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## Asymmetric introgression between sympatric molestus and pipiens forms of *Culex pipiens* (Diptera: Culicidae) in the Comporta region, Portugal

Bruno Gomes<sup>1</sup>, Carla A Sousa<sup>2</sup>, Maria T Novo<sup>2</sup>, Ferdinando B Freitas<sup>1,2</sup>, Ricardo Alves<sup>1,2</sup>, Ana R Côrte-Real<sup>1,2</sup>, Patrícia Salgueiro<sup>1</sup>, Martin J Donnelly<sup>3</sup>, António PG Almeida<sup>2</sup> and João Pinto<sup>\*1</sup>

Address: <sup>1</sup>Centro de Malária e outras Doenças Tropicais, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Rua da Junqueira 96, 1349-008 Lisboa, Portugal, <sup>2</sup>Unidade de Entomologia Médica/Unidade de Parasitologia e Microbiologia Médicas, Instituto de Higiene e Medicina Tropical, Universidade Nova de Lisboa, Rua da Junqueira 96, 1349-008 Lisboa, Portugal and <sup>3</sup>Vector Group, Liverpool School of Tropical Medicine, Pembroke Place L3 5QA, Liverpool, UK

Email: Bruno Gomes - bsilva@ihmt.unl.pt; Carla A Sousa - casousa@ihmt.unl.pt; Maria T Novo - tenovo@ihmt.unl.pt; Ferdinando B Freitas - ferdinando@ihmt.unl.pt; Ricardo Alves - ricardo.alves@zoo.ox.ac.uk; Ana R Côrte-Real - anarutecreal@gmail.com; Patrícia Salgueiro - psalgueiro@ihmt.unl.pt; Martin J Donnelly - M.J.Donnelly@liverpool.ac.uk; António PG Almeida - palmeida@ihmt.unl.pt; João Pinto\* - jpinto@ihmt.unl.pt

\* Corresponding author

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### Abstract

**Background:** *Culex pipiens* L. is the most widespread mosquito vector in temperate regions. This species consists of two forms, denoted molestus and pipiens, that exhibit important behavioural and physiological differences. The evolutionary relationships and taxonomic status of these forms remain unclear. In northern European latitudes molestus and pipiens populations occupy different habitats (underground vs. aboveground), a separation that most likely promotes genetic isolation between forms. However, the same does not hold in southern Europe where both forms occur aboveground in sympatry. In these southern habitats, the extent of hybridisation and its impact on the extent of genetic divergence between forms under sympatric conditions has not been clarified. For this purpose, we have used phenotypic and genetic data to characterise *Cx. pipiens* collected aboveground in Portugal. Our aims were to determine levels of genetic differentiation and the degree of hybridisation between forms occurring in sympatry, and to relate these with both evolutionary and epidemiological tenets of this biological group.

**Results:** Autogeny and stenogamy was evaluated in the F1 progeny of 145 individual *Cx. pipiens* females. Bayesian clustering analysis based on the genotypes of 13 microsatellites revealed two distinct genetic clusters that were highly correlated with the alternative traits that define pipiens and molestus. Admixture analysis yielded hybrid rate estimates of 8-10%. Higher proportions of admixture were observed in pipiens individuals suggesting that more molestus genes are being introgressed into the pipiens form than the opposite.

**Conclusion:** Both physiological/behavioural and genetic data provide evidence for the sympatric occurrence of molestus and pipiens forms of *Cx. pipiens* in the study area. In spite of the significant genetic differentiation between forms, hybridisation occurs at considerable levels. The observed pattern of asymmetric introgression probably relates to the different mating strategies adopted by each form. Furthermore, the differential introgression of molestus genes into the pipiens form may induce a more opportunistic biting behaviour in the latter thus potentiating its capacity to act as a bridge-vector for the transmission of arboviral infections.