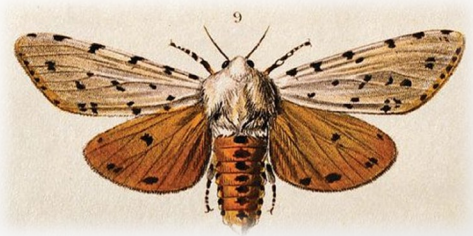
ZDRAVSTVENA I VETERINARSKA ENTOMOLOGIJA

Predstavnici redova

Hymenoptera,



Lepidoptera i

Coleoptera

kao vektori patogena

DR. SC. VLATKA MIČETIĆ STANKOVIĆ,
VIŠA KUSTOSICA

HRVATSKI PRIRODOSLOVNI MUZEJ
CROATIAN NATURAL-HISTORY MUSEUM

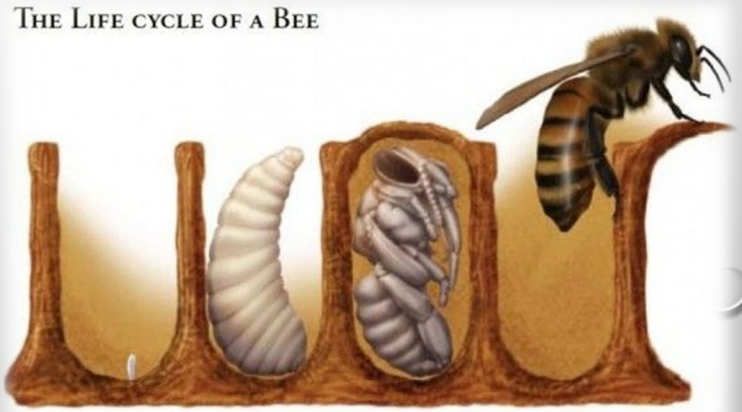
* vlatkams@hpm.hr

Red HYMENOPTERA - opnokrilci

- > 120 000 vrsta!!
- opnasta krila; kukica
- velike sastavljene oči

Symphyta
širokozačani

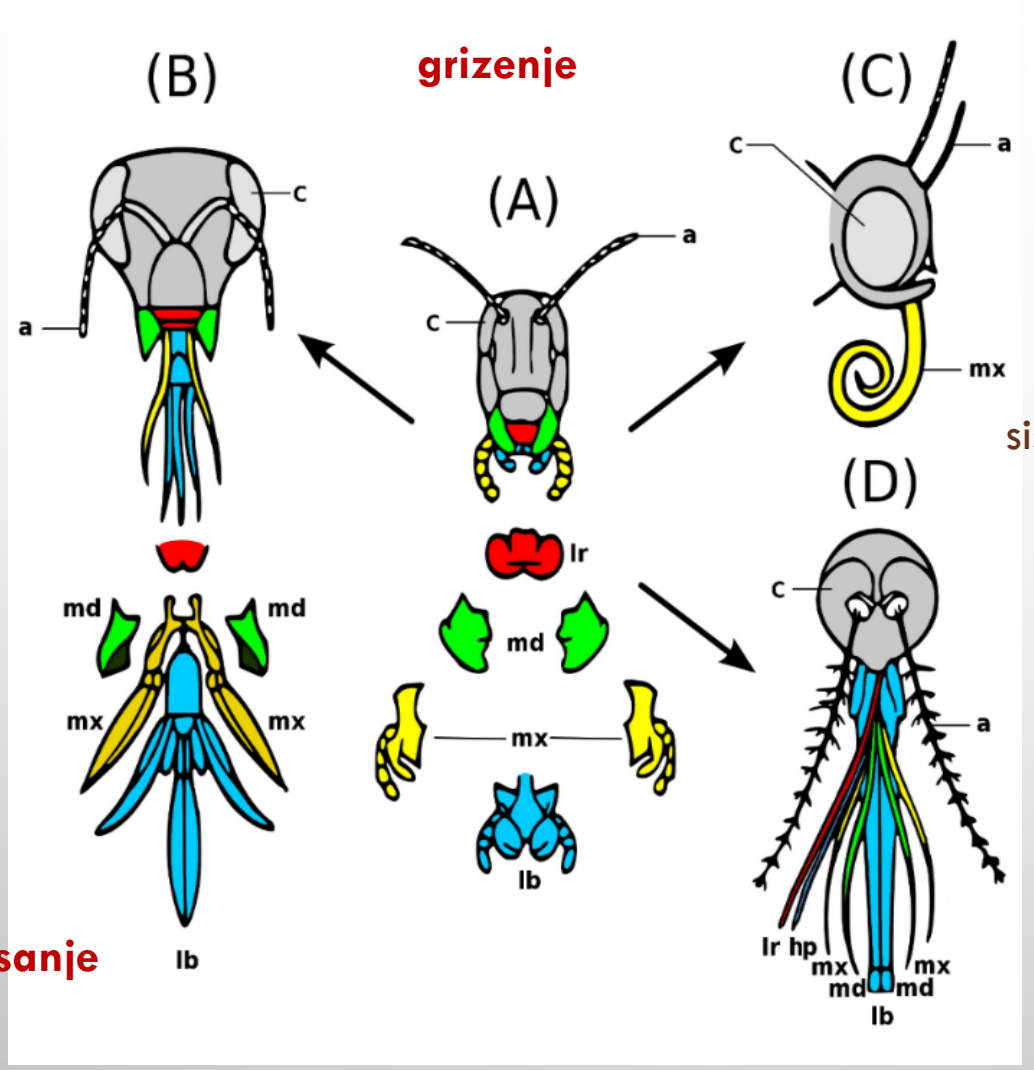
Apocrita
utegnutozačani



JAJE LIČINKA KUKULJICA IMAGO

* Craycroft, 2021; Gullan and Cranston, 2010; Forbes i sur., 2018

Red HYMENOPTERA - opnokrilci



lizanje i sisanje

bodenje i sisanje

Red HYMENOPTERA - opnokrilci

- > 120 000 vrsta!!
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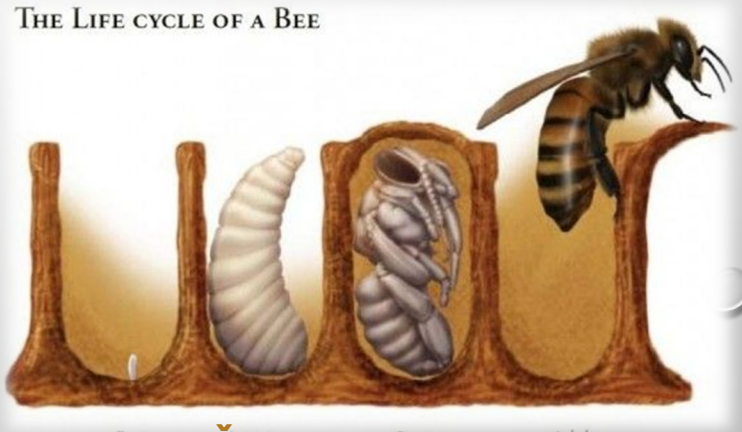
Symphyta
širokozačani

Apocrita
utegnutozačani



JAJE LIČINKA KUKULJICA IMAGO

* Craycroft, 2021; Gullan and Cranston, 2010; Forbes i sur., 2018

Red HYMENOPTERA - opnokrilci

Carstvo Animalia
Podcarstvo Bilateria
Koljeno Arthropoda Arthropoda
Potkoljeno Hexapoda
Razred Insecta
Podrazred Pterygota
Nadred Holometabola
Red Hymenoptera
Podred Apocrita
Mon. skupina Aculeata

APOIDEA

Apidae
medonosne pčele

Halictidae
znojne
pčele

VESPOIDEA

Formicidae
mravi

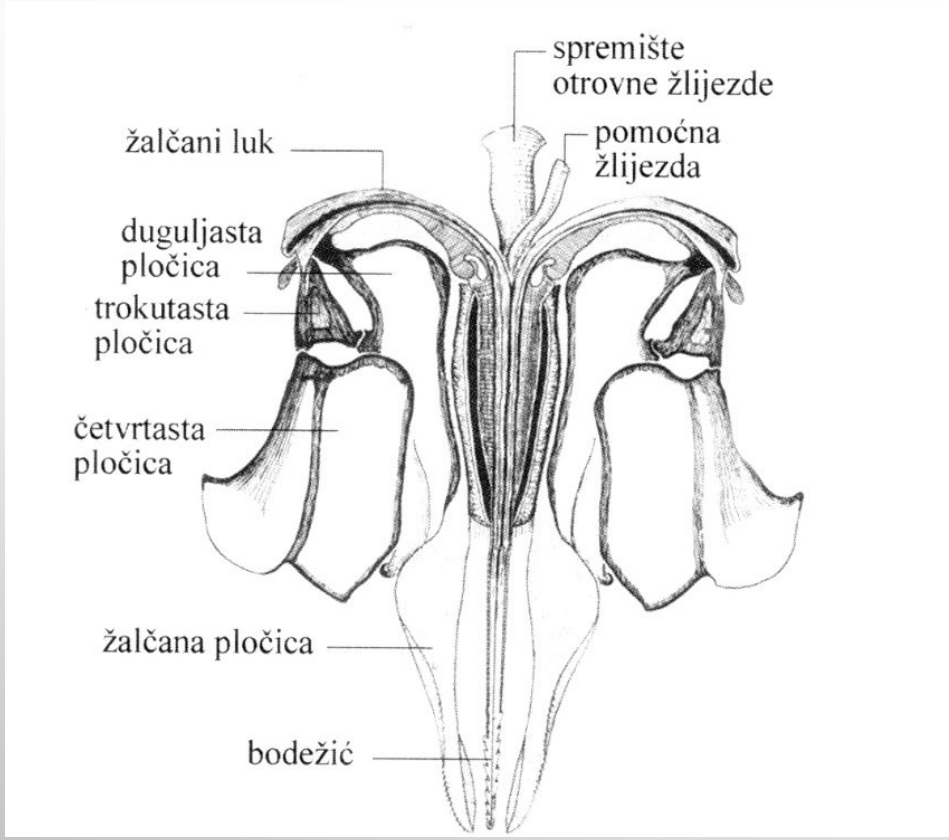
Mutillidae
mravarice

Pompilidae
putarice

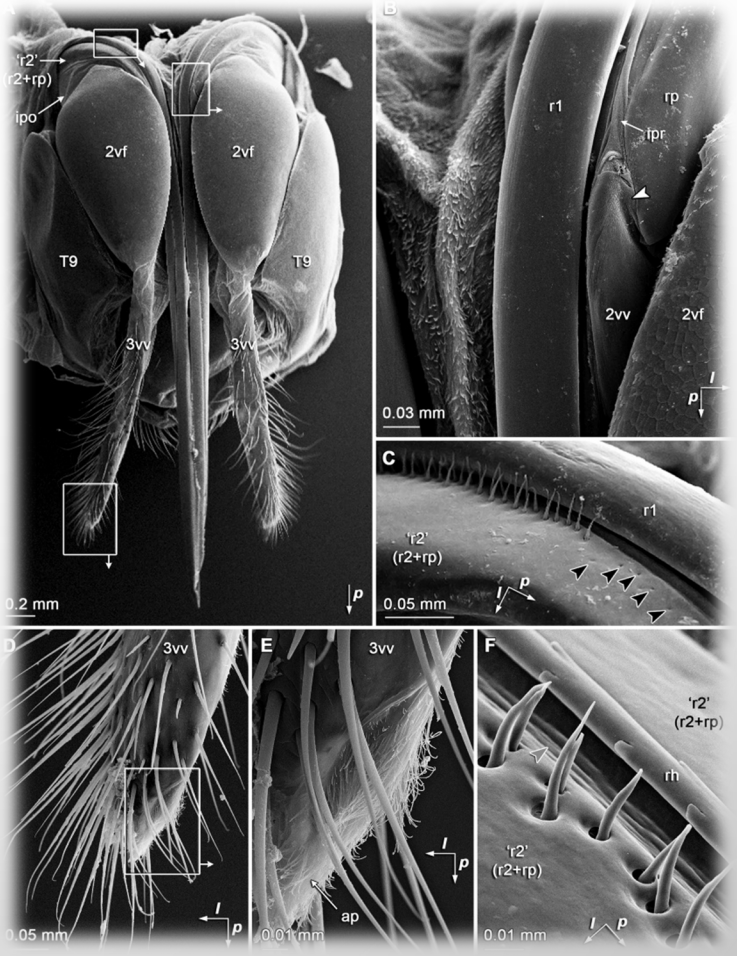
Vespidae
ose

*www. https://www.itis.gov.;

Red HYMENOPTERA - opnokrilci



Građa žalčanog aparata



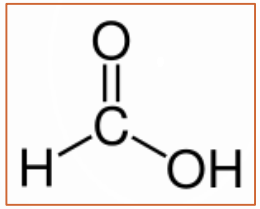
Fotografija žalčanog aparata stršljena elektronskim mikroskopom

*Habdija i sur., 2004; Stetsun i Matushkina, 2020

Red HYMENOPTERA - opnokrilci

Formicidae

- kozmopoliti
- zadružni opnokrilci



mravlja kiselina citotoksičan, hemolitičan, fungicidan, insekticidan i baktericidan

- Rod *Solenopsis* > 200 vrsta, nativni J. Amerika

Solenopsis invicta Buren, 1972 *Paraponera clavata* (Fabricius, 1775)

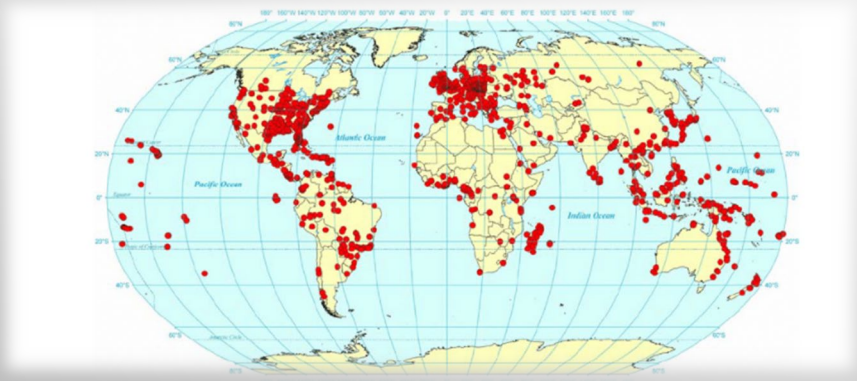
*Krinsky 2013

Red HYMENOPTERA - opnokrilci

Formicidae

- 2 mm veličina tijela
- autohton tropska Azija
- kolonije do milijun jedinki
- vektor patogena:
  Staphylococcus, Pseudomonas, Klebsiella, Enterobacter, Acinetobacter, Escherichia, Listeria; Candida, Aspergillus..

Monomorium pharaonis (Linnaeus, 1758)
faraonski mrav



Rasprostranjenost

*Beatson 1972; Wetterer 2010

Red HYMENOPTERA - opnokrilci

Vespidae

Vespa velutina Lepeletier, 1836

Vespula germanica (Fabricius, 1793)

Apidae

Apis: A. mellifera Linnaeus, 1758
A. dorsata Fabricius, 1793
A. cerana Fabricius, 1793
A. florea Fabricius, 1787

Apitoksinoterapija -
bee venom therapy

*Villemant, 2008, Rojas-Nossa i Calviño-Cancela, 2020

Red HYMENOPTERA - opnokrilci

Veterinarska važnost

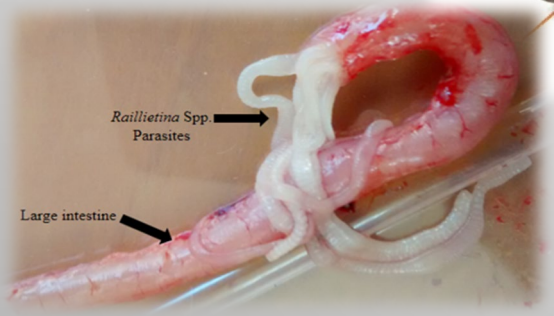
Vatreni mravi – tek okoćene životinje

Ose – mastitis krava

A. meliffera scutellata
Lepeletier, 1836
afrička pčela

Raillietina tetragona (Molin, 1858)

Formica spp.

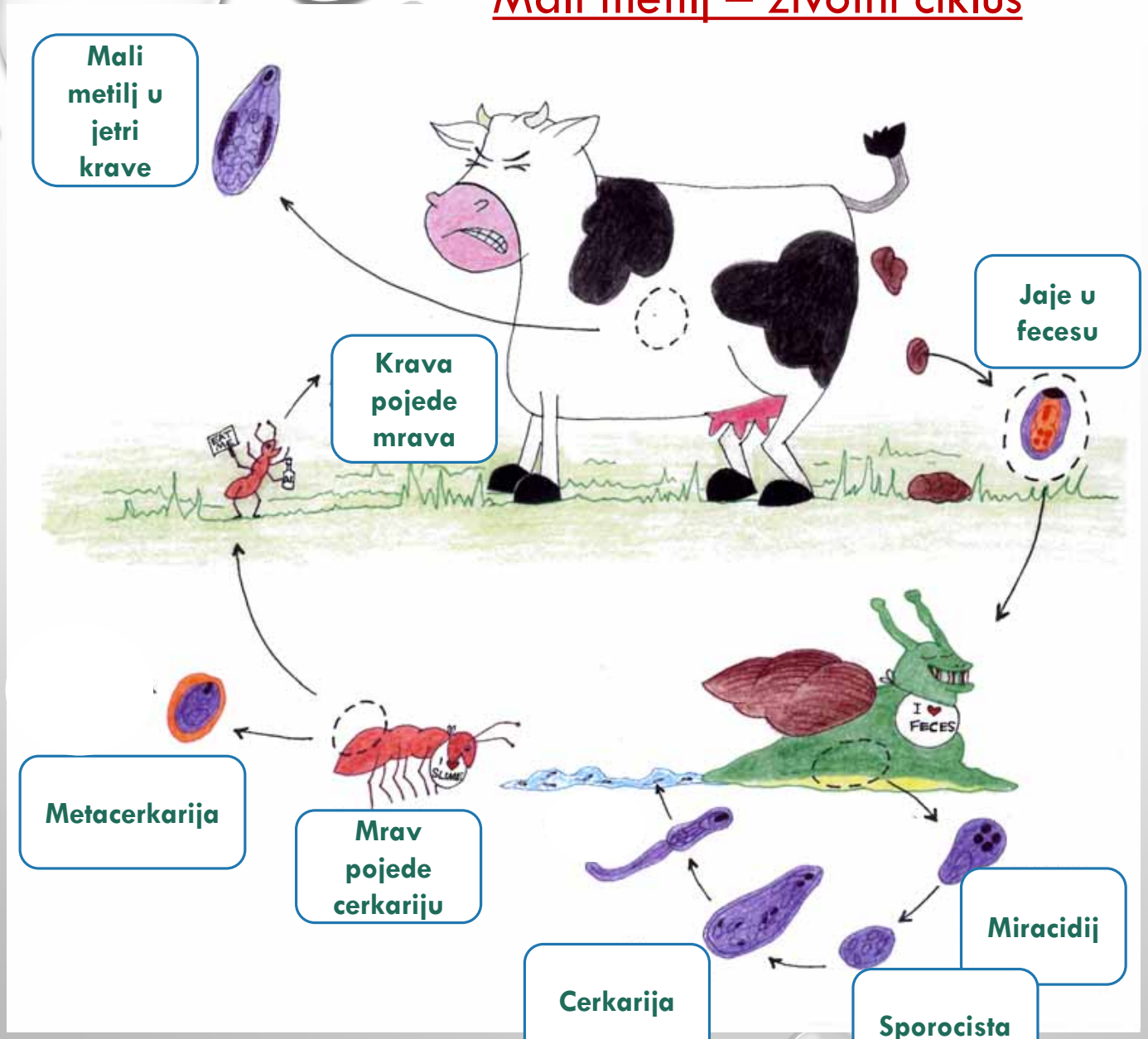


peradarstvo

Dicrocoelium dendriticum (Rudolphi, 1819)

*Lofgren, 1986; Kamal i sur., 2020

Mali metilj – životni ciklus



MIRACIDIJ – trepetljikava plivajuća ličinka

CERKARIJA – ličinka s repićem

METACERKARIJA – začahurena ličinka

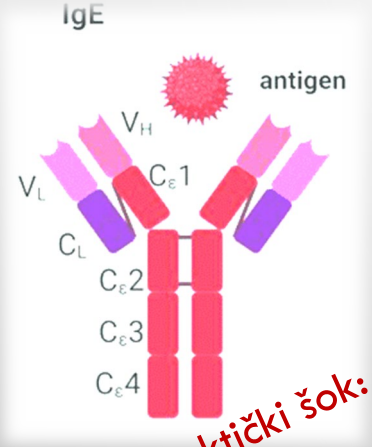
Zoonoza metiljavost

*http://goo.gl/6QHKwW;

Red HYMENOPTERA - opnokrilci

Javno-zdravstvena važnost

- 22% na 1 mil. posjeta (2001-2010.)
- Pčele 4x > Ose
- Vatreni mravi: 1998. 3,3 mil. posjeta



Anafilaktički šok: IgE

MJESTO UBODA REAKCIJA

LOKALNA

VELIKA LOKALNA

TOKSIČNA

SISTEMATSKA

*Xu i dr., 2012; Kariyawasam i James, 2020

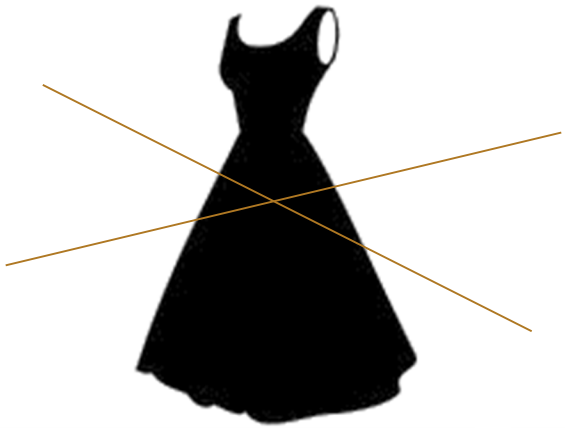
Red HYMENOPTERA - opnokrilci

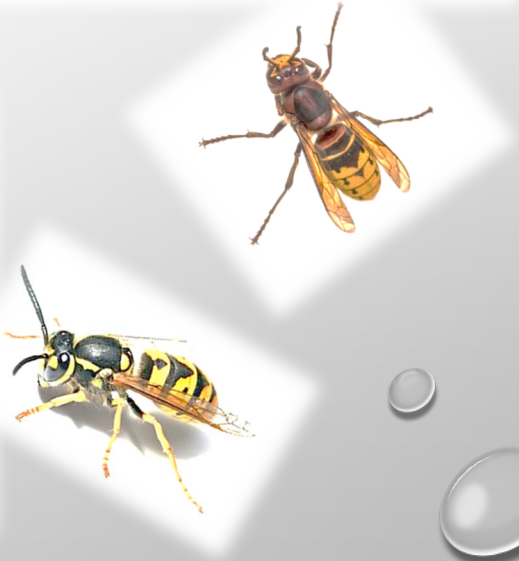
odstraniti žalac

hladan oblog

oprati mjesto uboda

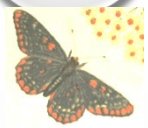
antihistaminici
epinefrin





*Reed i Landolt, 2019

Red LEPIDOPTERA - leptiri



- > 180 000 vrsta
- velike sastavljene oči
- ticala različite građe
- usni organi za sisanje - proboscis
- POTPUNA PREOBRAZBA

Danji leptiri

Noćni leptiri

Životni ciklus leptira

*Krenn, 1998; Gullan i Cranston, 2010

Red LEPIDOPTERA - leptiri

lepidopterizam

Noctuoidea
sovice

Bombycoidea
prelci

Zygenoidea
ivanjske ptičice

~ 100 vrsta od medicinskog i veterinarskog značaja

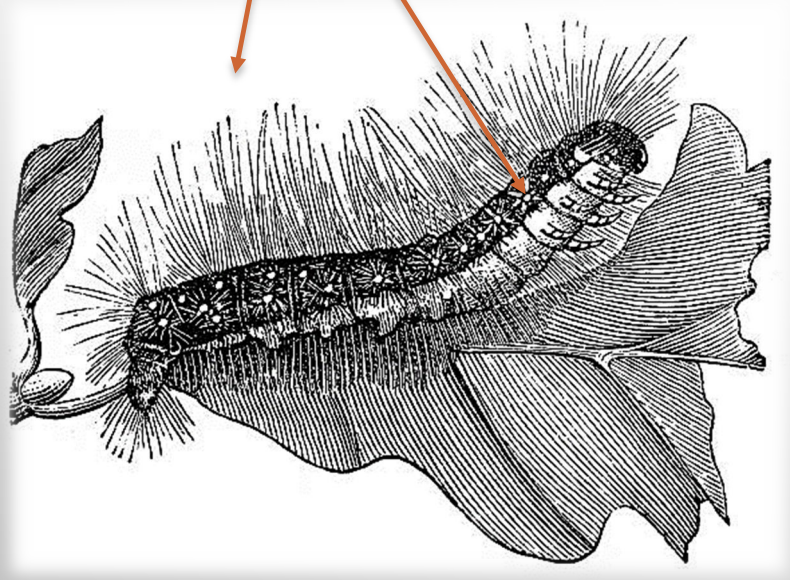
Papilionoidea
lastinrepci

* Plotkin i Goddard, 2013

Red LEPIDOPTERA - leptiri

Gusjenica

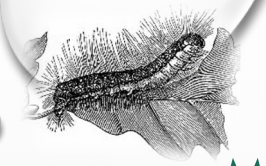
erucizam



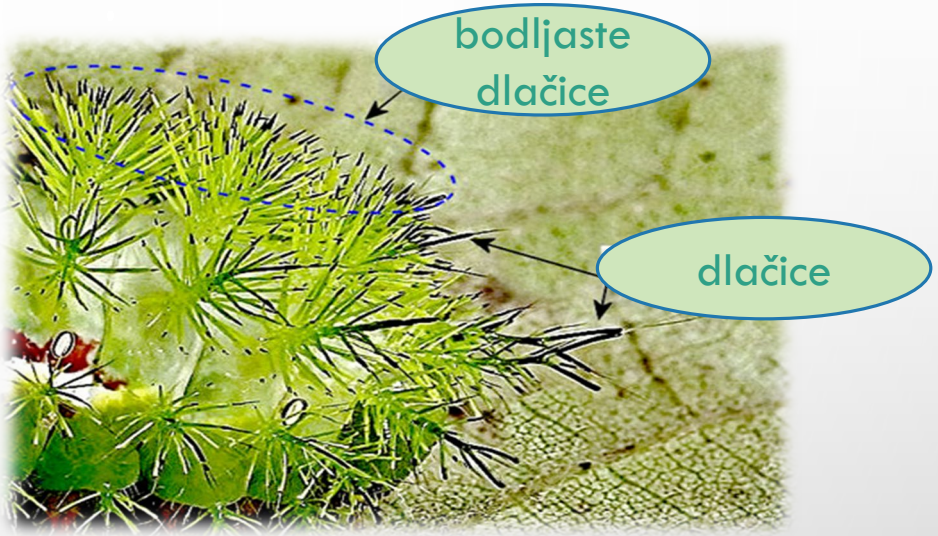
Imago

- hematofagni
- lakrimafagni
- sudofagni

Red LEPIDOPTERA - leptiri



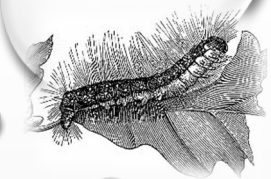
Megalopygidae
flanelni moljci



Megalopygae opercularis (JE Smith, 1797)

*Vidal i Lastória, 2014;

Red LEPIDOPTERA - leptiri



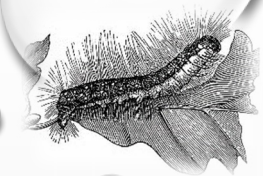
Limacodidae
pužoliki prelci

Acharia stimulea (Clemens, 1860)

Saturniidae
noćna paunčad

Lonomia obliqua Walker, 1855

Red LEPIDOPTERA - leptiri



Lymantriidae
gubari prelci

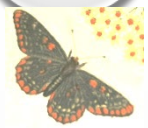
Thaumetopoeidae
četni prelci, procesionari

Lymantria dispar
Linnaeus, 1758.

…Arctiinae, Catocalinae, Lasiocampidae, Noctuidae..

Thaumetopoea processionea (Linnaeus, 1758)
hrastov povorkaš

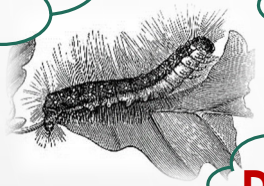
Red LEPIDOPTERA - leptiri



Zdravstvena i veterinarska važnost

Radni erucizam

Alergije



Dermatitis

Ingestija

Abortusi konja (2001/2002.) USA

Malacosoma americanum
(Fabricius, 1793)

*Collenette 1934, Krinsky, 2013

Red LEPIDOPTERA - leptiri

Lakrimalne vrste

> 100 vrsta; većinom tropi

…konj, kopitari, slonovi..1852. prvi zapisi

suze ili tkivo; **AKTIVNO ILI PASIVNO**

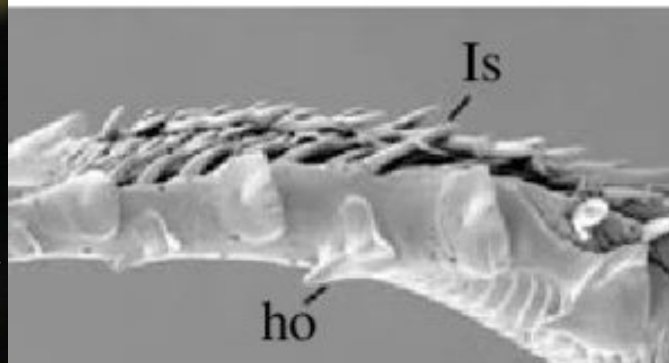
Geometridae, Nymphalidae, Noctuidae, Crambidae, Drepanidae, Sphingidae…

Hemiceratoides hieroglyphica (Saalmüller, 1891)

Lobocraspis griseifusa Hampson, 1895

- Bänziger i Büttiker (1969); Hilgartner i sur., 2007; Plotkin i Goddard, 2013

Hemiceratoides hieroglyphica



Red LEPIDOPTERA - leptiri

Lakrimafagne vrste

> 100 vrsta; većinom tropi

…konj, kopitari, slonovi..1852. prvi zapisi

suze ili tkivo; **AKTIVNO ILI PASIVNO**

Geometridae, Nymphalidae, Noctuidae, Crambidae, Drepanidae, Sphingidae…

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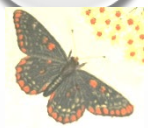
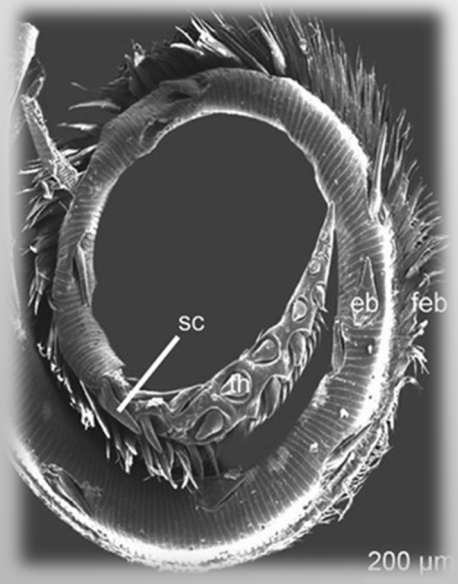
Red LEPIDOPTERA - leptiri



Hematofagne vrste

Proboscis – bodlje i kukice

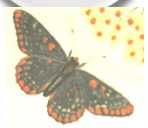
Calyptra sp.



PROBOSCIS

*Collenette 1934

Red LEPIDOPTERA - leptiri



Zdravstveni značaj

- lokalna upala i iritacija
- *Lobocraspis griseifusa* - najveća bol

POTENCIJALNI PRIJENOS PATOGENA

Staphyloccocus sp.

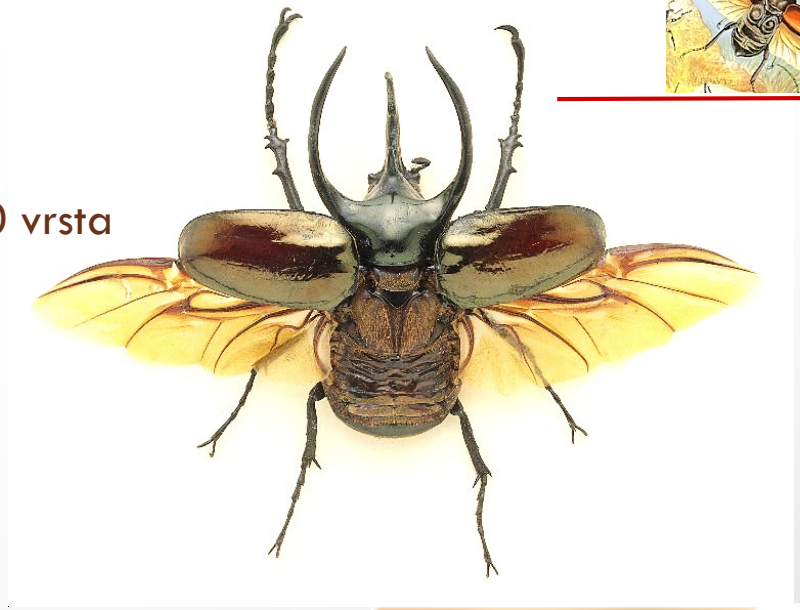
Dr. Hans Bänzinger i
Chaeopsestis ludovicae Le Cerf, 1941

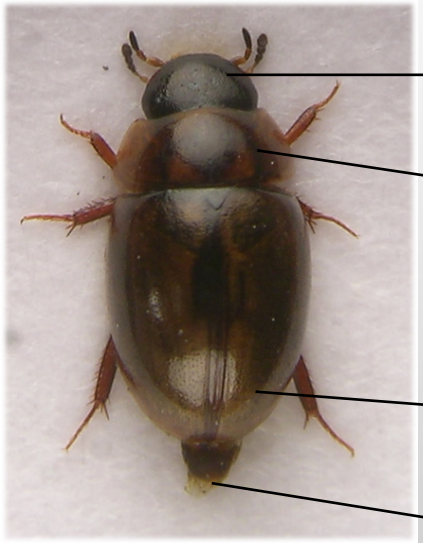
Dr. J. M. Zaspel

*Collenette 1934; Gouws i Howell, 1995

Red COLEOPTERA - kornjaši

- > 350 000 opisanih vrsta
- medicinski i veterinarski značaj < 100 vrsta
- grč. *elytron* – pokrov
- ticala 11 članaka; spolni dimorfizam
- usni organi za grizenje





glava (caput)

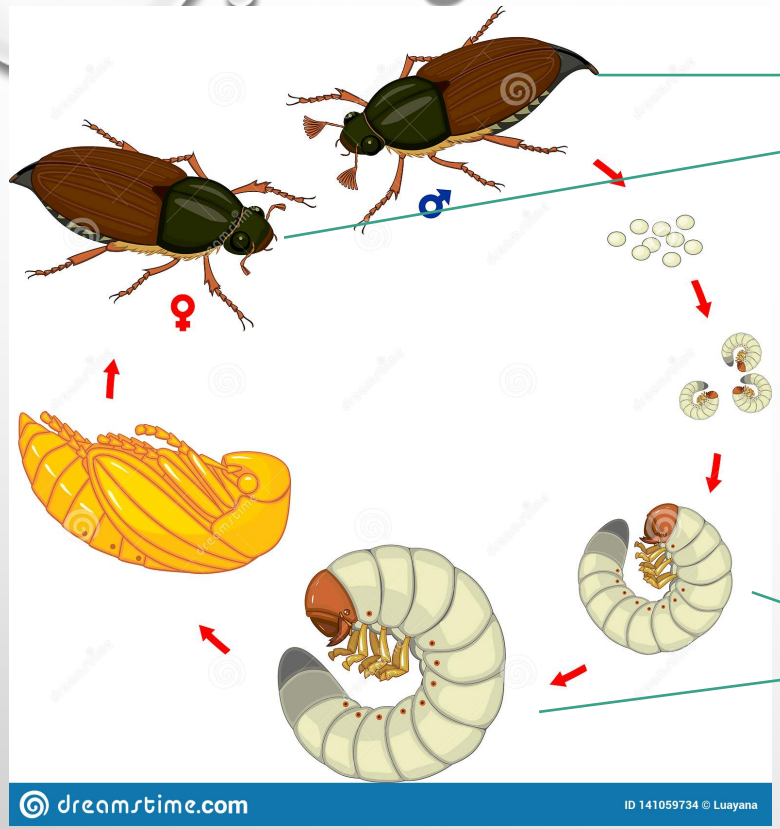
1. kolutić prsa (prothorax)

2. i 3. kolutić prsa i zadak (pterothorax-abdomen)

genitalije

*Crowson, 1981

Red COLEOPTERA - kornjaši



skarabijaza

kantarijaza

plikovi

iritacije

respiratorne alergije

gastrointestinalne smetnje

toksini

vektori patogena

mehanička oštećenja

međudomadari

*Krinsky, 2015

Red COLEOPTERA - kornjaši

vektori patogena

Salmonella sp.

Escherichia sp.

Streptococcus sp.

Bacillus sp.

Aspergillus sp.

Alphitobius diaperinus Panzer, 1797

manji brašnar

virus ptičje gripe

virus kozica

rotavirusi

Scarabaeidae, Silphidae, Dermestidae: potencijal prijenosa *Salmonella*, antraks

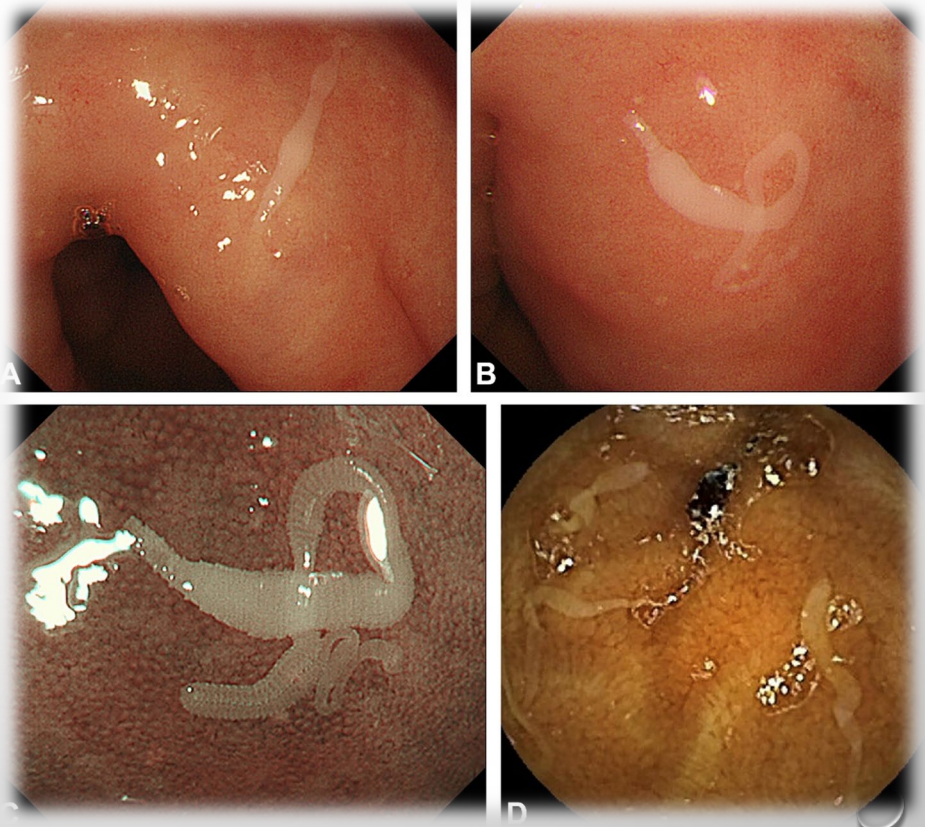
*Krinsky, 2015; Axtell, 1999

Red COLEOPTERA - kornjaši

međudomadari

Hymenolepis diminuta (Rudolphi, 1819)
štakorska trakavica

Tenebrio molitor Linnaeus, 1758
veliki brašnar



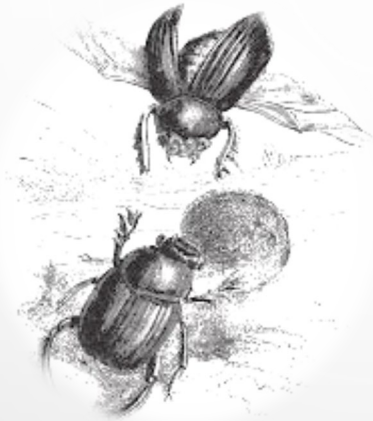
Hymenolepis nana Ransom, 1901 -
patuljasta trakavica; infekcija čovjeka

*Tanaka i sur., 2017

Red COLEOPTERA - kornjaši

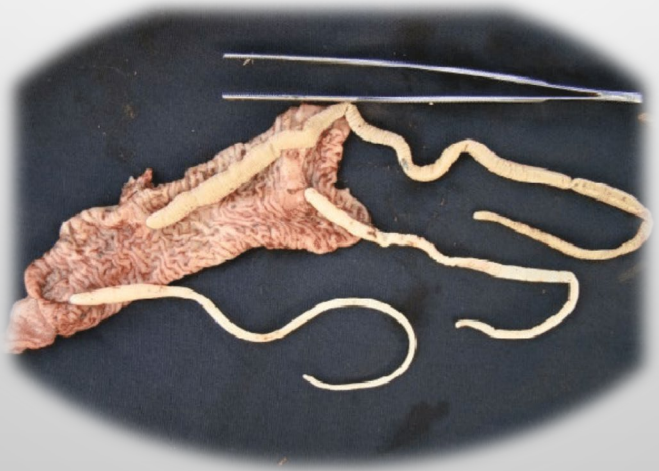
međudomadari

Raillietina cesticillus Molin, 1858



Taenia saginata
Goeze, 1782

Gongylonema pulchrum
Molin, 1857



Macracanthorhynchus hirudinaceus (Pallas, 1781)

Red COLEOPTERA - kornjaši

toksini

Porodica Meloidae – kokice, prištilci

Lytta vesicatoria (Linnaeus, 1758) – španjolska muha

Kantaridin

18-24 ha nakon kontakta

*Krinsky, 2013

Red COLEOPTERA - kornjaši

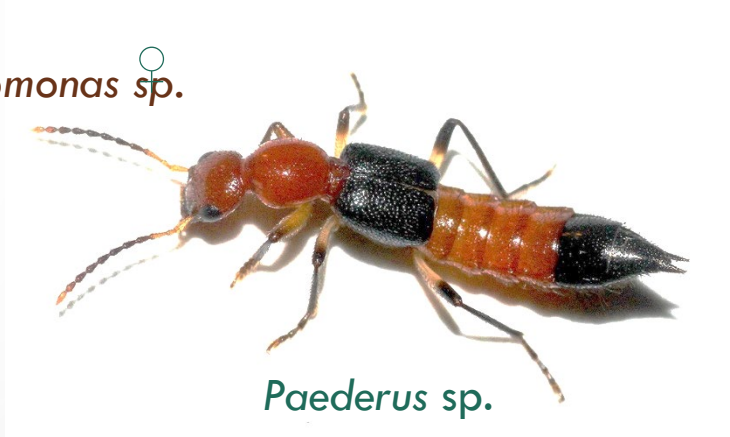
toksini

Porodica Staphylinidae - kusokrilci

- toksin pederin – ekstremno jak – sinteza *Pseudomonas sp.*

  iritacija 24 – 72 h nakon kontakta

  zrcalne iritacije; gnojni čirevi



Paederus sp.

*Uzunoğlu i sur., 2017; Pierce i sur.-, 2018

Red COLEOPTERA - kornjaši

mehanička oštećenja

Dermestidae - kožojedi

Dermestes maculatus
De Geer, 1774

Scarabaeidae - balegari

Onthophagus sp.

Caccobius sp.

Copris sp.

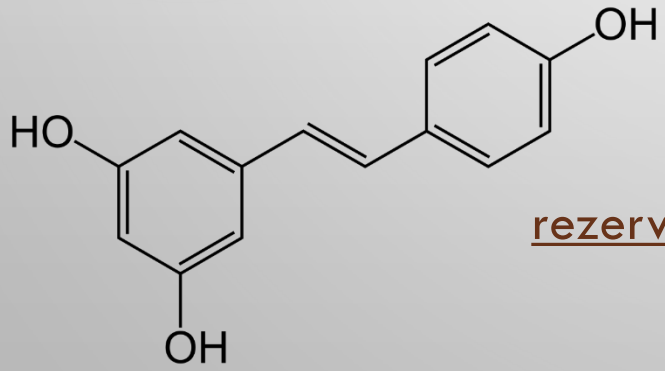
*Krinsky, 2015

Red COLEOPTERA - kornjaši

Coccinellidae – božje ovčice

Alkaloidi – kokcinelini

Harmonia axyridis (Pallas, 1773)



rezervatrol

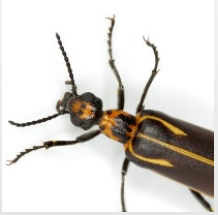
*Mičetić Stanković i sur., 2011

Red COLEOPTERA - kornjaši

Veterinarska važnost

ingestija

Macrodactylus subspinosus (Fabricius, 1775)



groznica

dehidracija

gastritis

smrt

groznica

dehidracija

smrt

*Krinsky, 2013

Red COLEOPTERA - kornjaši

Prevencija i kontrola

- edukacija
- pesticidi
- sanitarni standard
- kvaliteta stočne hrane

HVALA NA PAŽNJI

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