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SHORT COMMUNICATION

A peer-reviewed open-access journal

Launched to accelerate biodiversity research

A set of multi-entry identification keys to African frugivorous flies (Diptera, Tephritidae)

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<http://zoobank.org/0C5847D5-EC3D-4CE6-9579-282846092D99>

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a set of multi-entry electronic identification keys to African FF

originally the keys were provided as supplementary files to the paper,
(<http://dx.doi.org/10.3897/zookeys.428.7366>)

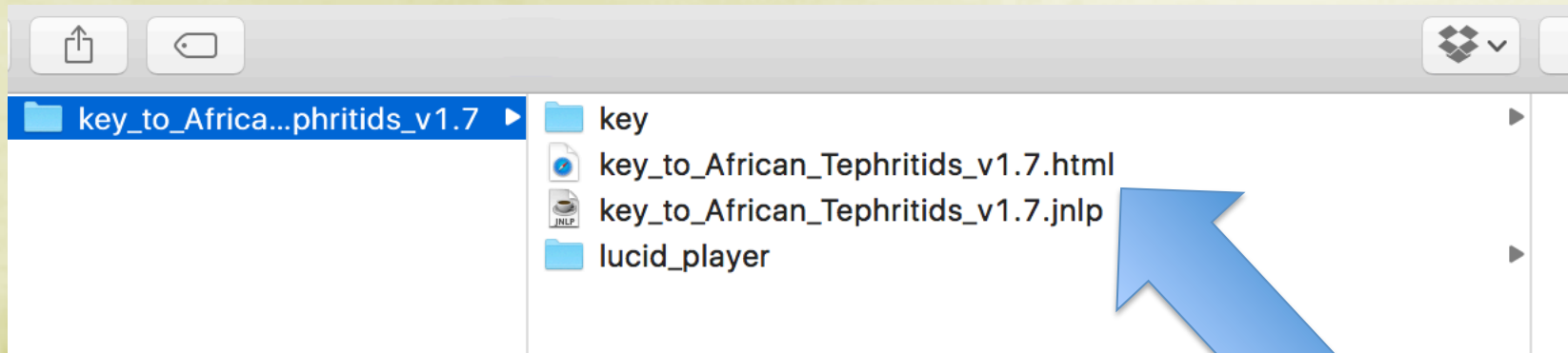
BUT

NO IMAGES AND NO UPDATES THERE

the updated versions of the keys are only available at:
<https://fruitflykeys.africamuseum.be>

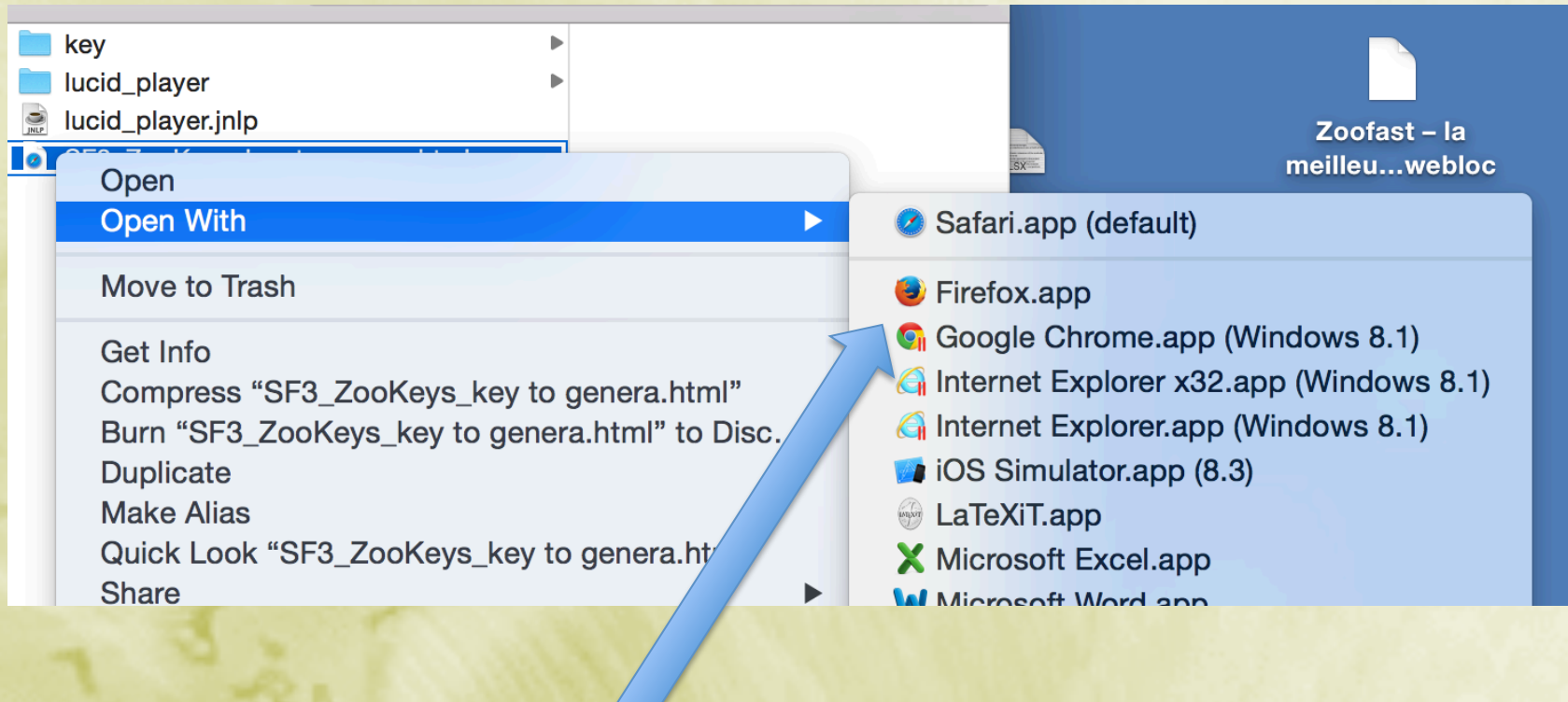
you can also contact:
massimiliano.virgilio@africamuseum.be
marc.de.meyer@africamuseum.be

launch the key



right click html file

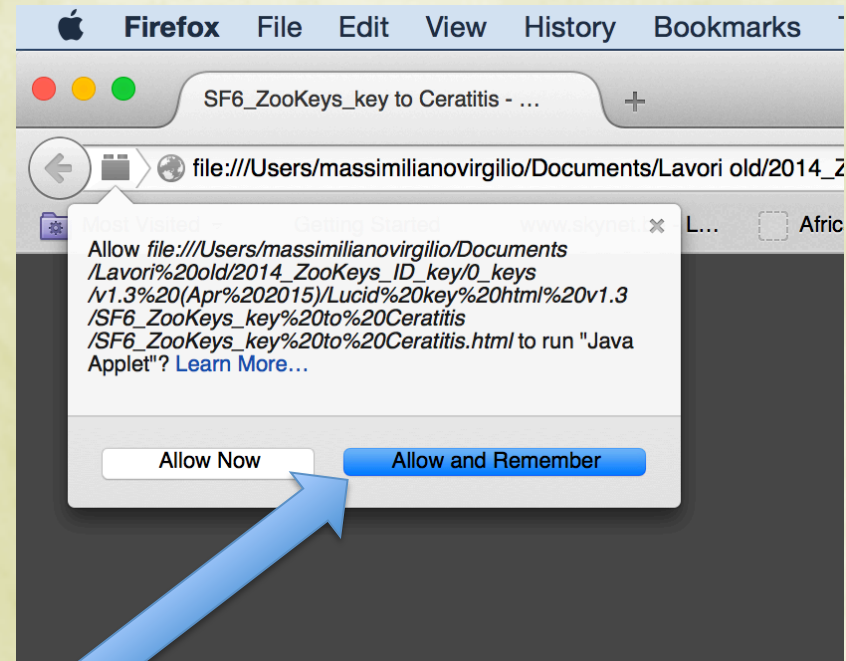
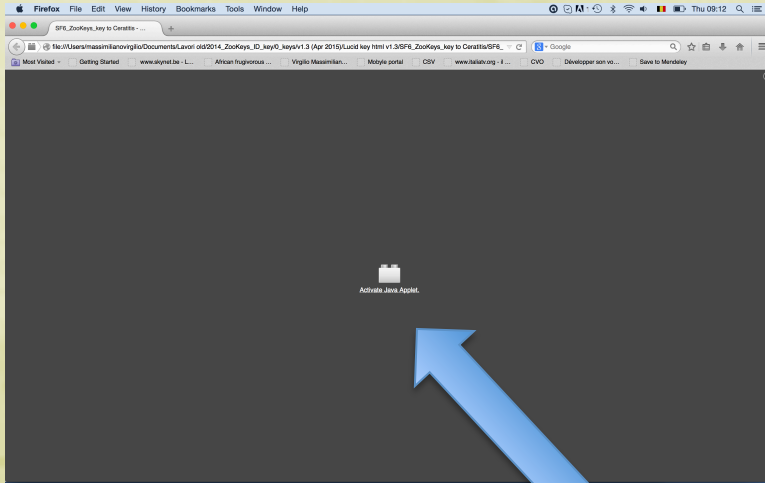
launch the key



choose a browser

- be sure your Java is updated (google: "verify java version")
- if it doesn't work try a different browser (explorer, firefox, safari, etc.)

launch the key



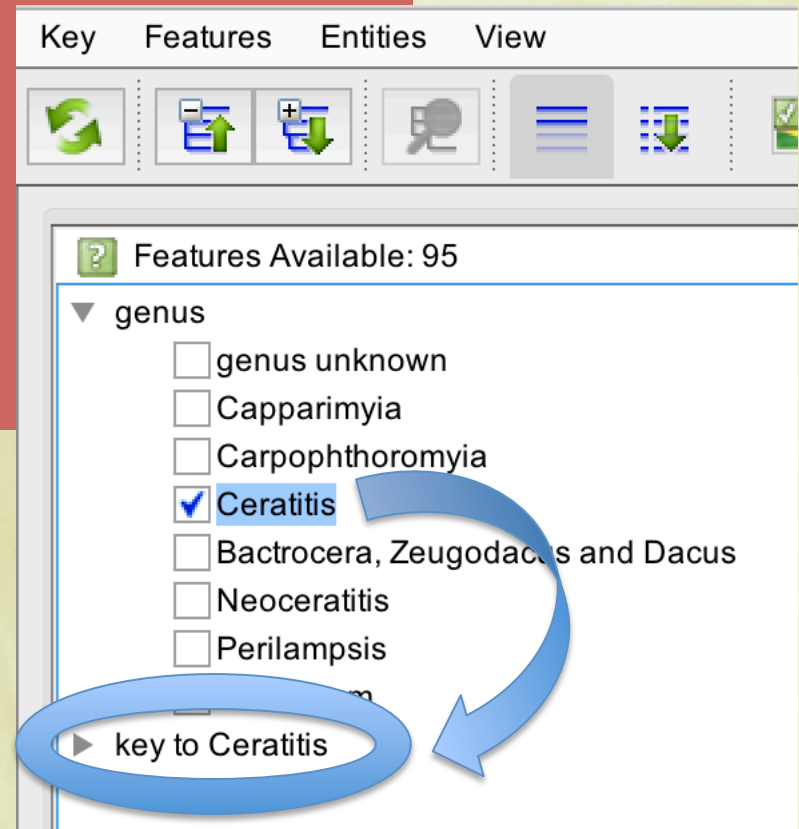
activate and authorise whatever you can activate and authorise

key structure

if you can already tell the genus,
select the corresponding key.

Seven keys available:

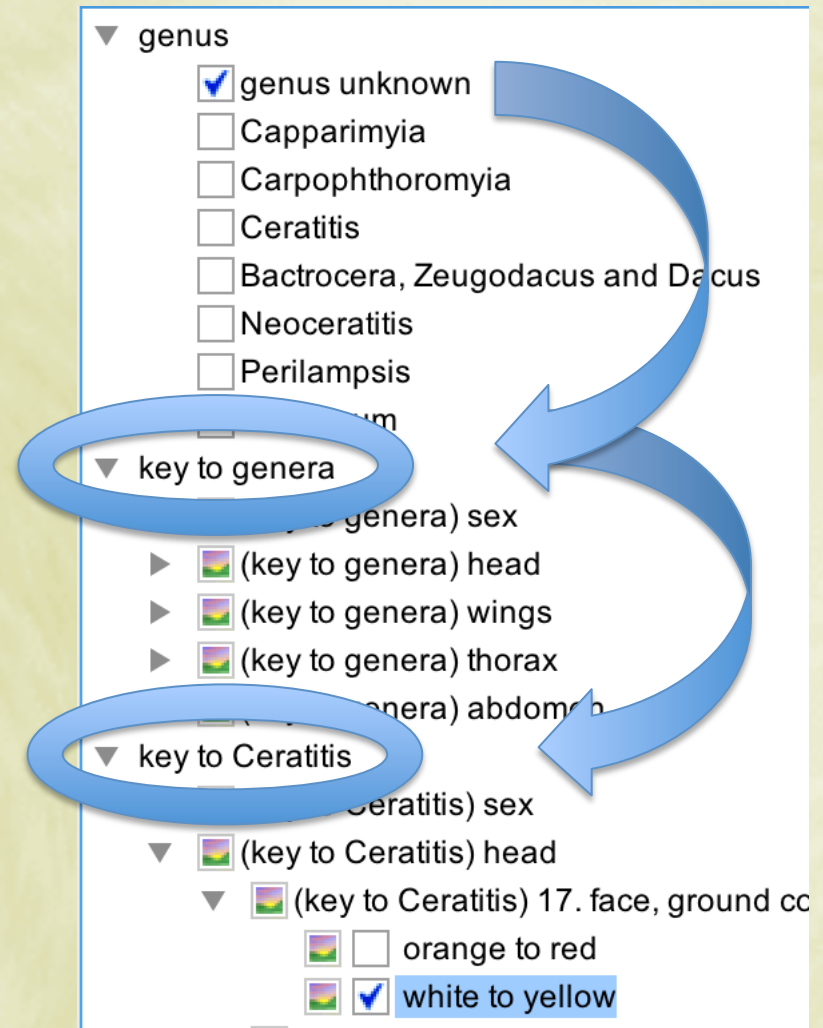
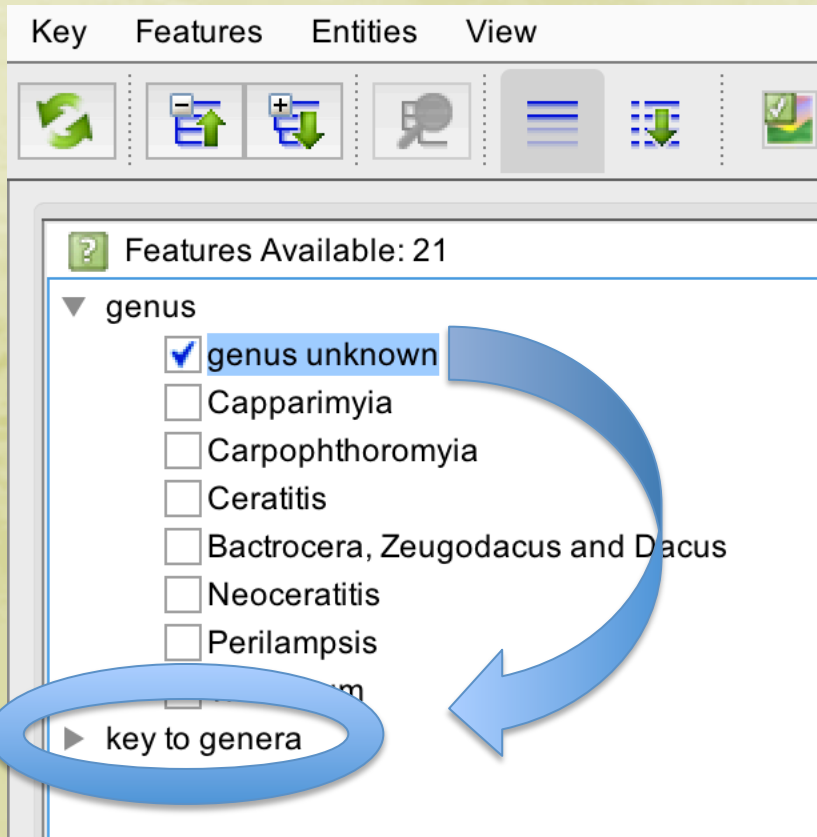
- to *Capparimyia*
- to *Carpophthoromyia*
- to *Ceratitis*
- to *Bactrocera* + *Zeugodacus* + *Dacus*
- to *Neoceratitis*
- to *Perilampus*
- to *Trirhithrum*



key structure

alternatively:
start from genus
identification

and just proceed until a species is identified
(the suitable generic key will be automatically
launched once the genus is identified)



key structure

LucidPlayer (UNREGISTERED) - A multi-entry identification key to African frugivorous fruit flies (Diptera, Tephritidae) - D:\demeyer Documents\collaborations\webkey\ID keys\0_key to genera.lk4

Key Features Entities View Window Help

Features Available: 15

- (key to genera) sex
- (key to genera) head
- (key to genera) wings
- (key to genera) thorax
- (key to genera) abdomen

Entities Remaining: 399

- Bactrocera
- Capparomyia
- Carpophthoromyia
- Ceratitis
- Dacus
- Neoceratitis
- Peniampsis
- Tririthrum

Features Chosen: 0

Characters in morphological groupings:

- head
- wings
- thorax
- abdomen
- (plus sex)

Trees Lists Images

Africa TERVUREN

key structure

click to unfold and see images

LucidPlayer (UNREGISTERED) - A multi-entry identification key to African frugivorous fruit flies (Diptera, Tephritidae) - D:\demeyer Documents\collaborations\webkey\ID keys\0_key to genera.lkc4

Key Features Entities View Window Help

Features Available: 15

- (key to genera) sex
 - female
 - male
- (key to genera) head
- (key to genera) wings
- (key to genera) thorax
- (key to genera) abdomen

Features Chosen: 0


- (key to genera) sex
 - female

Entities Remaining: 399

- Bactrocera
- Capparimyia
- Carpophthoromyia
- Ceratitis
- Dacus
- Neoceratitis
- Perilampus
- Triethirus

Entities Discarded: 0

female - Lucid3



Dacus phantoma (HT female) abdomen x0.8 (ZMHU) [© NHM 2003]

female

key structure

click to see explanatory illustrations

LucidPlayer (UNREGISTERED) - A multi-entry identification key to African frugivorous fruit flies (Diptera, Tephritidae) - D:\demeyer Documents\collaborations\webkey\ID keys\0_key to genera.lkc4

Key Features Entities View Window Help

Features Available: 15

- (key to genera) sex
 - female
 - male
- (key to genera) head
 - (key to genera) 1. first flagellomere**
 - (key to genera) 7. frontal setae
 - (key to genera) 22. ocellar setae
- (key to genera) wings
- (key to genera) thorax
- (key to genera) abdomen

Entities Remaining: 399

Bactrocera

(key to genera) head:(key to genera) 1. first flagellomere - Lucid3

head parts

Labels in diagram:
occiput
ocellar tubercle
eye
frons
lunula
arista
antenna: pedicel
antenna: 1st flagellomere
palpus
face
ptilinal suture

(key to genera) 1. first flagellomere

key structure

tick box to select

LucidPlayer (UNREGISTERED) - A multi-entry identification key to African frugivorous fruit flies (Diptera, Tephritidae) - D:\demeyer Documents\collaborations\webkey\ID keys\0_key to genera.lkc4

Key Features Entities View Window Help

Features Available: 14

- (key to genera) sex
 - female
 - male
- (key to genera) head
 - (key to genera) 1. first flagellomere
 - longer than facial margin
 - shorter than facial margin
 - (key to genera) 7. frontal setae
 - (key to genera) 22. ocellar setae
- (key to genera) wings
- (key to genera) thorax
- (key to genera) abdomen

Entities Remaining: 211

- Bactrocera
- Dacus


Features Chosen: 2

- (key to genera) sex
 - female
 - male
- (key to genera) head
 - (key to genera) 1. first flagellomere
 - longer than facial margin

Entities Discarded: 188

- Capparimya
- Carpophthoromyia
- Ceratitis
- Neoceratitis
- Perilampus
- Trirhithrum

longer than facial margin - Lucid3



Dacus famona (PT male) face x1.8 (BMNH 532563) [© NHM 2003]

longer than facial margin

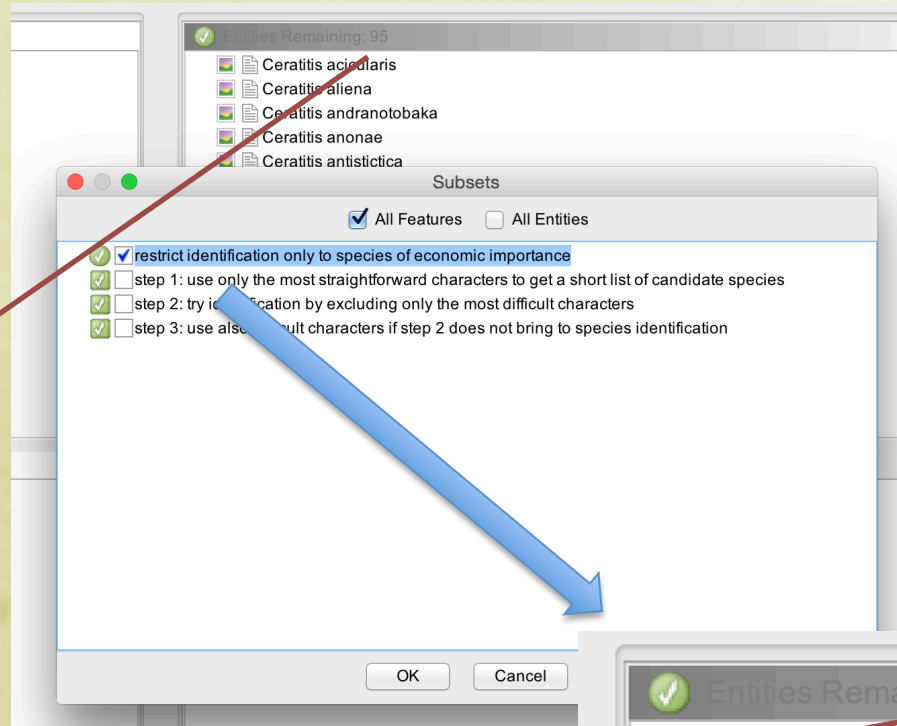
reducing the key complexity: using the option "subsets"

The screenshot shows a web application interface with a browser window. The main content area is divided into two panes. The left pane, titled "Features Available: 48", contains a tree view of features for the key "(key to Ceratitis) sex". The right pane, titled "Remaining: 95", contains a list of species names. A blue arrow points from the "Features Available" pane to a "Subsets" dialog box. The dialog box has two radio buttons: "All Features" (unchecked) and "All Entities" (checked). Below these are four checkboxes, each with a green checkmark icon:

- restrict identification only to species of economic importance
- step 1: use only the most straightforward characters to get a short list of candidate species
- step 2: try identification by excluding only the most difficult characters
- step 3: use also difficult characters if step 2 does not bring to species identification

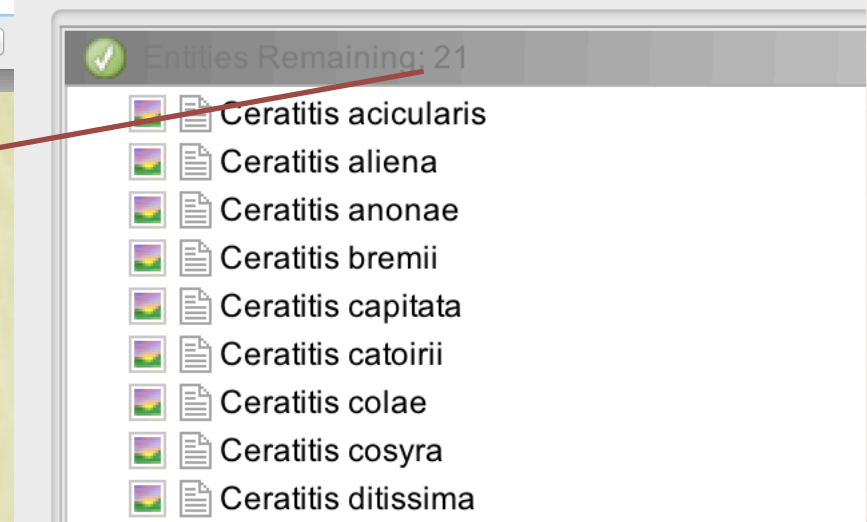
At the bottom of the dialog box are "OK" and "Cancel" buttons.

reduce the n. of species (e.g., for preliminary screening)

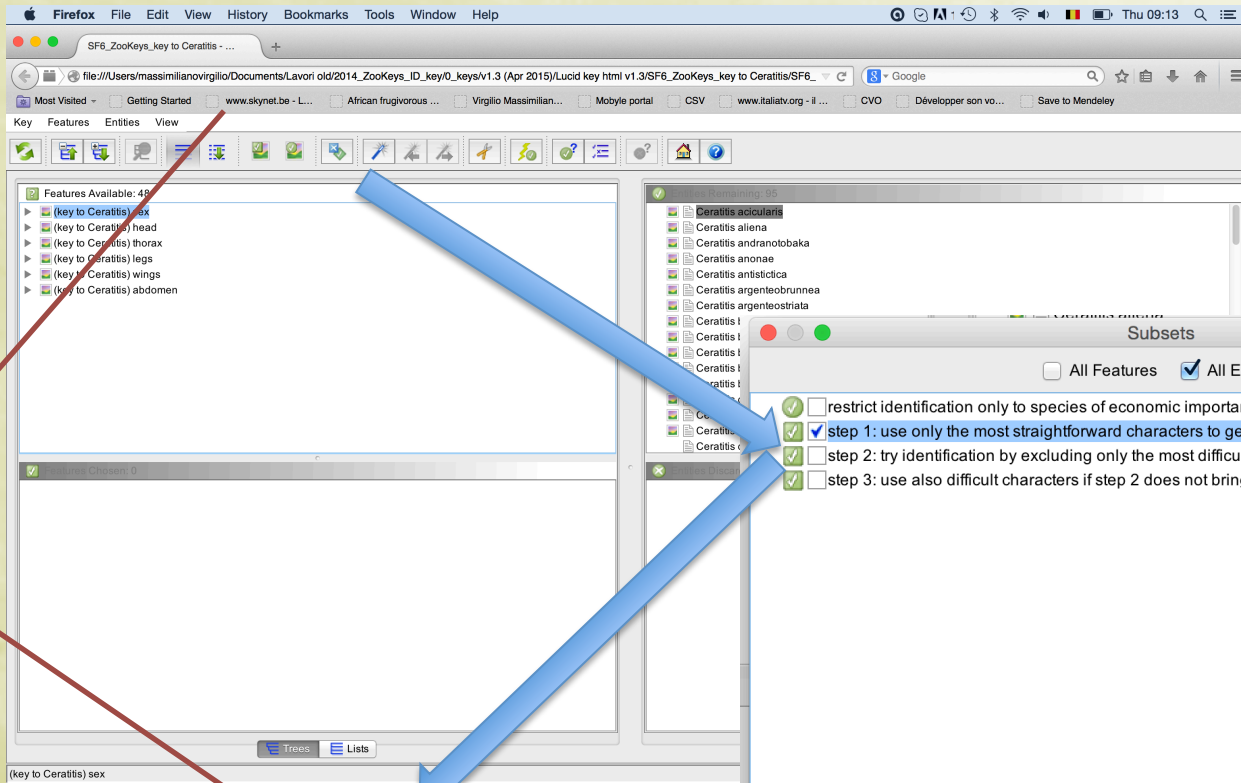


from 95 species

to 21
economically
important
species

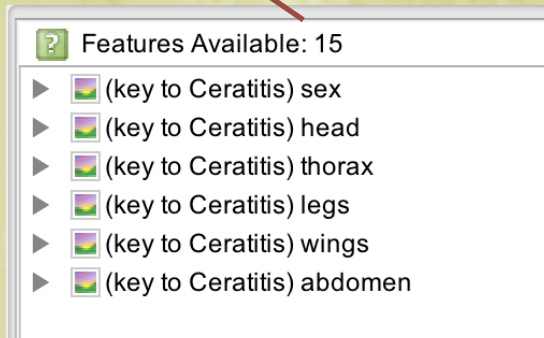


reduce the n. of characters: start trying "easy characters"!



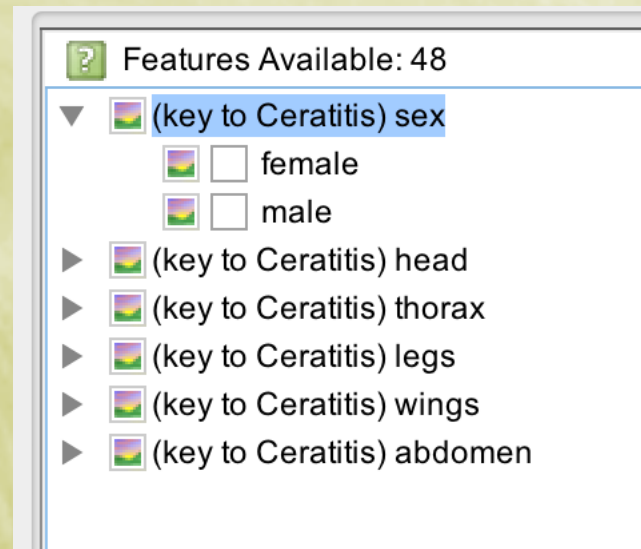
from 48
"mixed"
characters

to 15
"easy"
characters

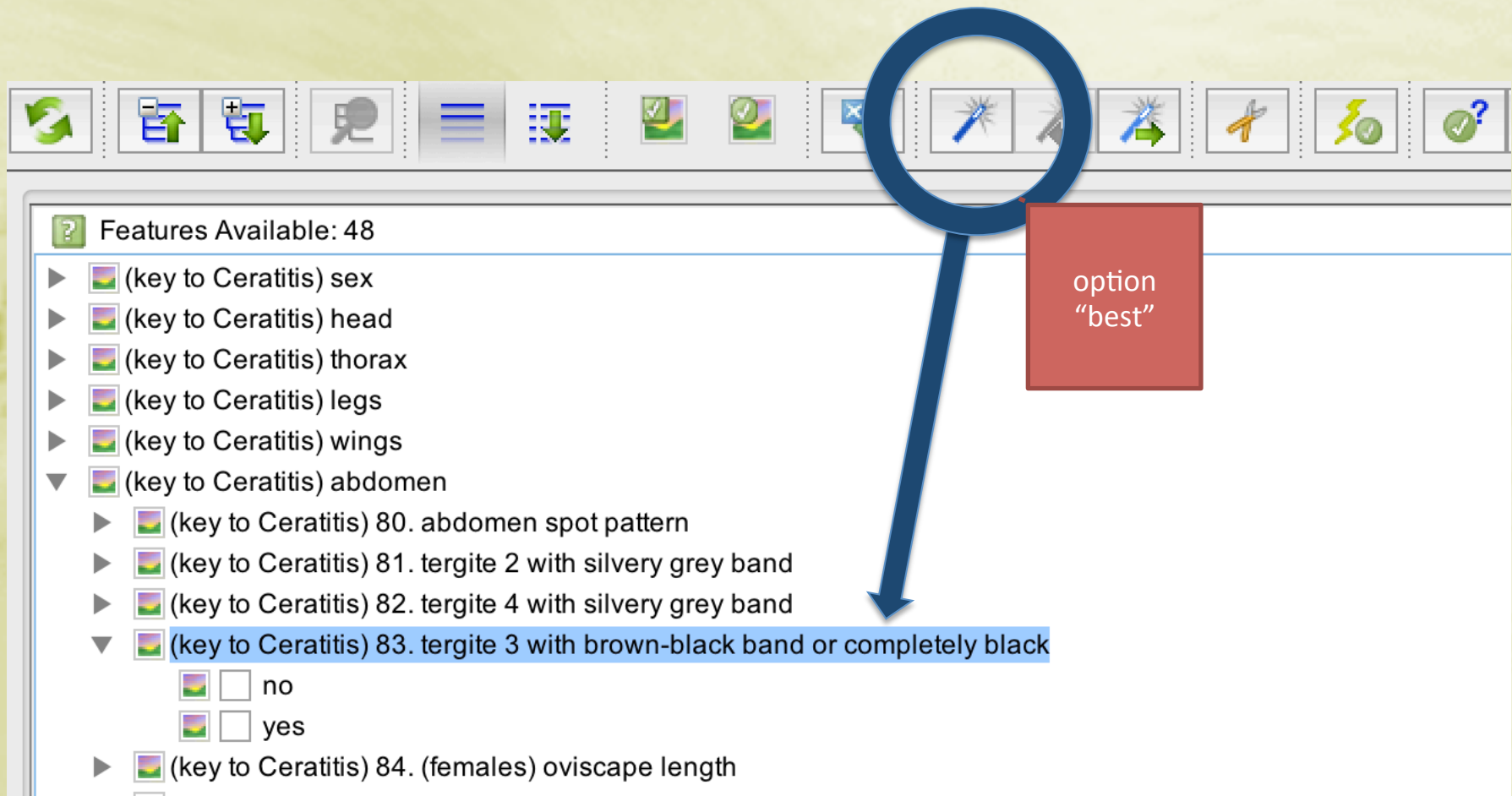


many characters are sex related:

eliminate the unnecessary characters
by specifying the specimen sex
AT FIRST



let the software choose the "best" character for the identification of your species



The screenshot shows a software interface with a toolbar at the top and a list of features below. The toolbar contains various icons for navigation and editing. The list of features is titled "Features Available: 48" and includes several categories of characters for identification. A magnifying glass is positioned over the toolbar, and a red box with the text "option 'best'" is connected to the magnifying glass by a blue arrow. The feature "(key to Ceratitis) 83. tergite 3 with brown-black band or completely black" is highlighted in blue.

Features Available: 48

- ▶ (key to Ceratitis) sex
- ▶ (key to Ceratitis) head
- ▶ (key to Ceratitis) thorax
- ▶ (key to Ceratitis) legs
- ▶ (key to Ceratitis) wings
- ▼ (key to Ceratitis) abdomen
 - ▶ (key to Ceratitis) 80. abdomen spot pattern
 - ▶ (key to Ceratitis) 81. tergite 2 with silvery grey band
 - ▶ (key to Ceratitis) 82. tergite 4 with silvery grey band
 - ▼ (key to Ceratitis) 83. tergite 3 with brown-black band or completely black
 - no
 - yes
 - ▶ (key to Ceratitis) 84. (females) oviscape length

if you can't answer,
just skip to the "next best" character

Features Available: 48

- ▶ (key to Ceratitis) sex
- ▶ (key to Ceratitis) head
- ▶ (key to Ceratitis) thorax
- ▼ (key to Ceratitis) legs
 - ▶ (key to Ceratitis) 63. fore coxa black
 - ▶ (key to Ceratitis) 64. fore coxa with silvery patch
 - ▶ (key to Ceratitis) 65. (males) fore femur anteriorly with black/white pattern and median patch of dense black h
 - ▶ (key to Ceratitis) 66. (males) fore femur with anteroventral dense row of silvery hairs
 - ▶ (key to Ceratitis) 67. (males) fore femur posteriorly with bush of hairs
 - ▶ (key to Ceratitis) 69. (males) mid femur, ventrally with feathering (even only partly)
 - ▼ (key to Ceratitis) 73. (males) mid tibia with feathering
 - no
 - yes
 - ▶ (key to Ceratitis) 76. (males) mid tibia flattened and broadened

if you do answer,
use "best" again and proceed (don't use "next best"!)








Key Features Entities View

Features Available: 48

- yes
- ▶ (key to Ceratitis) 79. (females) fore femur with dark hairs between posterior
- ▶ (key to Ceratitis) wings
- ▼ (key to Ceratitis) abdomen
 - ▶ (key to Ceratitis) 80. abdomen pattern
 - ▶ (key to Ceratitis) 81. tergite 3 with silvery grey band
 - ▶ (key to Ceratitis) 82. tergite 4 with silvery grey band
 - ▼ (key to Ceratitis) 83. tergite 3 with brown-black band or completely black
 - no
 - yes
 - ▶ (key to Ceratitis) 84. (females) oviscape length
 - ▼ (key to Ceratitis) 85. (females) aculeus tip simple, without notch, indentations
 - yes
 - no
 - ▶ (key to Ceratitis) 92. (females) aculeus distal end elongated but straight
















The toolbar contains several icons: a refresh icon, a search icon, a list icon, a download icon, a checkmark icon, a magnifying glass icon, a left arrow icon, and a right arrow icon. A blue circle highlights the magnifying glass icon, and a blue arrow points from it to the 'yes' checkbox in feature 83. Another blue circle with a diagonal slash is placed over the right arrow icon.

if you are not completely sure
you can give multiple answers








- ▼  (key to Bactrocera, Zeugodacus and Dacus) legs
 - ▼  key (to BZD) 72. fore femur colour
 -  fuscous / black
 -  pale basally, black apically
 -  pale basally, red-brown apically
 - pale, with dark spot
 -  red-brown
 -  yellow / pale

check the n. of species remaining
after every character score



Entities Remaining: 21

-  Ceratitis acicularis
-  Ceratitis aliena
-  Ceratitis anonae
-  Ceratitis breinii
-  Ceratitis capitata
-  Ceratitis catoirii
-  Ceratitis colae
-  Ceratitis cosyra
-  Ceratitis ditissima
-  Ceratitis fasciventris
-  Ceratitis malgassa
-  Ceratitis marriotti
-  Ceratitis pedestris
-  Ceratitis penicillata
-  Ceratitis punctata

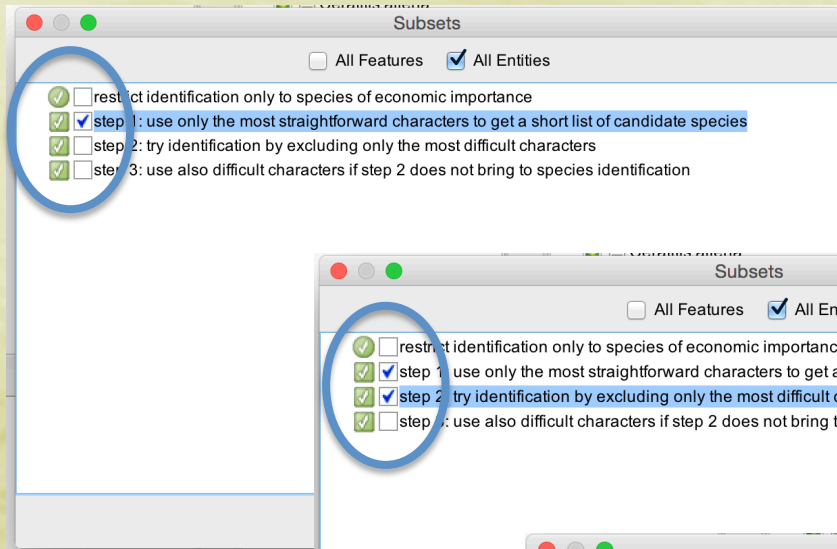
Entities Remaining: 7

-  Ceratitis capitata
-  Ceratitis cosyra
-  Ceratitis pedestris
-  Ceratitis punctata
-  Ceratitis quinaria
-  Ceratitis rubivora
-  Ceratitis silvestrii

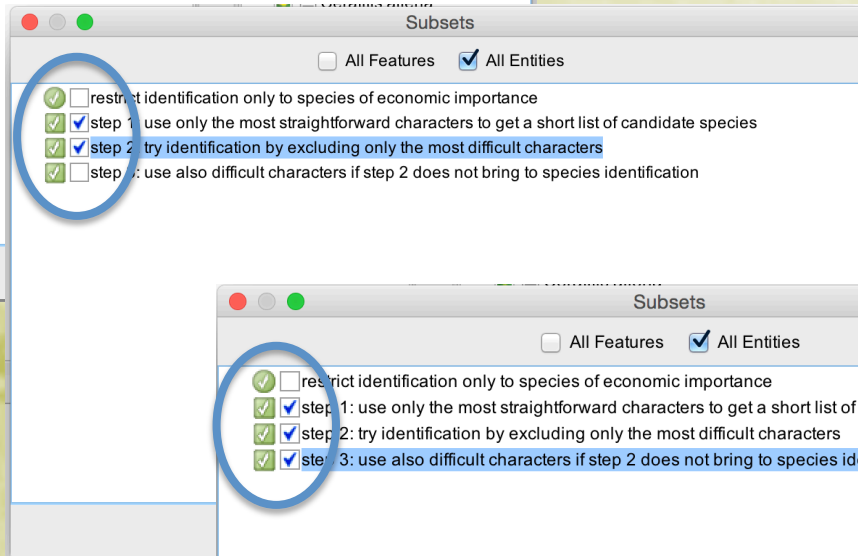
Entities Remaining: 2

-  Ceratitis pedestris
-  Ceratitis rubivora

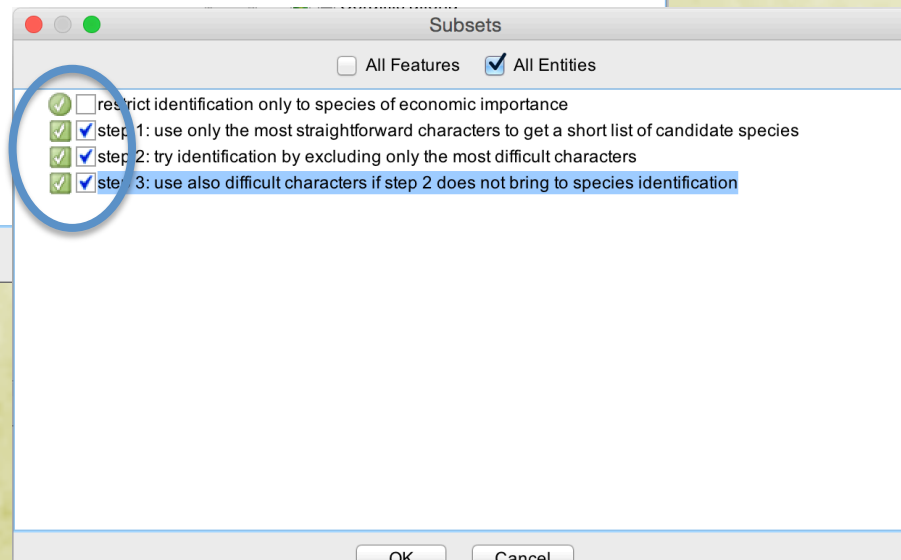
if you can't reduce the n. of species
increase the n. of characters
(option "subsets"):



easy characters



medium



difficult

if you are stuck then
just check the differences
between few remaining species

The screenshot shows a software interface with a toolbar at the top. A blue circle highlights a button with a list icon. Below it, a list of 'Features Remaining' shows two items: 'Ceratitis cosyra' and 'Ceratitis striatella', both circled in blue. A 'Differences' window is open, displaying a list of 'Different Features' and a comparison table. A blue circle highlights the 'Show All Features' checkbox at the bottom of the window.

Features Remaining: 2

- Ceratitis cosyra
- Ceratitis striatella

Differences

Different Features

- (key to Ceratitis) head:(key to Ceratitis) 8. ocellar setae colour
- (key to Ceratitis) head:(key to Ceratitis) 20. face with transverse median band
- (key to Ceratitis) thorax:(key to Ceratitis) 39. base scutellum with 2 brown or black spots
- (key to Ceratitis) head:(key to Ceratitis) 6. frons with silvery shine, at least in some areas
- (key to Ceratitis) thorax:(key to Ceratitis) 44. anepisternal setae
- (key to Ceratitis) head:(key to Ceratitis) 19. face, ground colour
- (key to Ceratitis) wings:(key to Ceratitis) 55. subapical band

Differences
Ceratitis cosyra: black or pale
Ceratitis striatella: black

Show All Features

option "differences + show all
features"
(e.g. between *C. cosyra* and *C. striatella*)

final selection

The screenshot displays a software interface with a menu bar (Features, Entities, View) and a toolbar. The main area is divided into two panes. The left pane, titled 'Features Available: 49', lists various morphological features with checkboxes for 'no' and 'yes'. The right pane, titled 'Entities Remaining: 1', shows a list with 'Ceratitis rubivora' selected. A blue oval highlights the 'Ceratitis rubivora' entry, and a blue arrow points from it to a context menu. A red box labeled 'right click' is positioned above the arrow. The context menu lists the following options:

- species description
- taxonomy, description, distribution (bebif)
- Encyclopedia of Life (eol)
- Barcode of Life Data Systems (BOLD)
- all character states

verify species description and images!

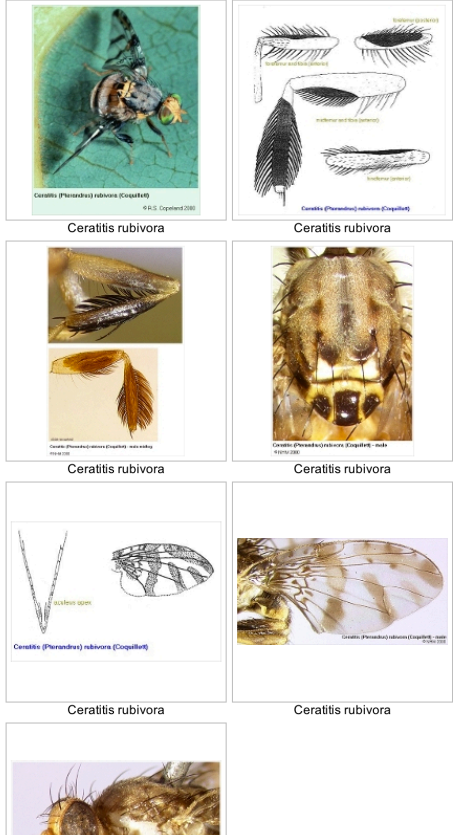
Entities Remaining: 1

Ceratitis rubivora

- species description
- taxonomy, description, distribution (bebif)
- Encyclopedia of Life (eol)
- Barcode of Life Data Systems (BOLD)
- all character states

Firefox File Edit View History Bookmarks Tools Window Help

Ceratitis rubivora - Lucid3



SF6_ZooKeys_key to Ceratitis - ... x Ceratitis (Pterandrus) rubivora C... x

file:///Users/massimiliano/virgilio/Documents/Lavori old/2

Most Visited - Getting Started - www.skynet.be - L... - African frugivorous ... - Virgilio Massimilian...

Ceratitis (Pterandrus) rubivora Coquillett

Ceratitis rubivora Coquillett, 1901: 29.

Body length: 4.56 (3.95-5.00) mm; wing length: 4.98 (4.45-5.45) mm.

Male

Head: Antenna yellow. First flagellomere 2-3 times as long as pedicel. Arista with short to moderately long rays; ventral rays shorter and sparser than dorsal rays, especially basally. Frons pale, in center more yellow; with short scattered setulae of same color as frons. Frontal setae well developed, occasionally anterior one slightly underdeveloped. Face white. Genal seta and setulae dark or dark reddish, latter moderately to poorly developed.

Thorax: Postpronotal lobe yellowish white, without spot, at most with darker yellow coloration near postpronotal seta. Scutal pattern: ground color, grayish-brown, usually with orange tinge, sometimes without; with streaks and darker markings but without distinct spots or clearly defined stripes, except prescutellar white separate markings, with paler gray area in between. Scapular setae dark reddish or black. Scutellum yellowish white, basally with ill defined separate dark spots (occasionally well developed), apically with three separate black spots, extending to basal 0.33, sometimes only to half-way. Anepisternum on ventral half yellowish orange to brown; setulae pale.

Legs: Yellow except where otherwise noted; setation typical for subgenus, mixed pale and dark. Foreleg: femur anteriorly with dorsal margin brownish over entire length; posterodorsally brown, with dispersed long dark setulae along entire length, but not forming distinct bush; ventral setae pale, distally dark, rarely dark over entire length. Midleg: femur brown on distal half to 0.66 (usually only ventral part brown anteriorly) except at apical margin where white, with weak silvery shine; ventrally with dark feathering along distal half, basally with more dispersed pale or dark setulae; tibia broadened, largely brownish black except at extremities, with conspicuous silvery shine when viewed from certain angle, with black feathering dorsally along distal 0.8-0.9 and ventrally along distal 0.8. Hindleg: femur partly brownish colored; at apical 0.25 with longer setulae dorsally and ventrally. Darker coloration of legs in some specimens more pronounced and more extensively blackish.

Wing: banding yellowish brown. Interruption between marginal and discal bands near vein R₁ clear and complete; discal band often partly, occasionally fully interrupted in discal cell; cubital band free; medial band free (not always well defined, sometimes missing); crossvein R-M at or just proximal to middle of discal cell. Apex of vein R₁ distal to level of crossvein R-M. Crossvein DM-Cu oblique anterobasally.

Abdomen: Mostly yellow. Tergite 1 with black patches across posterior margin. Tergites 2 and 4 with pale gray band on posterior half; tergite 4 with anterior margin brown. Tergite 3 with brown transverse band along posterior half to 0.66; tergite 5 with brown band along anterior 0.33 and narrowly brownish black across posterior margin. Brown bands on tergites 3, 4 and 5 often interrupted in middle. Male epandrium in lateral view with posterior lobe of lateral surstylus short and slightly curved, anterior lobe pronounced.

Female

116%

have a look at the hyperlinks

Entities Remaining: 1

Ceratitis rubivora

- species description
- taxonomy, description, distribution (bebif)
- Encyclopedia of Life (eol)
- Barcode of Life Data Systems (BOLD)
- all character states



Ceratitis rubivora Coquillett

Taxonomy

Status: valid

Current Taxonomy

Subfamily	Dacinae
Tribe	Cerattidini
Genus	Ceratitis
Species	rubivora

Original Taxonomy

Subfamily	Dacinae
Tribe	Cerattidini
Genus	Ceratitis
Species	rubivora

>> back to top

Species description

download

>> back to top

Specimens

Encyclopedia of Life

Ceratitis rubivora

learn more about names for this taxon

Overview | Detail | Data | 7 Media | 3 Maps | Names | Community | Resources | Literature | Updates

EOL has data for 4 traits see all

type specimen repository	National Museum of Natural History, Smithsonian Institution (USNM)
habitat	woodland
habitat	non-marine
extinction status	extant

Found in 4 classifications see all

Species recognized by NCBI Taxonomy:

- Ceratitis rubivora
- Ceratitis acaciariae
- Ceratitis anomae
- Ceratitis colae
- Ceratitis copelandi
- Ceratitis curvata
- Ceratitis FAR complex sp. HD-2013
- Ceratitis fasciventris
- Ceratitis flexuosa

Ceratitis rubivora **[BOLD]**

© Copeland
Source: Atrotropical Fruitley Project

see all media
see all maps

BOLDSYSTEMS Databases | Taxonomy | Identification | Workbench | Resources

Ceratitis rubivora (species) - Arthropoda; Insecta; Diptera; Tephritidae; Dacinae; Ceratitids;

Sub-taxa

Taxon Description (Wikipedia)

full article at Wikipedia

BOLD Stats

Specimen Records:	15	Public Records:	9
Specimens with Sequences:	12	Public Species:	1
Specimens with Barcodes:	10	Public BINs:	1
Species:	1		
Species With Barcodes:	1		

Species List - Progress

Access Published & Released Data

Contributors (Specimens & Sequencing)

Specimen Depositories:

- Mined from GenBank, NCBI [8]
- International Centre of Insect Physiology and Ecology [3]
- Royal Museum for Central Africa [2]

Sequencing Labs:

- Mined from GenBank, NCBI [8]
- Biodiversity Institute of Ontario [3]
- Royal Museum for Central Africa [1]

Images