Identification of the Origins of *Coniatus* sp., a Non-Native Weevil in Western North America

Outline

- Intro
  - History in US
  - Identification
  - Range
- Questions
  - One/multiple introductions
  - Origin
    - Molecular phylogenetics
  - Lifecycle
  - Polymorphisms
    - Color
    - Pupal case
  - Impact on tamarisk
    - Shoots
    - Flowers

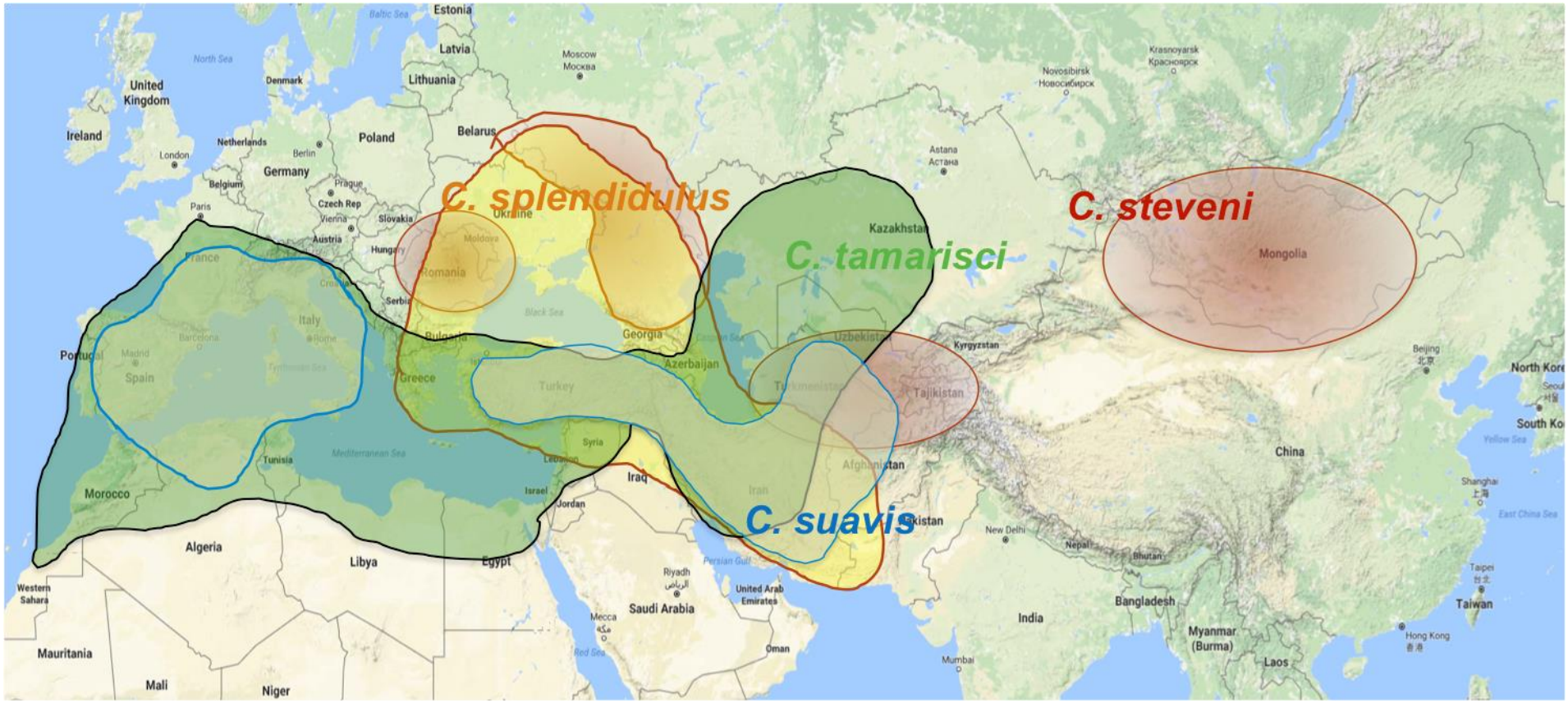
First sightings in US in 2006 in Arizona

- Non-native to North America
- First published report in 2011
  - Jason R. Eckberg and Marissa E. Foster. 2011. First account of the splendid tamarisk weevil, *Coniatus splendidulus* Fabricius, 1781 (Coleoptera: Curculionidae) in Nevada. *The Pan-Pacific Entomologist* 87(1): 51-53.

Range of *Coniatus* sp. in North America

- 24 species in genus *Coniatus*
- Believed to be natural predators of *Tamarix* species
- Other *Coniatus* species have been studied and evaluated as possible biocontrol agents for tamarisk
  - *C. repandus,*
  - *C tamarisci*
  - *C. stevini*
- *C. tamarisci* was approved by the Technical Advisory Group for Biological Control Agents of Weeds
  - no known intentional releases of any of *Coniatus* species have been made in US

Native Ranges of four *Coniatus* spp.



Based on Catalogue of Palaearctic Coleoptera

Questions

- One/multiple introductions?
- Origin?
  - Molecular phylogenetics

CO1 analysis

U.S. Collections –

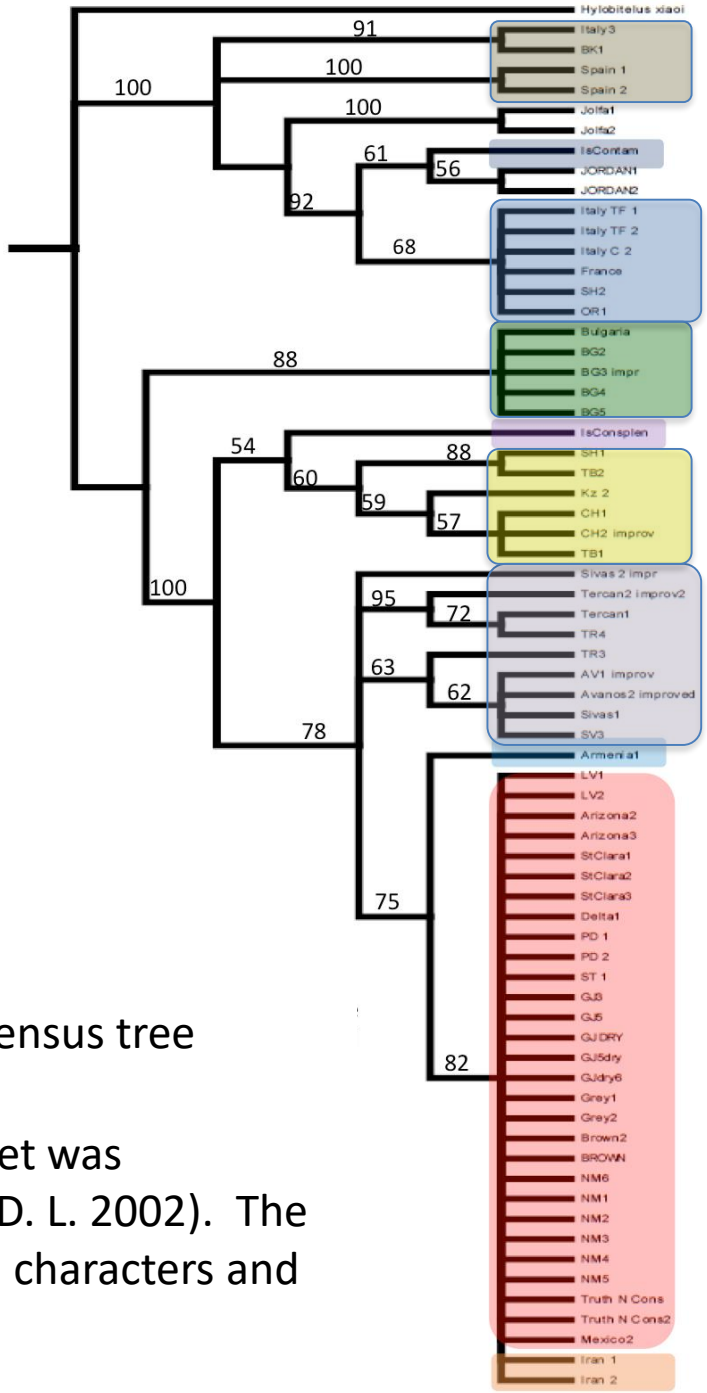
Tom Dudley,
Karen Rosen,
Dan Bean,
Levi Jamison

Overseas collections

Massimo Cristofaro, Francesca Marini, René Sforza, Amanda Stahlke, Laibale Friedman

North American samples display little to none variation in CO1 (1296 bp)

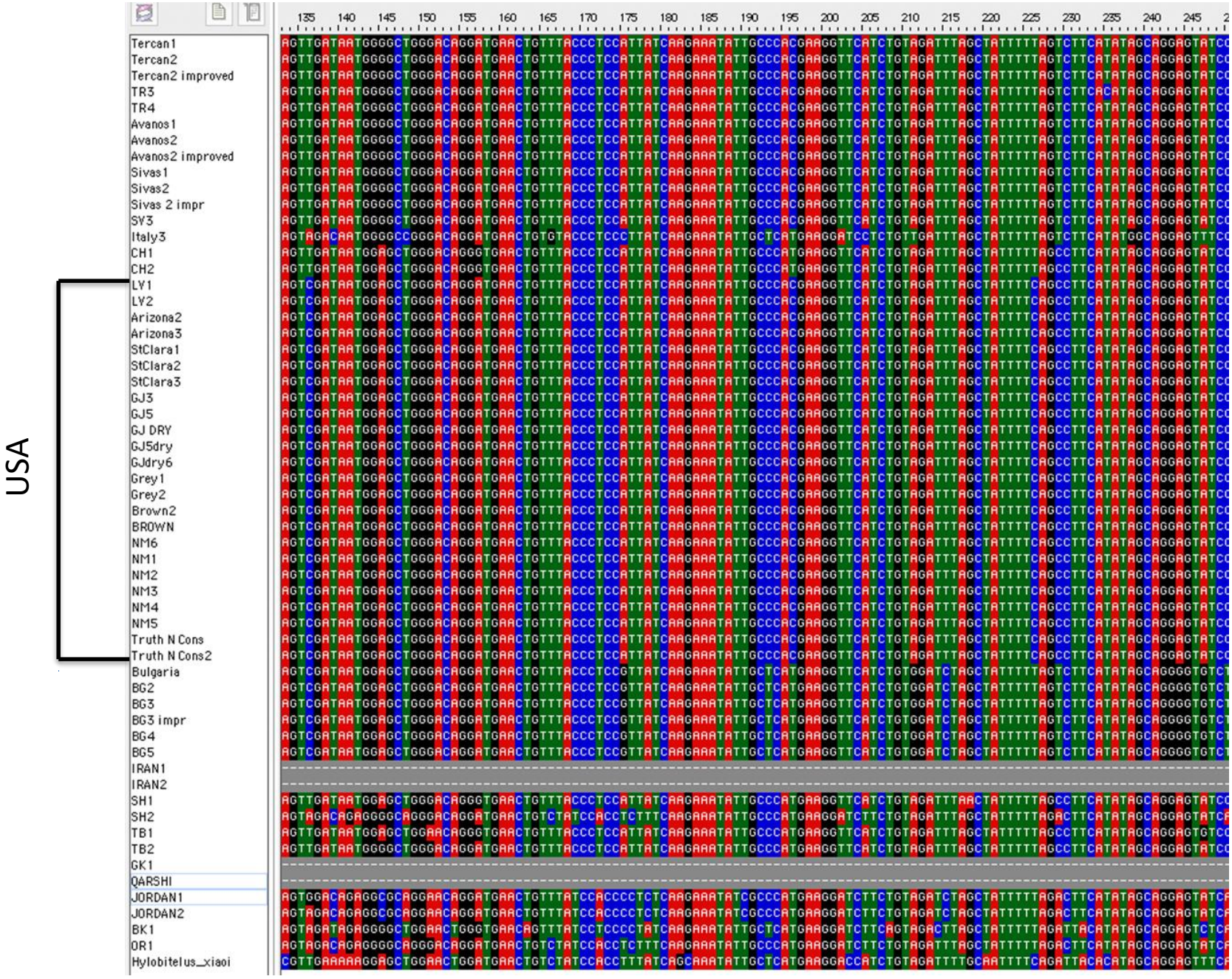
Single introduction



Bootstrap 50% majority-rule Consensus tree

N. America

Maximum Parsimony analysis of the data set was performed using PAUP*v.4.b10 (Swofford, D. L. 2002). The bootstrap number was 1000 with 755 total characters and 217 informative characters.


USA
135 140 145 150 155 160 165 170 175 180 185 190 195 200 205 210 215 220 225 230 235 240 245
Tercan1
Tercan2
Tercan2 improved
TR3
TR4
Avanos1
Avanos2
Avanos2 improved
Sivas1
Sivas2
Sivas 2 impr
SY3
Italy3
CH1
CH2
LY1
LY2
Arizona2
Arizona3
StClara1
StClara2
StClara3
GJ3
GJ5
GJ DRY
GJ5dry
GJdry6
Grey1
Grey2
Brown2
BROWN
NM6
NM1
NM2
NM3
NM4
NM5
Truth N Cons
Truth N Cons2
Bulgaria
BG2
BG3
BG3 impr
BG4
BG5
IRAN1
IRAN2
SH1
SH2
TB1
TB2
GK1
QARSHI
JORDAN1
JORDAN2
BK1
OR1
Hylobitelus_xiaoi

Some clades contain specimens collected from different sites

Some species present in several geographical areas

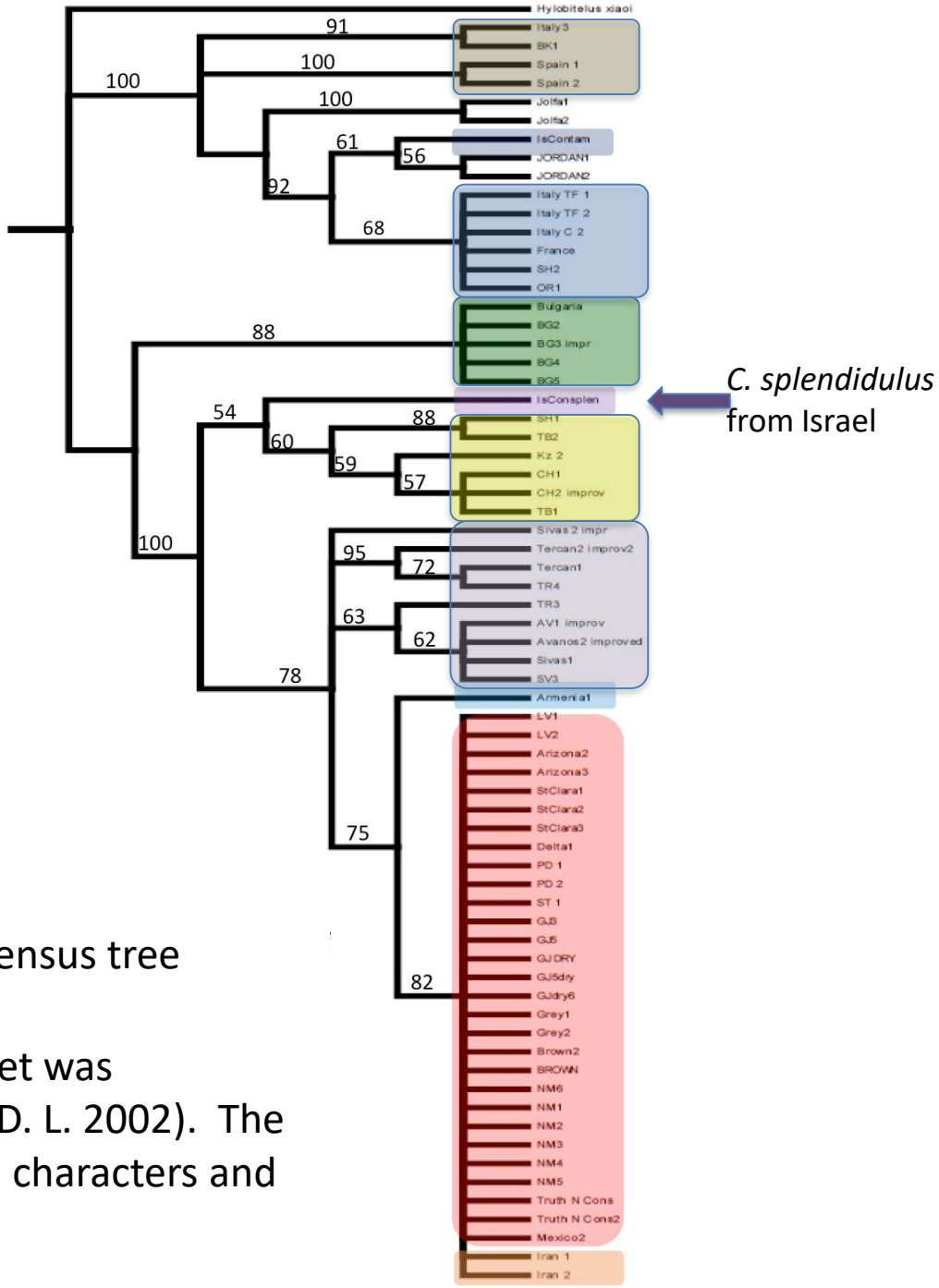
Bootstrap 50% majority-rule Consensus tree

Maximum Parsimony analysis of the data set was performed using PAUP*v.4.b10 (Swofford, D. L. 2002). The bootstrap number was 1000 with 755 total characters and 217 informative characters.

North American samples do NOT group with *Coniatus splendidulus*

Species designations may need to be redone in the genus using DNA markers

Use of museum specimens which have already been taxonomically identified based on morphology



C. splendidulus from Israel

Bootstrap 50% majority-rule Consensus tree

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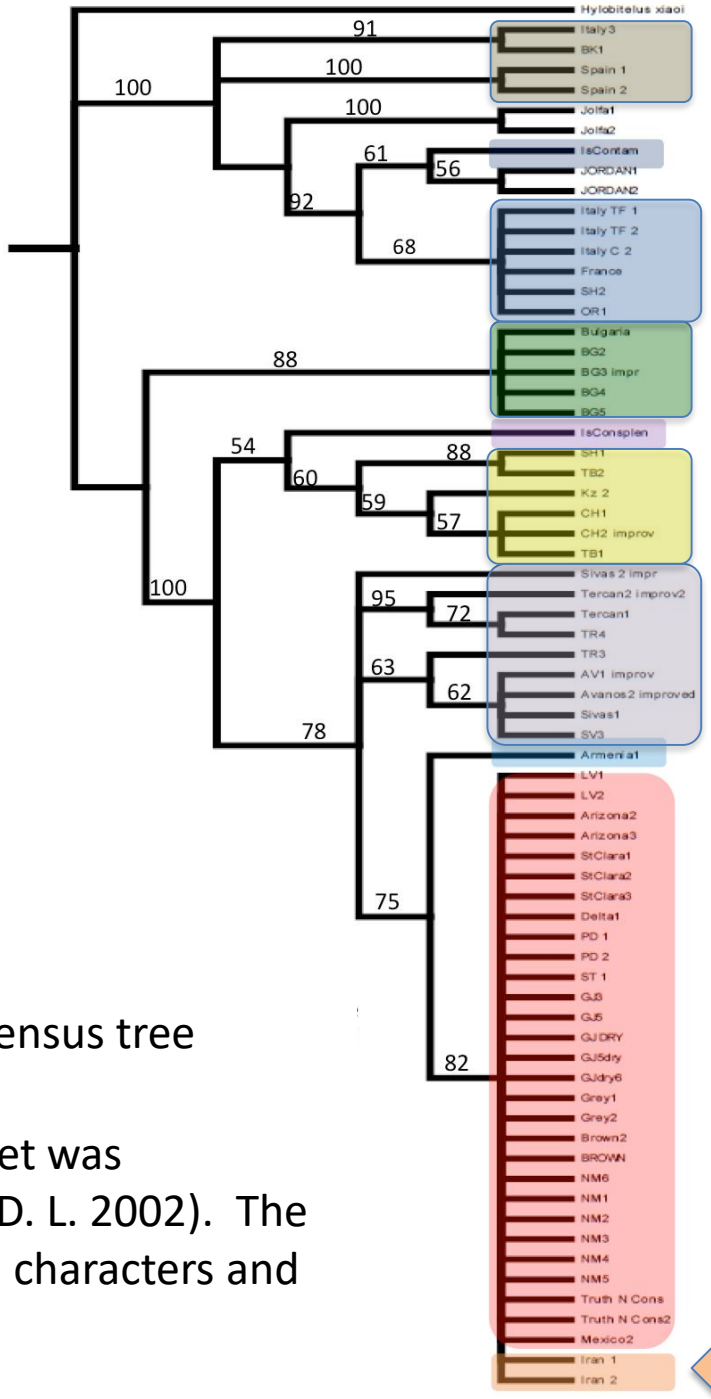
North American samples DO group with specimens collected near Shiraz, Iran

We may have an origin



Shiraz Iran

Bootstrap 50% majority-rule Consensus tree

Maximum Parsimony analysis of the data set was performed using PAUP*v.4.b10 (Swofford, D. L. 2002). The bootstrap number was 1000 with 755 total characters and 217 informative characters.

Best Match: Shiraz, Iran

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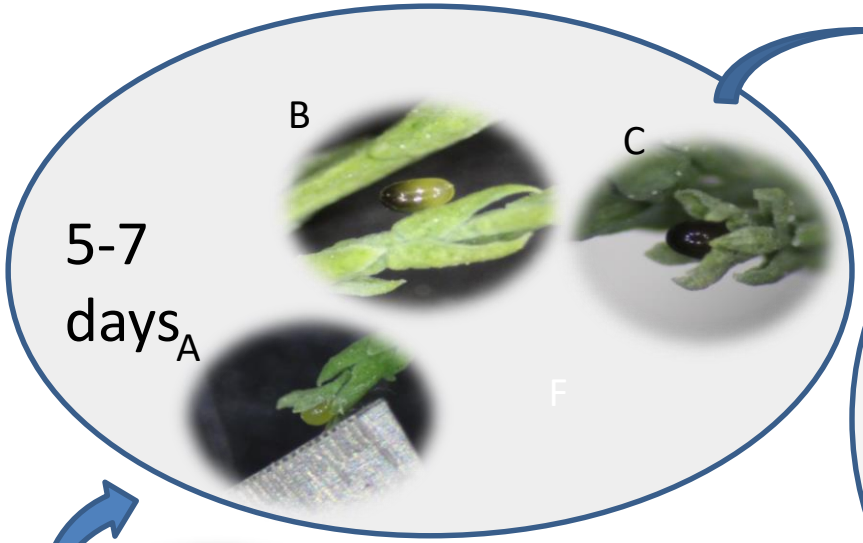
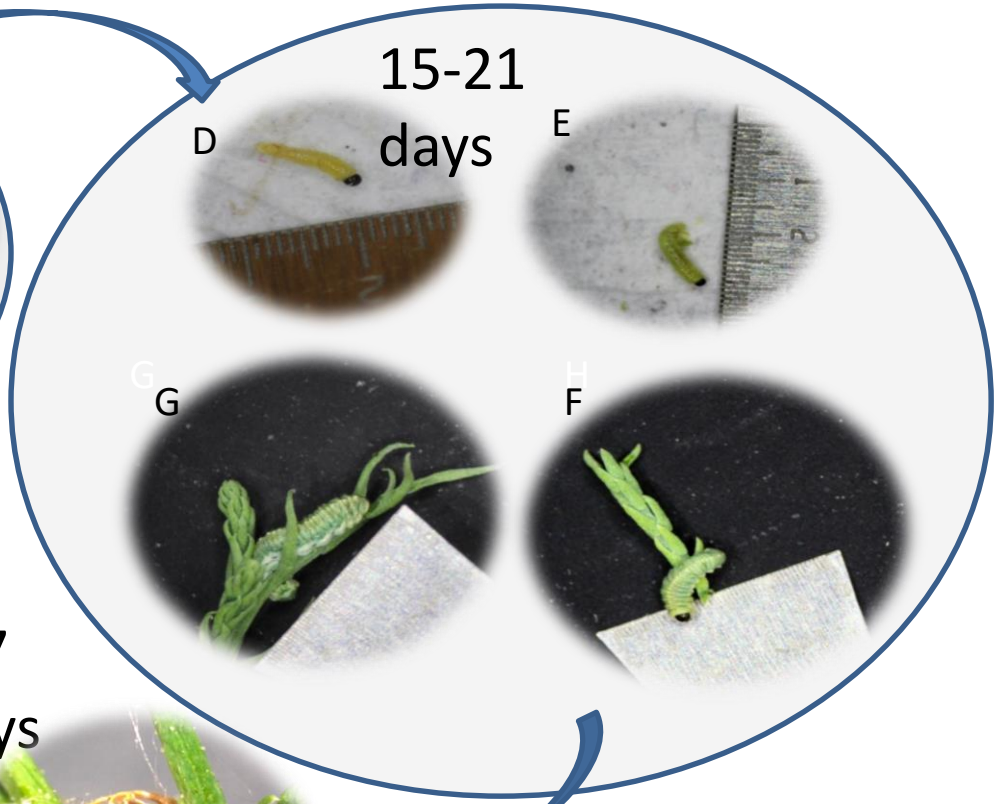
Life cycle of the *Coniatus* sp. collected in GJ , CO

Insects were raised in an incubator at 25C at 14L:10D light cycle (similar to the day length observed in GJ late May/early June)





5-7
days

Egg to Adult ~35 days

Color morphs

Color polymorphisms throughout the season

Pupal case polymorphisms

Questions- and some answers

- One/multiple introductions
- Origin
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- Lifecycle
- Polymorphisms
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- 3-4 generations/season
- Long lifespan >12 months
- Found on tamarisk March-late November

Seems to be dependent on the time of the season

- not due to sex of the larvae
- May be an inherited trait

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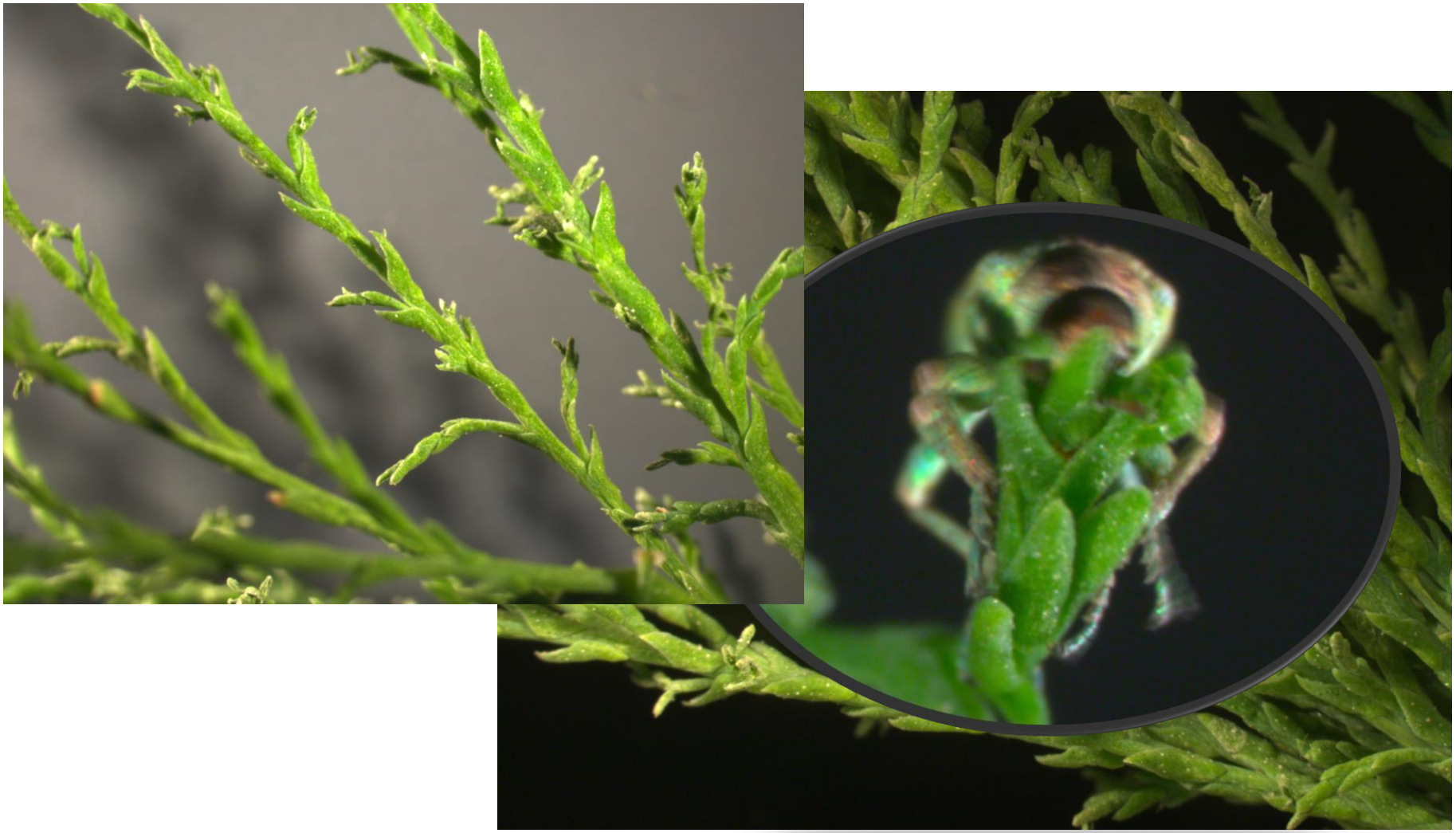
Coniatus adults feed on the tip of the shoots



Oviposition at the shoot tips

Oviposition at the shoot tips AND flower buds – lower seed production?

Questions- and some answers

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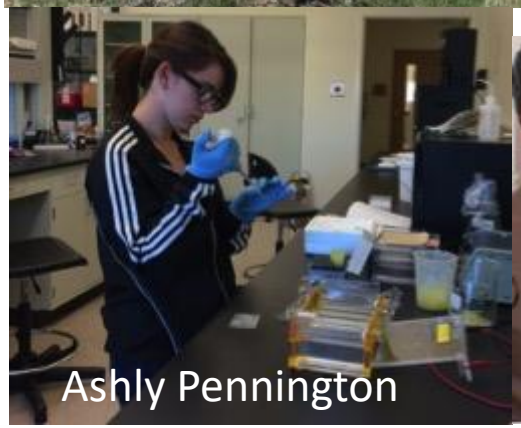
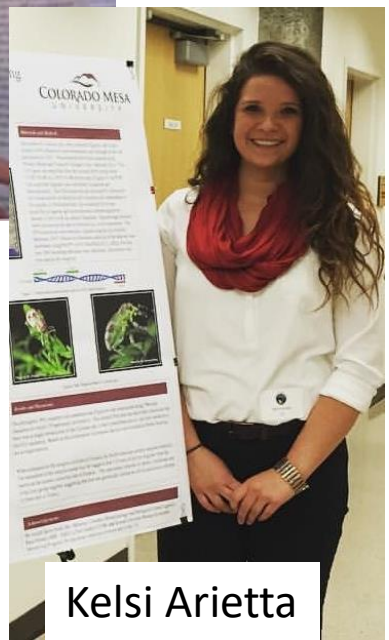
Coniatus has the potential to stunt the plant growth and lower seed production

CMU Undergraduates

Amanda Stahlke





Katharyn Woodard

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