

Morfološke adaptacije medicinski i veterinarski važnih kukaca



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Uvod

- Adaptacija – fenotipsko svojstvo koje ima određenu funkcionalnu ulogu, a evoluiralo je prirodnom selekcijom
- Morfologija tijela, krila, usnih organa, nogu i osjetilnih struktura



PHTHYRIUS PUBIS



IXODES SCAPULARIS



CIMEX LECTULARIUS



OTODECTES CYNOTIS



CULICIDAE



PEDICULUS HUMANUS



SARCOPTES SCABIEI



PARASITIFORMES



HYPODERMA BOVIS



DEMODEX FOLLICULORUM



SIMULIIDAE



NITV

Oblik tijela

Spljoštenost - prilagodba za kretanje na domadaru i skrivanje

Lateralna spljoštenost

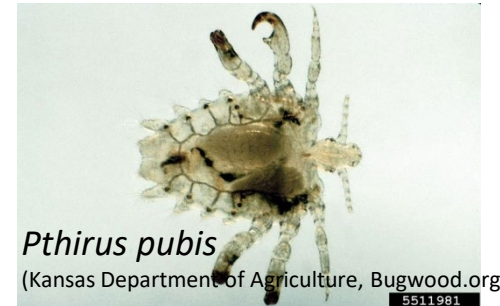


Buhe (Siphonaptera)

Dorzoventralna spljoštenost



Stjenice (Hemiptera), uši (Phthiraptera), *beaver beetles* (Coleoptera), krpelji (Acari: Ixodida)



Dodatne prilagodbe

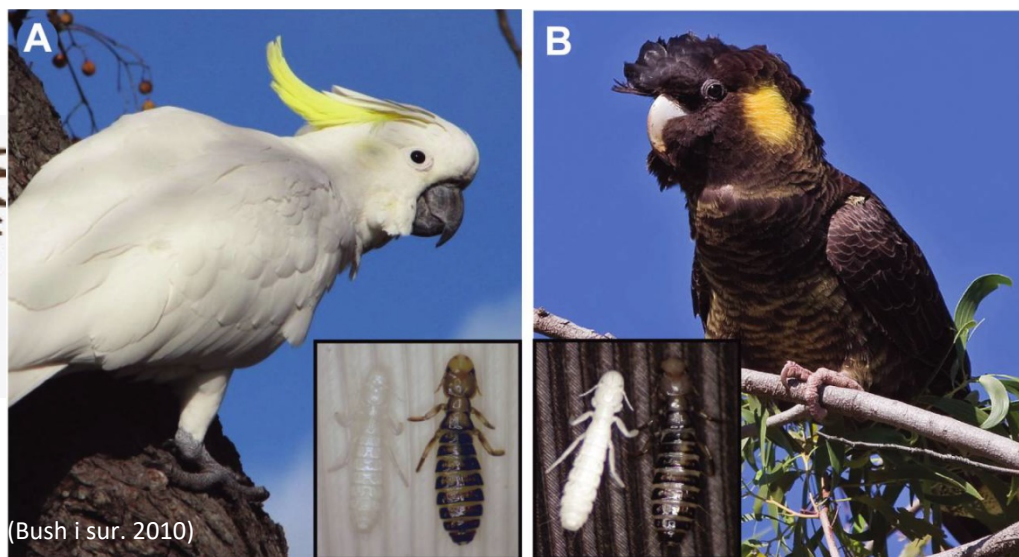
Sklerotizirane „četke“ na glavama buha



Moguće funkcije:

1. Lakše kretanje kroz krzno
2. Pričvršćivanje za dlake
3. Zaštita

Kriptička obojenost kod uši



*Neopsittaconirum
albus*

*Neopsittaconirum
borgioli*

Krila

Dobro razvijena krila



Tabanus sulcifrons
(Bruce Marlin)

Obadi (Diptera: Tabanidae) – 45 km/h

Reducirana krila



Lipoptena cervi
Ušare (Diptera: Hippoboscidae)

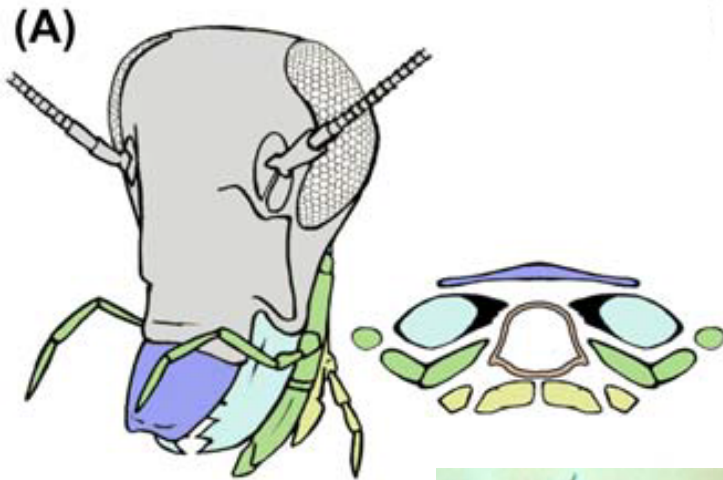
Odbacuje krila nakon što se pričvrsti za domadara



Potpuno odsutna krila

Usni organi - Insecta

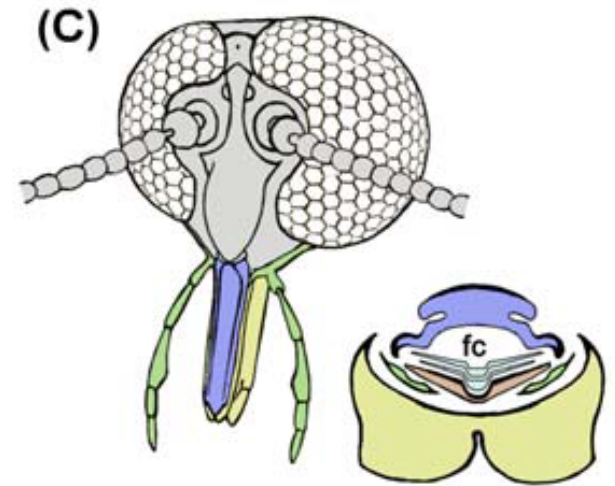
Hranjenje čvrstom hranom ili tkivima
domadara



Organi za grizenje

Žohari

Hranjenje krvlju



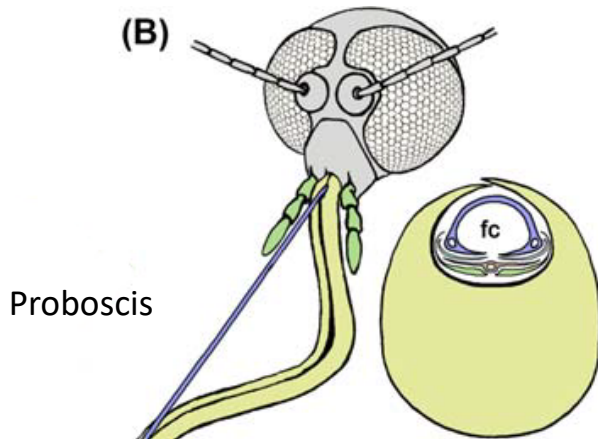
Telmofagija – hranjenje
krvlju s mjesta ugriza
Organi za grizenje i sisanje

Culicoides sonorensis
(Diptera: Ceratopogonidae)



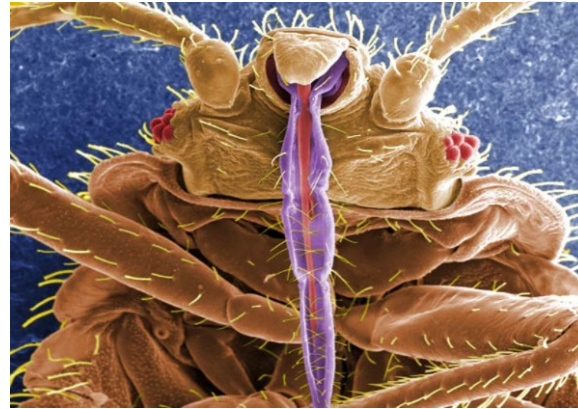
Usni organi - Insecta

Hranjenje krvlju

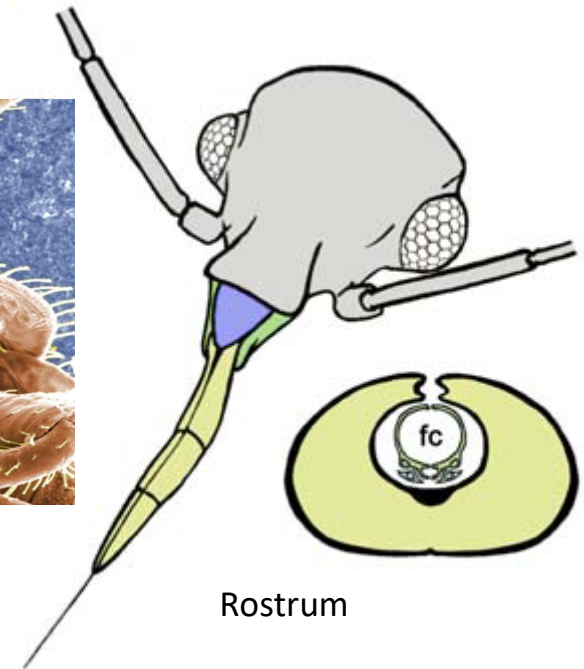


Culiseta longiareolata
(Alvesgaspar)

Hranjenje krvlju



Stjenice (Janice Haney Carr)



Solenofagija – različite strukture s istom funkcijom

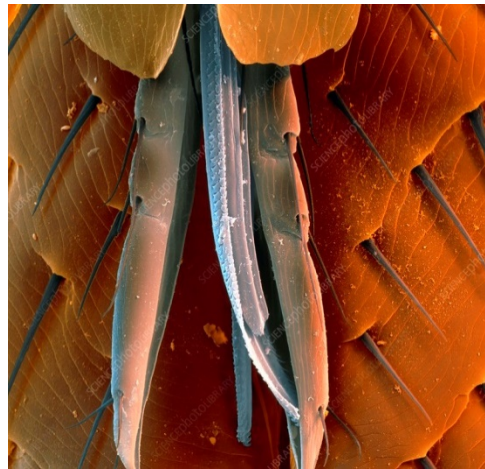
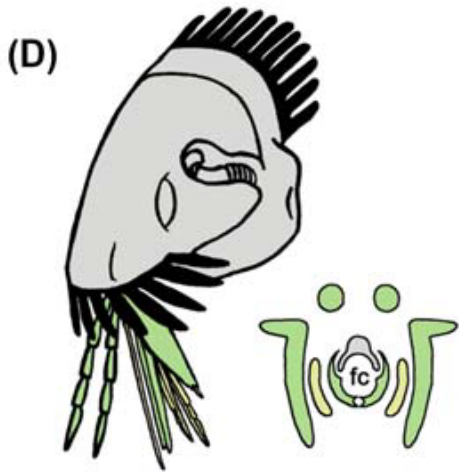
Solenofagija – direktno hranjenje krvlju

Organi za bodenje i sisanje

Labrum
 Mandible
 Maxilla
 Labium
 Hypopharynx

Usni organi - Insecta

Hranjenje krvlju

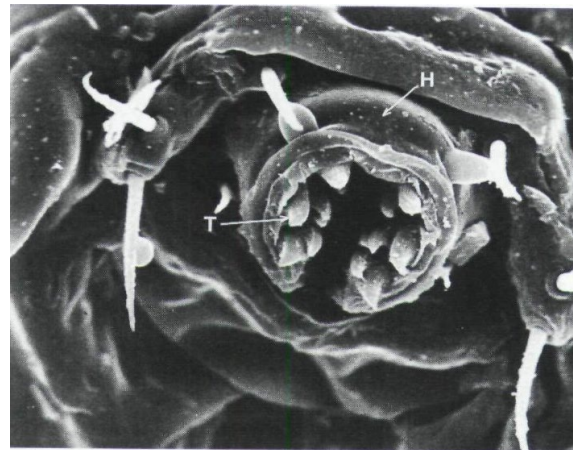


Buhe (Eye of Science)

Bušenje kože maksilama koje se oblikuju u cijev za hranjenje

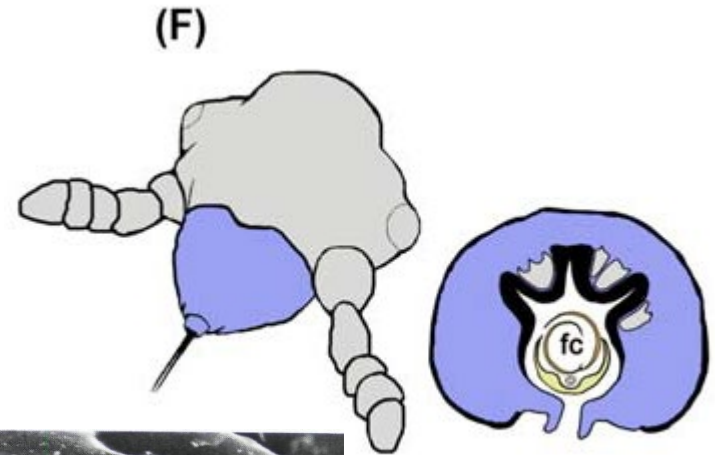
Uši

(Burns i Sims 1988)

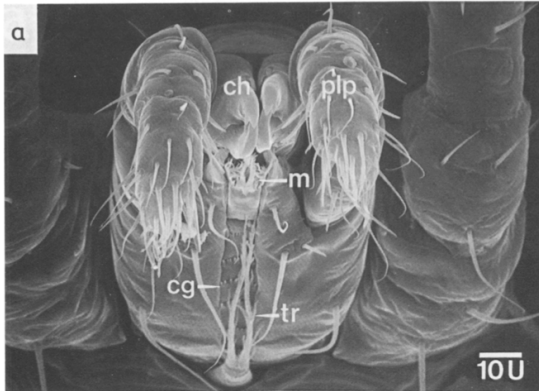


Posebna struktura – haustelum sa „zubima” za pričvršćivanje

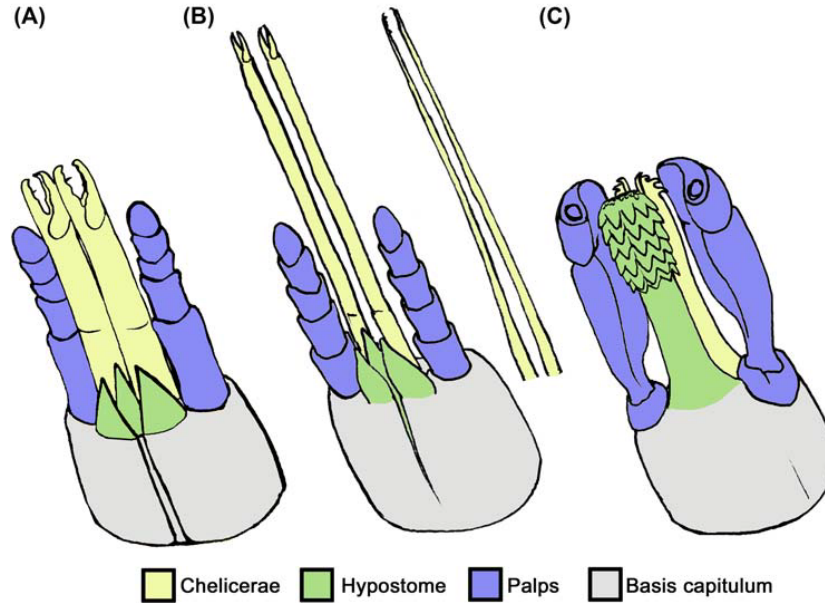
Hranjenje krvlju



Usni organi - Arachnida



Pneumolaelaps (Acari: Mesostigmata) (Royce i Krantz 1989)



Amblyomma (Acari: Ixodida)

Chelicere za manipulaciju hranom – većina grinja



Ornithonyssus bacoti (Acari: Mesostigmata) (Beck i Fölster-Holst 2009)

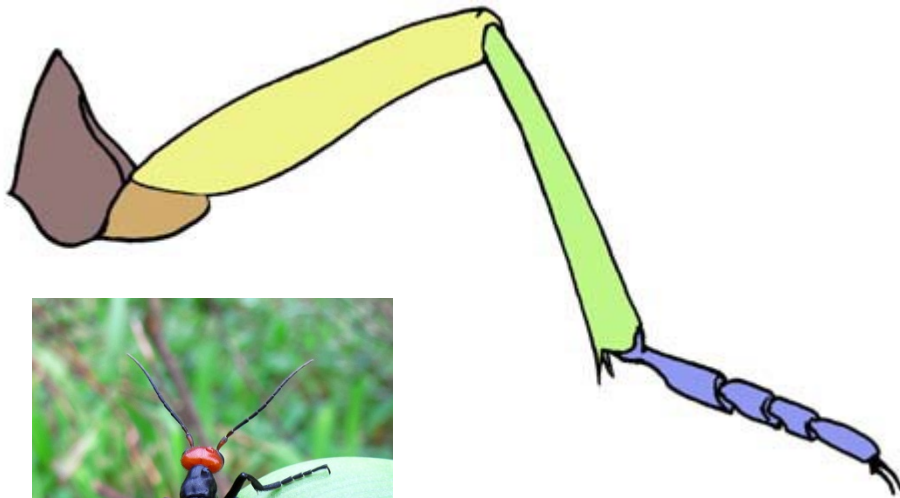
Chelicere za bušenje kože



Chelicere za bušenje kože, hipostoma za učvršćivanje pod kožom

Noge - Insecta

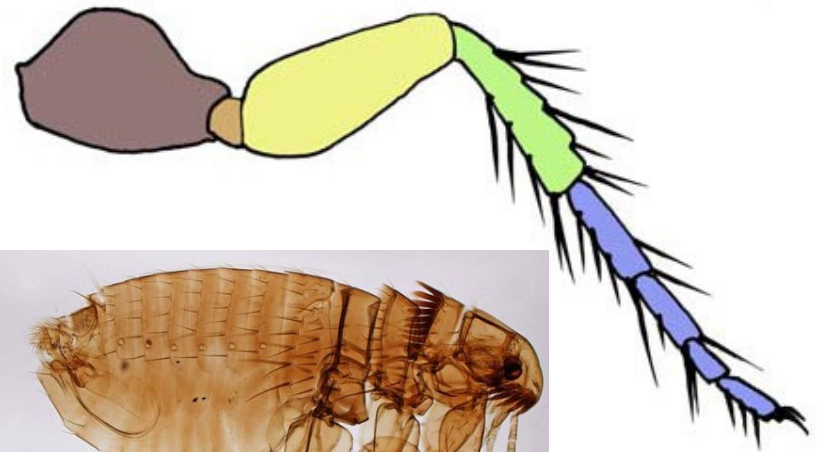
Tipična noga



Epicauta hirticornis
(Vaikoover)



Noge za skakanje

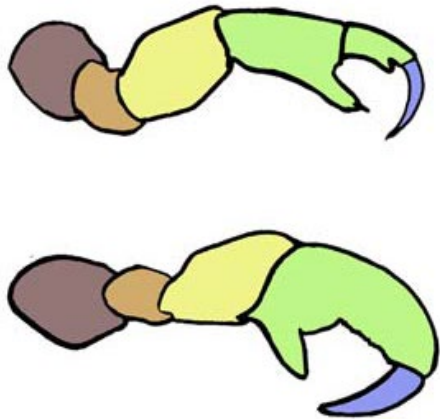


Protein
rezilin

Ctenocephalides felis (Dr. Michael
W. Dryden)

Noge - Insecta

Noge za držanje



Pediculus humanus capitis

Noge za držanje



Lipoptena cervi (Diptera: Hippoboscidae)

-  Coxa
-  Trochanter
-  Femur
-  Tibia
-  Tarsus

Phtirus pubis

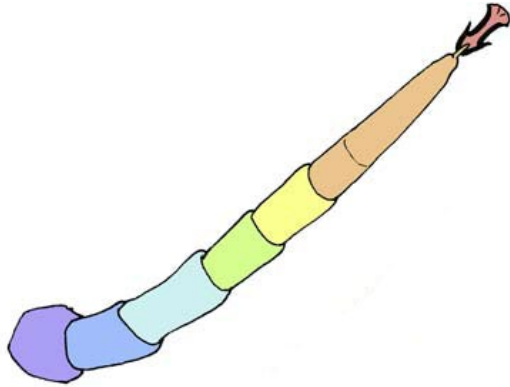
(Nicole Ottawa)



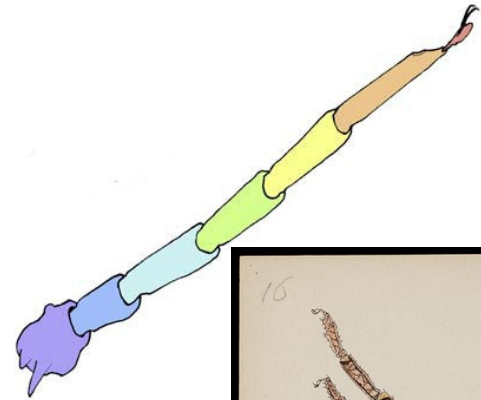
Zdepaste noge s igličastim projekcijama

Noge - Arachnida

Tipična noga



Noge za hvatanje (1. noga)



Pneumolaelaps sp. (female, dorsal view)

Pneumolaelaps sp. (Acari: Laelapidae)

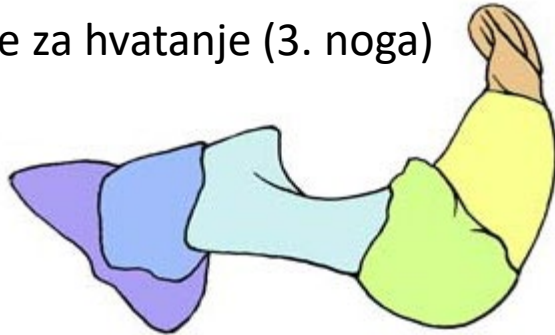
-  Coxa
-  Trochanter
-  Femur
-  Genu
-  Tibia
-  Tarsus
-  Apotele



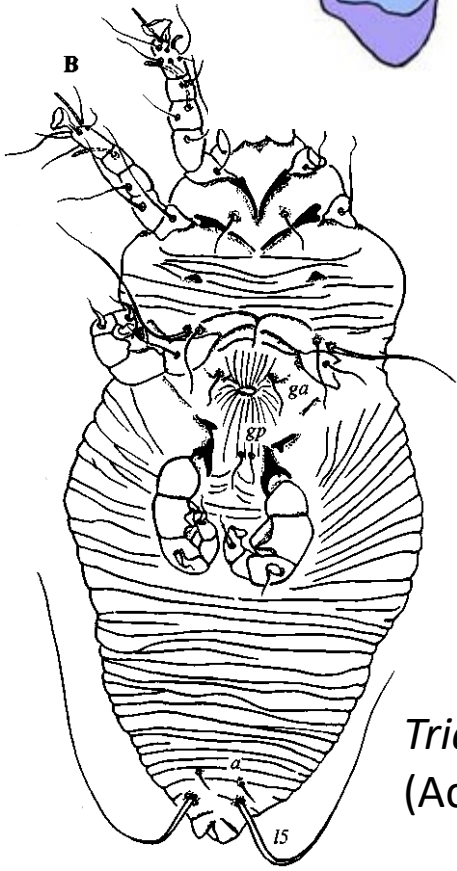
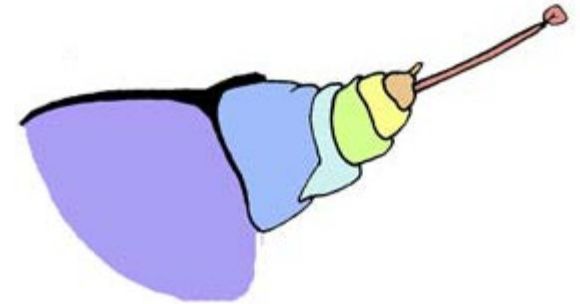
Amblyomma sp.
(Acari: Ixodidae)

Noge - Arachnida

Noge za hvatanje (3. noga)



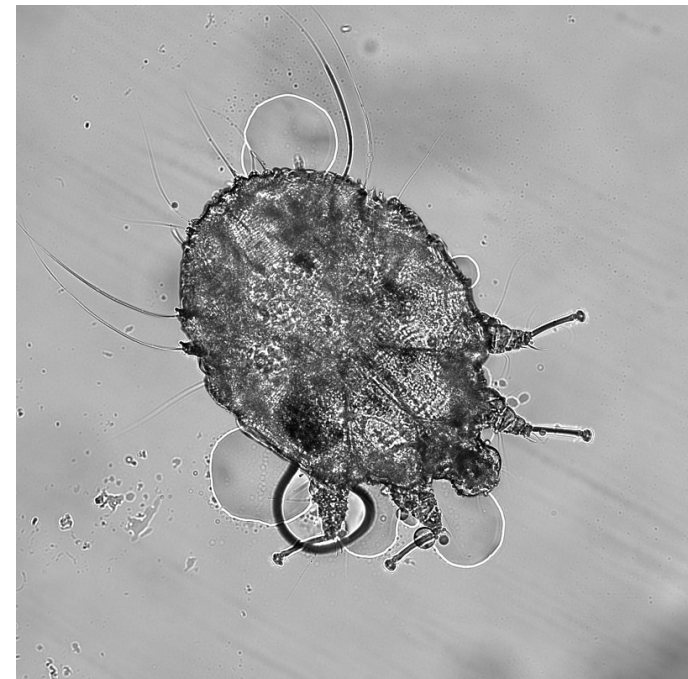
Noge za prijanjanje (1. noga)



-  Coxa
-  Trochanter
-  Femur
-  Genu
-  Tibia
-  Tarsus
-  Apotele

Sarcoptes scabiei
(Sarcoptiformes:
Sarcoptidae)
(Arthur Goldstein)

Trichoecius calomyisci
(Acari: Myocoptidae)



Osjetilne strukture

Oči

Reducirane ili odsutne

Ctenocephalides felis (Siphonaptera)



Joseph Berger, Bugwood.org

5385965

Snažno razvijene



Tabanus sulcifrons (Diptera: Tabanidae) (Bruce Marlin)



(Fedaro)

Diptera: Culicidae



Pediculus humanus capitis
(Phthiraptera)

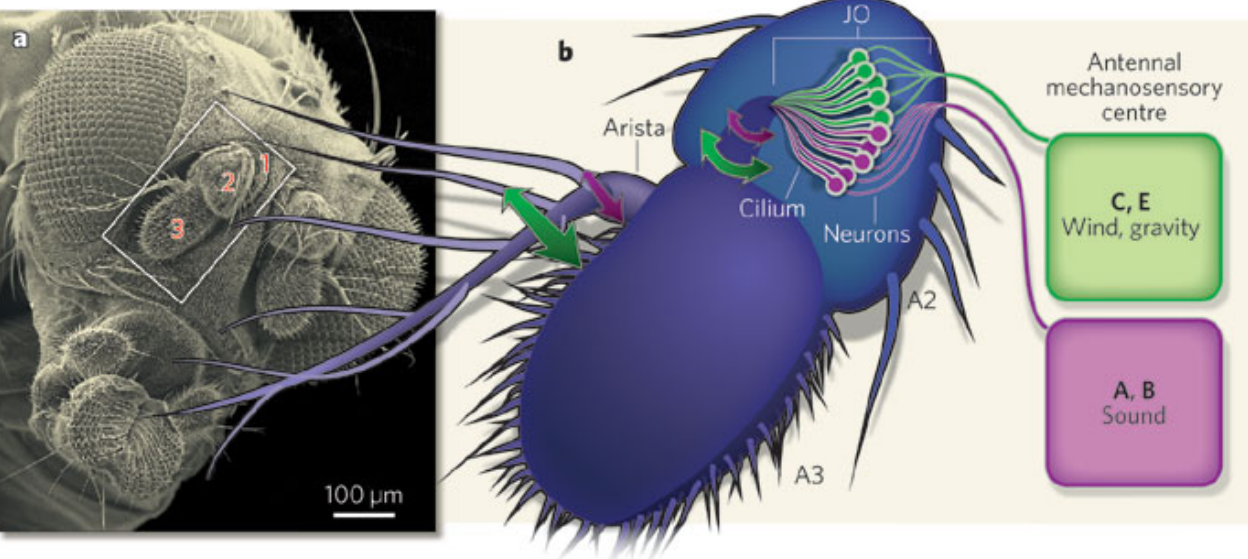
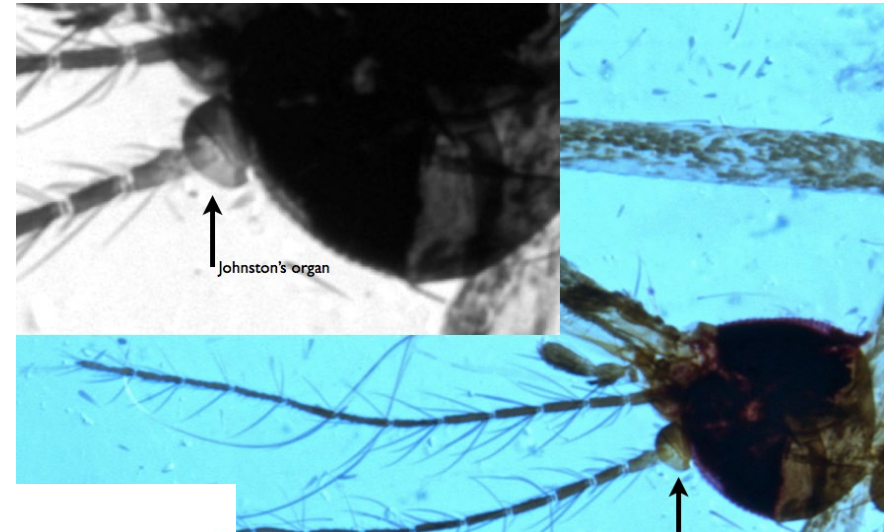
Osjetilne strukture

Johnstonov organ

Organ za detekciju vibracija (uključujući i pokrete i glasanje plijena)

Komarci

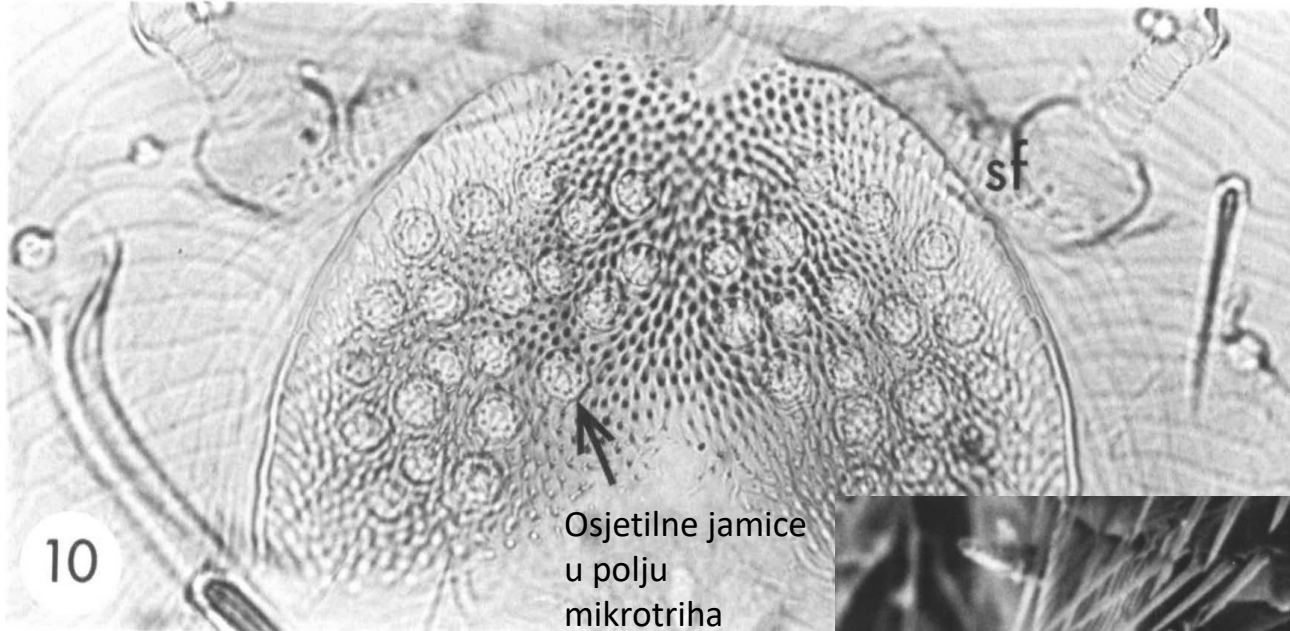
Dodatna osjetila na ticalima: CO₂, mliječna kiselina, estrogen, masne kiseline, aminokiseline



Osjetilne strukture oko usnih organa – dobro razvijene kod medicinski važnih kukaca

Osjetilne strukture

Sensilium - buhe



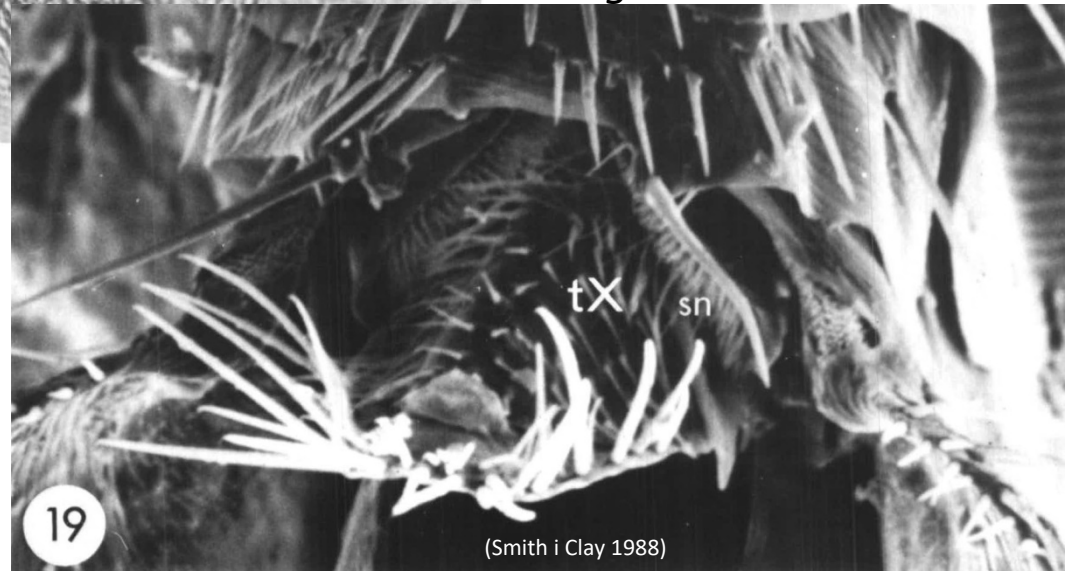
Osjetilne jamice
u polju
mikrotriha

Sensilium ženke
Myodopsylla insignis
(Siphonaptera:
Ischnopsyllidae)

Sensilium mužjaka *M.*
insignis

Pronalaženje plijena pomoću vibracija i
temperaturnih gradijenata,
poravnavanje genitalije tijekom
kopulacije

Varijabilna struktura, dorzalni dio
terminalnih abdominalnih segmenata



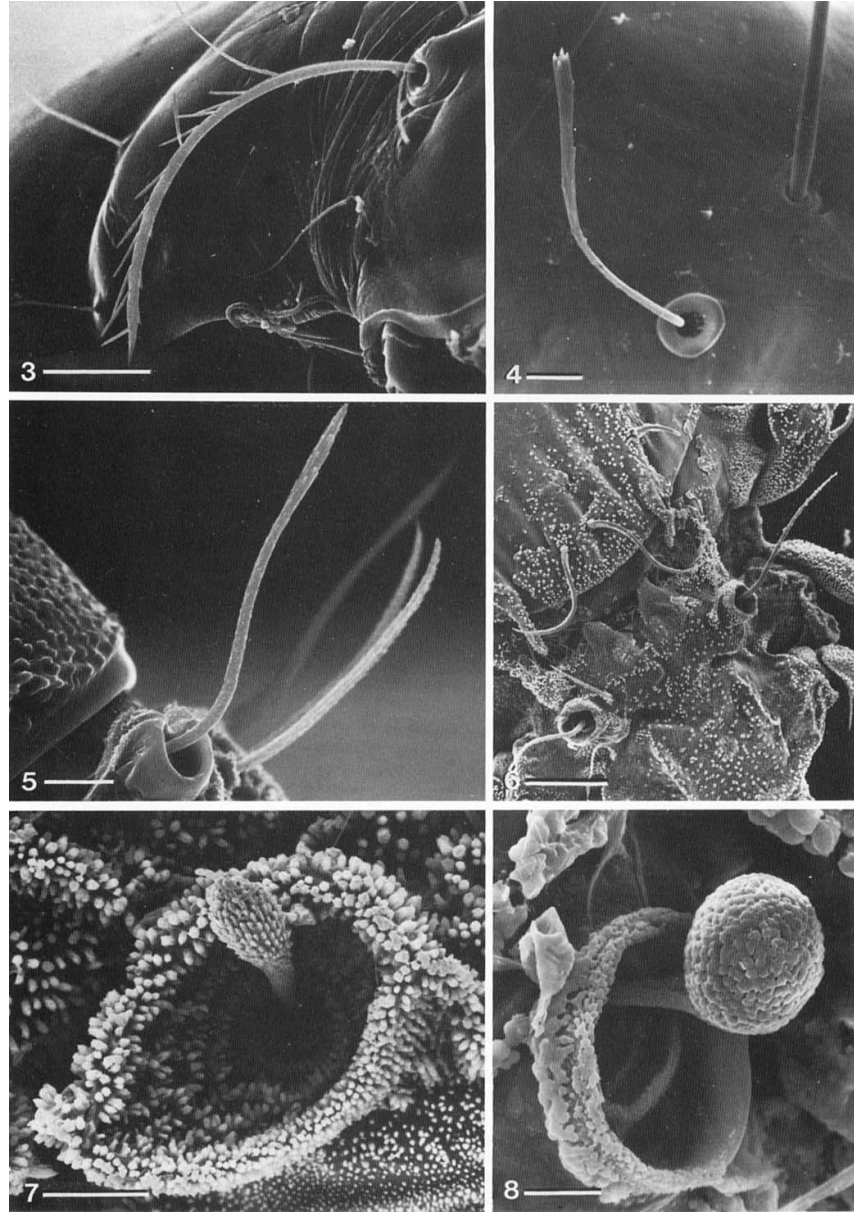
(Smith i Clay 1988)

Osjetilne strukture

Trihobotriji

Plake za detekciju vibracija

Arachnida: Acari, ali prisutne
i kod brojnih drugih skupina
Arachnida



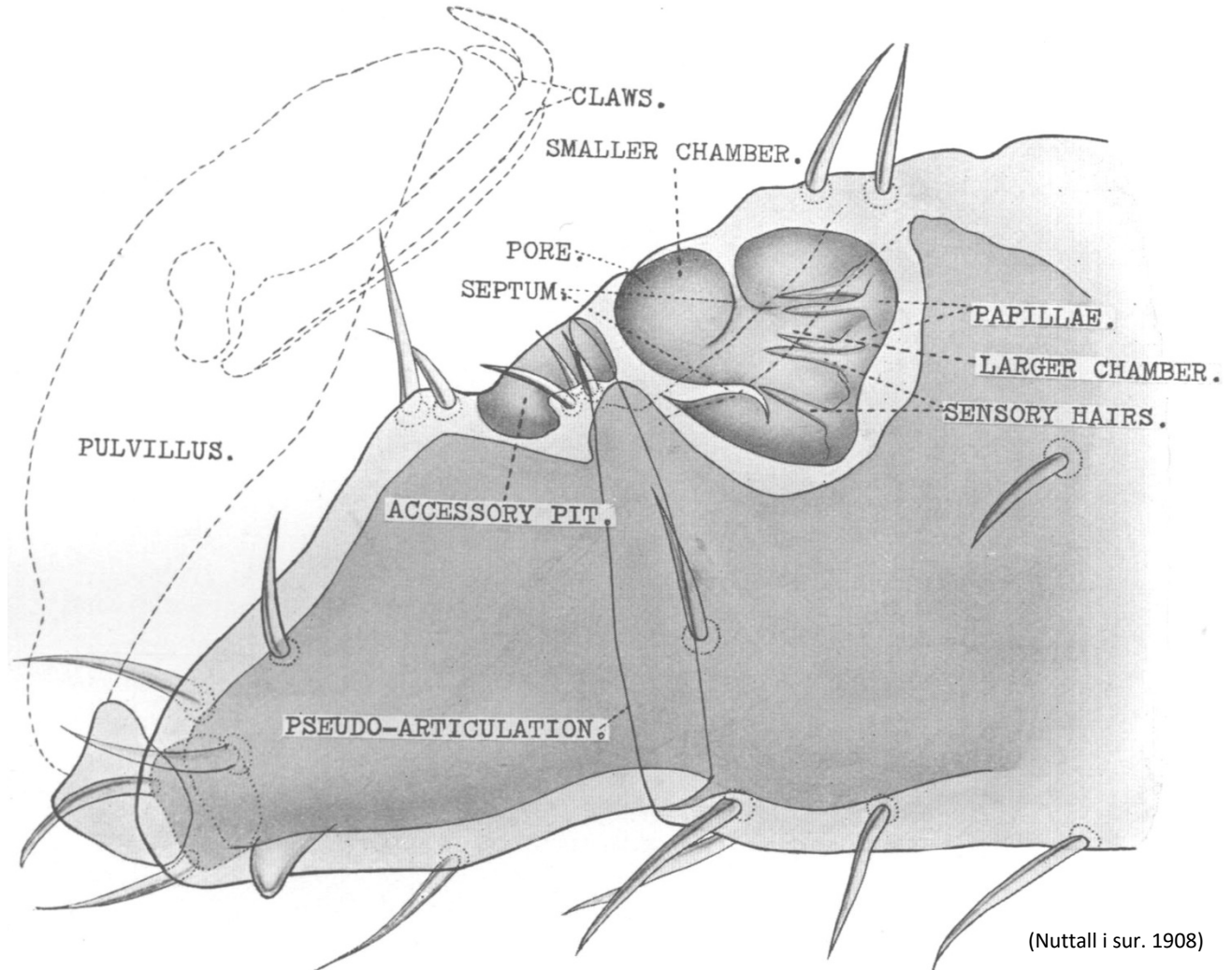
Osjetilne strukture

Hallerov organ

Arachnida: Ixodida

Struktura na
dorzalnim
dijelovima tarzusa
prvih nogu

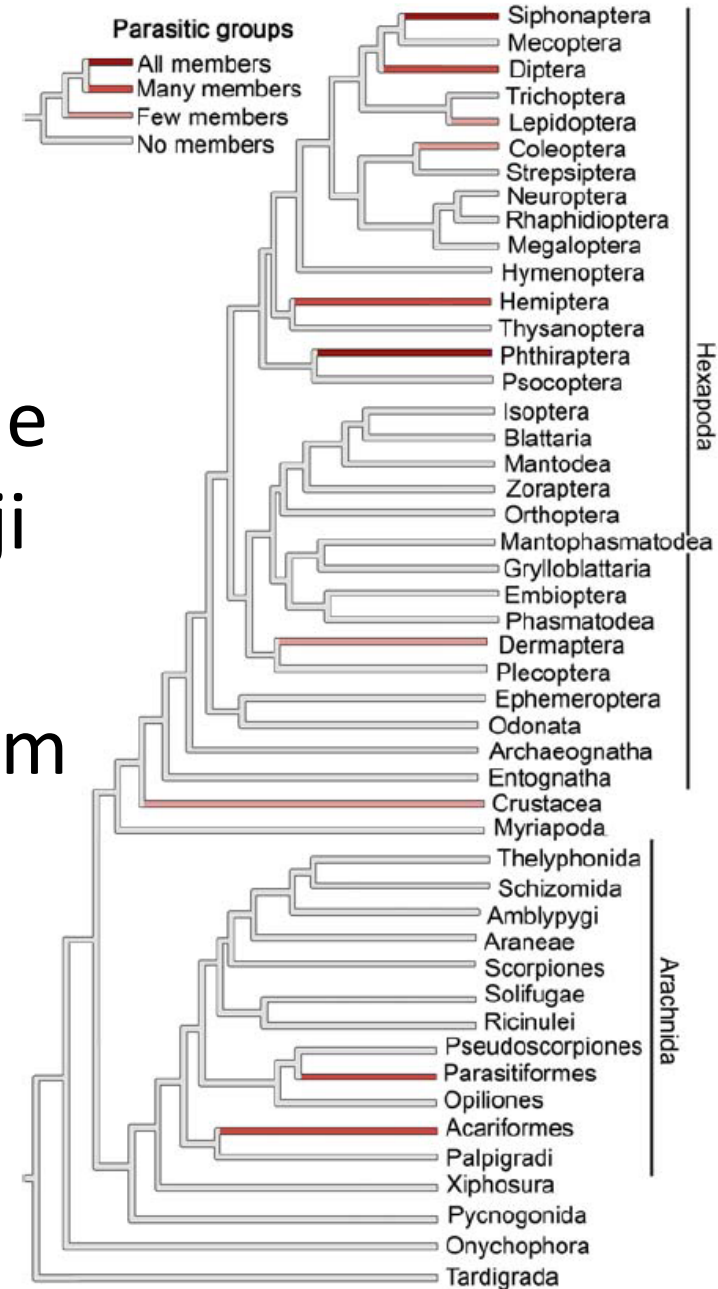
Detekcija
temperature,
strujanja zraka i
mirisa domadara



(Nuttall i sur. 1908)

Zaključak

- Adaptacije koje omogućuju parazitski način života pojavile su se nekoliko puta u evoluciji kukaca
- Brojne strukture sa specifičnim funkcijama
- Konvergentna evolucija



Literatura

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