 7f)	14(6), 17(2), 18(2)	11 (3m, 4f)	5(11)	11 (3m, 4f)	1(11)
Saint-Véran (France)	44.70°N, 5.86°E	8 (2m, 6f)	14(8)	6 (2m, 2f)	2, 4(3), 5(2)	10 (2m, 4f)	1(10)
Kandersteg (Switzerland)	46.49°N, 7.67°E	7 (7m)	11, 14(6)	5 (5m)	4(3), 5(2)	5 (5m)	1(5)
Vals (Switzerland)	46.62°N, 9.19°E	7 (7m)	14(6), 15	3 (3m)	3, 4(2)	4 (4m)	1(4)
Gramais (Austria)	47.27°N, 10.54°E	9 (9f)	10, 14(8)	10 (5f)	4(5), 5(5)	10 (5f)	1(10)
Bohinjsko Jezero (Slovenia)	46.28°N, 13.78°E	8 (8f)	12, 13, 14(5), 16	10 (5f)	4(8), 5(2)	6 (3f)	1(6)
Carpates (Ukraine)	48.15°N, 24.55°E	5 (3m, 2f)	14(5)	5 (3m, 1f)	4(5)	3 (3m)	1(3)
<b><i>B. hortorum</i> (G)</b>							
Uppsala (Sweden)	59.85°N, 17.63°E	3 (3m)	2, 5(2)	1 (1m)	1	1 (1m)	4
Jämtland (Sweden)	62.81°N, 13.61°E	2 (2m)	5(2)	1 (1m)	1	1 (1m)	4
Lund (Sweden)	55.65°N, 13.50°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Alness (England)	57.77°N, 4.25°W	2 (2m)	5(2)	1 (1m)	1	1 (1m)	4
Berismenil (Belgium)	50.18°N, 5.64°E	3 (3m)	5(2), 8	1 (1m)	1	1 (1m)	4
Nord-Pas-de-Calais (France)	50.93°N, 1.71°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Saint-Véran (France)	44.70°N, 6.86°E	1 (1f)	4	2 (1f)	1(2)	2 (1f)	3, 4
Forêt d'Egat (France)	42.51°N, 2.02°E	5 (5m)	5(4), 6	3 (3m)	1(3)	3 (3m)	4(3)
Gavarnie (France)	42.71°N, 0.01°W	5 (5m)	5(5)	3 (3m)	1(3)	3 (3m)	3, 4(2)
Reutte (Austria)	47.50°N, 10.74°E	2 (2m)	5(2)	1 (1m)	1	1 (1m)	4
Lovech (Bulgaria)	42.78°N, 24.61°E	1 (1m)	5	1 (1m)	1	-	-
Prague (Czech Republic)	50.11°N, 14.42°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Kolin (Czech Republic)	50.06°N, 15.21°E	2 (2m)	5, 7	1 (1m)	1	1 (1m)	4
Negruzzo (Italia)	44.72°N, 9.21°E	3 (3m)	5(3)	2 (2m)	1(2)	1 (1m)	3
Biesland (Holland)	50.83°N, 5.69°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Rørros (Norway)	62.66°N, 11.53°E	5 (5m)	1, 5(4)	5 (5m)	1(5)	5 (5m)	4(5)
Stary Gieląd (Poland)	53.86°N, 21.14°E	1 (1m)	8	1 (1m)	1	1 (1m)	4
Mazurki (Poland)	53.87°N, 22.90°E	2 (2m)	5(2)	1 (1m)	1	1 (1m)	3
Radoszyce (Poland)	51.07°N, 20.27°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Kranjska Gora (Slovenia)	46.44°N, 13.75°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Radovljica (Slovenia)	46.37°N, 14.16°E	3 (3m)	5(3)	3 (3m)	1(3)	3 (3m)	4(3)
Nesvady (Slovakia)	47.96°N, 18.10°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Kamenica nad Hronom (Slovakia)	47.83°N, 18.73°E	1 (1m)	5	1 (1m)	1	1 (1m)	4
Mykulychyn (Ukraine)	48.42°N, 24.61°E	5 (5m)	3, 5(4)	5 (5m)	1(5)	4 (4m)	4(4)
Milliparki (Turkey)	40.93°N, 41.14°E	5 (5m)	9(5)	5 (5m)	1(5)	4 (4m)	4(4)

**Table S1b.** Sampling localities for the *Pyrobombus* species (*B. brodmannicus* and *B. pratorum*) and distribution of haplotypes for three loci. (S) and (G) refer to a specialist or generalist species (or group of sampled populations in the case of *B. brodmannicus*). The number of analysed individuals is indicated beside each number of haplotypes (“m” refers to male individuals and “f” to female individuals). (\*) refers to phased haplotypes associated to a low reconstruction probability ( $p < 0.9$ ).

Population Locality	Geographical coordinates	n (COI)	Haplotypes (no. of copies) COI	n (EF-1 $\alpha$ )	Haplotypes (no. of copies) EF-1 $\alpha$	n (PEPCK)	Haplotypes (no. of copies) PEPCK
<b><i>B. brodmannicus</i> (S)</b>							
Saint-Paul sur Ubaye (France)	44.59°N, 6.83°E	3 (1m, 2f)	14(2), 15	5 (1m, 2f)	11(5)	5 (1m, 2f)	45(5)
Le Roux (France)	44.84°N, 6.95°E	6 (6f)	11, 14(5)	8 (4f)	11(8)	12 (6f)	45(12)
Sainte-Catherine (France)	44.60°N, 6.70°E	4 (4f)	11(4)	6 (3f)	11(6)	2 (1f)	45(2)
Col d'Allos (France)	44.30°N, 6.58°E	3 (3f)	14(3)	4 (2f)	11(4)	6 (3f)	45(6)
Col de la Cayolle (France)	44.25°N, 6.75°E	3 (3f)	14(3)	4 (2f)	11(4)	6 (3f)	45(6)
<b><i>B. brodmannicus</i> (G)</b>							
Erzurum (Turkey)	40.35°N, 41.70°E	18 (18m)	12(12), 13(6)	18 (18m)	10, 11(13), 12(2), 13(2)	14 (14m)	45(10), 46(3), 47
<b><i>B. pratorum</i> (G)</b>							
Luxembourg (Belgium)	50.25°N, 5.78°E	4 (4m)	1(4)	4 (4m)	6(3), 7	4 (4m)	20, 35, 38(2)
Hainaut (Belgium)	50.44°N, 3.87°E	2 (2m)	6(2)	2 (2m)	2(2)	2 (2m)	17, 20
Eindhoven (Holland)	51.47°N, 5.39°E	1 (1m)	6	1 (1m)	6	1 (1m)	30
Nunspeet (Holland)	52.33°N, 5.77°E	1 (1m)	6	1 (1m)	6	1 (1m)	36
Nord-Pas-de-Calais (France)	50.90°N, 1.69°E	1 (1m)	6	1 (1m)	2	1 (1m)	37
Bouchouse (France)	44.74°N, 6.99°E	1 (1m)	6	1 (1m)	2	1 (1m)	5
Le Roux (France)	44.84°N, 6.94°E	1 (1m)	6	1 (1m)	1	1 (1m)	35
Eyne (France)	42.42°N, 2.05°E	2 (2m)	6, 7	2 (2m)	1(2)	2 (2m)	23, 31
Nohèdes (France)	42.63°N, 2.26°E	4 (4m)	6, 7(3)	2 (2m)	1, 2	3 (3m)	15, 28, 43
Saint-Véran (France)	44.70°N, 6.86°E	4 (4m)	1(2), 6(2)	4 (4m)	1, 2(2), 6	4 (4m)	3, 20, 23(2)
Forêt d'Egat (France)	42.51°N, 2.02°E	1 (1m)	6	-	-	-	-
Saint-Paul sur Ubaye (France)	44.56°N, 6.81°E	2 (1m, 1f)	6(2)	3 (1m, 1f)	1, 6(2)	3 (1m, 1f)	5, 14*, 16*
Col d'Allos (France)	44.29°N, 5.57°E	2 (2m)	6(2)	2 (2m)	6(2)	2 (2m)	40(2)
Colmar (France)	48.07°N, 7.37°E	2 (2m)	6(2)	2 (2m)	2, 4	2 (2m)	5, 23
Angers (France)	47.50°N, 0.50°W	1 (1m)	6	1 (1m)	7	1 (1m)	40
Seine Maritime (France)	49.50°N, 0.07°E	1 (1m)	6	-	-	-	-
Essonne (France)	48.50°N, 2.33°E	1 (1m)	6	1 (1m)	2	-	-
Aveyron (France)	44.53°N, 2.94°E	2 (2m)	6(2)	-	-	-	-
Ille et Vilaine (France)	48.51°N, 1.62°E	1 (1m)	6	-	-	-	-
Frossay (France)	47.24°N, 1.94°W	1 (1m)	6	-	-	-	-
Saint-Père-en-Retz (France)	47.21°N, 2.04°W	1 (1m)	6	-	-	-	-
Le Pellerier (France)	49.04°N, 0.88°W	1 (1m)	6	-	-	-	-
Pornic (France)	47.12°N, 2.10°W	1 (1m)	6	1 (1m)	4	1 (1m)	23
Plougastel (France)	48.37°N, 4.37°W	1 (1m)	6	1 (1m)	2	-	-
Fontaine-le-Port (France)	48.49°N, 2.76°E	1 (1m)	6	1 (1m)	6	1 (1m)	10
Dettenheim (Germany)	49.15°N, 8.40°E	1 (1m)	6	1 (1m)	6	1 (1m)	20
Lauffen (Germany)	49.09°N, 9.17°E	1 (1m)	6	1 (1m)	6	1 (1m)	32
Sjælland (Denmark)	54.97°N, 12.02°E	1 (1m)	1	1 (1m)	2	1 (1m)	21
Dallarna (Sweden)	61.39°N, 13.30°E	2 (2m)	1(2)	2 (2m)	2, 6	2 (2m)	19(2)
Jämtland (Sweden)	62.81°N, 13.61°E	2 (2m)	2(2)	2 (2m)	1(2)	2 (2m)	7, 12
Inari (Finland)	68.49°N, 26.09°E	1 (1m)	6	-	-	-	-
Kittilä (Finland)	67.75°N, 25.23°E	1 (1m)	6	-	-	-	-
Røros (Norway)	62.64°N, 11.57°E	1 (1m)	3	1 (1m)	1	1 (1m)	20
Botn-Vatnet (Norway)	70.66°N, 29.20°E	3 (3m)	3(3)	-	-	-	-
Oppland (Norway)	60.58°N, 10.33°E	7 (7m)	3(6), 6	6 (6m)	1(3), 6(3)	1 (1m)	26
Rogaland (Norway)	59.37°N, 5.98°E	3 (3m)	3(3)	4 (4m)	2(2), 6(2)	2 (2m)	9, 14
Hordaland (Norway)	59.81°N, 6.81°E	1 (1m)	3	1 (1m)	2	-	-
Oslo (Norway)	59.99°N, 10.67°E	1 (1m)	6	1 (1m)	2	1 (1m)	34
Larvik (Norway)	59.02°N, 9.84°E	1 (1m)	3	1 (1m)	6	1 (1m)	14
Wick (England)	58.47°N, 3.23°W	2 (2m)	1(2)	2 (2m)	2, 6	2 (2m)	6, 11
Winnersh (England)	51.43°N, 0.88°W	2 (2m)	6(2)	2 (2m)	2, 6	2 (2m)	1, 32
Milliparki (Turkey)	40.92°N, 41.15°E	4 (4m)	4(4)	5 (5m)	2(5)	3 (3m)	39, 43, 44
Damar (Turkey)	41.15°N, 41.53°E	5 (5m)	4(5)	4 (4m)	2(3), 3	4 (4m)	42(3), 43
Dehetná (Czech Republic)	49.63°N, 12.76°E	1 (1f)	6	2 (1f)	1(2)	2 (1f)	11*, 35*
Vstavacova (Czech Republic)	50.05°N, 14.30°E	1 (1f)	5	2 (1f)	6(2)	2 (1f)	23, 24
Modrava (Czech Republic)	49.02°N, 13.50°E	1 (1m)	6	2 (2m)	2, 6	2 (2m)	8, 20
Horní Alberice (Czech Republic)	50.69°N, 15.85°E	1 (1m)	3	1 (1m)	2	-	-
Carpates (Romania)	45.45°N, 24.62°E	6 (6m)	6, 7(5)	5 (5m)	1, 2(3), 6	5 (5m)	4, 7(2), 14, 25
Bohinjsko Jezero (Slovenia)	46.28°N, 13.78°E	3 (3m)	6(2), 7	3 (3m)	2, 4, 6	2 (2m)	23, 31
Iglenik (Slovenia)	45.74°N, 15.25°E	1 (1m)	7	-	-	-	-
Planina (Slovenia)	45.82°N, 14.24°E	1 (1m)	7	-	-	-	-
Rogla (Slovenia)	46.45°N, 15.33°E	1 (1m)	6	-	-	-	-
Terruel (Spain)	40.24°N, 0.64°W	3 (3m)	6(3)	3 (3m)	1(2), 2	3 (3m)	10, 15, 23
Segovia (Spain)	41.25°N, 3.45°W	3 (3m)	6(3)	2 (2m)	1, 6	3 (3m)	10, 11, 28
Vals (Switzerland)	46.62°N, 9.19°E	1 (1m)	6	1 (1m)	2	1 (1m)	36
Popdatranská Kotlina (Slovakia)	49.17°N, 20.28°E	5 (5m)	6, 7(4)	3 (3m)	2, 4, 5	4 (4m)	13, 23(2), 27
Serebryanye Prudy (Russia)	54.50°N, 38.51°E	1 (1m)	6	2 (2m)	1, 2	2 (2m)	2, 36
Taldom (Russia)	56.47°N, 37.65°E	2 (2m)	6(2)	2 (2m)	6(2)	2 (2m)	18, 41
Rakhiv (Ukraine)	48.15°N, 24.55°E	2 (2m)	6, 7	3 (3m)	1(2), 2	4 (4m)	7, 14, 23, 35