

Taxonomic discovery in *Cyphalonotus*:

Phylogenetic evidence for an independent
origin of extreme sexual size dimorphism
in the araneid spider *Poltys*

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⁷State Key Laboratory of Biocatalysis and Enzyme Engineering, and Centre for Behavioral Ecology and Evolution, School of Life Sciences, Hubei University, Wuhan, Hubei Province, China

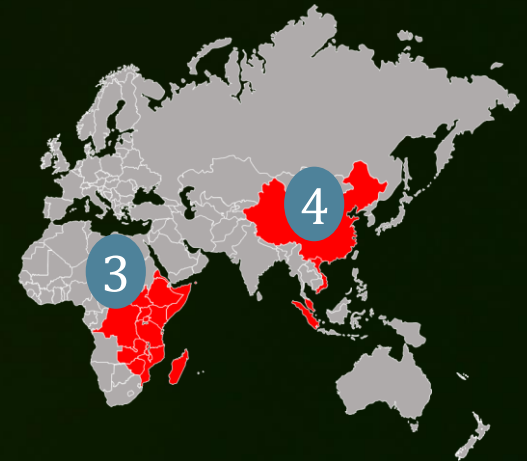
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Poorly studied genus



- Cryptic nocturnal orb-weaver
- Twig camouflage
- Fairly scarce

- Poor original descriptions
- Lack of molecular data



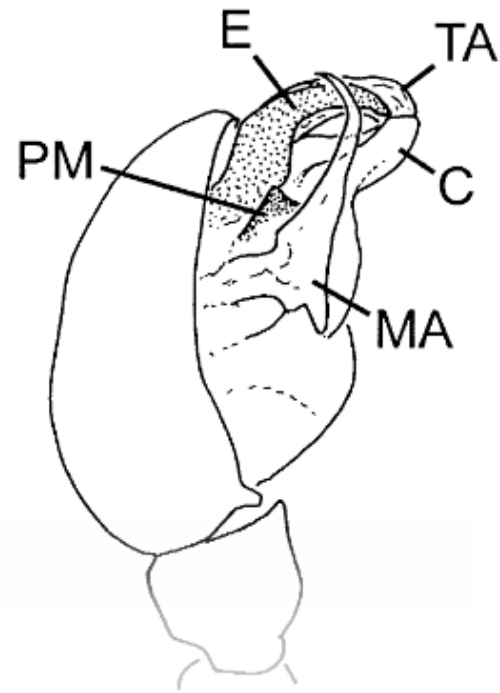
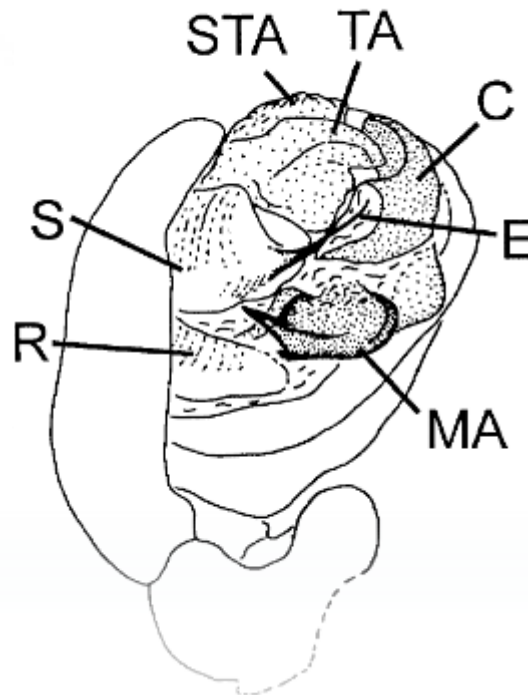
Cyphalonotus and *Poltys*

Similar behaviors
Similar morphologies

Cyphalonotus=*Poltys*?

Wide	Eye tubercle	Narrow
Normal	Fovea	Depressed
Depressed	Metatarsus	Normal

Cyphalonotus and *Poltyx*



Sexual Size Dimorphism (SSD)

Systematic placement?

1. Poltyeae (Simon, 1895)
 - + *Poltya*, *Pycnacantha*, *Kaira*, *Homalopoltya*
2. Cyphalonotini (Archer, 1951)
 - + *Simonarachne* (= *Eriovixia*)
3. Dolophini (Archer, 1965)
 - + *Dolophones*
4. Proximity with *Araneus* (Smith, 2005)
 - *A. diadematus*, *A. marmoreus*, *A. angulatus*



Objectives

1

Taxonomic composition

Asian
Cyphalonotus

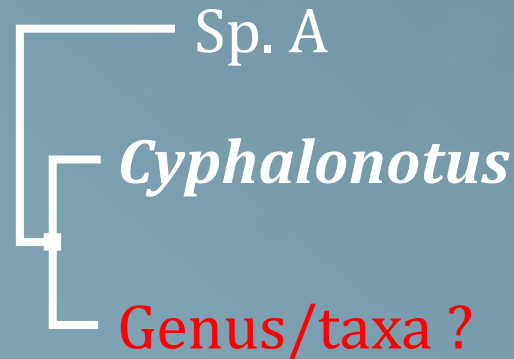


☐ Character A

☐ Character B

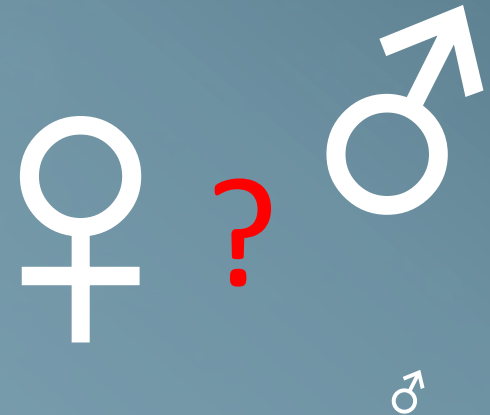
2

Phylogenetic placement

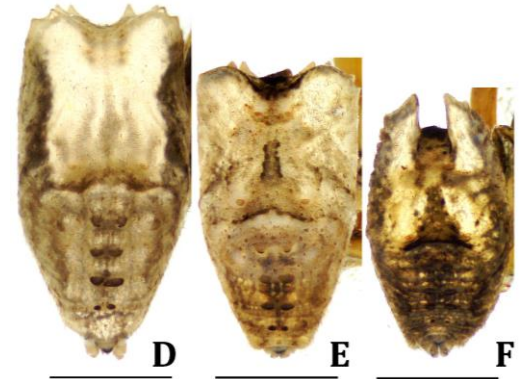
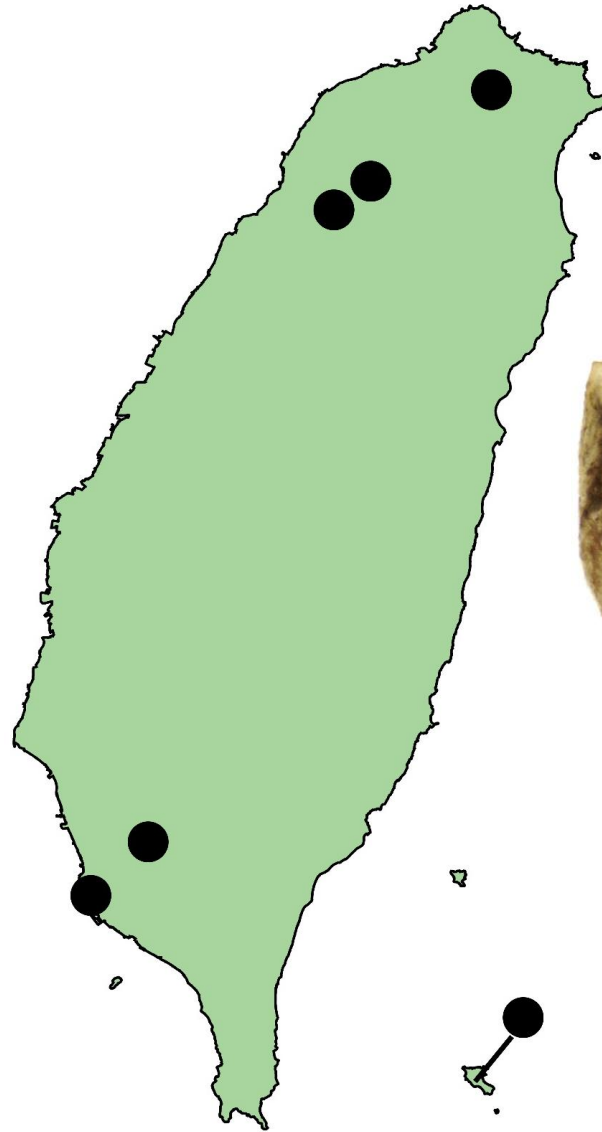
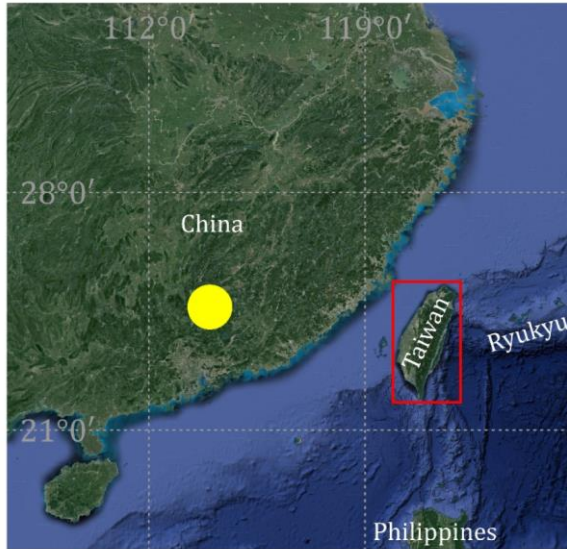


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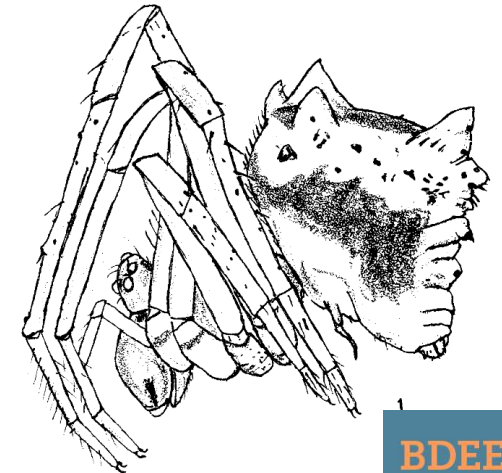
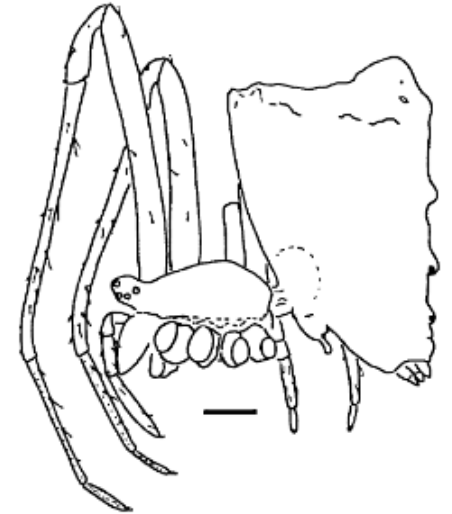
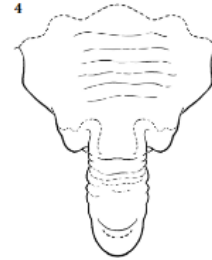
Sexual size dimorphism



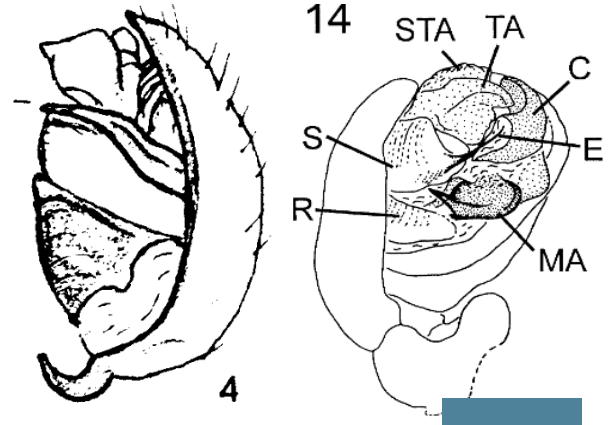
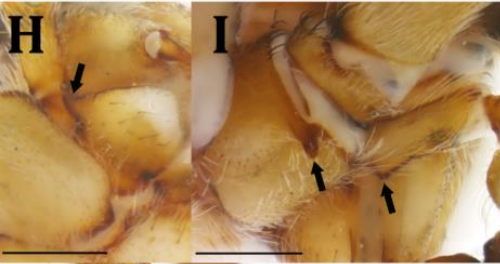
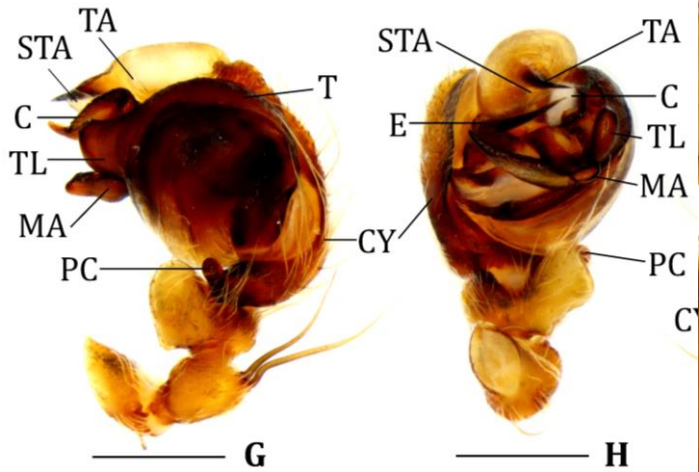
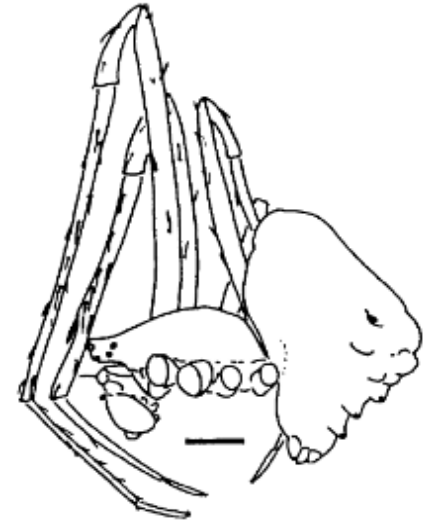
15 newly collected individuals



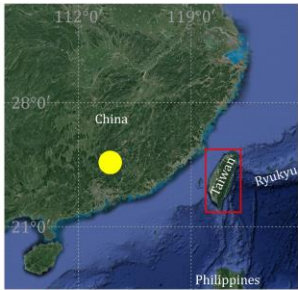
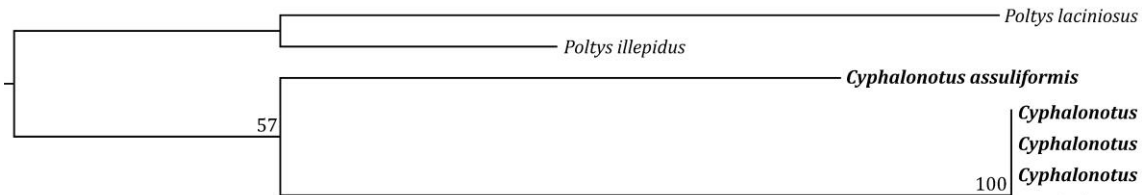
Female *Cyphalonotus*



Male *Cyphalonotus*



Species delimitation

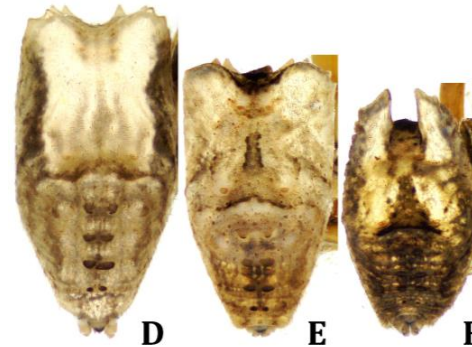


- Study Area
- Shaoguan, Guangdong, China
- Taipei, Taiwan
- ◆ Hsinchu 1, Taiwan
- ◇ Hsinchu 2, Taiwan
- ▲ Kaohsiung 1, Taiwan
- ▲ Kaohsiung 2, Taiwan
- ★ Lanyu Island, Taiwan

- Cyphalonotus variabilis* ▲
- Cyphalonotus variabilis* ★
- Cyphalonotus variabilis* ▲
- Cyphalonotus variabilis* ▲
- Cyphalonotus variabilis* ▲
- Cyphalonotus variabilis* ▲
- Cyphalonotus variabilis* ●
- Cyphalonotus variabilis* ◇
- Cyphalonotus variabilis* ●
- Cyphalonotus variabilis* ●
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- Cyphalonotus variabilis* ●

COI

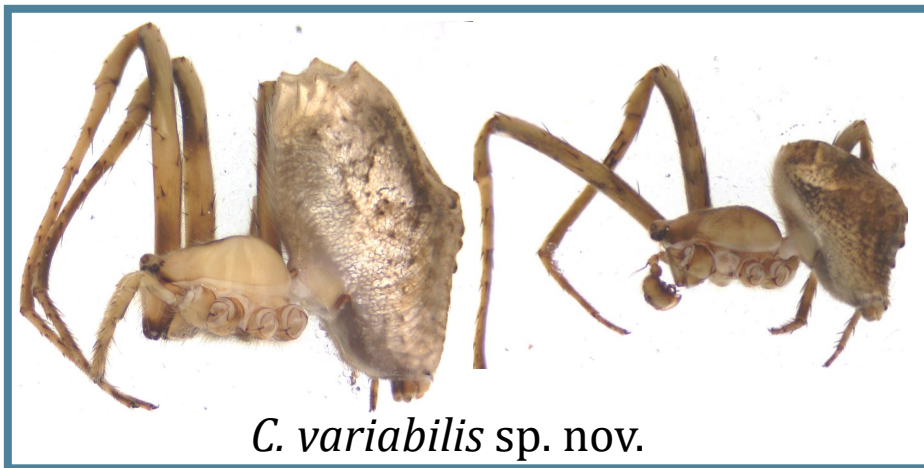
ABGD mPTP

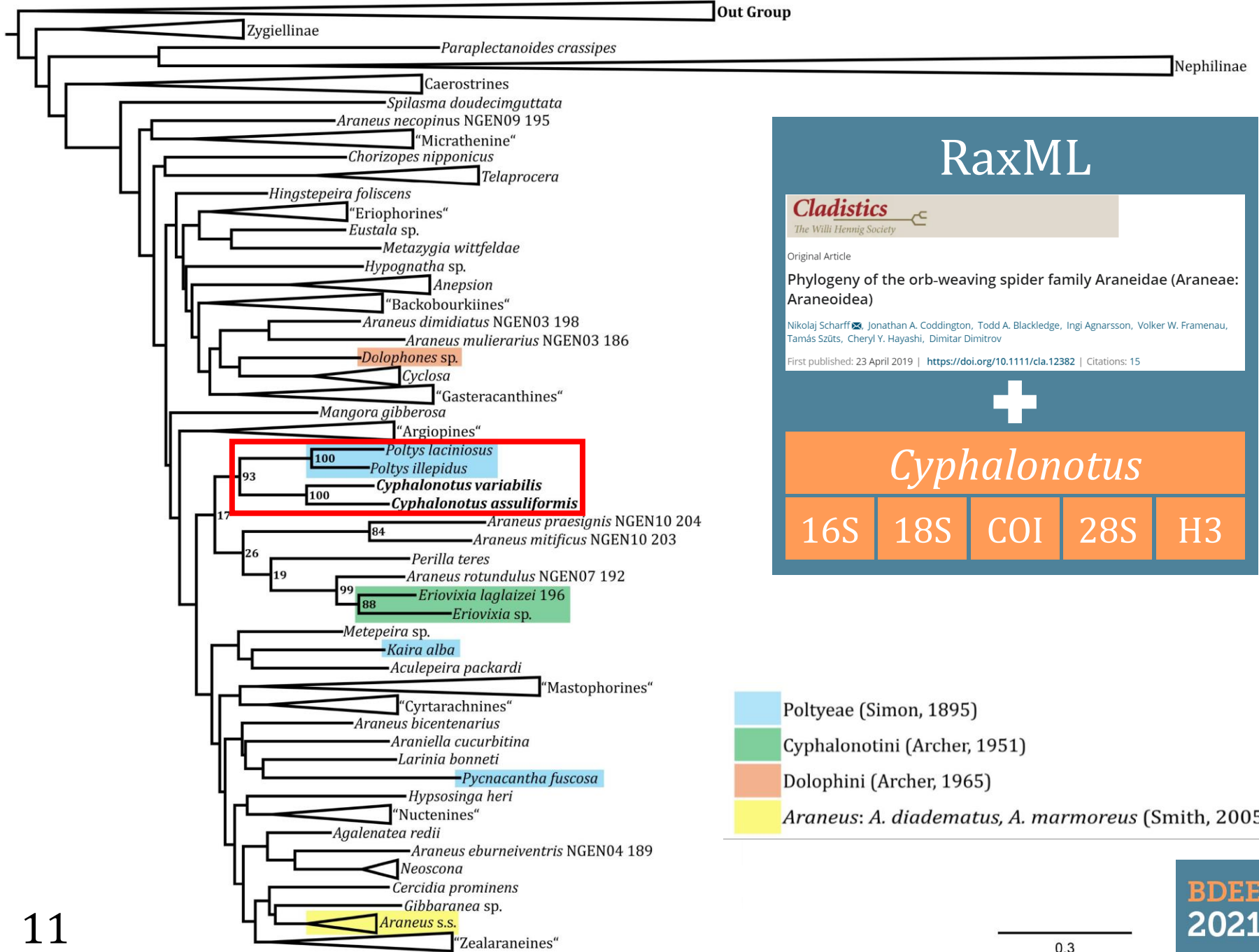


Objective 1: summary

1. Taxonomic composition confirmed
 - Asian *Cyphalonotus* = African *Cyphalonotus*

2. A new species and a known species are found





RaxML

Cladistics
The Willi Hennig Society

Original Article

Phylogeny of the orb-weaving spider family Araneidae (Araneae: Araneoidea)

Nikolaj Scharff, Jonathan A. Coddington, Todd A. Blackledge, Ingi Agnarsson, Volker W. Framenau, Tamás Szűts, Cheryl Y. Hayashi, Dimitar Dimitrov

First published: 23 April 2019 | <https://doi.org/10.1111/cla.12382> | Citations: 15

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Cyphalonotus

16S	18S	COI	28S	H3
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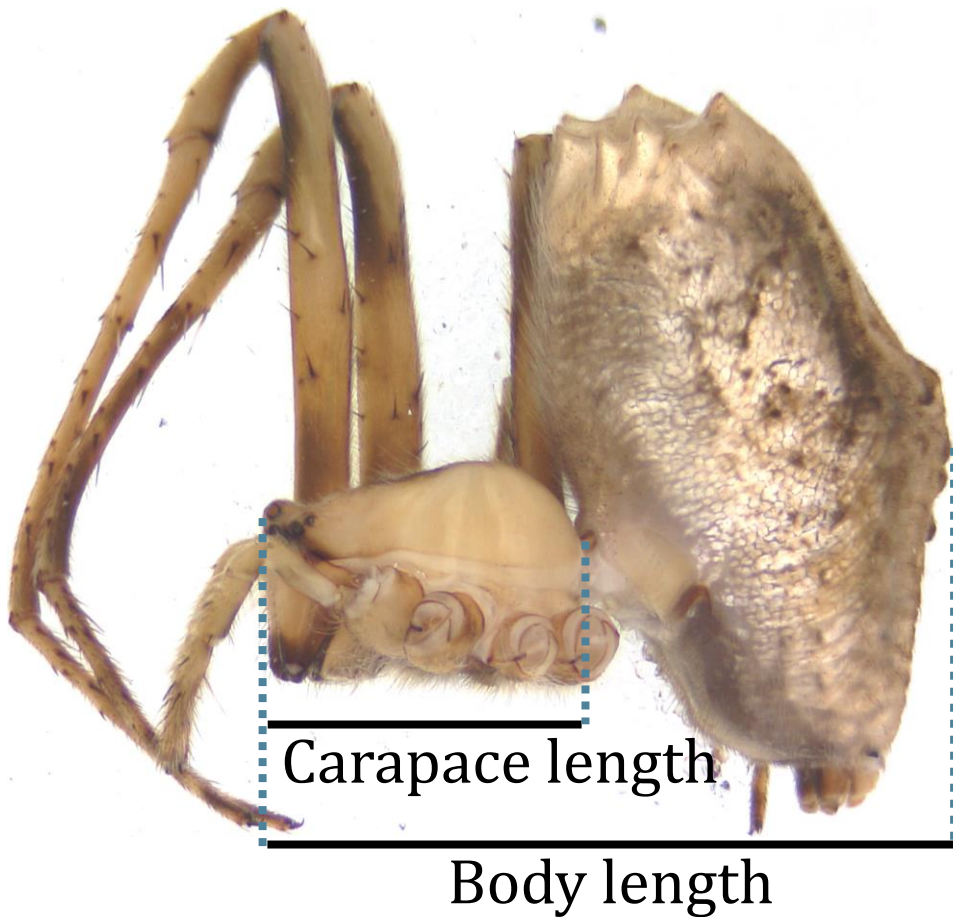
- Polteyae (Simon, 1895)
- Cyphalonotini (Archer, 1951)
- Dolophones (Archer, 1965)
- Araneus: *A. diadematus*, *A. marmoreus* (Smith, 2005)

Objective 2: summary

1. No previous hypotheses are fully supported
2. Sister group : *Cyphalonotus* + *Poltya*

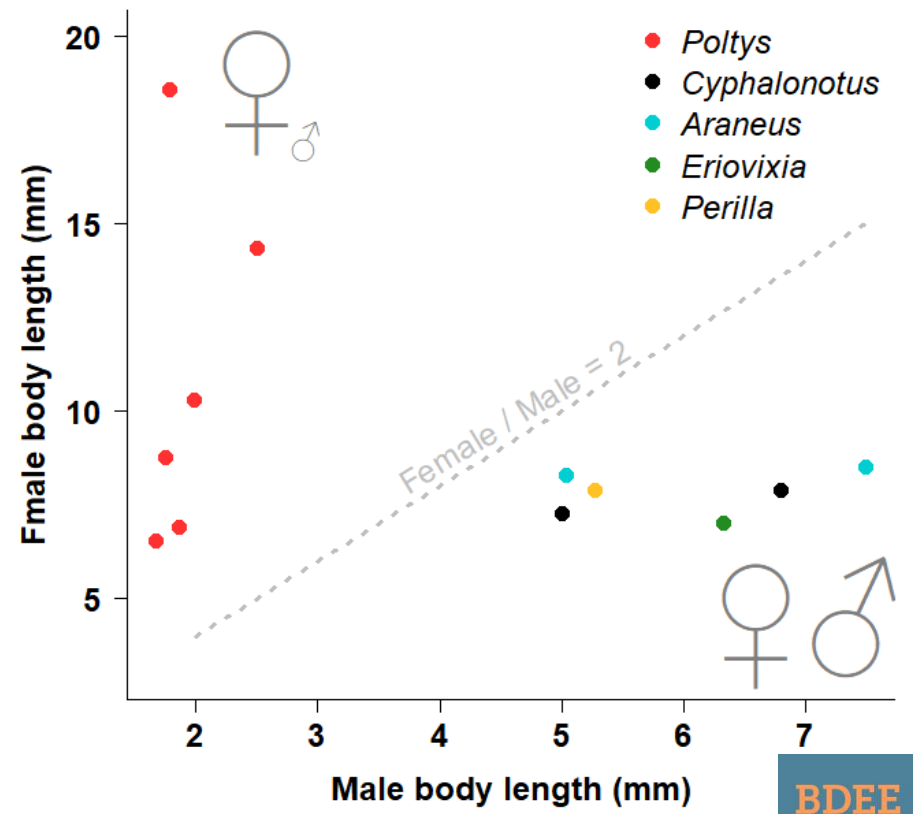
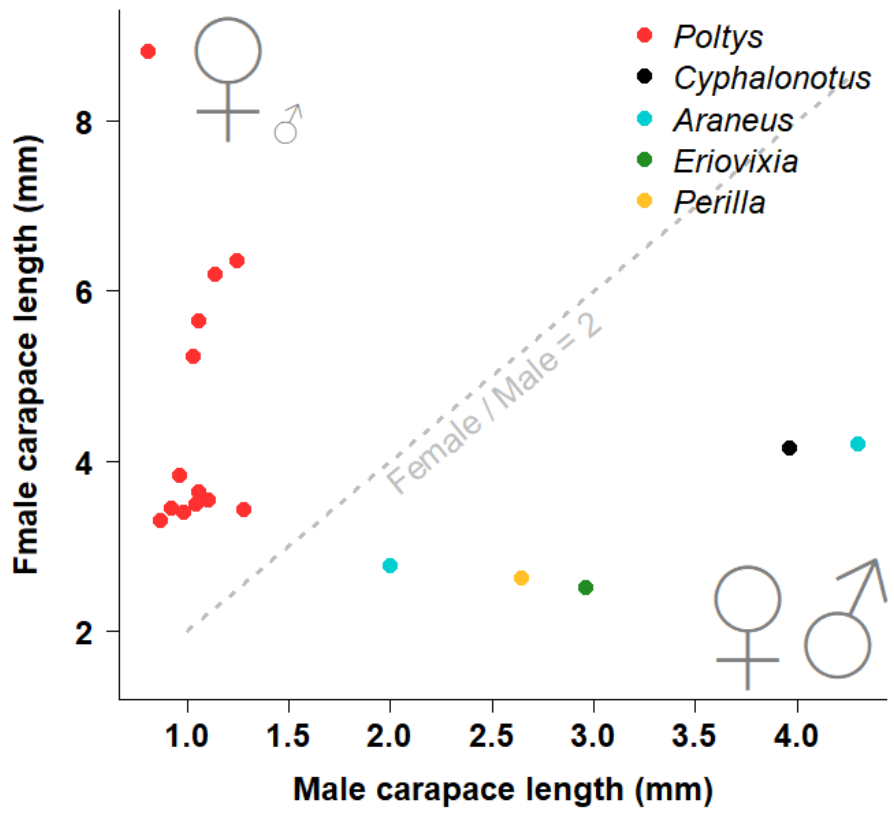
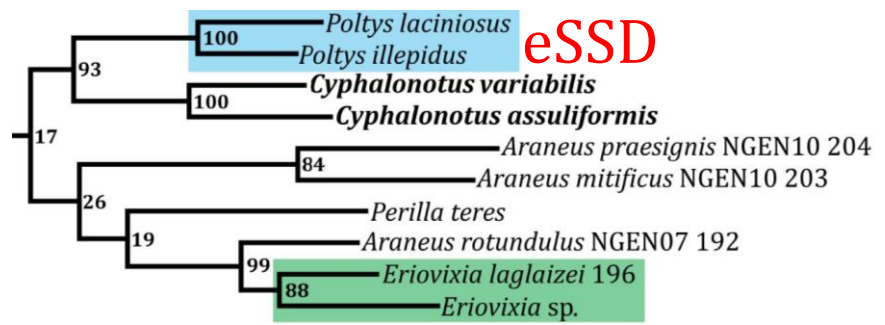


Sexual size dimorphism (SSD)



- Data of some genera are from literature
- $SSD = \frac{\text{♀}}{\text{♂}}$
- $SSD > 2 \rightarrow \text{eSSD}$

SSD comparison



Objective 3: summary

1. All known *Poltya* are eSSD
 - Male dwarfism
 - Male dwarfism + Female gigantism
2. Independent origin of eSSD in *Poltya*



Conclusions

1. Taxonomic composition re-confirmed
 - Asian *Cyphalonotus* = African *Cyphalonotus*
2. No prior phylogenetic hypothesis supported
 - Sister group : *Cyphalonotus* + *Poltyis*
3. Independent origin of eSSD in *Poltyis*

Acknowledgments



e2lab





Thank you for
your interest