



High nucleotide divergence in a dimorphic parasite with disparate hosts

JEYARANNEY KATHIRITHAMBY†, JOSEPH. J. GILLESPIE^{1,2,3}, EVA JIMENEZ-GURI†, ANTHONY. I. COGNATO^{1,4} & J. SPENCER JOHNSTON¹

†Department of Zoology, University of Oxford, Oxford, United Kingdom, OX1 3PS, UK jeyaraney.kathirithamby@zoo.ox.ac.uk, eva.jimenez@zoology.oxford.ac.uk

¹Department of Entomology, Texas A&M University, College Station, TX 77843, USA spencerj@tamu.edu

²Department of Microbiology and Immunology, University of Maryland School of Medicine, Baltimore, MD 21201, USA pvittata@hotmail.com

³Virginia Bioinformatics Institute at Virginia Tech, Blacksburg, VA 24061, Blacksburg, VA, USA

⁴Department of Entomology, Michigan State University, East Lansing, MI 48824, USA cognato@msu.edu

Correspondence: Jeyaranney Kathirithamby, Department of Zoology, University of Oxford, Oxford, United Kingdom, OX1 3PS; e-mail: jeyaraney.kathirithamby@zoo.ox.ac.uk

Abstract

Morphologically cryptic male *C. fenyesei sensu lato* are found parasitic in different ant hosts over a wide geographical range. We use ribosomal DNA (rDNA) primary sequence and predicted rRNA secondary structure to compare between the second expansion segment (D2) of the nuclear large subunit rDNA (28S) and the entire nuclear small subunit rDNA (18S) of the male and the sexually dimorphic, neotenic female of *Caenocholax fenyesei waloffi* Kathirithamby & Johnston from Los Tuxtlas, Mexico, with that of the morphologically identical male *C. f. texensis* Kathirithamby & Johnston (Myrmecolacidae) from Texas, USA. In Los Tuxtlas the male *C. f. waloffi* parasitizes the ant, *Dolichoderus bispinosus* Olivier, while the female parasitizes the cricket, *Macroanaxipha macilenta* (Saussure). In Texas, the male *C. f. texensis* parasitizes the red imported fire ant, *Solenopsis invicta* Buren. The compared sequences show similar unusual secondary structures in the rRNA variable regions, but with approximately 14% overall divergence between Mexican and Texan specimens (15.5% divergence after correction for multiple substitutions). Our findings open a new opportunity in evolutionary biology to investigate speciation under a mechanism of morphological stasis and high genetic divergence in a unique parasite that is not only profoundly sexually dimorphic but wherein the sexes specialize in entirely different niches (hosts).

Key words: Strepsiptera, Myrmecolacidae, *Caenocholax fenyesei sensu lato*, 28S rDNA, 18S rDNA

Consequently, whatever part of the structure of the common progenitor, or of its earlier descendants, became variable; variations of this part would, it is highly probable, be taken advantage of by natural and sexual selection, in order to fit the several species to their several places in the economy of nature, and likewise to fit the two sexes of the same species to each other, or to fit the males to struggle with other males for the possession of the females. ...

Darwin's Origin of Species 1859

Introduction

In male *Caenocholax fenyesei* Pierce (Strepsiptera), morphological stasis is observed over a wide geographical range and evolutionary time span (Kathirithamby unpublished; Kathirithamby and Henderickx unpublished). Since Pierce's description of the male from Veracruz, Mexico, in 1909, morphologically identical males have