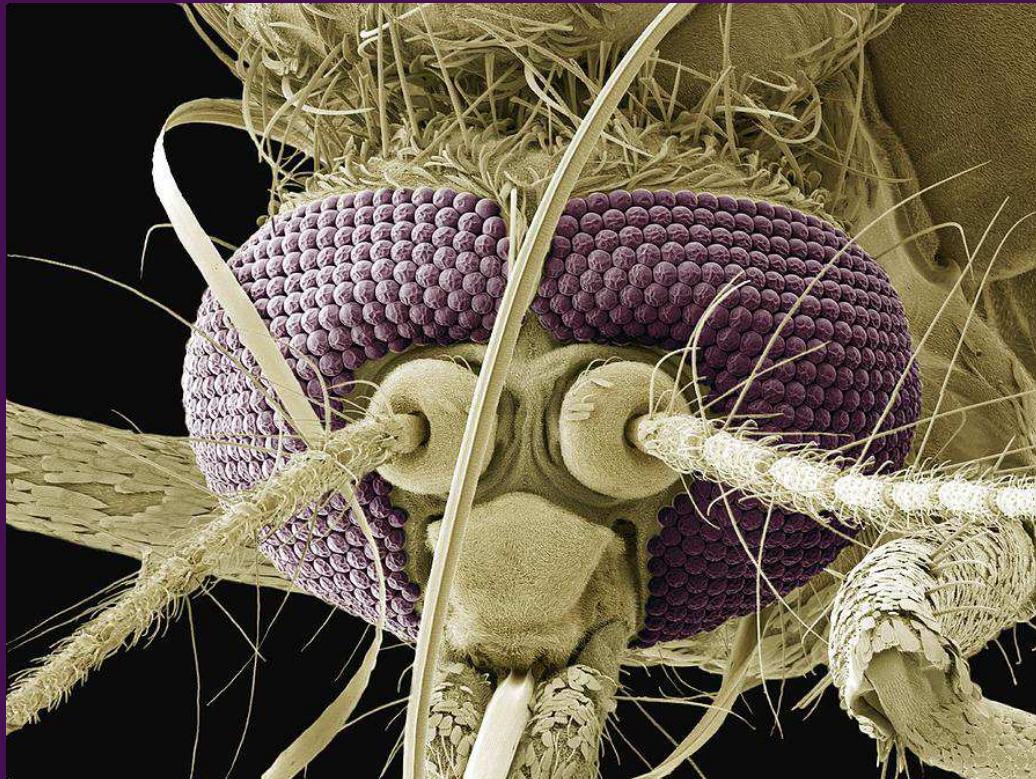


# - OČI U OČI SA KOMARCIMA -



**LOVCEN**

Surveillance of invasive and native mosquito vectors  
and pathogens they transmit in Montenegro

<http://project-lovcen.me/index.php>

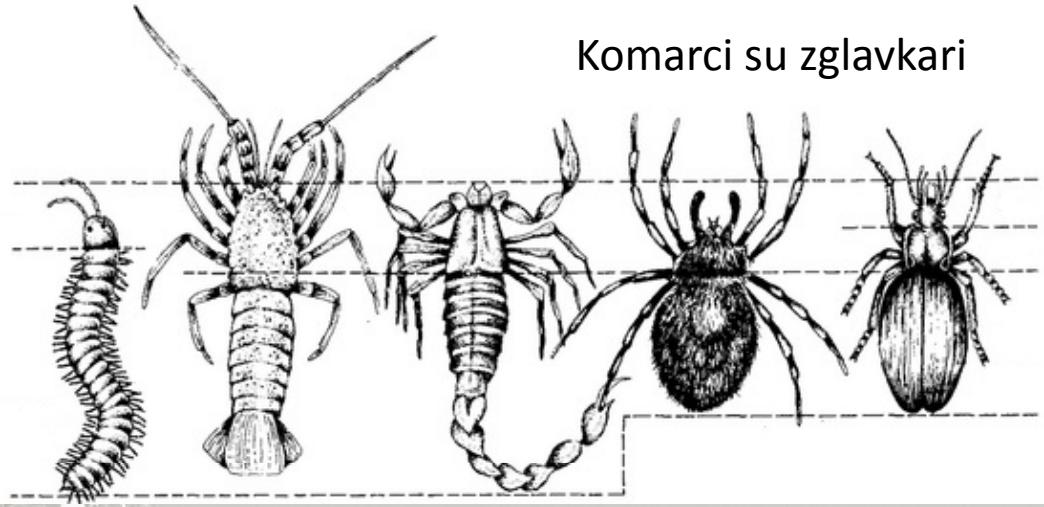
Pajović Igor

Prezentacija sadrži slike i crteže napravljene od strane autora ili pozajmljene iz drugih izvora koje se u prezentaciji koriste isključivo u svrhu edukacije.

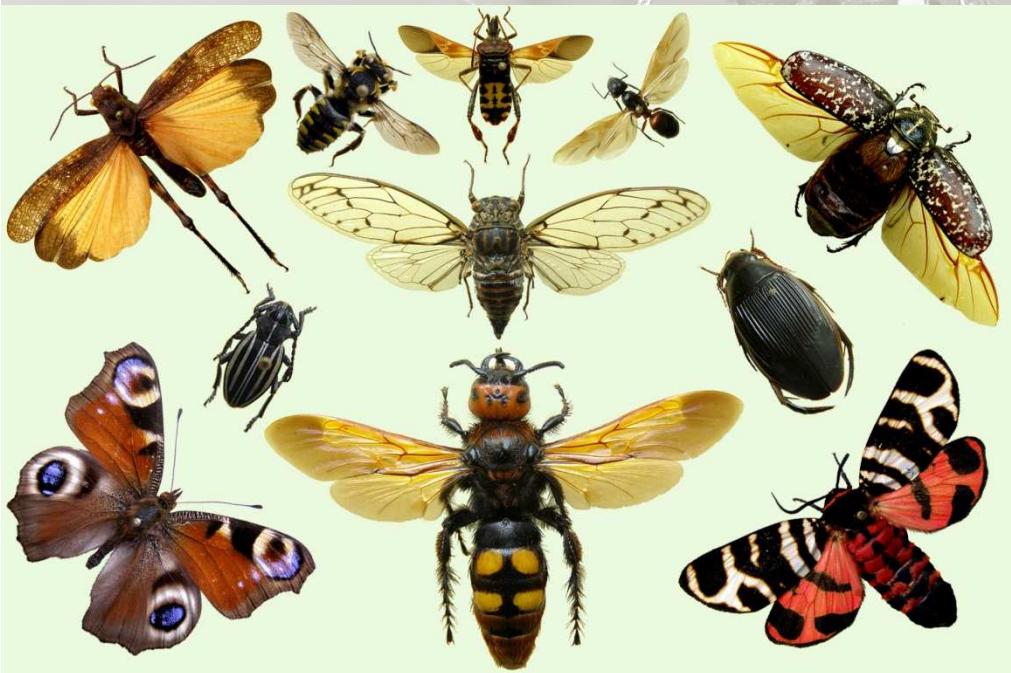
# Za početak !



Komarci su životinje



Komarci su zglavkari

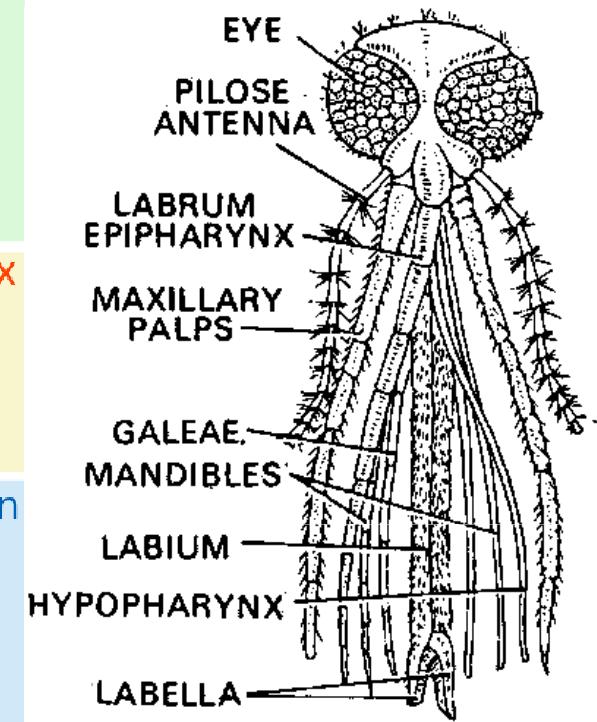
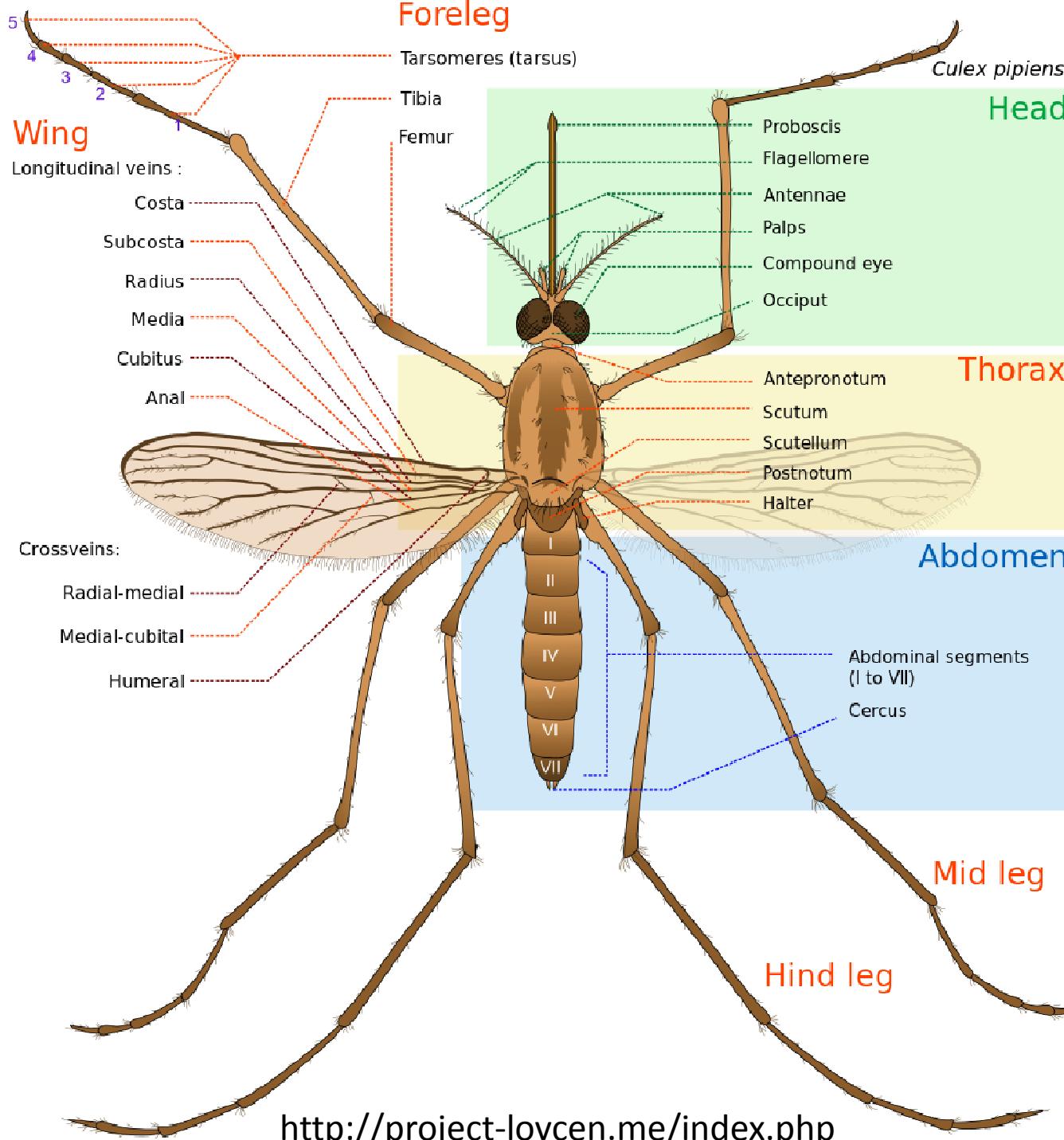


Komarci imaju šest nogu, odnosno tri para nogu,

bića koja su životinje - zglavkari, i  
koja imaju tri para nogu  
nazivaju se Insekti

Komarci su prisutni na Zemlji od doba Jure  
Što znači da su oko 210 miliona godina  
stara grupa živih bića

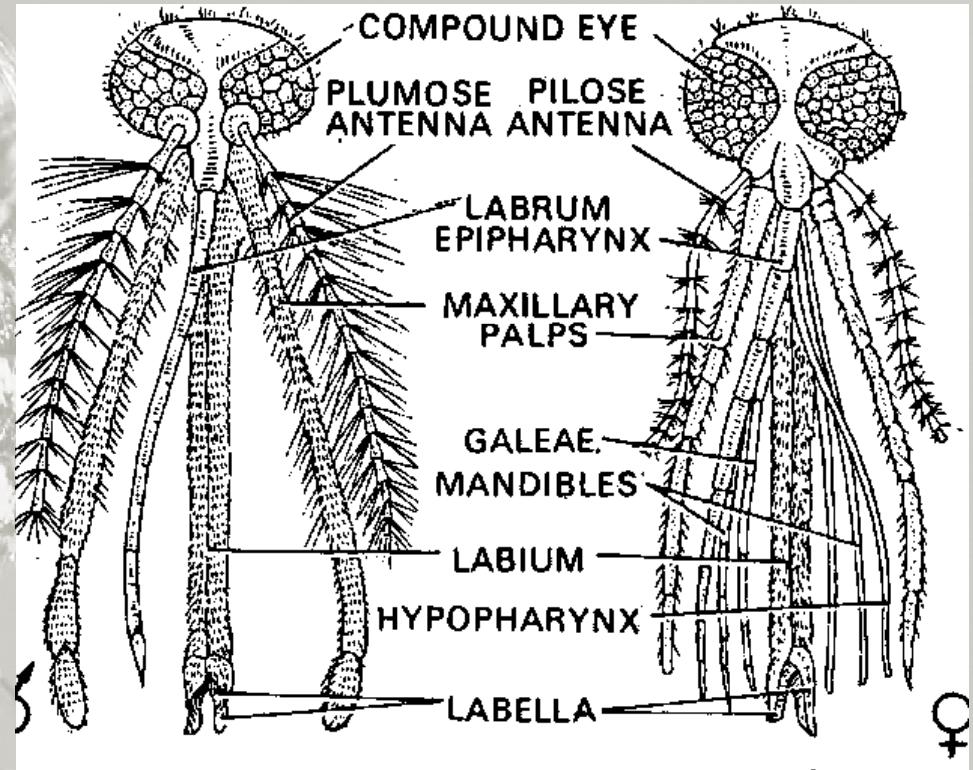
# Izgled komaraca



# Proboscis

Komarci nemaju zube, oni ubadaju i hrane se posebnim usnim aparatom zvanim proboscis.

Otok od uboda komaraca izaziva njihova pljuvačka koju ubrizgaju prilikom uboda u tijelo domaćina. Kroz jednu cjevčicu proboscisa oni ubrizgovaju pljuvačku u domaćina, a kroz drugu usisavaju krv.



# Komarcima slični insekti



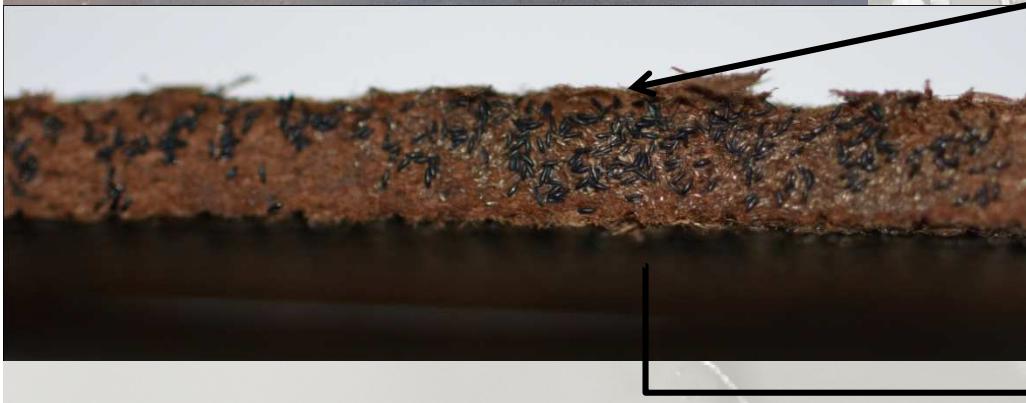
©2006 Will Cook



<http://project-lovcen.me/index.php>

# Kako izgledaju životni stadijumi komaraca - jaja

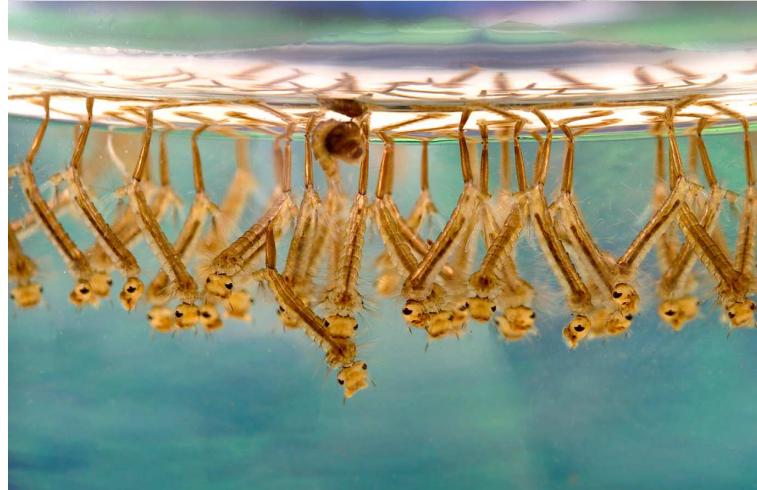
Ženke komaraca mogu položiti  
i do 300 jaja u jednom mahu  
Obično polažu jaja u tri navrata prije nego uginu.



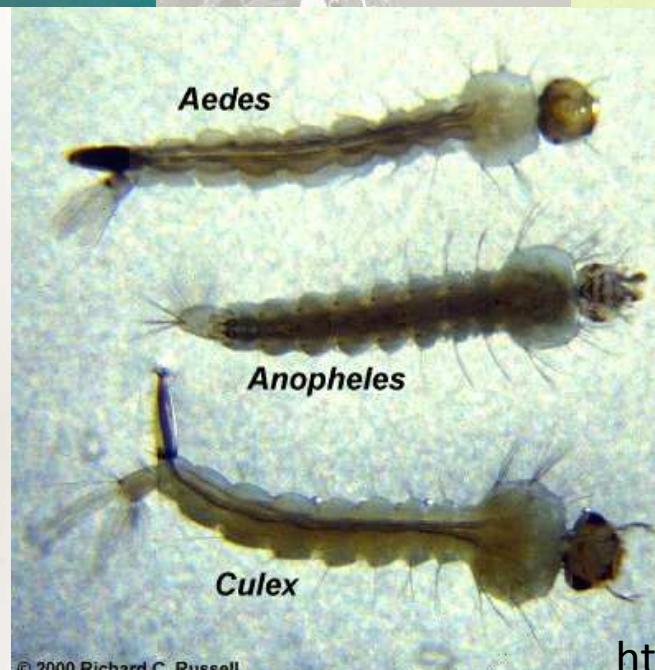
# Kako izgledaju životni stadijumi komaraca – larve i lutke

Da bi mogli da se razviju do odrasle forme komarci u stadijumu larve i lutke

**MORAJU DA ŽIVE U VODI**



Larve se hrane  
algama,  
bakterijama i drugim  
mikroorganizmima.



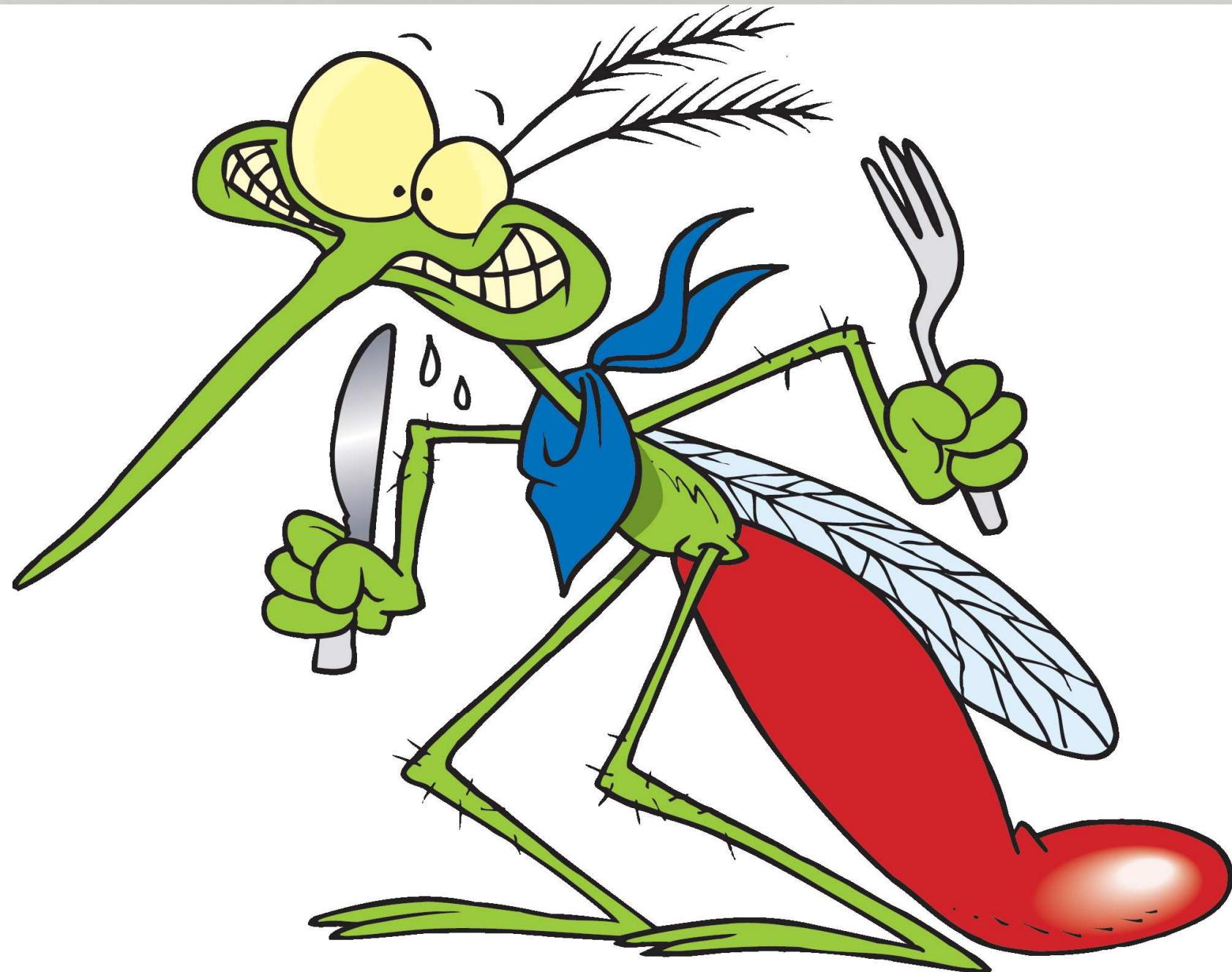
© 2000 Richard C. Russell



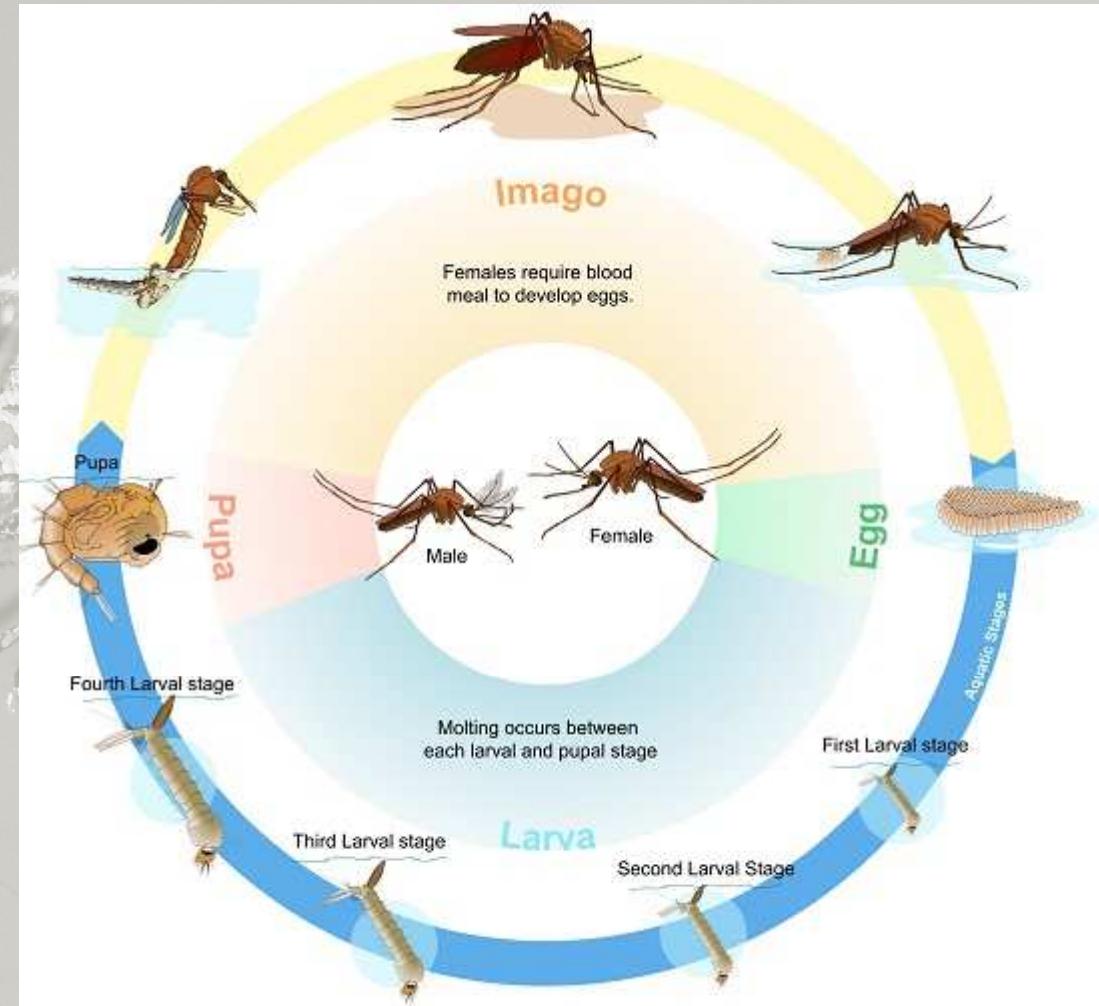
# Eklozija (izlazak imaga iz lutke) komaraca



## Kako izgledaju životni stadijumi komaraca - adulti



# Životni ciklus komaraca



Komarci kao i druge hladnokrvne životinje padaju u zimski san ili hibernaciju na oko 10 stepeni se deaktiviraju, a optimum za njihovu aktivnost je na oko 25 stepeni

Mužjaci žive oko desetak dana, a ženke pod optimalnim uslovima od šest do osam nedjelja, osim kod vrsta kod kojih prezimljavaju ženke, one mogu da žive od šest do osam mjeseci.

# Na koje sve načine komarci štete ljudima



Otok od uboda komaraca izaziva njihova pljuvačka koju ubrizgaju prilikom uboda u tijelo domaćina.

Većina ljudi ima blage alergijske reakcije na ubod komarca.

# **Na koje sve načine komarci štete ljudima – VIRUSI I KOMARCI**

Komarci se smatraju za najsmrtonosnije životinje na svijetu

*Anopheles*-i prenose malariju od koje umre preko milion ljudi godišnje.

Vjeruje se da je i Aleksandar Veliki umro od malarije oko 300 godina prije nove ere.

**Računa se da komarci prenesu bolest na oko 700 miliona ljudi godišnje, što za posledicu ima smrt od 2 do 3 miliona ljudi.**

Mogu biti vektori: (DEN) - virusa denga hemoralgične groznice; (JE) Japanskog encefalitisa; (WN) groznice Zapadnog Nila; (YF) žute groznice; (SLE) St. Louis encefalitisa; (EEE)(WEE) istočnog i zapadnog encefalitisa konja; (POT) Potosi virusa; (TEN) Tensav virusa; (LAC) LaCrosse encephalitis; (CHIK) čikungunja virus; (RVF) Ross River i Rift Valley Fiver virusa; (KEY) Keystone, Sindbis (SIN) i Batai (BAT) virusa, Israel Turkey meningoencephalitis (ITM); African horses sickness (AHS) virusa; Sandfly fever virusa i filarija od značaja u veterini *Dirofilaria immitis* i *Dirofilaria repens* (doghearthworm), odnosno nematoda koje napadaju pse razvijajući se u srcu psa, tzv srčani crvi pasa.

**Ne mogu da prenose HIV/AIDS, EBOLA, SARS ili MERS viruse.**

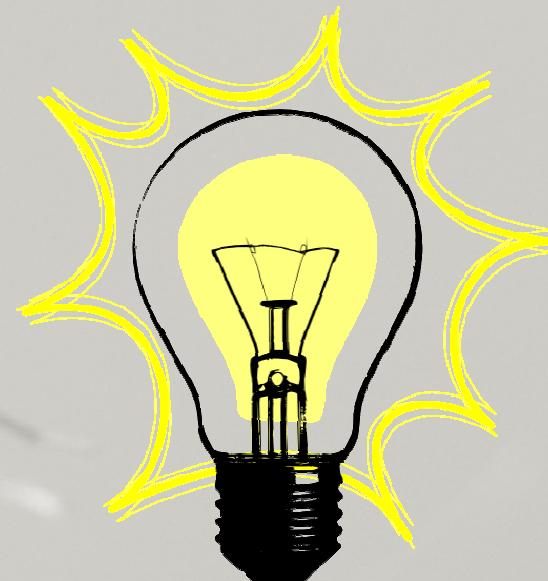
# Zbog čega napadaju komarci i kako nas pronađu

Ubadaju isključivo ženke komaraca

Krvni obrok je neophodan da bi jaja bila fertilna

Komarci osjećaju dah ljudi receptorima na antenama .  
Odnosno kreću se prema povećanoj koncentraciji ugljen dioksida

Ugasi svjetlo ući će komarci.



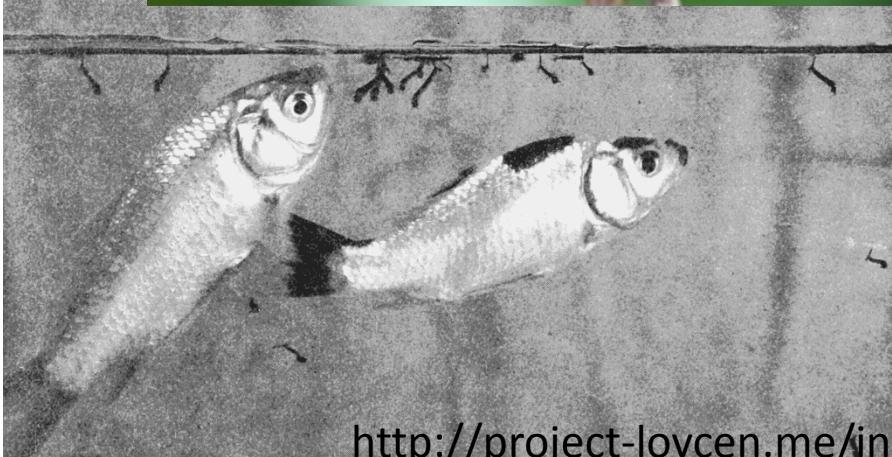
# Prirodni neprijatelji komaraca

Na žalost slijepi miševi ni laste nijesu bitni predatori komaraca.

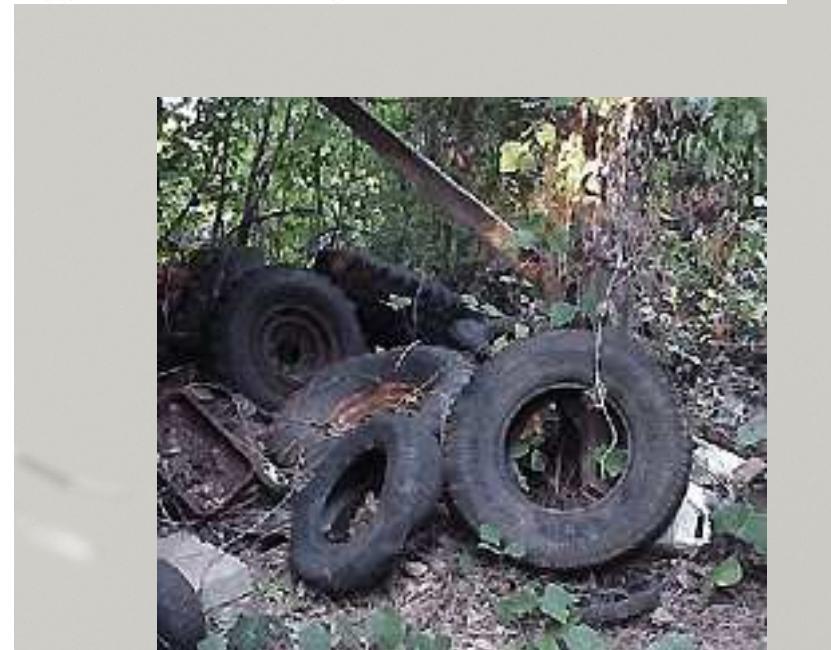
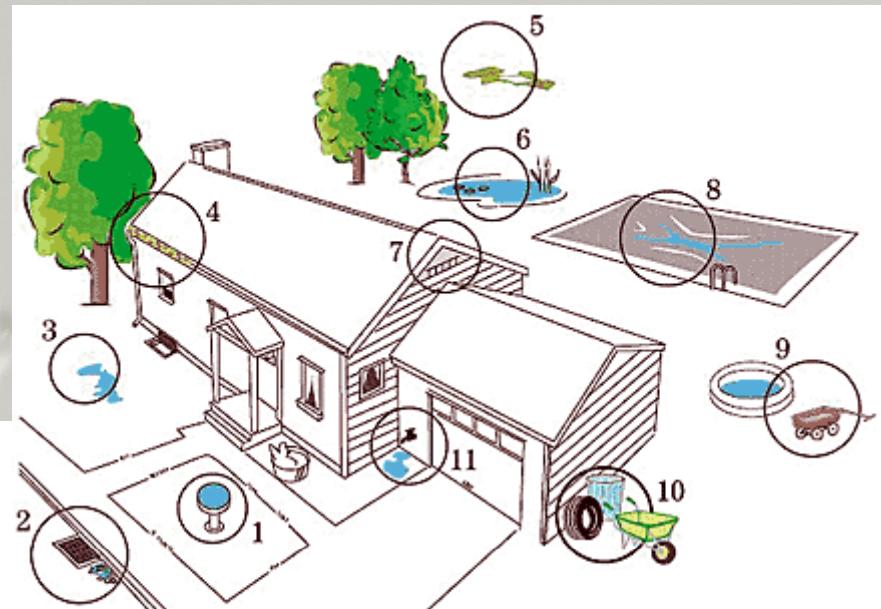
Na meniju slijepog miša u samo oko 1% slučajeva nađu se komarci.

Najveći prirodni neprijatelji komaraca su, pored **mraza, vilini konjici i ribe**.

Vrsta ribe roda *Gambusia* koristi se u svijetu u kontroli populacija komaraca.



# Kako smanjiti napad komaraca





<http://project-lovcen.me/index.php>

# Kako smanjiti napad komaraca



<http://project-lovcen.me/index.php>

# Kako smanjiti napad komaraca

Tamna odjeća posebno privlači komarce.

Bolje je koristiti komarnike, nego repelente tipa autan-a.

Javite se nama.

Koristite KOMARAC APP

<http://project-lovcen.me/page.php?id=30>

Insekticidi su djelotvorni, posebno larvicidi,  
ali je njihov efekat ograničenog trajanja.



# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca

## Utvrđuje se prisustvo i rasprostranjenost pojedinih vrsta



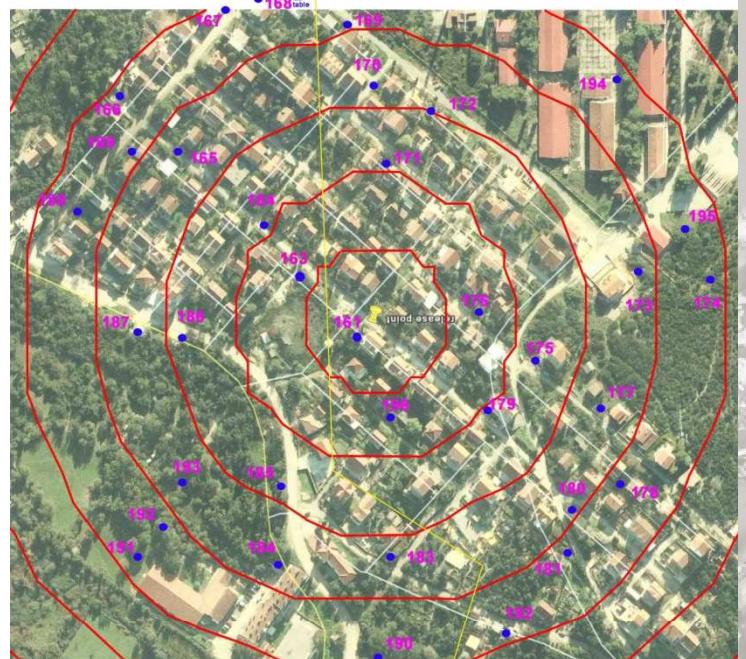
# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca

1	<i>Aedes (Ochlerotatus) mariae</i>
2	<i>Aedes zammitti</i>
3	<i>Aedimorphus (Aedes) vexans</i>
4	<i>Aedes Dahliana (Ochlerotatus) echinus</i>
5	<i>Aedes Dahliana geniculata</i>
6	<i>Aedes Ochlerotatus annulipes</i>
7	<i>Aedes Ochlerotatus caspius</i>
8	<i>Aedes Ochlerotatus cataphylla</i>
9	<i>Aedes Ochlerotatus communis</i>
10	<i>Aedes Ochlerotatus detritus</i>
11	<i>Aedes Ochlerotatus pionips</i>
12	<i>Aedes Ochlerotatus pulcritarsis</i>
13	<i>Aedes Ochlerotatus pullatus</i>
14	<i>Aedes Ochlerotatus punctor</i>
15	<i>Aedes Ochlerotatus rusticus</i>
16	<i>Aedes Ochlerotatus sticticus</i>
17	<i>Aedes albopictus</i>
18	<i>Anopheles atroparvus</i>
19	<i>Anopheles claviger</i>
20	<i>Anopheles hyrcanus</i>
21	<i>Anopheles maculipennis</i>
22	<i>Anopheles messeae</i>
23	<i>Anopheles plumbeus</i>
24	<i>Anopheles saccharovi</i>
25	<i>Anopheles superpictus</i>
26	<i>Coquillettidia richiardii</i>
27	<i>Coquillettidia buxtoni</i>
28	<i>Culex hortensis</i>
29	<i>Culex modestus</i>
30	<i>Culex pipiens</i>
31	<i>Culex territans</i>
32	<i>Culex theileri</i>
33	<i>Culiseta longiareolata</i>
34	<i>Culiseta annulata</i>
35	<i>Culiseta morsitans</i>
36	<i>Orthopodomyia pulripalpis</i>

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**Utvrđeno je prisustvo  
36 vrsta komaraca  
u Crnoj Gori**

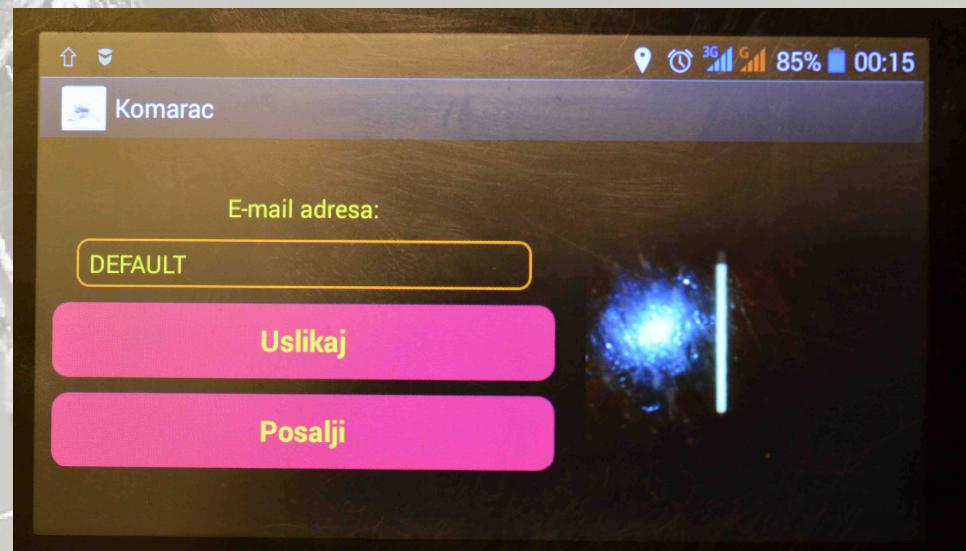
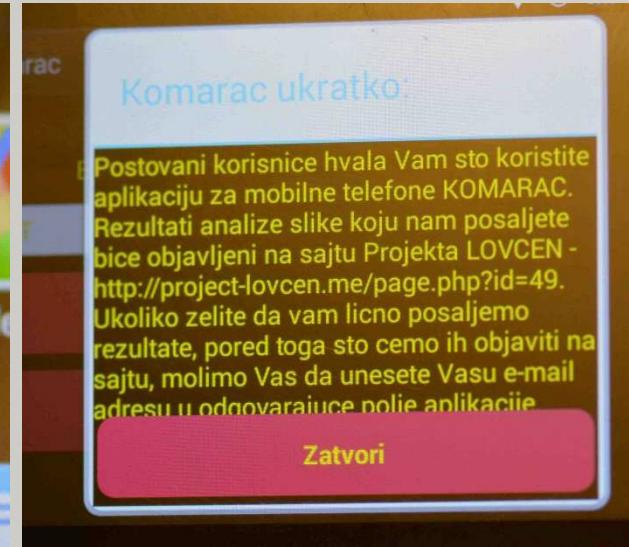
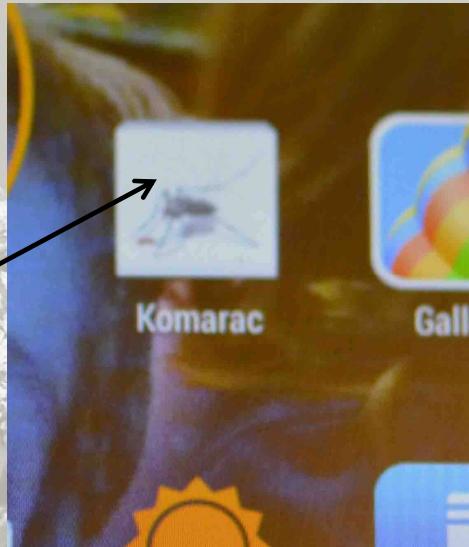
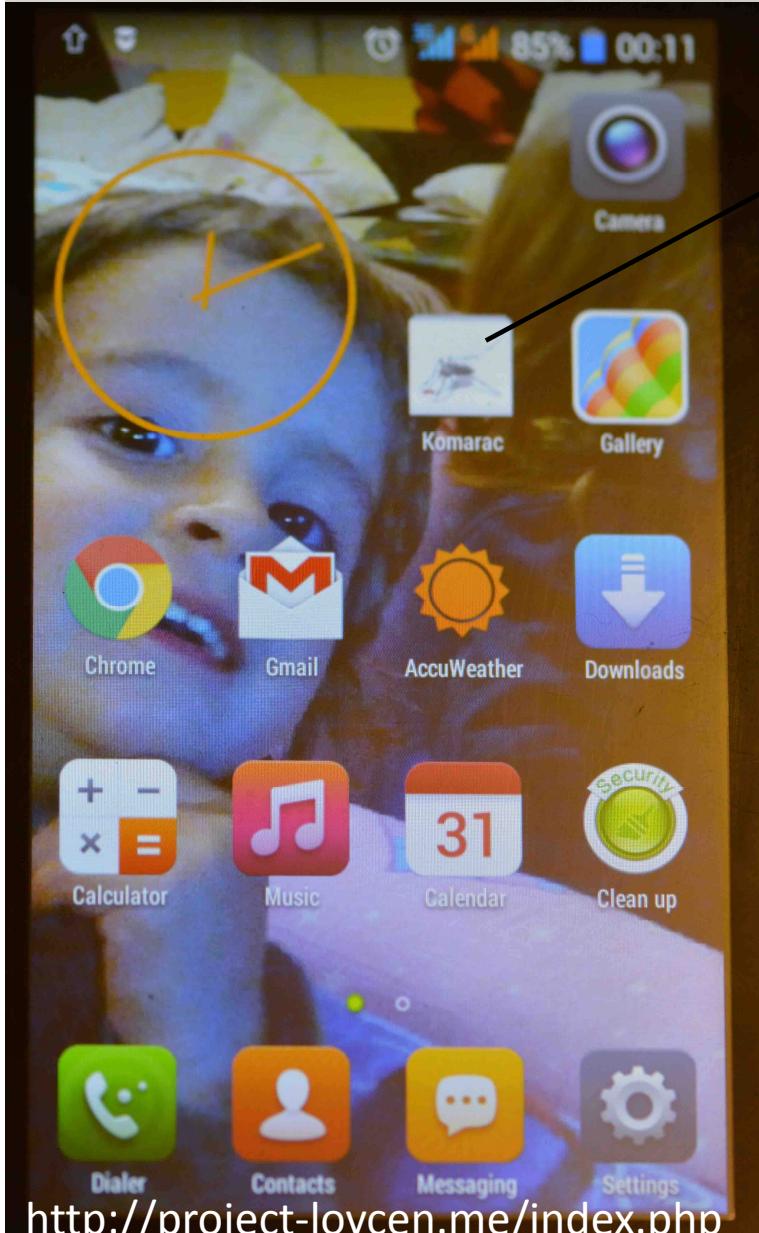
# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca



Korišćena je eksperimentalno SIT tehnika



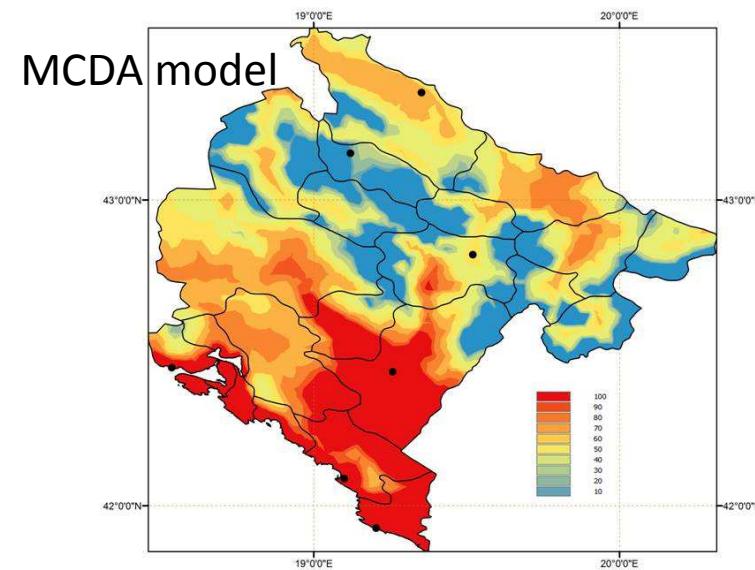
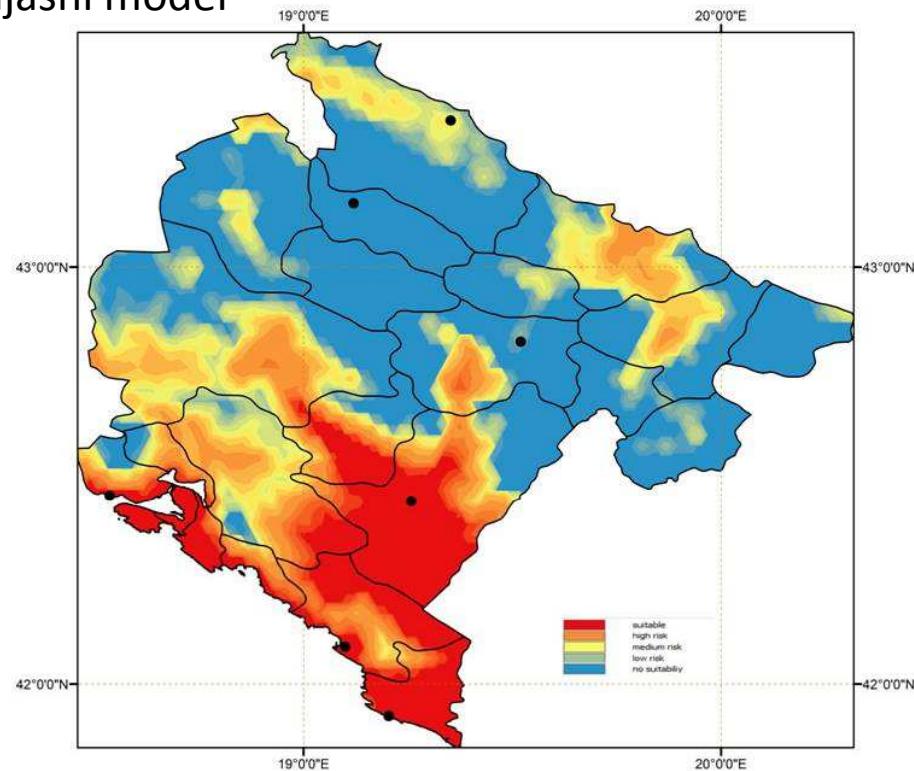
# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca



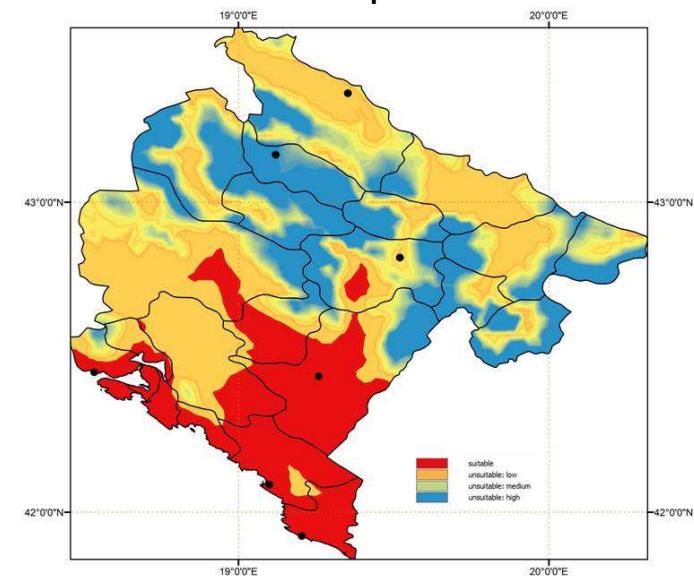
Napravljena je KOMARAC aplikacija za mobilne telefone  
koja može da se preuzme sa sajta  
<http://project-lovcen.me/page.php?id=30>

# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca

Kobajashi model



overwinter St. albopicta



Koriste se klimatski modeli predviđanja  
pojave i nastanjenja za vrstu  
*Aedes albopictus*  
sram perioda 1981-2010



## About project



## News

02.08.2015

**Forcoming - 30th August-4th September - five-day meeting with training on climate change (CC) assessment skills to LOVCEN project researchers**

Activities on WP1f and WP2a - mobility to Faculty of Agriculture in Novi Sad. Training visit for Slavica Micev and Angel Marcev from IHMS to Branislava Lalic in FoA.

Training visit IHMS-FoA

01.08.2015

**New researchers in LOVCEN Project Team**

Four new researcher joint LOVCEN Project team Prof Aleksandra Ignjatovic Cupina; Bogoljub Kandic; Dijana Stijepovic and Mina Petric.

The main idea that led us to propose this HERIC-CRDS project is to endorse exchange of knowledge and methodologies, improve higher education, facilitate training of next generation experts, improve the national policies, produce innovation and disseminate the related scientific information under the umbrella of surveillance of mosquito vectors and diseases they transmit.

The project will be realized through a coherent set of research, coordination, dissemination and development actions grouped in four work packages.

We propose top quality innovative research:

- application of SIT in invasive mosquito control;
- implementation of the newly released (September 2012) European Centre for Diseases Prevention and Control (ECDC) "Guidelines for the surveillance of invasive mosquitoes in Europe";
- mobile phone application for surveillance of invasive and indigenous mosquito species KOMARAC;
- evaluation of novel non-pesticide, biodegradable materials for control of mosquito larvae;
- identification of mosquito species present in Montenegro and their distribution;
- identification of mosquito vector species;
- detection of pathogens carried by mosquito vector species;
- modelling of climate changes influence on MV and MBD;
- survey, discussion and feedback of stakeholder's opinions about direction of the research in vector borne disease prevention;
- Introduction of teaching on MV and MBD at already existing courses at BTU and Faculty of Medicine, University of Montenegro...

## About mosquitoes

Mosquito vectors and mosquito-borne diseases are raising threat to Europe, which impact strength is difficult to predict. The main objective is to identify sources of pathogen transmission, vector and environmental factors, hence the best choice for prevention and control of diseases is surveillance and control of mosquito vectors. Montenegro will be the third European country implementing the newly released European Centre for Diseases Prevention and Control (ECDC) "Guidelines for the surveillance of invasive mosquitoes in Europe" and introducing the sustainable programme for monitoring of indigenous species. It is not known which mosquito species live in Montenegro. Last study was conducted more than 30 years ago. Data on mosquito species, their vector capacity and biting behaviour are invaluable for tailoring the appropriate control measures.

## KOMARAC phone application

Purpose of the "Komarac" Mosquito Surveillance Software (MSS) is data acquisition and management of invasive and indigenous mosquito distribution in Montenegro. User side application is developed for Android and Windows Mobile operating systems in order to provide opportunity to as large as possible number of people to be included in process of described data acquisition. Functionality of the user side application is very simple. Objectives of applications are: surveillance of invasive and indigenous species; identification of mosquito species present in Montenegro and their distribution and identification of mosquito vector species.

## Modelling

The studies on Climate change impact on MV and MBD, adaptation and mitigation, numerical weather prediction, climate simulation on regional level, projection of impact of climate change on MV and MBD, that are new for Montenegro, will be initiated through intensive training to be realized within WP2a in collaboration between BTU, IHMS and FoA.

## Soil temperature



# Šta se dešava u Crnoj Gori po pitanju proučavanja komaraca

napravljen je sajt Project LOVCEN

<http://project-lovcen.me/index.php>

Kao i Facebook strana

[https://www.facebook.com/Project-Lovcen-836612506367432/timeline/?ref=aymt\\_homepage\\_panel](https://www.facebook.com/Project-Lovcen-836612506367432/timeline/?ref=aymt_homepage_panel)

od 12.01. imamo 4321 pregleda iz 94 zemlje



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