



# Identification of larvae and adults MosKeyTool

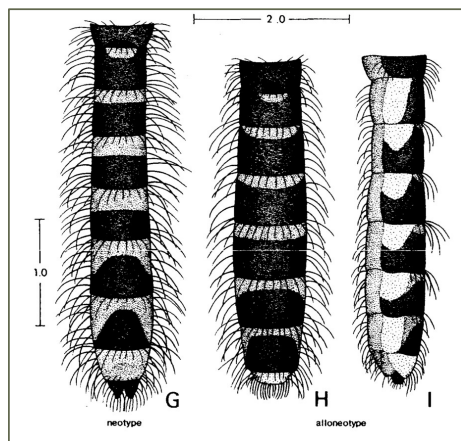
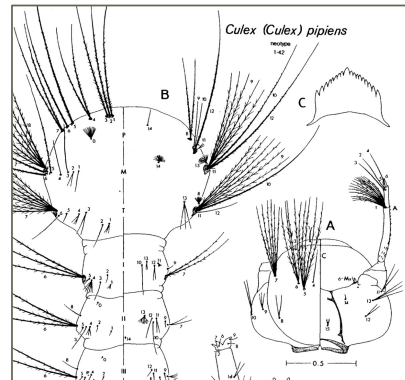
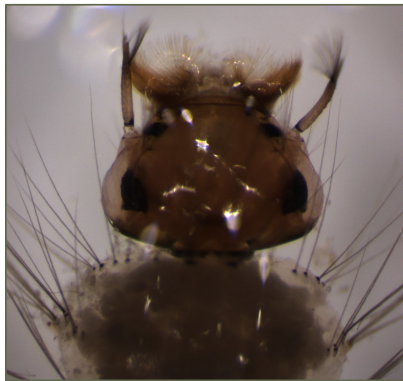
FILIZ GUNAY



HACETTEPE UNIVERSITY  
HU-VERG TURKEY



Not so easy... Recognition requires experience and expertise



- Difficult to learn where the seta are,
- Importance of preparing a good slide
- Phenotypic plasticity
  - Variation on the characters, even in neotype and alloneotype specimens

## MediLabSecure Training Course in 2015 Ankara - Turkey

- After the field work participants experienced;
  - Samples might have a missing leg



**MediLabSecure**  
Preventing vector-borne diseases around  
the Mediterranean and Black Sea regions

**TRAINING COURSE**  
Capacity building in mosquito vectors of arboviruses  
Sampling, morphological and molecular identification

Hacettepe University, Faculty of Science, Turkey  
**7-11 September 2015**

---

Organised by:  
• Hacettepe University, HU-ESR/VERG, Turkey  
Ecological sciences research laboratories, Vector ecology research group

Supporting by:  
• IRD, MIVEGEC, France  
Infectious diseases and vector ecology, genetics, evolution and control



## MediLabSecure Training Course in 2015 Ankara - Turkey

- After the field work participants experienced;
  - Samples might have a missing leg
  - Or even a missing body ☺




**TRAINING COURSE**  
Capacity building in mosquito vectors of arboviruses  
Sampling, morphological and molecular identification

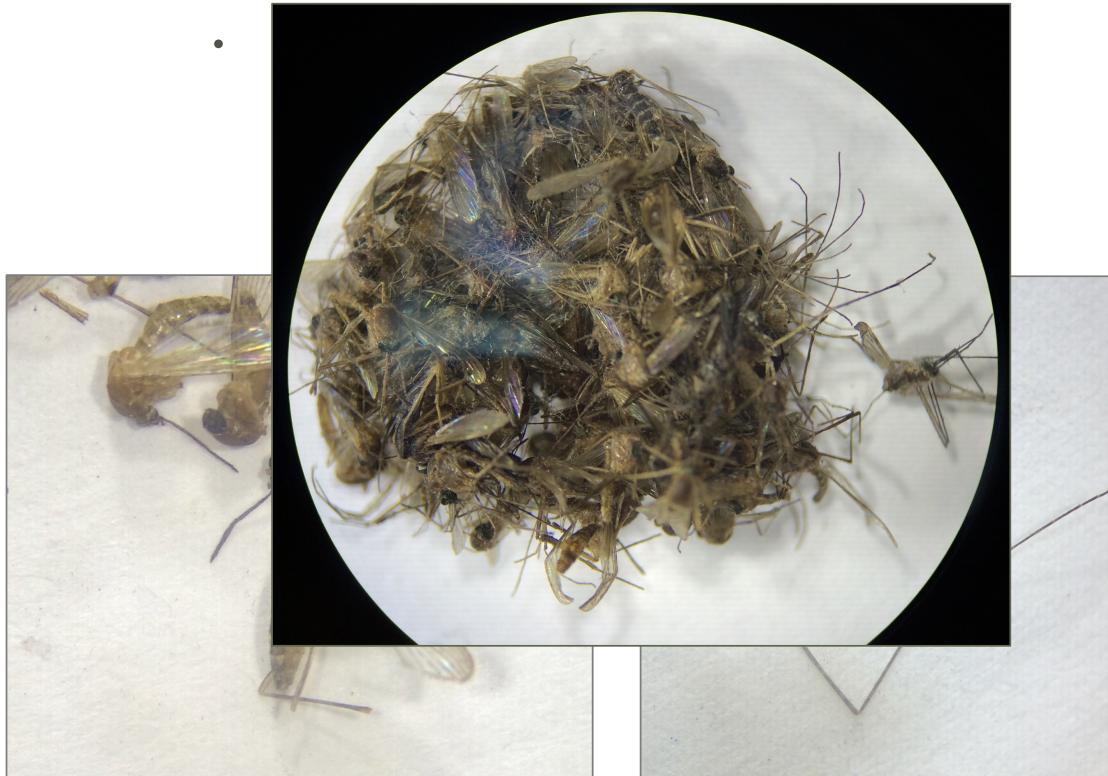
Hacettepe University, Faculty of Science, Turkey  
**7-11 September 2015**

Organised by:  
 > Hacettepe University, HU-ESR, VERG, Turkey  
 Ecological sciences research laboratories, Vector ecology research group  
 > IRD, MIVEGEC, France  
 Infectious diseases and vector ecology, genetics, evolution and control

Supporting by:  


## MediLabSecure Training Course in 2015 Ankara - Turkey

- After the field work they experienced;
  - You might have a missing leg



  
**MediLabSecure**  
Preventing vector-borne diseases around  
the Mediterranean and Black Sea regions

**TRAINING COURSE**  
Capacity building in mosquito vectors of arboviruses  
Sampling, morphological and molecular identification

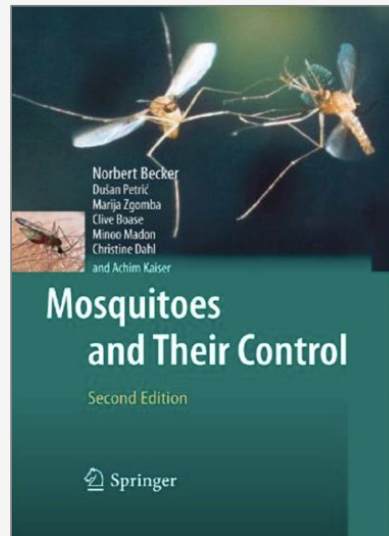
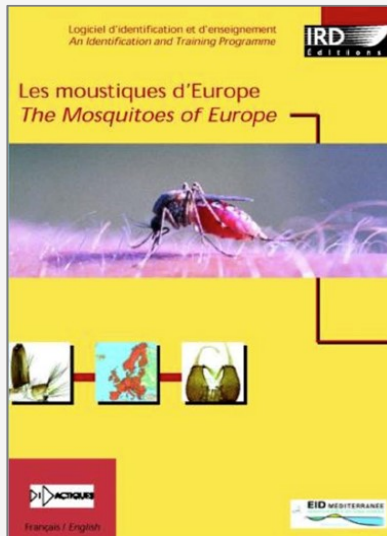
Hacettepe University, Faculty of Science, Turkey  
**7-11 September 2015**

Organised by:  
Hacettepe University, HU-ESR-VERG, Turkey  
Ecological sciences research laboratories, Vector ecology research group

Supporting by:  
IRD, MIVEGEC, France  
Infectious diseases and vectors, ecology, genetics, evolution and control

# Entomologists in Turkey

- Identification keys we use;



*Journal of the American Mosquito Control Association*, 13(3):247-254, 1997 Copyright (©) 1997 by the American Mosquito Control Association, Inc.

**KEYS FOR THE IDENTIFICATION OF THE MOSQUITOES OF GREECE**

RICHARD E DARSIE, JR. AND ANNA SAMANDOU-VOYADIOGLOU<sup>1</sup>

ABSTRACT Keys to the adult females and 4th instar larvae of the mosquitoes of Greece are presented. In all, 53 species in 7 genera are included. Also, *Aedes albopictus* is added because of the potential for its introduction into Greece.

*Zootaxa* 2078: 1–33 (2009)  
www.mapress.com/zootaxa/

Article

ISSN 1175-5326 (print edition)  
**ZOOTAXA**  
ISSN 1175-5334 (online edition)

Copyright © 2009 - Magnolia Press

**Keys to the adult females and fourth-instar larvae of the mosquitoes of Iran (Diptera: Culicidae)**

SHAHYAD AZARI-HAMIDIAN<sup>1</sup> & RALF E. HARBACH<sup>2</sup>

<sup>1</sup>School of Public Health, Guilan University of Medical Sciences, P.O. Box: 3391, Rasht, Iran, Tel.: 0098 131 3229599, Fax: 0098 131 3234155, E-mail: azari@gums.ac.ir

<sup>2</sup>Department of Entomology, The Natural History Museum, Cromwell Road, London, SW7 5BD, U.K. E-mail: rharbach@nhm.ac.uk

JULY 1992 125

**ILLUSTRATED KEY TO THE FEMALE ANOPHELES OF SOUTHWESTERN ASIA AND EGYPT (DIPTERA: CULICIDAE)<sup>1</sup>**

JAYSON I. GLICK<sup>2</sup>

*Walter Reed Biosystematics Unit, Department of Entomology, Walter Reed Army Institute of Research, Washington, DC 20307-5100*

## Why do we need a computer aided identification key?

- Dichotomic Keys – impossible to use when there are missing body parts

248 JOURNAL OF THE AMERICAN MOSQUITO CONTROL ASSOCIATION VOL. 13, No. 3

**KEYS TO THE ADULT FEMALES**

**KEY TO THE GENERA<sup>3</sup>**

1.	Palpi about as long as proboscis; scutellum evenly rounded .....	<i>Anopheles</i>
-	Palpi 0.5 or less length of proboscis; scutellum trilobed .....	2
2(1).	Cell $R_2$ of wing less than 0.5 length of its stem, vein $R_{2+3}$ ; anal wing vein ending a little before fork of veins $Cu_1$ and $Cu_2$ .....	<i>Uranotaenia unguiculata</i>
-	Cell $R_2$ of wing more than 0.5 length of its stem, $R_{2+3}$ ; anal wing vein ending well beyond fork of veins $Cu_1$ and $Cu_2$ .....	3
3(2).	Prespiracular setae present; row of setae present on subcostal wing vein basoventrally .....	<i>Culiseta</i>
-	Prespiracular setae absent; subcostal vein without row of setae basoventrally .....	4
4(3).	Foretarsomere 4 as long as wide; palpi 0.5 length of proboscis; Scutum with delicate white lines .....	<i>Orthodomyia pulcralpilis</i>
-	Foretarsomere 4 distinctly longer than wide; palpi about 0.3 or less length of proboscis; Scutum with other scale pattern .....	5
5(4).	Postspiracular setae present; abdomen pointed apically .....	<i>Aedes</i>
-	Postspiracular setae absent; abdomen rounded and blunt apically .....	6
6(5).	Legs with pulvilli present and claws small; hindtarsomere 1 as long as or longer than hindtibia (except <i>Cx. modestus</i> ) ...	<i>Culex</i>
-	Legs with pulvilli absent and claws large; hindtarsomere 1 distinctly shorter than hindtibia .....	<i>Coquillettia</i>

**KEY TO THE SPECIES OF GENUS *Aedes*<sup>d</sup>**  
Note: female and larval stages of *Ochlerotatus duplex* unknown

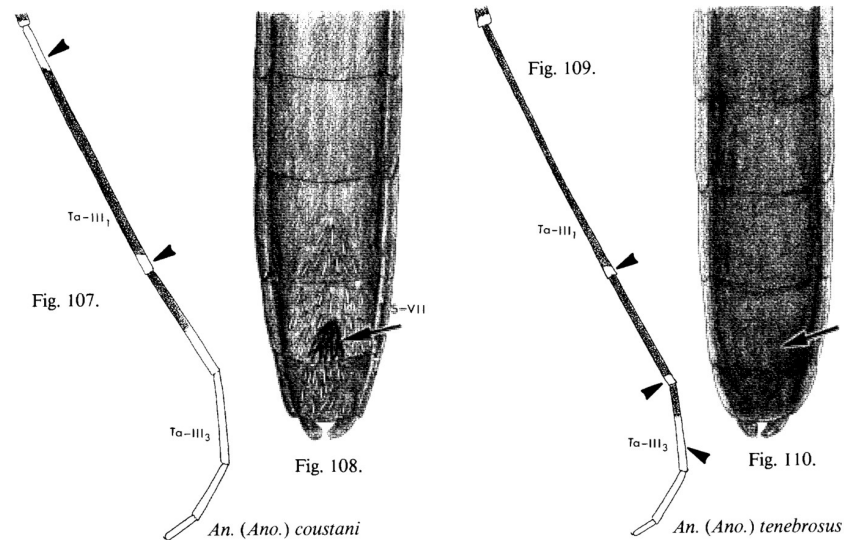
1	Tarsomeres entirely dark-scaled .....	2
-	Some tarsomeres with pale scales .....	7
2(1).	Abdomen with prominent silvery-white lateral patches, cerci short, scarcely visible .....	3
-	Abdomen with lateral patches yellowish or white, not silvery-white; cerci long, plainly visible .....	4
3(2).	Scutellum with narrow yellowish-white scales .....	<i>geniculatus</i>
-	Scutellum with broad white scales .....	<i>echinus</i>
4(2).	Proepimeron with broad straight black scales dorsally; Scutum with 1 or 2 broad dark-scaled longitudinal stripes .....	5

## Why do we need a computer aided identification key?

- Pictorial Keys

JULY 1992 125  
**ILLUSTRATED KEY TO THE FEMALE *ANOPHELES* OF  
 SOUTHWESTERN ASIA AND EGYPT (DIPTERA: CULICIDAE)<sup>1</sup>**  
 JAYSON I. GLICK<sup>2</sup>  
*Walter Reed Biosystematics Unit, Department of Entomology, Walter Reed Army Institute of  
 Research, Washington, DC 20307-5100*

- 35(34). Hindtarsomere 1 (Ta-III<sub>1</sub>) broadly pale at base and apex, hindtarsomere 2 (Ta-III<sub>2</sub>) pale over approximately apical half, hindtarsomere 3 (Ta-III<sub>3</sub>) dark at base only or entirely pale (Fig. 107); abdominal sternum VII with a group of posteromedian dark scales (Fig. 108) ..... *coustani* Laveran
- Hindtarsomeres 1 and 2 narrowly pale at apex only, hindtarsomere 3 pale over apical third to two-thirds (Fig. 109); abdominal sternum VII with or without posteromedian dark scales (Fig. 110) ..... *tenebrosus* Doenitz (Note 13)





# Why the identification key we already have isn't enough?

- Computer-aided Keys



♀

**AVAILABLE CHARACTERS** 15

HEAD: Maxillary palpus' length  
 THORAX: Prespiracular setae  
 THORAX: Postspiracular setae  
 THORAX: General shape of scutellum  
 LEG I: Length of tarsomere 4  
 LEG I-II: Length of tarsomere 1 compared to length of tarsomeres 2 through 4  
 LEG III: Colour of tarsomere 1  
 LEG III: Colour of tarsomere 5  
 LEGS: Sensory organs at the apex of tarsomeres 5  
 WING: Ornamentation of the base (alula)  
 WING: Localization of the apex of the vein 1-A  
 WING: Length of the fork R2/R3  
 ABDOMEN: Ornamentation of tergites III to V  
 GENITALIA: Form and ornamentation of the insula  
 Genus' distribution

**POTENTIAL GENERA** 8

Aedes  
 Anopheles  
 Coquillettidia  
 Culex  
 Culiseta  
 Ochlerotatus  
 Orthopodomyia  
 Uranotaenia

Optimization

Step 1  
 Eliminated Characters and Taxa  
 Identification end



IRD  
 Logiciel d'identification et d'enseignement  
 An Identification and Training Programme  
 Les moustiques d'Europe  
 The Mosquitoes of Europe  
 IRD  
 EID MEDITERRANEE  
 Franco / English

(L SIDE)  
 apical band area  
 genitalia (cerci)  
 abdominal segments I to VIII

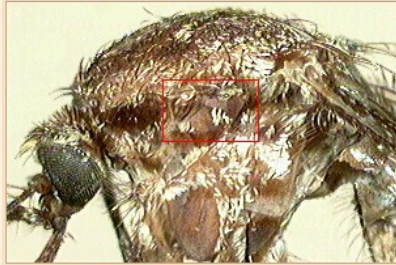

# Why the identification key we already have isn't enough?

- Computer-aided Keys

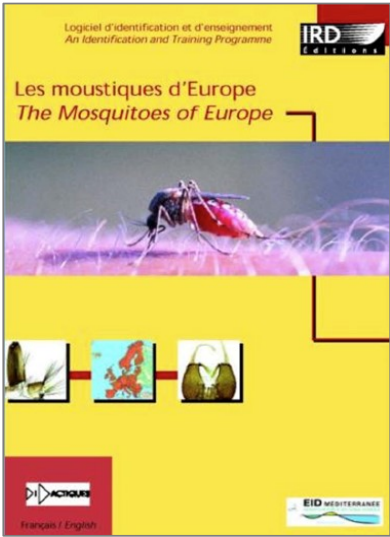
**THORAX: Prespiracular setae**

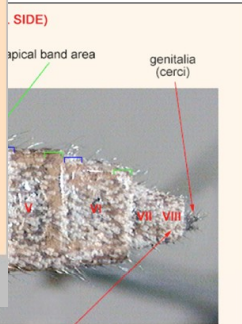



absent

present





abdominal segments I to VIII

X

# MosKeyTool A computer-aided mosquito identification key



Descriptors Description in progress

Descriptors : 4

Filter by group All groups

Best descriptor?

SAMPLING AREA: West of Western Palaearctic Region  
SAMPLING AREA: East of Western Palaearctic Region  
SAMPLING AREA: South of Western Palaearctic Region  
Developmental stage

States : 45

Submit OR

Albania (72)  
Austria (78)  
Azores (10)  
Balearic Islands (31)  
Belgium (58)  
Bosnia and Herzegovina (40)  
Bulgaria (86)  
Corsica (90)  
Croatia (82)  
Czech Republic (82)  
Denmark (64)  
Estonia (56)  
Faroe Island (0)  
Finland (76)  
France (112)  
Germany (100)  
Greece (108)

Definition

SAMPLING AREA: West of Western Palaearctic Region

To avoid misidentifications of newly introduced species we encourage you to select neighbouring countries. This can be done buy using the CTRL button.

Images

1. SAMPLING ARE...

Title SAMPLING AREA: West of Western Palearct

Description

Remaining items : 259

Aedes aegypti (F)  
Aedes aegypti (L)  
Aedes albescens (F)  
Aedes albineus (F)  
Aedes albopictus (F)  
Aedes albopictus (L)  
Aedes annulipes (F)  
Aedes annulipes (L)  
Aedes behningi (F)  
Aedes behningi (L)  
Aedes berlandi (F)  
Aedes berlandi (L)  
Aedes biskraensis (F)  
Aedes biskraensis (L)

Discarded items : 0



French National Research  
Institute for Sustainable  
Development

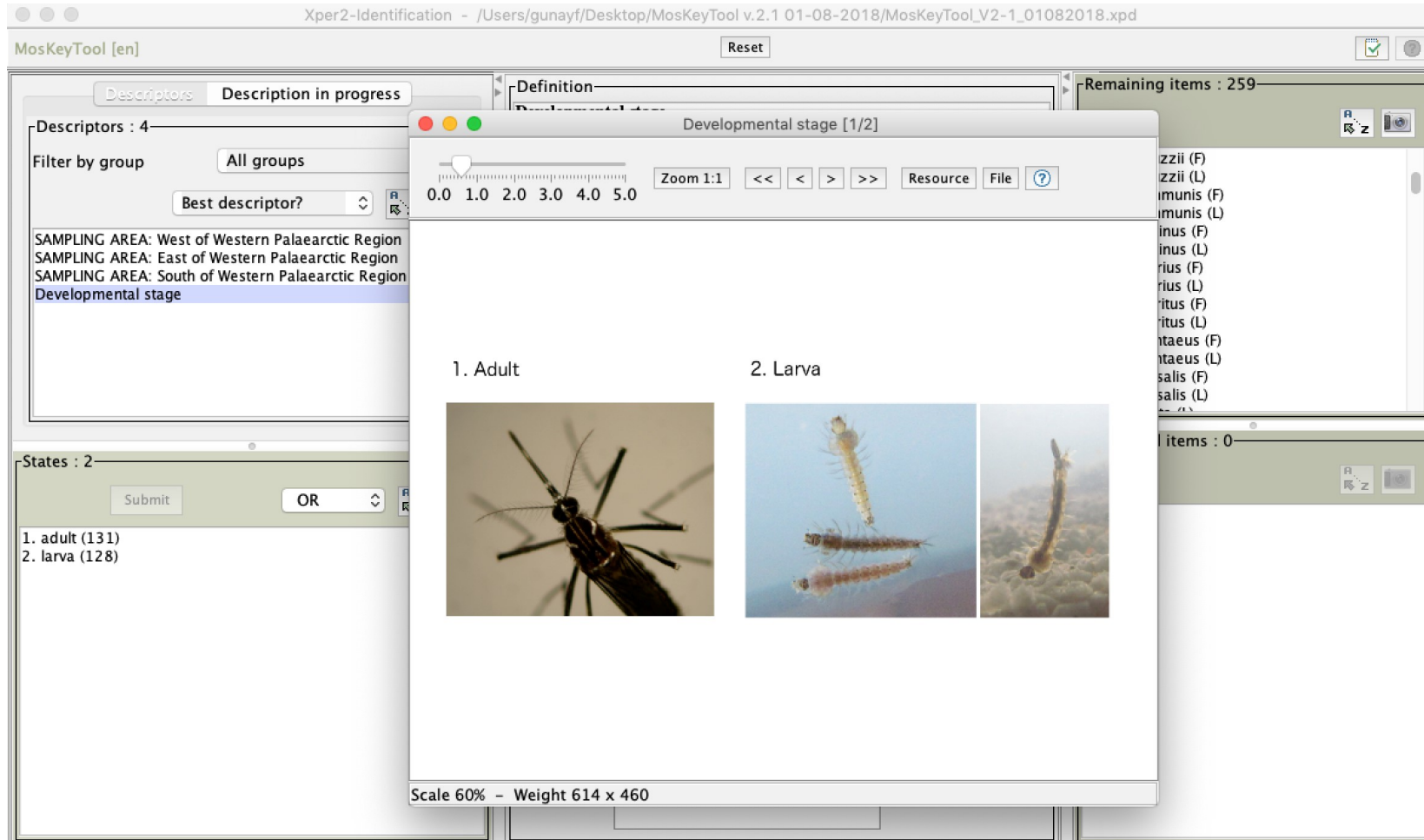


HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Definition

Remaining species

Discarded species

Images



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



MosKeyTool [en] Reset

**Descriptors** Description in progress

-Descriptors : 10-

Filter by group All groups

Best descriptor?  
 Xper original sort  
 Sokal and Michener sort  
 Jaccard sort

SAMPLING AREA: ...  
 SAMPLING AREA: ...  
 SAMPLING AREA: ...  
 HEAD - THORAX: Anopheles or not  
 ABDOMEN: Colour of the scales on the tergite  
 WING: General ornamentation of the wing  
 WING: Wing length from insertion to apex  
 WING: Ornamentation of the base (alula)  
 LEG III: Colour of tarsomere 1  
 LEG III: Colour of tarsomere 5

**Definition**

**HEAD - THORAX: Anopheles or not**

CAUTION! Male mosquitoes have plumose antenna and a large genitalia unlike females. Maxillary palpus (red arrows) of male mosquitoes and female *Anopheles* are nearly as long as proboscis.

State 2 and 4 correspond to *Anopheles* genus.

**Remaining items : 131**

Aedes excrucians (F)  
 Aedes flavescens (F)  
 Aedes geminus (F)  
 Aedes geniculatus (F)  
 Aedes gilcolladoi (F)  
 Aedes hexodontus (F)  
 Aedes hungaricus (F)  
 Aedes impiger (F)  
 Aedes intermedius (F)  
 Aedes intrudens (F)  
 Aedes japonicus (F)  
 Aedes koreicus (F)  
 Aedes krymmtanus (F)  
 Aedes lepidonotus (F)

**States : 4**

Submit OR

1. maxillary palpus clearly shorter than proboscis (108)
2. maxillary palpus nearly equal to proboscis (23)
3. scutellum clearly trilobate (108)
4. scutellum without conspicuous lobes (23)

**Images**

1. HEAD - THOR... 2. HEAD - THOR... 3. HEAD - THOR...

Title HEAD - THORAX: Anopheles or not

Description

**Discarded items : 128**

Aedes aegypti (L) (1)  
 Aedes albopictus (L) (1)  
 Aedes annulipes (L) (1)  
 Aedes behningi (L) (1)  
 Aedes berlandi (L) (1)  
 Aedes biskraensis (L) (1)  
 Aedes cantans (L) (1)  
 Aedes caspius (L) (1)  
 Aedes cataphylla (L) (1)  
 Aedes cinereus (L) (1)  
 Aedes coluzzii (L) (1)  
 Aedes communis (L) (1)  
 Aedes cretinus (L) (1)  
 Aedes cyprus (L) (1)  
 Aedes detritus (L) (1)  
 Aedes diaetaeus (L) (1)  
 Aedes dorsalis (L) (1)  
 Aedes dzeta (L) (1)

**Xper original sort**



French National Research  
 Institute for Sustainable  
 Development



HACETTEPE  
 UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Descriptors Description in progress

Descriptors : 10

Filter by group All groups

Xper original sort

HEAD - THORAX: Anopheles or not [5.0]  
WING: General ornamentation of the wing [4.61]  
ABDOMEN: Colour of the scales on the tergite [4.52]  
LEG III: Colour of tarsomere 1 [3.58]  
LEG III: Colour of tarsomere 5 [3.44]  
WING: Ornamentation of the base (alula) [3.32]  
WING: Wing length from insertion to apex [3.2]  
SAMPLING AREA: East of Western Palaearctic Region [2.54]  
SAMPLING AREA: South of Western Palaearctic Region [2.53]  
SAMPLING AREA: West of Western Palaearctic Region [2.5]

Submit OR

1. maxillary palpus clearly shorter than proboscis (108)  
2. maxillary paplus nearly equal to proboscis (23)  
3. scutellum clearly trilobate (108)  
4. scutellum without conspicuous lobes (23)

Definition

**HEAD - THORAX: Anopheles or not**

CAUTION! Male mosquitoes have plumose antenna and a large genitalia unlike females. Maxillary palpus (red arrows) of male mosquitoes and female *Anopheles* are nearly as long as proboscis.

State 2 and 4 correspond to *Anopheles* genus.

Images

1. HEAD - THOR... 2. HEAD - THOR... 3. HEAD - THOR...

Title HEAD - THORAX: Anopheles or not

Description

Remaining items : 131

Aedes excrucians (F)  
Aedes flavescens (F)  
Aedes geminus (F)  
Aedes geniculatus (F)  
Aedes gilcolladoi (F)  
Aedes hexodontus (F)  
Aedes hungaricus (F)  
Aedes impiger (F)  
Aedes intermedius (F)  
Aedes intrudens (F)  
Aedes japonicus (F)  
Aedes koreicus (F)  
Aedes krymmtanous (F)  
Aedes lepidonotus (F)

Discarded items : 128

Aedes aegypti (L) (1)  
Aedes albopictus (L) (1)  
Aedes annulipes (L) (1)  
Aedes behningi (L) (1)  
Aedes berlandi (L) (1)  
Aedes biskraensis (L) (1)  
Aedes cantans (L) (1)  
Aedes caspius (L) (1)  
Aedes cataphylla (L) (1)  
Aedes cinereus (L) (1)  
Aedes coluzzii (L) (1)  
Aedes communis (L) (1)  
Aedes cretinus (L) (1)  
Aedes cypricus (L) (1)  
Aedes detritus (L) (1)  
Aedes diaetaeus (L) (1)  
Aedes dorsalis (L) (1)  
Aedes dzeta (L) (1)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Descriptors : 10

Filter by group: All groups

Xper original sort

HEAD - THORAX: Anopheles or not [5.0]  
WING: General ornamentation of the wing [4.61]  
ABDOMEN: Colour of the scales on the tergite [4.52]  
LEG III: Colour of tarsomere 1 [3.58]  
LEG III: Colour of tarsomere 5 [3.44]  
WING: Ornamentation of the base (alula) [3.32]  
WING: Wing length from insertion to apex [3.2]  
SAMPLING AREA: East of Western Palaearctic Region [2.54]  
SAMPLING AREA: South of Western Palaearctic Region [2.53]  
SAMPLING AREA: West of Western Palaearctic Region [2.5]

States : 4

Submit OR

1. maxillary palpus clearly shorter than proboscis (108)  
2. maxillary palpus nearly equal to proboscis (23)  
3. scutellum clearly trilobate (108)  
4. scutellum without conspicuous lobes (23)

Definition

**HEAD - THORAX: Anopheles or not**

CAUTION! Male mosquitoes have plumose antenna and a large genitalia unlike females. Maxillary palpus (red arrows) of male mosquitoes and female *Anopheles* are nearly as long as proboscis.

State 2 and 4 correspond to *Anopheles* genus.

Remaining items : 131

Aedes excrucians (F)  
Aedes flavescens (F)  
Aedes geminus (F)  
Aedes geniculatus (F)  
Aedes gilcolladoi (F)  
Aedes hexodontus (F)  
Aedes hungaricus (F)  
Aedes impiger (F)  
Aedes intermedius (F)  
Aedes intrudens (F)  
Aedes japonicus (F)  
Aedes koreicus (F)  
Aedes krymmtanus (F)  
Aedes lepidonotus (F)

Discarded items : 128

Aedes aegypti (L) (1)  
Aedes albopictus (L) (1)  
Aedes annulipes (L) (1)  
Aedes behningi (L) (1)  
Aedes berlandi (L) (1)  
Aedes biskraensis (L) (1)  
Aedes cantans (L) (1)  
Aedes caspius (L) (1)  
Aedes cataphylla (L) (1)  
Aedes cinereus (L) (1)  
Aedes coluzzii (L) (1)  
Aedes communis (L) (1)  
Aedes cretinus (L) (1)  
Aedes cyprius (L) (1)  
Aedes detritus (L) (1)  
Aedes diaetaeus (L) (1)  
Aedes dorsalis (L) (1)  
Aedes dzeta (L) (1)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>



# MosKeyTool A computer-aided mosquito identification key



Xper2-Identification - /Users/gunayf/Desktop/MosKeyTool v.2.1 01-08-2018/MosKeyTool\_V2-1\_01082018.xpd

MosKeyTool [en]

Descriptors Description in progress

Descriptors : 10

Filter by group All groups

Xper original sort

HEAD - THORAX: Anopheles or not [5.0]  
WING: General ornamentation of the wing [4.61]  
ABDOMEN: Colour of the scales on the tergite [4.52]  
LEG III: Colour of tarsomere 1 [3.58]  
LEG III: Colour of tarsomere 5 [3.44]  
WING: Ornamentation of the base (alula) [3.32]  
WING: Wing length from insertion to apex [3.2]  
SAMPLING AREA: East of Western Palaearctic Region [2.54]  
SAMPLING AREA: South of Western Palaearctic Region [2.53]  
SAMPLING AREA: West of Western Palaearctic Region [2.5]

States : 4

Submit OR

1. maxillary palpus clearly shorter than proboscis (108)
2. maxillary palpus nearly equal to proboscis (23)
3. scutellum clearly trilobate (108)
4. scutellum without conspicuous lobes (23)

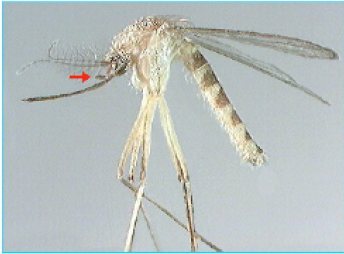
HEAD - THORAX: Anopheles or not [1/3]

Zoom 1:1

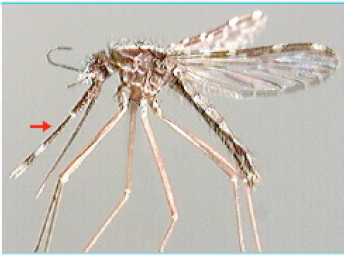
Resource File ?

0.0 1.0 2.0 3.0 4.0 5.0

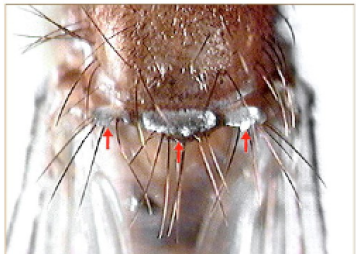
1. Maxillary palpus are shorter than proboscis




2. Palpus are as long as proboscis



3. Scutellum is trilobate



4. Scutellum is without conspicuous lobes



Scale 70% - Weight 716 x 537

Aedes dzeta (L) (1)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



MosKeyTool [en]

Descriptors Description in progress

Descriptors : 10

Filter by group All groups

Xper original sort

HEAD - THORAX: Anopheles or not [5.0]  
WING: General ornamentation of the wing [4.61]  
ABDOMEN: Colour of the scales on the tergite [4.52]  
LEG III: Colour of tarsomere 1 [3.58]  
LEG III: Colour of tarsomere 5 [3.44]  
WING: Ornamentation of the base (alula) [3.32]  
WING: Wing length from insertion to apex [3.2]  
SAMPLING AREA: East of Western Palaearctic Region [2.54]  
SAMPLING AREA: South of Western Palaearctic Region [2.53]  
SAMPLING AREA: West of Western Palaearctic Region [2.5]

States : 4





Submit OR

1. maxillary palpus clearly shorter than proboscis (108)  
2. maxillary palpus nearly equal to proboscis (23)  
3. scutellum clearly trilobate (108)  
4. scutellum without conspicuous lobes (23)

HEAD - THORAX: Anopheles or not [2/3]

Zoom 1:1

0.0 1.0 2.0 3.0 4.0 5.0

	FEMALE	MALE
<b>Anopheles</b>		
	Female <i>Anopheles superpictus</i>	Male <i>Anopheles superpictus</i>
<b>NOT Anopheles</b>		
	Female <i>Aedes aegypti</i>	Male <i>Aedes aegypti</i>

Scale 90% - Weight 705 x 561



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Descriptors Description in progress

Descriptors : 10

Filter by group All groups

Xper original sort

HEAD - THORAX: Anopheles or not [5.0]  
WING: General ornamentation of the wing [4.61]  
ABDOMEN: Colour of the scales on the tergite [4.52]  
LEG III: Colour of tarsomere 1 [3.58]  
LEG III: Colour of tarsomere 5 [3.44]  
WING: Ornamentation of the base (alula) [3.32]  
WING: Wing length from insertion to apex [3.2]  
SAMPLING AREA: East of Western Palaeartic Region [2.54]  
SAMPLING AREA: South of Western Palaeartic Region [2.53]  
SAMPLING AREA: West of Western Palaeartic Region [2.5]

Submit OR

1. maxillary palpus clearly shorter than proboscis (108)  
2. maxillary paplus nearly equal to proboscis (23)  
3. scutellum clearly trilobate (108)  
4. scutellum without conspicuous lobes (23)

Definition

**HEAD - THORAX: Anopheles or not**

CAUTION! Male mosquitoes have plumose antenna and a large genitalia unlike females. Maxillary palpus (red arrows) of male mosquitoes and female *Anopheles* are nearly as long as proboscis.

State 2 and 4 correspond to *Anopheles* genus.

Images

1. HEAD - THOR... 2. HEAD - THOR... 3. HEAD - THOR...

Title HEAD - THORAX: Anopheles or not

Description

Remaining items : 131

Aedes excrucians (F)  
Aedes flavescens (F)  
Aedes geminus (F)  
Aedes geniculatus (F)  
Aedes gilcolladoi (F)  
Aedes hexodontus (F)  
Aedes hungaricus (F)  
Aedes impiger (F)  
Aedes intermedius (F)  
Aedes intrudens (F)  
Aedes japonicus (F)  
Aedes koreicus (F)  
Aedes krymmtanous (F)  
Aedes lepidonotus (F)

Discarded items : 128

Aedes aegypti (L) (1)  
Aedes albopictus (L) (1)  
Aedes annulipes (L) (1)  
Aedes behningi (L) (1)  
Aedes berlandi (L) (1)  
Aedes biskraensis (L) (1)  
Aedes cantans (L) (1)  
Aedes caspius (L) (1)  
Aedes cataphylla (L) (1)  
Aedes cinereus (L) (1)  
Aedes coluzzii (L) (1)  
Aedes communis (L) (1)  
Aedes cretinus (L) (1)  
Aedes cypricus (L) (1)  
Aedes detritus (L) (1)  
Aedes diaetaeus (L) (1)  
Aedes dorsalis (L) (1)  
Aedes dzeta (L) (1)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Xper2-Identification - /Users/gunayf/Desktop/MosKeyTool v.2.1 01-08-2018/MosKeyTool\_V2-1\_01082018.xpd

MosKeyTool [en]

Descriptors Description in progress

Descriptors : 18

Filter by group All groups

Xper original sort

WING: General ornamentation of the wing [4.55]  
 ABDOMEN: Colour of the scales on the tergite [4.34]  
 WING: Uranotaenia or not [4.0]  
 THORAX: Scutum's ornamentation [3.83]  
 THORAX: Prespiracular and postspiracular setae [3.71]  
 LEG III: Colour of tibia [3.66]  
 LEG III: Colour of tarsomere 1 [3.57]  
 HEAD: Colour of maxillary palpus [3.51]  
 LEG III: Colour of tarsomere 5 [3.44]

States : 8

Submit OR

- entirely dark (64)
- dark with black spots (7)
- with a thin line of pale scales on the costal vein base (14)
- with only a pale spot at the apex (0)
- with pale spots only on the costal margin (12)
- with pale spots on the mid veins (0)
- with only a pale spot on the base of subcosta and radius veins
- mixture of pale and dark scales on veins (31)

WING: general ornamentation of the wing [1/1]

Zoom 1:1 Resource File ?

- entirely dark
- dark with black spots
- with a thin line of pale scales on the costal vein base
- with only a pale spot at the apex
- with pale spots only on the costal margin
- with pale spots on the mid veins
- with only a pale spot on the base of subcosta and radius veins
- mixture of pale and dark scales on veins

Scale 70% - Weight 716 x 537

Aedes azeta (L) (1)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



End of identification

Your specimen seems to be the item 'Orthopodomyia pulcralpalis (F)'

OK

1. Orthopodomyi... 2. Orthopodomyi...

Title

Description



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Xper2-Identification - /Users/gunayf/Desktop/MosKeyTool v.2.1 01-08-2018/MosKeyTool\_V2-1\_01082018.xpd

MosKeyTool [en] Reset

Orthopodomomyia pulcripalpis (F)

Remaining items : 1

## *Orthopodomomyia pulcripalpis* (F)

*Orthopodomomyia pulcripalpis* (Rondani, 1872)  
Type-loc: Italy

*Orthopodomomyia* genus is represented by only one species in the coverage area of this identification key. Female can be distinguished from 4th tarsal segment being shorter than 5th but this isn't the case for males. Distinctive pattern on the scutum and white scale patch on the basal part of the wing allows identify this species very easily.

Orthopodomomyia pulcripalpis (F)

Orthopodomomyia pulcripalpis (F)

- Developmental stage : 1. adult

### Head

- HEAD - THORAX: Anopheles or not : 1. maxillary palpus clearly shorter than proboscis; scutellum clearly trilobate
- HEAD: Colour of maxillary palpus : 2. dark at the base and pale at the apex ; 3. with narrow and pale scales
- HEAD: Colour of proboscis : 5. with a clearly marked median pale ring

### Thorax

Save Print Close

Thorax, scutum

Wing

IRD Coll.

Scale 60% - Weight 614 x 460



French National Research Institute for Sustainable Development



HACETTEPE UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Reset

Best descriptor?  
Xper original sort  
Sokal and Michener sort  
Developmental stage  
Jaccard sort

Click "Reset" to start again

Xper original sort

Remaining items : 259

Discarded items : 0

States : 2

1. adult (131)  
2. larva (128)

1. Developmental... 2. Developmental...

Title Developmental stage

Description



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Descriptors Description in progress

Descriptors : 4

Filter by group All groups

Xper original sort

Developmental stage [4.0]  
SAMPLING AREA: East of Western Palaearctic Region [2.54]  
SAMPLING AREA: South of Western Palaearctic Region [2.53]  
SAMPLING AREA: West of Western Palaearctic Region [2.5]

Submit OR

Algeria (120)  
Canary Islands (22)  
Egypt (77)  
Libya (62)  
Madeira (18)  
Morocco (128)  
Tunisia (93)

Definition

Libya  
Libya

Remaining items : 259

Aedes aegypti (F)  
Aedes aegypti (L)  
Aedes albescens (F)  
Aedes albineus (F)

Images

You can select more than one option

To select several characters:  
Ctrl + left click (on PC)  
Cmd+ click (on Mac)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>



# MosKeyTool A computer-aided mosquito identification key



**You can select more than one item and compare all characters**

**To select several characters:**  
**Ctrl + left click (on PC)**  
**Cmd+ click (on Mac)**



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



Xper2-Identification - /Users/gunayf/Desktop/MosKeyTool v.2.1 01-08-2018/MosKeyTool\_V2-1\_01082018.xpd

MosKeyTool [en]

Comparison

Descriptors Descripti

Descriptors : 15

Filter by group All group Xper original s

ABDOMEN: Colour of the scales on the

THORAX: Prespiracular and postspir

WING: Wing length from insertion to

WING: Ornamentation of the base (al

LEG III: Colour of tarsomere 5 [3.0]

THORAX: Scutum's ornamentation [3

HEAD: Colour of maxillary palpus [3.

HEAD: Colour of proboscis [3.0]

WING: Colour of the scales on the wi

WING: Uranotaenia or not [3.0]

State : 0

Submit

ABDOMEN: Ornamentation of tergite III	?	?	1. entirely dark, 2. with a basal pale band, 3. with a basal pale band extending backwards in a median triangle, 4. with an apical pale band extending forward in a median triangle, 5. with an apical pale band extending forward in all abdominal segments, 7. with lateral pale patches, 8. almost completely covered with pale scales	1. entirely dark, 2. with a basal pale band, 3. with a basal pale band extending backwards in a median triangle, 4. with an apical pale band extending forward in a median triangle, 6. with an apical pale band extending forward in all abdominal segments, 7. with lateral pale patches, 8. almost completely covered with pale scales
ABDOMEN: Ornamentation of tergites III and IV	1. with a basal pale band	3. almost completely covered with pale scales	1. with a basal pale band, 3. almost completely covered with pale scales	
LEGS I - III: Ornamentation of the femur's 1/3 distal part	3. with a subapical pale ring	3. with a subapical pale ring	3. with a subapical pale ring	3. with a subapical pale ring
HEAD: Colour of maxillary palpus - Cs	3. with mixed dark and pale scales	3. with mixed dark and pale scales	3. with mixed dark and pale scales	3. with mixed dark and pale scales

Save Print Close

Description

Remaining items : 2

- Culiseta annulata (F)
- Culiseta subochrea (F)

Discarded items : 257

- Culiseta longiareolata (F) (1)
- Aedes aegypti (F) (2)
- Aedes albineus (F) (2)
- Aedes berlandi (F) (2)
- Aedes caspius (F) (2)
- Aedes cinereus (F) (2)
- Aedes coluzzii (F) (2)
- Aedes detritus (F) (2)
- Aedes dorsalis (F) (2)
- Aedes echinus (F) (2)
- Aedes geniculatus (F) (2)
- Aedes mariae (F) (2)
- Aedes pulcritarsis (F) (2)
- Aedes vexans (F) (2)
- Aedes vittatus (F) (2)
- Aedes zammitii (F) (2)
- Anopheles maculipennis s.l. (F) (2)
- Culex antennatus (F) (2)



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>

# MosKeyTool A computer-aided mosquito identification key



The screenshot shows a web browser window with the URL [www.medilabsecure.com](http://www.medilabsecure.com). The page header includes logos for Institut Pasteur, the international network, and the European Commission. The main content area features the MediLabSecure logo and the text: "ONE HEALTH NETWORK FOR THE PREVENTION OF VECTOR-BORNE DISEASES AROUND THE MEDITERRANEAN AND BLACK SEA REGIONS". A navigation menu includes links for NEWS, PROJECT, PARTNERS, ACTIVITIES, COUNTRIES, WORKING GROUPS, and RESOURCES. The main heading reads "MosKeyTool: an interactive identification key for mosquitoes of Euro-Mediterranean". Below this, there is a brief description of the tool and its development. Two images show a mosquito larva and an adult mosquito. A link "HOW TO INSTALL MOSKEYTOOL ?" is visible at the bottom of the page.



French National Research  
Institute for Sustainable  
Development



HACETTEPE  
UNIVERSITY



<http://www.medilabsecure.com/moskeytool.html>



# How to install MosKeyTool

1. Download and install the Xper2 identification version software  
Version 2.3.2 for [Windows XP/Vista/7](#) / [Linux](#) / [MacOS X \(>10.10\)](#) \* / [MacOS X \(<10.11\)](#) \*  
More infos on [Xper2](#).  
\* [Help for installation on Mac](#).

**Download and  
install the Xper2  
software**

2. Download the [MosKeyTool database](#) (.zip file)  
Extract the zip archive inside a directory, you must have 1 folder and 4  
folder "images" file "[name of the database].xpd"  
file "[name of the database].xpx"  
file "[name of the database].xpw"  
file "[name of the database].xpr"

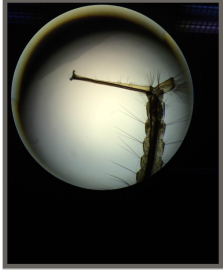


**Download the  
MosKeyTool  
Database**

3. Open the Xper2 software  
Go to File -> Open a Database and select the file "[name of the database].xpd"

**Open the Xper2  
software and  
open the  
MosKeyTool  
database**

<http://www.medilabsecure.com/moskeytool.html>



We must keep MosKeyTool up to date!

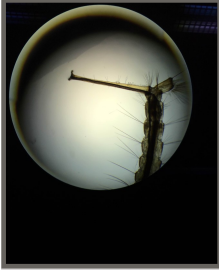


NEW SPECIES? NEW RECORD?

LET US KNOW:



[moskeytool@gmail.com](mailto:moskeytool@gmail.com)



WHAT HAPPENS  
WHEN  
MORPHOLOGICAL  
CHARACTERS  
AREN'T ENOUGH?

