



## The identity of *Pentalonia nigronervosa* Coquerel and *P. caladii* van der Goot (Hemiptera: Aphididae) based on molecular and morphometric analysis

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### Abstract

*Pentalonia nigronervosa* (*sensu* Hardy 1931) samples from banana and from Zingiberaceae and Araceae species exhibit fixed differences in DNA sequence in mitochondrial cytochrome oxidase subunit 1 (“DNA barcode”) and in the nuclear gene elongation factor 1 $\alpha$ , and have morphometric differences, including non-overlapping ranges in the length of the distal rostral segment. It is thus proposed that the name *P. nigronervosa* Coquerel be restricted to banana-feeding ‘nigronervosa’ specimens, and that the name *Pentalonia caladii* van der Goot be restored to full species status for specimens typically feeding on Zingiberaceae and Araceae.

**Key words:** DNA barcode, elongation factor 1 $\alpha$ , species status

### Introduction

The banana aphid, *Pentalonia nigronervosa* Coquerel (*sensu* Hardy 1931), is widely distributed throughout tropical and subtropical areas of the world, and is also found in greenhouses in North America and Europe (Blackman and Eastop 2000). In addition to banana and other species in the genus *Musa*, such as abaca (*M. textilis*, the source of Manilla hemp), it is found on various plant species in the order Zingiberales and in the family Araceae, including important food and ornamental plants such as cardamom (*Elettaria*), comb ginger (*Alpinia*), ginger (*Zingiber*), taro (*Colocasia*), *Caladium*, *Costus*, *Dieffenbachia*, *Hedychium*, *Heliconia* and *Xanthosoma* (Waterhouse 1987).

*P. nigronervosa* is economically important as the vector of banana bunchy top virus (BBVT) in Africa, East Asia, India, Australia and the Pacific Regions (Hu *et al.* 1996). BBVT is considered the most important disease of banana and related crops in the world (Dale 1987). The aphid is also capable of transmitting banana mosaic disease, papaya ringspot potyvirus and cardamon mosaic potyvirus (Hughes and Eastop 1991, Blackman and Eastop 2000). Reproduction is almost entirely asexual, the rare sexual forms being reported only from northeast India and Nepal (Bhanotar and Ghosh 1969, Blackman and Eastop 2000).

Coquerel (1859) first described *Pentalonia nigronervosa* on banana from the Indian Ocean island of Réunion. Subsequently, van der Goot (1917) described a second species, *Pentalonia caladii*, from *Caladium* in Java, without explicitly mentioning *P. nigronervosa* or providing characters distinguishing the two. Hardy (1931) believed the observed variation to be environmentally induced and placed *P. caladii* in synonymy. Although most authors since then have considered only one species, some authors recognized the variation within this species by separating forms “typica” and “caladii” (Eastop 1966; Eastop and Hille Ris Lambers 1976, Remaudière and Remaudière 1997). A few faunal lists have treated them as separate species (*e.g.* Cermeli 1990). Attempts have been made to study and explain morphological and biological variation among populations of the aphid (Rajan 1981; Padmalatha and Ranjit Singh 2001), but no firm conclusions were