

A catalogue of parasitoid and seed wasps associated with olive fruit in South Africa using DNA barcodes and morphological analyses

Chanté Powell^{1*}, Emma Cook^{1*}, Virgilio Caleca², Elleunorah Allsopp³, Simon van Noort⁴, Barbara van Asch¹

¹Department of Genetics, Faculty of AgriSciences, University of Stellenbosch, Stellenbosch, South Africa ²Agricultural Research Council, Infruitec- Nietvoorbij, Stellenbosch, South Africa. ³Department of Agricultural and Forestry Sciences, University of Palermo, Italy. ⁴Division of Entomology, Department of Natural History, Iziko South African Museum, Cape Town, South Africa. *Both authors contributed equally to this work.

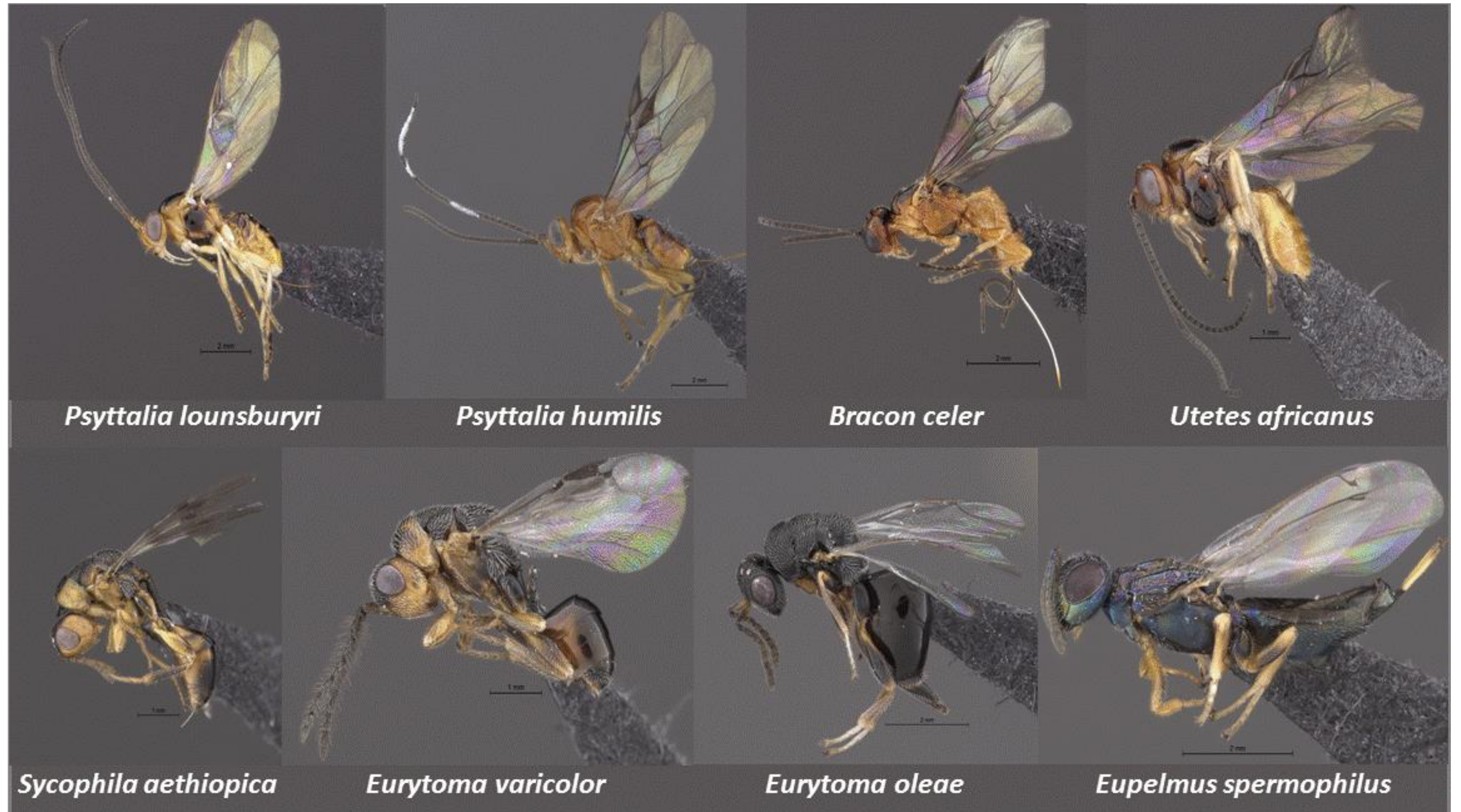


Figure 1. Parasitoid and seed hymenopteran associated with wild and cultivated olives in the Western Cape province of South Africa.

Introduction

Endemic parasitoid wasps may contribute to control *Bactrocera oleae* infestations in cultivated olive orchards. The Western Cape province of South Africa has a particularly rich diversity of these hymenopterans. Despite their potential utility as biocontrol agents in South Africa and other world regions, parasitoid wasps are understudied and lack standardized reference COI barcode sequences. Morphological and molecular analyses were used to identify species, and phylogenetic relationships at the genus level were explored using new and publicly available sequence data.

Materials & Methods

Table 1. PCR primers used for DNA barcoding of parasitoid wasp species found associated with wild and cultivated olives in the Western Cape province of South Africa.

Species	Primer (5'-3')	Amplicon (bp)
<i>Eurytoma oleae</i>	Euryt-COI-F2 & Euryt-COI-R2	~650
<i>Eurytoma varicolor</i>		
<i>Eupelmus spermophilus</i>	Eupel-COI-F & Eupel-COI-R	~650
<i>Sycophila aethiopica</i>		
<i>Psyttalia lounsburyi</i>		
<i>Psyttalia humilis</i>	LCO1490 & HCO2198	~710
<i>Utetes africanus</i>		
<i>Bracon celer</i>		
<i>Neochrysocharis formosa</i>		

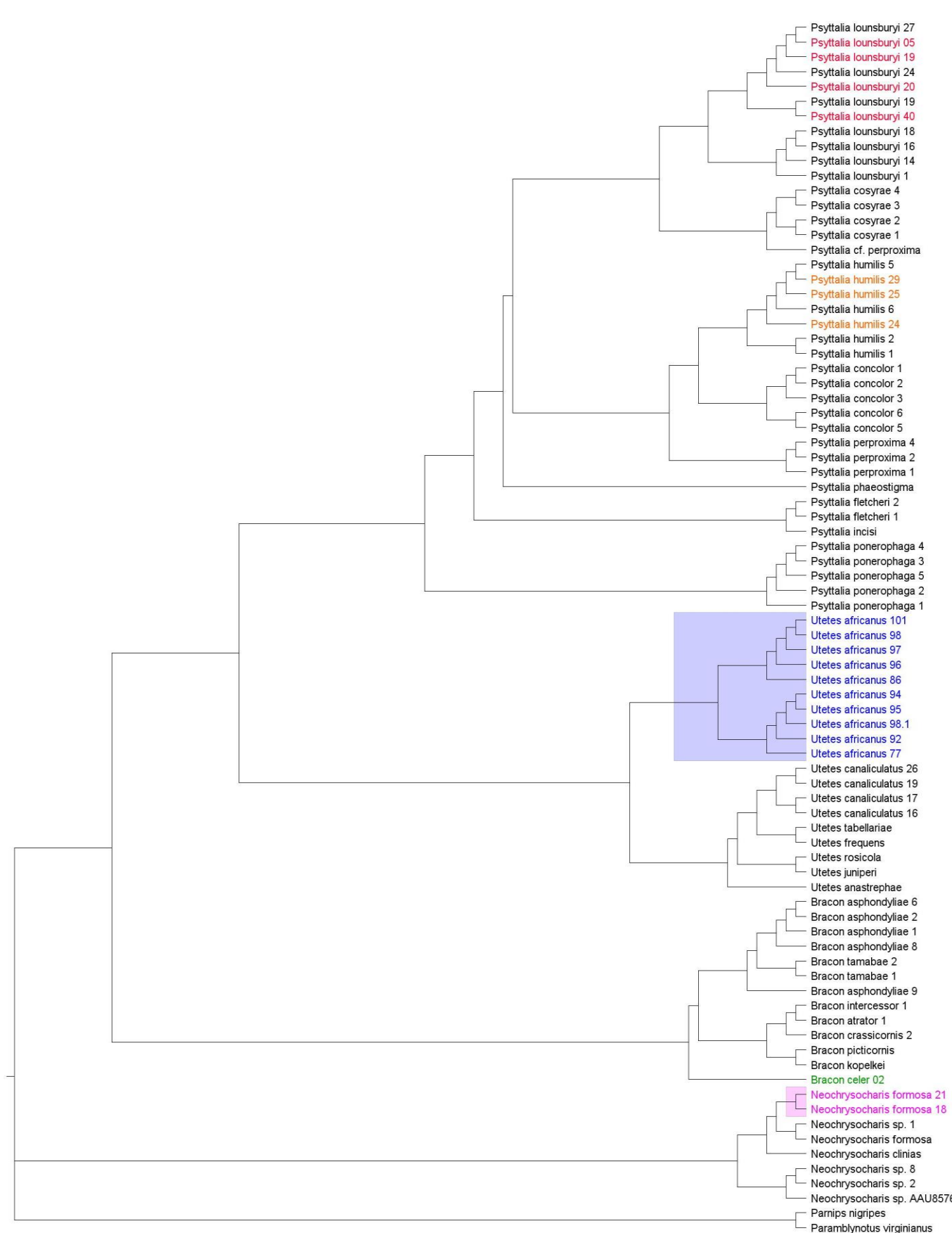


Figure 2. NJ tree of braconid wasps based on 558-bp alignment of new and public COI sequences.

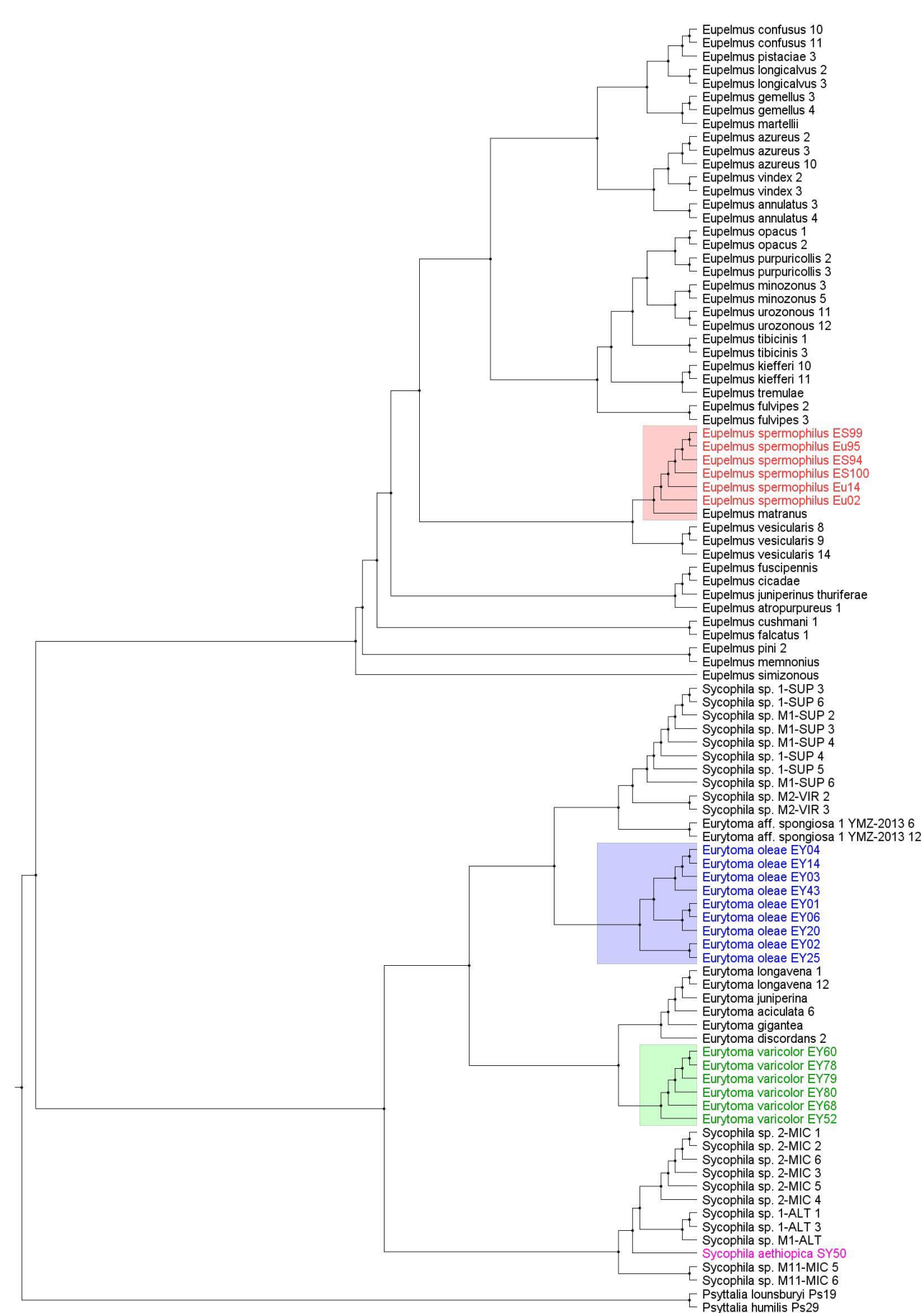


Figure 3. NJ tree of chalcid wasps based on 581-bp alignment of new and public COI sequences.

Conclusions

DNA barcodes and phylogenetic clustering correlated with morphological identification in all cases.

Eurytoma and *Sycophila* are not monophyletic.

Neochrysocharis formosa clustered with *Neochrysocharis clinias*, suggesting the presence of a single species.