

Workers select mates for queens: a possible mechanism of gene flow restriction between supercolonies of the invasive Argentine ant

Eiriki Sunamura • Sugihiko Hoshizaki • Hironori Sakamoto • Takeshi Fujii • Koji Nishisue • Shun Suzuki
• Mamoru Terayama • Yukio Ishikawa • Sadahiro Tatsuki

Correspondence to Eiriki Sunamura: Graduate School of Agricultural and Life Sciences, University of Tokyo, Bunkyo-ku, Tokyo 113-8657, Japan; e-mail: eirikisunamura@yahoo.com

Online Resource 1 Cuticular hydrocarbons of workers and males from two supercolonies ('Japanese main' and 'Kobe C') of the Argentine ant. Fifty-four compounds were detected with GC/MS. Mean \pm SD (%) of each compound is shown for workers and males. Compounds which highly contributed to the first and second principal component in the principal component analysis (Fig. 3) are indicated by + and ++, respectively.

| Peak | Compound | RT (min) | Japanese main | | Kobe C | |
|------------------|----------|----------|-----------------|-----------------|-----------------|-----------------|
| | | | Worker | Male | Worker | Male |
| 1 | n-C14 | 10.0 | 0.08 \pm 0.06 | 0.10 \pm 0.08 | 0.14 \pm 0.08 | 0.12 \pm 0.08 |
| 2 | n-C15 | 10.9 | 0.20 \pm 0.08 | 0.19 \pm 0.10 | 0.58 \pm 0.31 | 0.18 \pm 0.11 |
| 3 ⁺⁺ | 3-MeC15 | 11.4 | 0.09 \pm 0.06 | 0.02 \pm 0.02 | 0.23 \pm 0.08 | 0.03 \pm 0.02 |
| 4 | n-C16 | 11.6 | 0.20 \pm 0.08 | 0.21 \pm 0.15 | 0.64 \pm 0.99 | 0.22 \pm 0.10 |
| 5 | C17:1 | 12.3 | 0.14 \pm 0.09 | 0.06 \pm 0.05 | 0.22 \pm 0.38 | 0.06 \pm 0.10 |
| 6 | n-C17 | 12.4 | 1.93 \pm 0.50 | 1.49 \pm 0.74 | 3.09 \pm 0.74 | 1.85 \pm 1.07 |
| 7 ⁺⁺ | 3-MeC17 | 13.0 | 0.19 \pm 0.09 | 0.09 \pm 0.02 | 0.24 \pm 0.06 | 0.09 \pm 0.04 |
| 8 | n-C18 | 13.2 | 0.28 \pm 0.17 | 0.33 \pm 0.12 | 0.44 \pm 0.14 | 0.29 \pm 0.11 |
| 9 ⁺⁺ | C19:2 | 13.7 | 0.32 \pm 0.09 | 0.19 \pm 0.10 | 0.27 \pm 0.07 | 0.10 \pm 0.04 |
| 10 ⁺⁺ | C19:1 | 13.8 | 3.41 \pm 1.41 | 2.04 \pm 0.34 | 4.06 \pm 1.07 | 2.14 \pm 0.82 |
| 11 | n-C19 | 14.0 | 0.48 \pm 0.14 | 0.83 \pm 0.16 | 1.00 \pm 0.42 | 1.16 \pm 0.49 |
| 12 ⁺⁺ | n-C20 | 14.9 | 0.25 \pm 0.14 | 0.19 \pm 0.06 | 0.25 \pm 0.09 | 0.13 \pm 0.05 |
| 13 | n-C21 | 15.9 | 0.33 \pm 0.23 | 0.50 \pm 0.18 | 0.47 \pm 0.21 | 0.60 \pm 0.26 |
| 14 | n-C22 | 17.0 | 0.25 \pm 0.17 | 0.27 \pm 0.11 | 0.25 \pm 0.10 | 0.21 \pm 0.10 |
| 15 | n-C23 | 18.2 | 0.59 \pm 0.25 | 1.75 \pm 0.88 | 0.86 \pm 0.47 | 1.93 \pm 0.87 |
| 16 | n-C24 | 19.4 | 0.35 \pm 0.21 | 0.37 \pm 0.20 | 0.33 \pm 0.17 | 0.28 \pm 0.17 |
| 17 | n-C25 | 20.7 | 1.08 \pm 0.71 | 0.97 \pm 0.39 | 0.50 \pm 0.19 | 1.14 \pm 0.51 |
| 18 ⁺⁺ | n-C26 | 22.0 | 0.75 \pm 0.33 | 0.36 \pm 0.17 | 0.52 \pm 0.26 | 0.19 \pm 0.14 |

(Continued)

| Peak | Compound | RT (min) | Japanese main | | Kobe C | |
|------------------|--|----------|---------------|-----------|-----------|-----------|
| | | | Worker | Male | Worker | Male |
| 19 ⁺⁺ | 3-MeC26 | 22.9 | 0.41±0.29 | 0.36±0.26 | 0.55±0.32 | 0.15±0.10 |
| 20 ⁺⁺ | n-C27 | 23.3 | 5.36±1.28 | 0.82±0.19 | 2.08±0.54 | 0.52±0.23 |
| 21 | 3-MeC27 | 24.3 | 0.66±0.55 | 0.26±0.14 | 0.21±0.13 | 0.09±0.04 |
| 22 ⁺⁺ | n-C28 | 24.6 | 1.16±0.38 | 0.33±0.11 | 1.28±0.38 | 0.19±0.10 |
| 23 ⁺⁺ | n-C29 | 25.9 | 4.87±1.32 | 1.23±0.27 | 9.21±2.63 | 1.12±0.43 |
| 24 | 11- / 13- / 15-MeC29 | 26.4 | 0.28±0.11 | 0.22±0.11 | 0.96±0.41 | 0.16±0.09 |
| 25 | 7- / 9- / 11-MeC29 | 26.5 | 0.16±0.10 | 0.14±0.16 | 0.38±0.23 | 0.23±0.08 |
| 26 | 5-MeC29 | 26.6 | 0.70±0.75 | 0.18±0.05 | 0.37±0.23 | 0.16±0.06 |
| 27 ⁺⁺ | 3-MeC29 | 26.9 | 0.92±0.74 | 0.56±0.81 | 1.39±0.59 | 0.32±0.06 |
| 28 ⁺⁺ | n-C30 | 27.1 | 1.96±1.50 | 0.53±0.33 | 1.16±0.37 | 0.29±0.14 |
| 29 | n-C31 | 27.2 | 3.53±2.33 | 2.31±0.87 | 5.06±1.70 | 1.61±0.71 |
| 30 ⁺ | 11- / 13- / 15-MeC31 | 28.5 | 1.34±1.19 | 0.83±0.22 | 2.76±0.37 | 1.76±0.44 |
| 31 ⁺ | 3-MeC31 | 29.0 | 0.56±0.24 | 0.37±0.12 | 1.60±0.44 | 0.68±0.09 |
| 32 ⁺ | 11,13- / 11,19-diMeC31 | 29.6 | 0.33±0.14 | 0.57±0.22 | 1.32±0.16 | 1.33±0.19 |
| 33 ⁺ | 5,13,15- / 5,13,17- / 5,15,17- triMeC31 | 30.0 | 1.76±0.55 | 1.23±0.31 | 0.69±0.16 | 0.80±0.14 |
| 34 ⁺ | 3,13,15- / 3,13,17- / 3,15,17- triMeC31 | 30.1 | 0.47±0.13 | 0.39±0.12 | 1.00±0.25 | 0.66±0.18 |
| 35 | n-C33 | 30.5 | 1.55±0.75 | 3.22±0.89 | 2.97±1.07 | 2.96±1.06 |
| 36 ⁺ | 13,15,17-MeC33 | 31.7 | 2.09±0.20 | 2.44±0.58 | 5.69±1.50 | 5.09±1.02 |
| 37 ⁺ | 11,17- / 11,19- / 13,17- / 13,19- / 15,17- / 15,19- / 17,19-diMeC33 | 32.3 | 1.40±0.64 | 1.14±0.40 | 4.06±1.02 | 6.03±0.78 |
| 38 ⁺ | 9,13- / 11,13-diMeC33 | 32.7 | 0.14±0.12 | 0.16±0.25 | 1.70±0.23 | 1.93±0.30 |
| 39 ⁺⁺ | 5,15- / 5,17-diMeC33 | 33.0 | 3.38±0.52 | 3.22±0.57 | 3.10±0.90 | 5.12±0.67 |
| 40 ⁺ | 9,13,15- / 9,13,17- / 11,13,15- / 11,13,17-triMeC33 | 33.3 | 0.06±0.14 | 0.70±1.39 | 6.97±0.95 | 7.74±0.59 |
| 41 ⁺ | 5,13,17- / 5,15,17- / 5,13,19- / 5,15,19- triMeC33 | 33.8 | 7.22±0.62 | 6.53±1.00 | 1.26±0.35 | 1.80±0.18 |
| 42 | 3,13,15- / 3,13,17- / 3,13,19- / 3,15,17- / 3,15,19-triMeC33 | 34.3 | 1.75±0.20 | 1.50±0.46 | 1.75±0.42 | 4.25±7.00 |

(Continued)

| Peak | Compound | RT (min) | Japanese main | | Kobe C | |
|---------------------------------|--|----------|---------------|------------|-----------|------------|
| | | | Worker | Male | Worker | Male |
| 43 | n-C35 | 35.9 | 1.04±0.17 | 2.78±0.77 | 0.93±0.36 | 1.95±0.58 |
| 44 | 13- / 15- / 17-MeC35 | 36.7 | 3.11±0.39 | 3.95±0.70 | 4.11±0.69 | 4.70±0.82 |
| 45 ⁺ , ⁺⁺ | 11,17- / 11,19- / 13,17- / 13,19- / 15,17- / 15,19- / 17,19-diMeC35 | 37.5 | 3.36±1.11 | 3.18±0.46 | 7.22±1.57 | 10.87±1.14 |
| 46 ⁺⁺ | 5,15- / 5,17-diMeC35 | 38.1 | 5.38±0.38 | 5.94±0.92 | 6.08±1.21 | 9.72±1.08 |
| 47 | 9,13,15- / 9,13,17- / 11,13,15- / 11,13,17-triMeC35 | 38.5 | 0 | 0 | 3.05±0.48 | 4.05±0.38 |
| 48 ⁺ | 5,13,17- / 5,13,19- / 5,15,17- / 5,15,19-triMeC35 | 38.8 | 15.36±1.19 | 15.91±1.48 | 0.82±0.34 | 1.47±0.23 |
| 49 ⁺ | 3,13,15- / 3,13,17- / 3,13,19- / 3,15,17- / 3,15,19-triMeC35 | 39.5 | 3.26±0.41 | 3.96±0.49 | 0.57±0.16 | 0.99±0.16 |
| 50 ⁺ | 13- / 15- / 17- / 19-MeC37 | 42.9 | 1.94±0.40 | 3.14±0.46 | 1.08±0.39 | 1.31±0.30 |
| 51 ⁺⁺ | 11,17- / 11,19- / 13,17- / 13,19- / 15,17- / 15,19- / 17,19-diMeC37 | 43.9 | 3.00±0.56 | 4.14±0.48 | 3.11±0.85 | 5.58±1.24 |
| 52 ⁺ | 5,15- / 5,17-diMeC37 | 45.0 | 2.53±0.43 | 4.38±0.82 | 1.23±0.51 | 3.12±0.88 |
| 53 ⁺ | 5,13,17- / 5,13,19- / 5,15,17- / 5,15,19- triMeC37 | 46.0 | 6.88±0.69 | 11.13±1.91 | 0.11±0.15 | 0.44±0.15 |
| 54 ⁺ | 3,13,15- / 3,13,17- / 3,13,19- / 3,15,17- / 3,15,19-triMeC37 | 47.0 | 1.16±0.21 | 2.31±0.59 | 0.09±0.07 | 0.09±0.06 |