**A sex ratio for the Kasarani population of *D. chrysippus*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Appendix 1. Expected frequencies of C locus genotypes and *Spiroplasma* infection in the offspring of the observed population of *D. chrysippus* at Kasarani in 2004-10 assuming random mating

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Female genotypes Male genotypes and frequencies observed (%)

frequencies & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

observed (%) *CC* 19.858 *Cc* 73.050 *cc* 7.092 100.000

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*CC* 2.961 *CC* 0.294 ♂ *CC* 0.541 ♂ *Cc* 0.105 ♂ 2.961

 *CC* 0.294 ♀ *Cc* 0.541 ♂ *Cc* 0.104 ♀

 *CC* 0.541 ♀

 *Cc* 0.541 ♀

*Cc* Σ+ 60.820 *CC* Σ+ 6.039 ♂ *CC* Σ+ 11.107 ♂ *Cc* Σ+ 2.157 ♂ 60.820

 *Cc* Σ+ 6.039 ♀ *Cc* Σ+ 11.107 ♂ *cc* Σ+ 2.157 ♀

 *Cc* Σ+ 11.107 ♀

 *cc* Σ+ 11.107 ♀

*Cc* Σ– 20.274 *CC*  1.007 ♂ *CC* 3.702 ♂ *Cc* 0.359 ♂ 20.274

 *CC* 1.007 ♀ *Cc* 3.702 ♂ *Cc* 0.359 ♀

 *Cc* 1.006 ♂ *Cc* 3.703 ♀ *cc* 0.360 ♂

 *Cc* 1.006 ♀ *cc* 3.703 ♀ *cc* 0.360 ♀

*cc* Σ+ 11.959 *Cc* Σ+ 1.187 ♂ *Cc* Σ+ 2.184 ♂ *cc* Σ+ 0.424 ♂ 11.959

 *Cc* Σ+ 1.187 ♀ *cc* Σ+ 2.184 ♂ *cc* Σ 0.425 ♀

 *Cc* Σ+ 2.184 ♀

 *cc* Σ+ 2.184 ♀

*cc* Σ– 3.986 *Cc* 0.396 ♂ *Cc*  0.728 ♂ *cc* 0.141 ♂ 3.986

 *Cc* 0.396 ♀ *cc* 0.728 ♂ *cc* 0.141 ♀

 *Cc* 0.728 ♀

 *cc* 0.728 ♀

 100.000 19.858 73.050 7.092 100.000

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Σ+, *Spiroplasma* infected, Σ–, not *Spiroplasma* infected. *c* indicates the recessive allele of *D. c. chrysippus* which is W-linked and inherited matrilinearly. Male genotypes highlighted in grey are those lost to the population through early male killing.

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The above random mating model has the following empirically derived parameters:

1. In the Kasarani sample, 75% of females (the median value over the 12 month study period, 2009-10), irrespective of genotype (*Cc* or *cc*), are *Spiroplasma* carriers, and all ∑+ females are expected to carry the W-*bc*-autosome fusion (Smith *et al.*, 2010). [After correction for penetrance the *CC* genotype was deemed absent from both sexes (Table 3); hence, we have no proof that this genotype is ever infected.]
2. Vertical transmission of *Spiroplasma* by Σ+ females to their offspring is 100%. (In practice transmission is invariably somewhat less than 100% (Jiggins *et al*., 2000a); therefore, Σ+ mothers produce a few Σ– offspring of both sexes, and any males so produced are fully viable. As we have not bred from known Σ+ females, transmission in this population has not been directly measured. However, from previous experience breeding with females from all-female broods (Smith *et al*., 1998), and therefore assumed to be Σ+, we believe vertical transmission is extremely efficient in the Nairobi region, certainly in excess of 90%. This estimate is entirely justified by the sample of screened females for March-July 2009 in which 95% were ∑+ (*n* = 71).
3. In the progenies of Σ+ females, all males die. (This is not quite true because 6.8% of Kasarani males are Σ+ (Gordon *et al*., in prep.); these three males, two *Cc* and one *C-* phenotypes, may carry a *Spiroplasma* suppressor gene that enables their survival (Smith, 1975a, 2013).
4. Observed frequencies of genotypes within sexes at Kasarani are averaged over the entire study period 2004-10 (Table 2).
5. Mate selection at the C locus is random. As most parents were unseen, mate selection has not been studied; however, some degree of assortative and disassortative mate selection is expected (Smith, 1984).