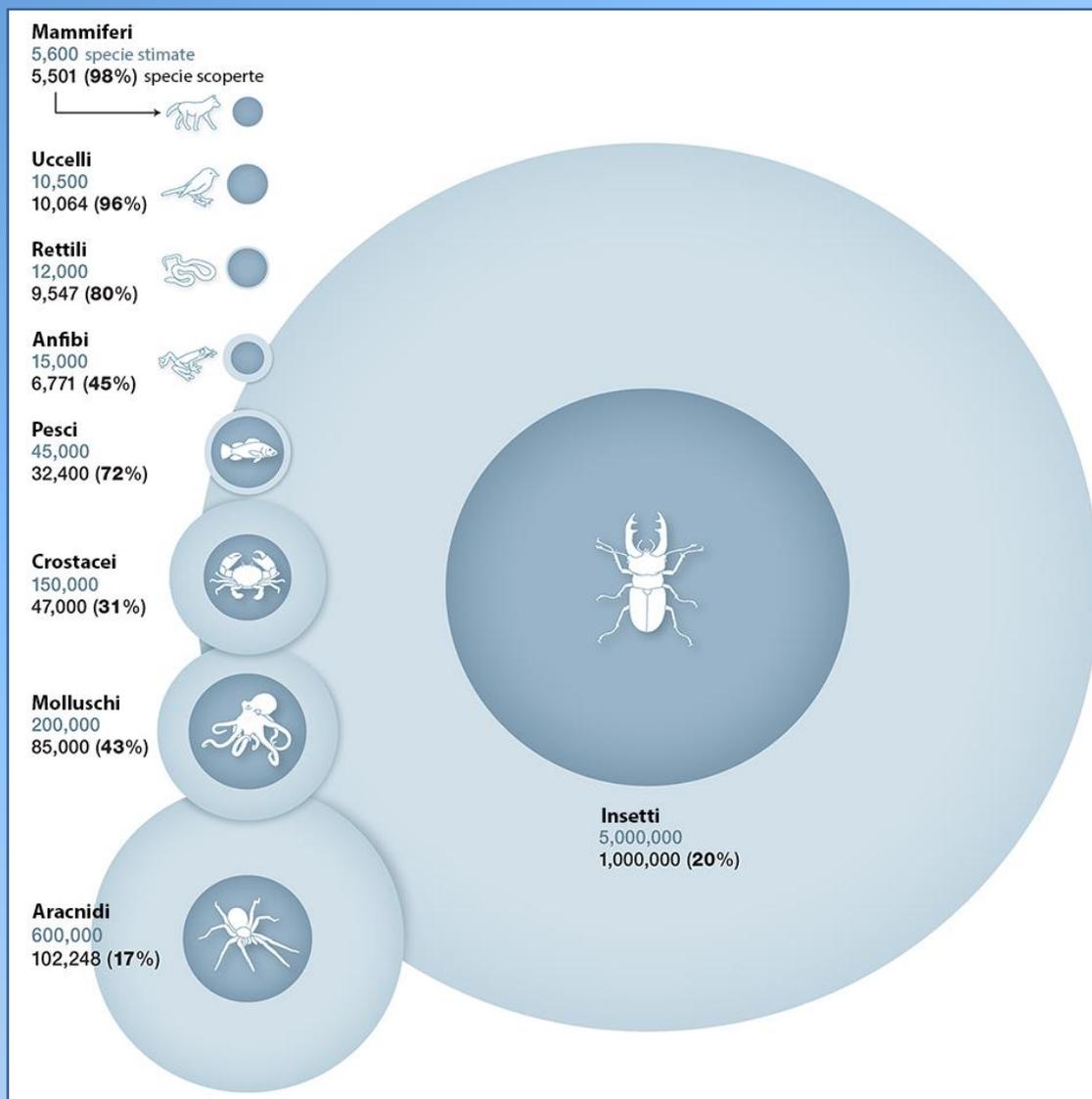


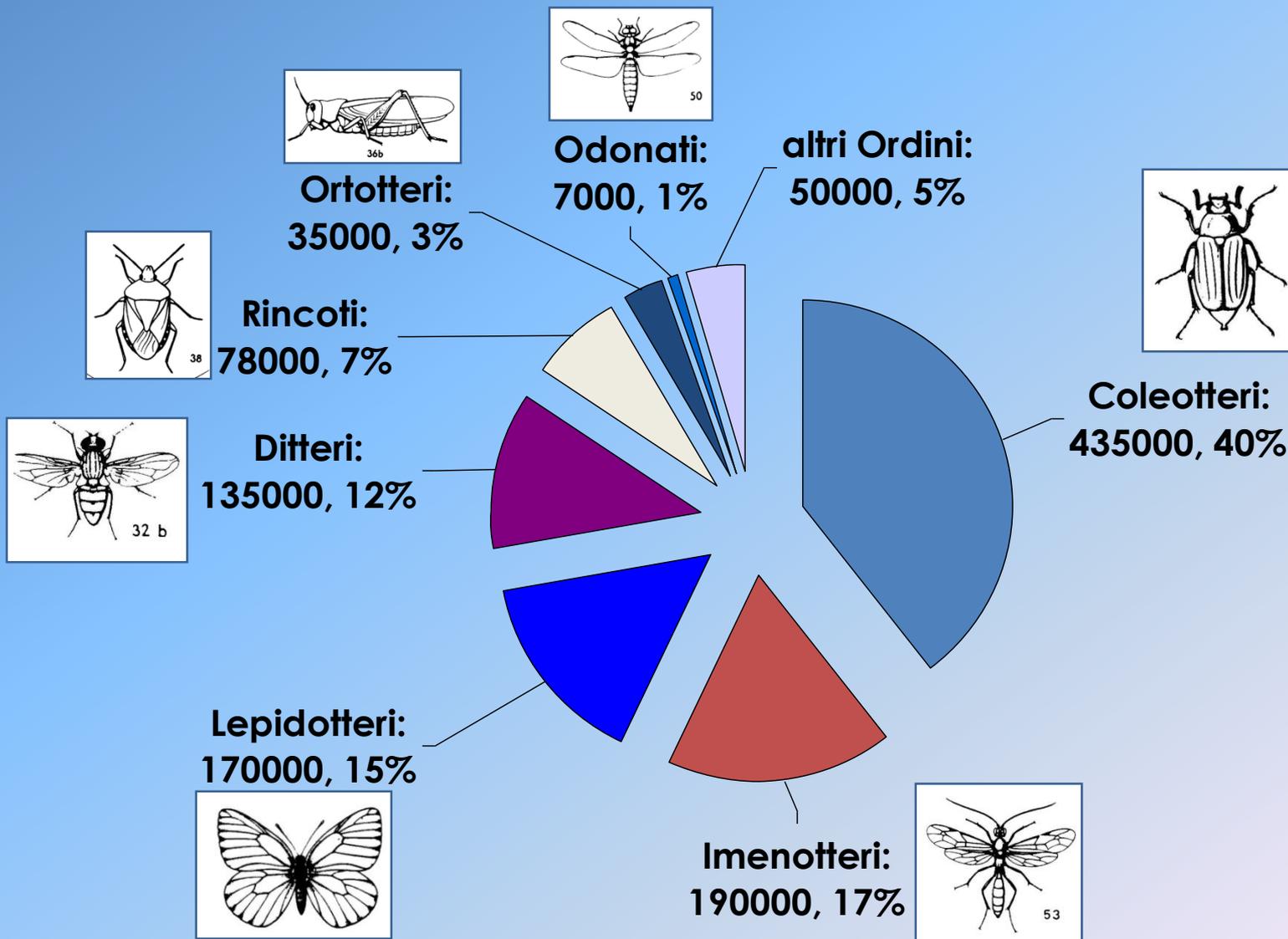
Il mondo ... (è) ... degli Insetti



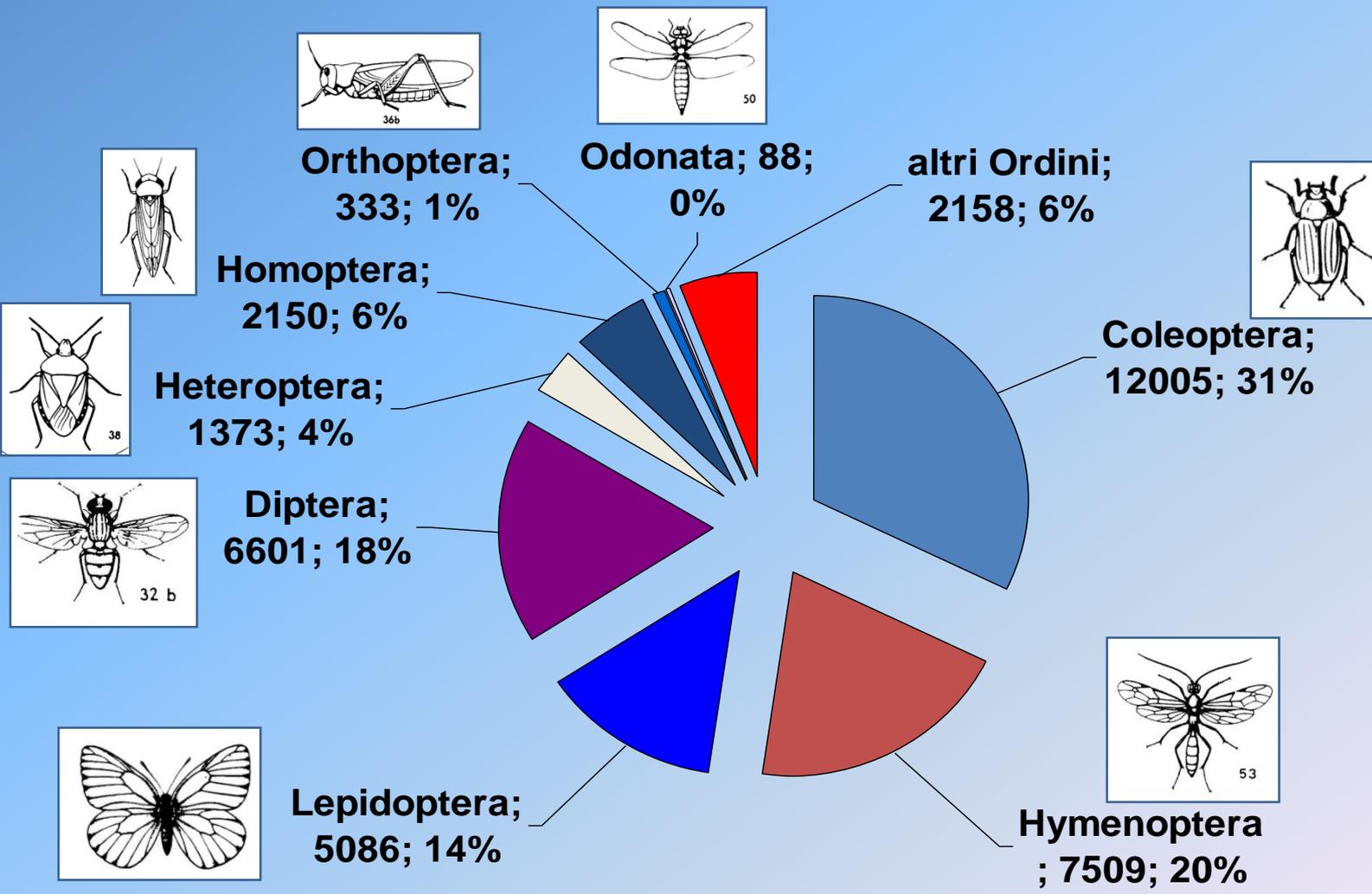
Uno, dieci, centomila... ma quanti sono?



Numero approssimativo delle specie descritte dei principali ordini di Insetti e loro rapporto percentuale



Numero approssimativo delle specie descritte dei principali ordini di Insetti e loro rapporto percentuale in Italia (totale specie = 37.303)



“What inference might one draw about the nature of God from a study of his works?”

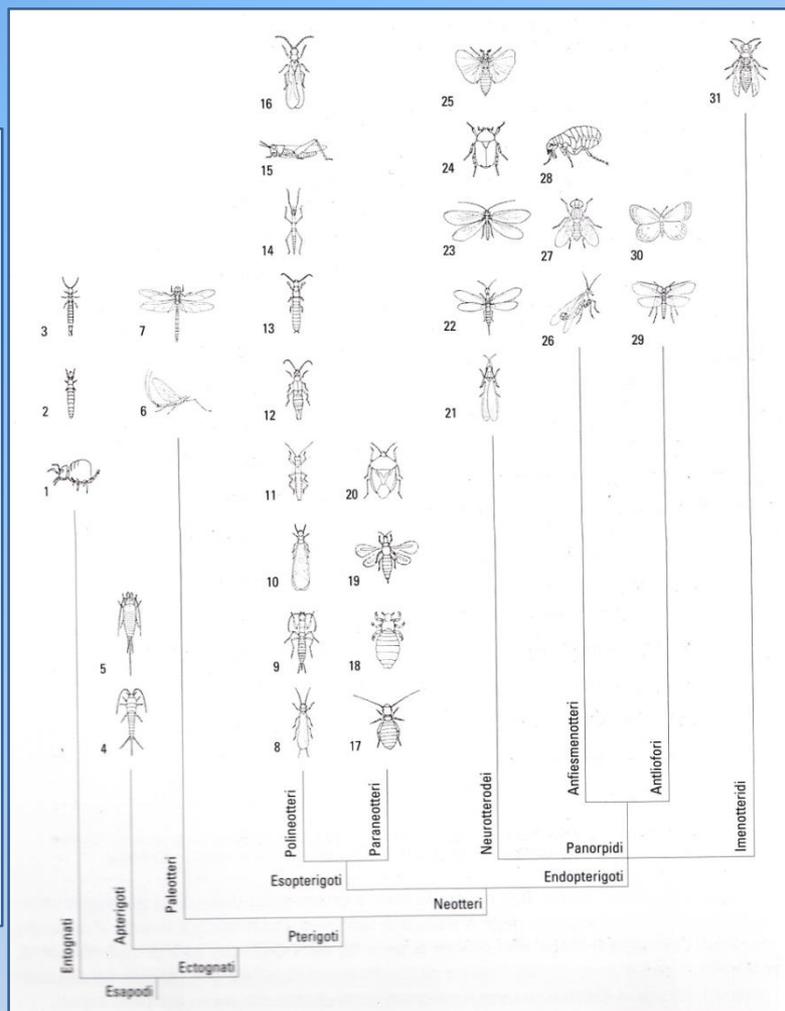
“An inordinate fondness for beetles!”

J.B.S. Haldane



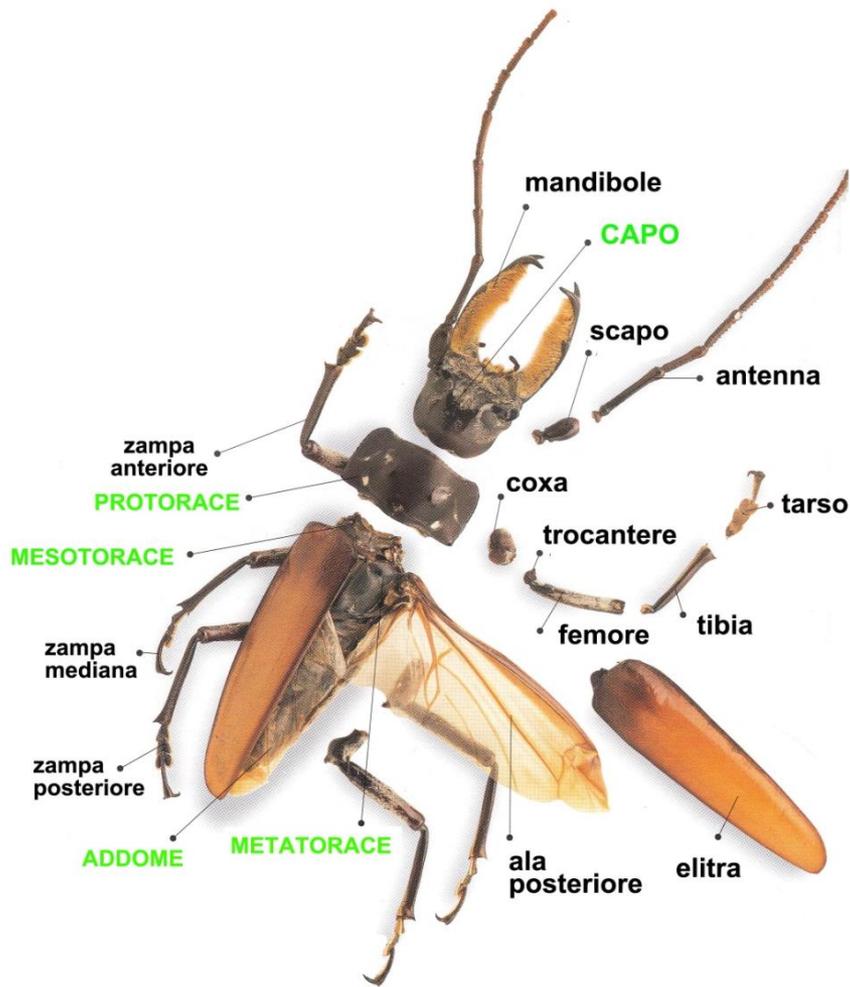
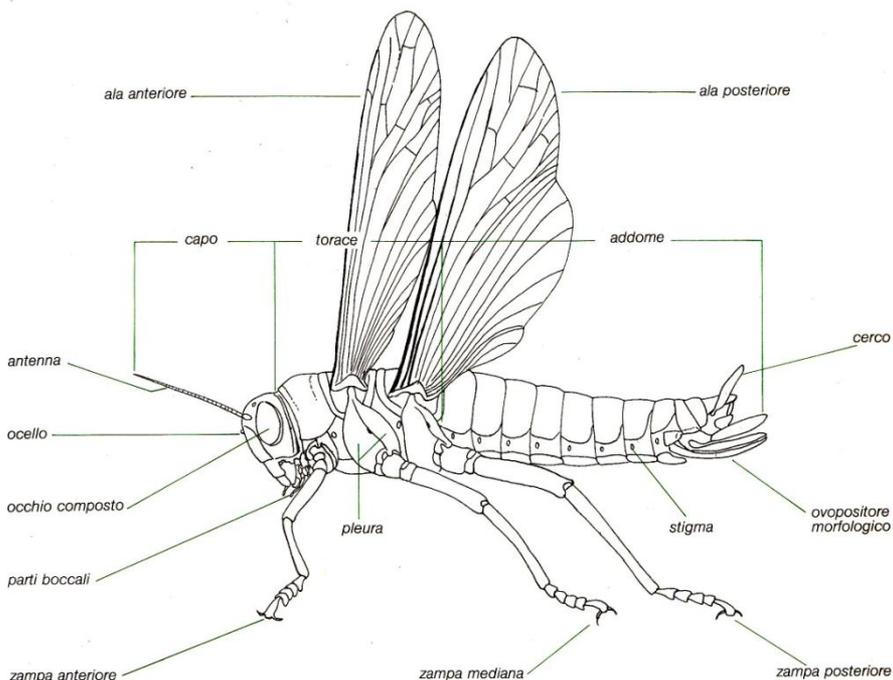
Ordini di Insetti e loro relazioni filogenetiche

1) Collembola	17) Psocoptera
2) Protura	18) Phthiraptera (ex Mallophaga + Anoplura)
3) Diplura	19) Thysanoptera
4) Microcoryphia } 5) Zygentoma } (ex Thysanura)	20) Rhynchota (= Hemiptera)
6) Ephemeroptera	21) Megaloptera
7) Odonata	22) Raphidioptera
8) Plecoptera	23) Neuroptera (= Planipennia)
9) Grylloblattodea	24) Coleoptera
10) Dictyoptera (ex Blattodea + Mantodea + Isoptera)	25) Strepsiptera
11) Mantophasmatodea	26) Mecoptera
12) Dermaptera	27) Diptera
13) Embiidina (= Embioptera)	28) Aphaniptera (= Siphonaptera)
14) Phasmatodea (= Phasmida)	29) Trichoptera
15) Orthoptera	30) Lepidoptera
16) Zoraptera	31) Hymenoptera



Morfologia di un insetto

▽ CORPO DI INSETTO FEMMINA DIVISO IN REGIONI: CAPO, TORACE E ADDOME



Ma quante zampe?

artropodi non insetti



Ad ognuno il suo nome!

“noterelle” nomenclatoriali

***Scarabaeus sacer* Linnaeus, 1758**



***Sisyphus schaefferi* (Linnaeus, 1758)**



La cicala e la formica...

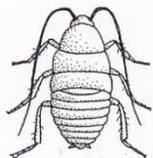
lo sviluppo postembrionale

Esopterigote

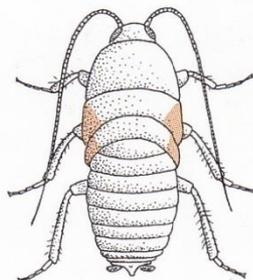
es. Blatte, Cicale, ...



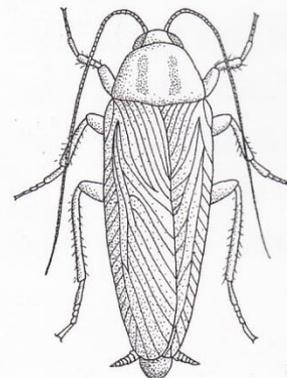
uovo



neanide



ninfa



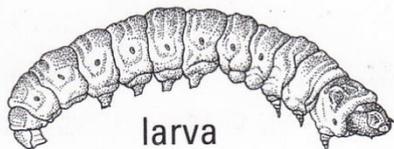
adulto

Endopterigote

es. Farfalle, Formiche, ...



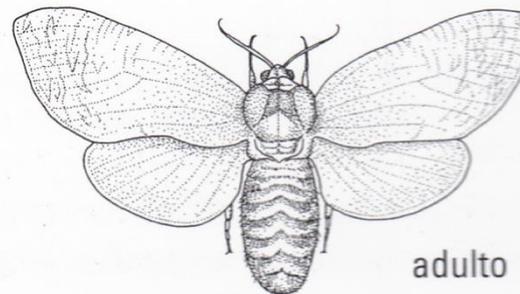
uovo



larva



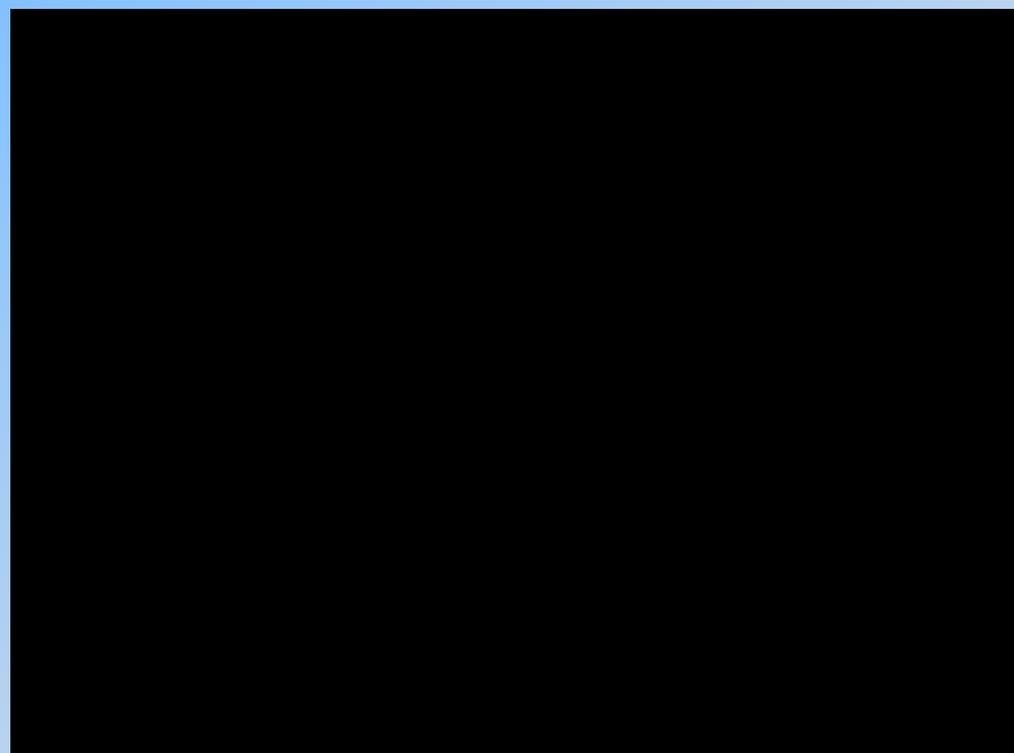
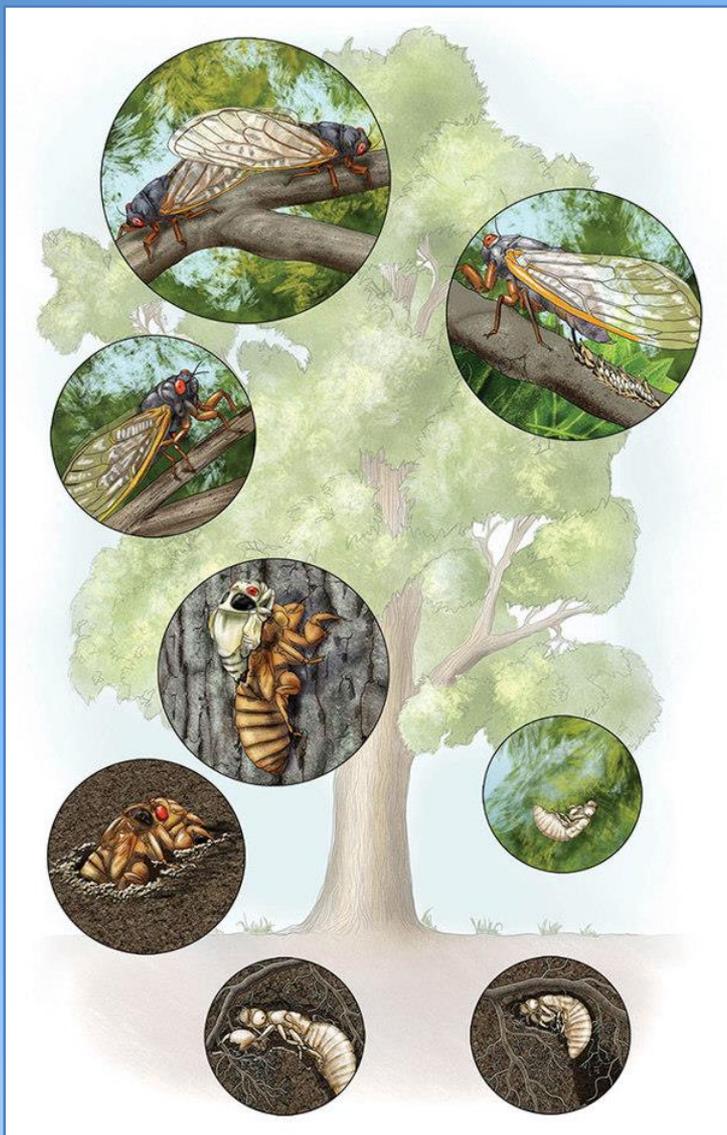
pupa



adulto

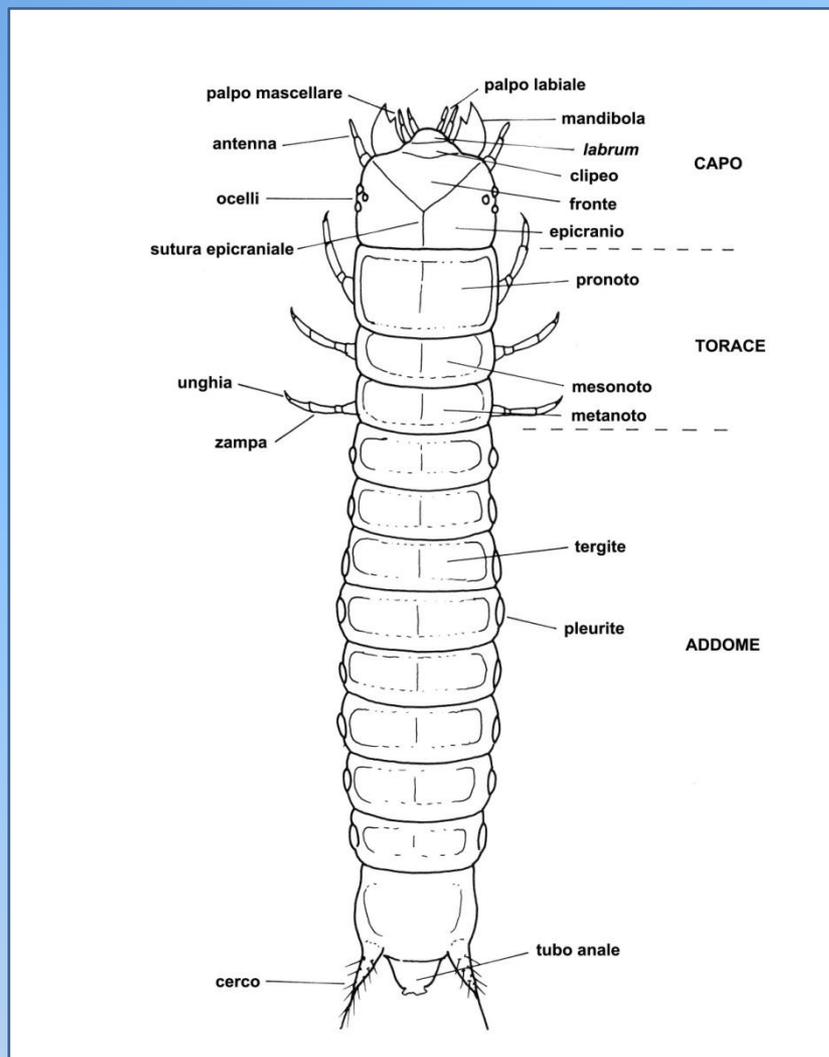


Vita da cicala...



Vita da larva

struttura generale



Vita da larva

formazioni metameriche: pseudozampe

▽ PSEUDOZAMPE PRESENTI NEL 1° - 8° URITE

▶ Larva di Mecottero

1° urite 10° urite
zampe toraciche pseudozampe pigopodio

▽ PSEUDOZAMPE PRESENTI NEL 3° - 6° E 10° URITE (IN ALTO) E NEL 6° E 10° (IN BASSO)

▶ Larva di Lepidottero (regola generale)

1° e 2° urite 10° urite
zampe toraciche pseudozampe

▶ Larva di Lepidottero Geometride

1° urite 5° urite 10° urite
zampe toraciche pseudozampe

▽ PSEUDOZAMPE PRESENTI NEL 2° - 8° E 10° URITE

▶ Larva di Imenottero Sinfito (regola generale)

1° urite 10° urite
zampe toraciche pseudozampe

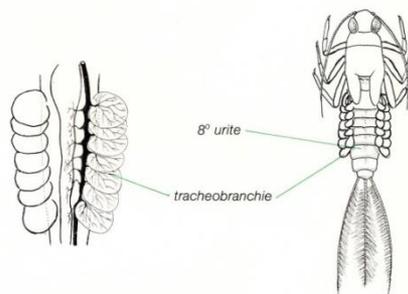


Vita da larva

formazioni metameriche e non: funzioni diverse

▽ TRACHEOBRANCIE CON DISTRIBUZIONE METAMERICA

▽ Tracheobranchie addominali in ninfa di Efemerottero (Cleon)

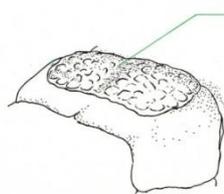


▽ TRACHEOBRANCIE CAUDALI

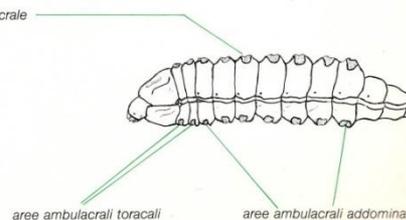


▽ AREE AMBULACRALI A DISTRIBUZIONE METAMERICA

▽ 3° urotergo

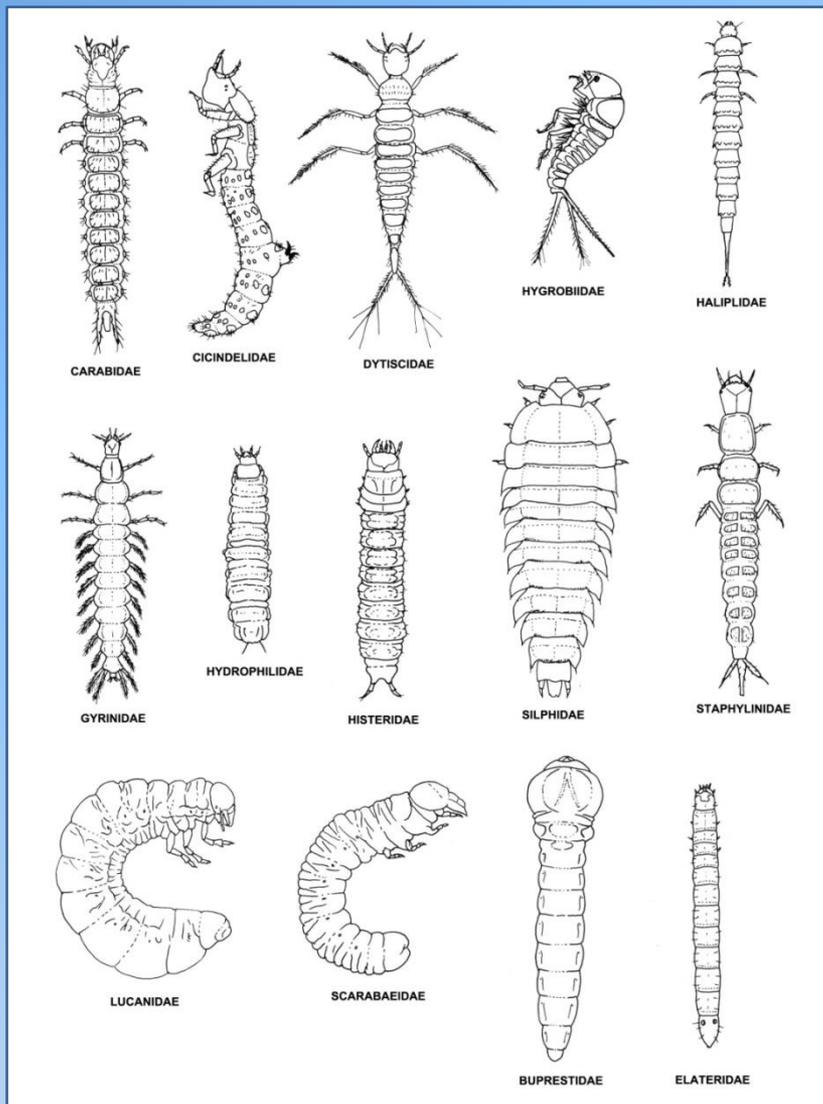


▽ Larva di Coleottero Cerambicide



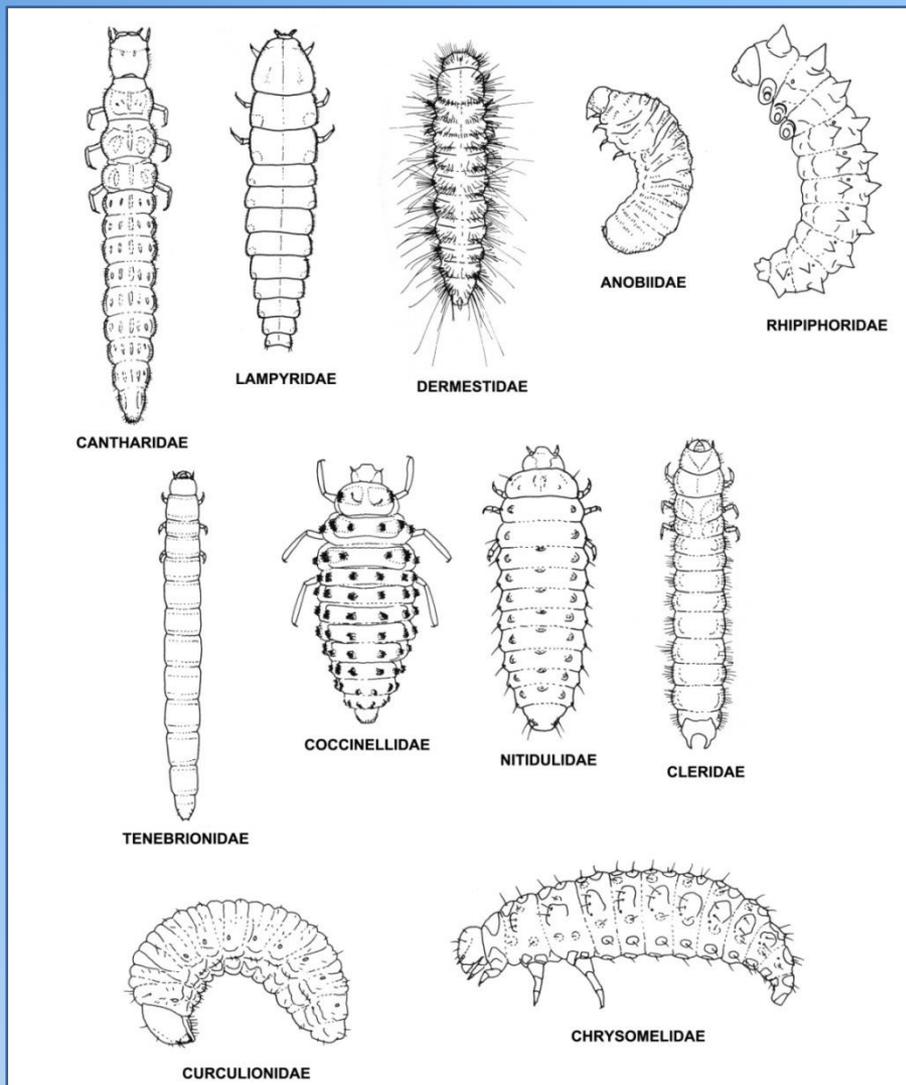
Vita da larva

larve di Coleoptera - I



Vita da larva

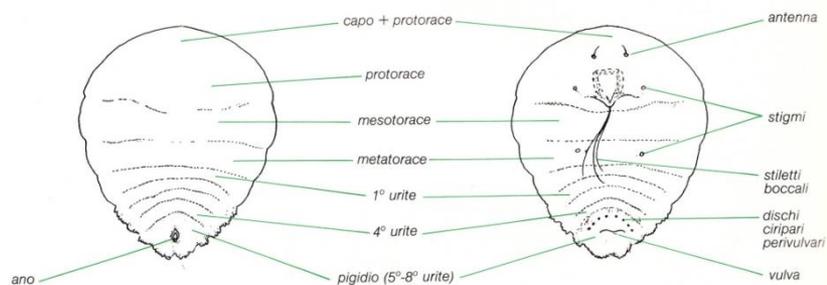
larve di Coleoptera - II



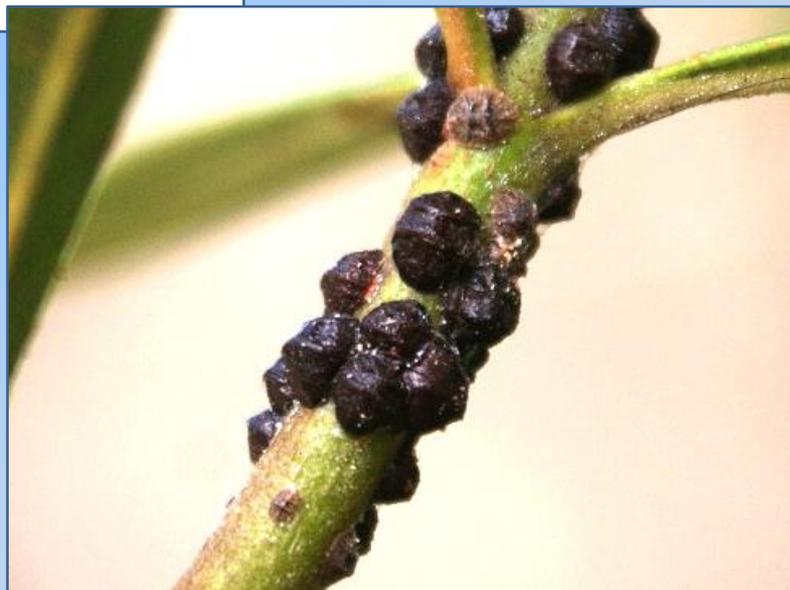
“Strani” insetti

modificazioni del corpo

▽ FEMMINA ADULTA DI RINCOTO DIASPIDIDE VISTA DAL DORSO (A SIN.) E DAL VENTRE (A DEST.)



Cocciniglia mezzo grano di pepe
Saissetia oleae (Olivier)
[Homoptera]

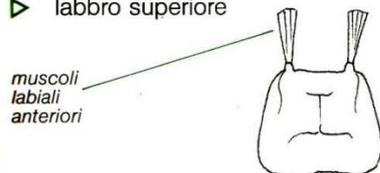


Apparato boccale

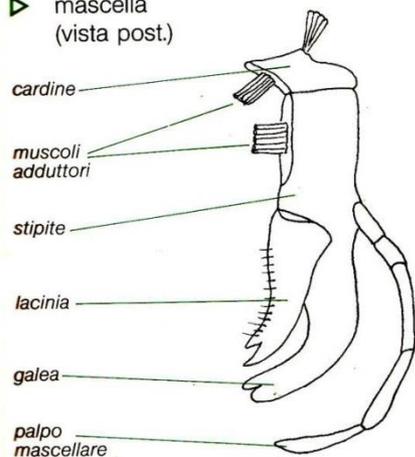
masticatore tipico

▽ PARTI BOCCALI

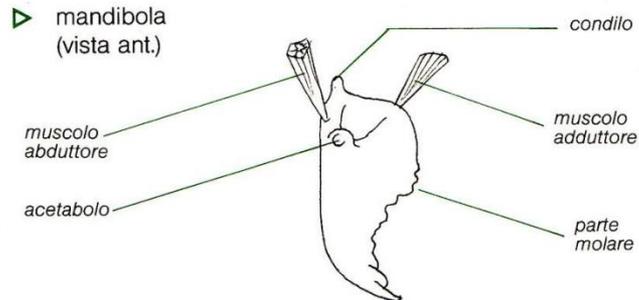
▷ labbro superiore



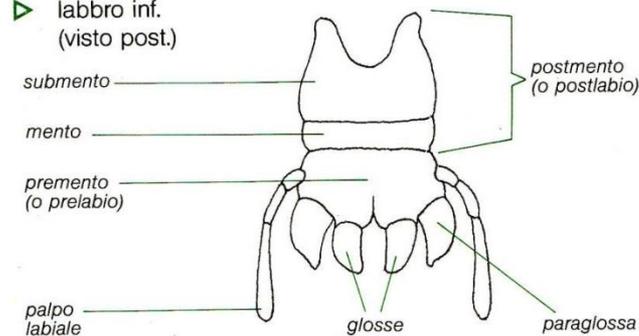
▷ mascella (vista post.)



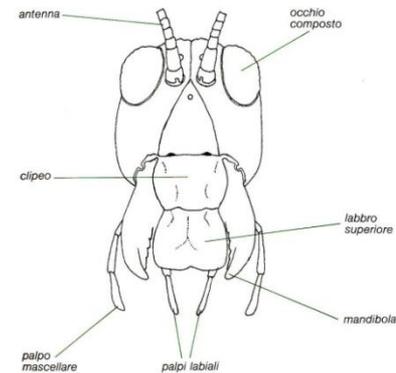
▷ mandibola (vista ant.)



▷ labbro inf. (visto post.)



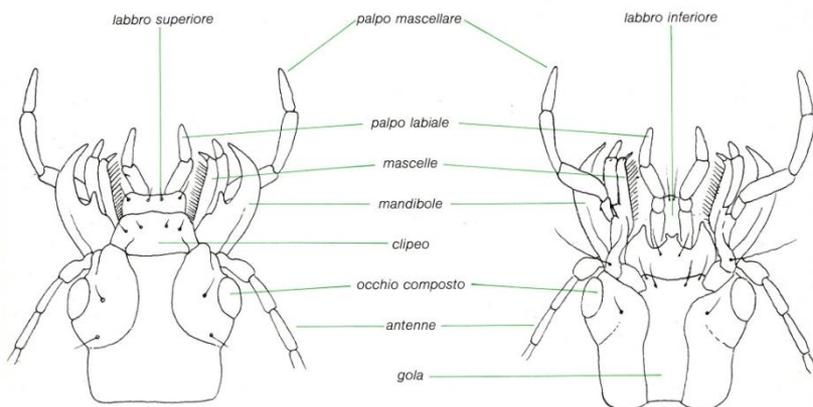
▽ CAPO VISTO FRONTALMENTE



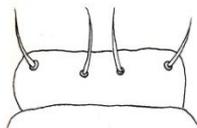
Apparato boccale

masticatore tipico

▽ CAPO VISTO DORSALMENTE (A SINISTRA) E VENTRALMENTE (A DESTRA)



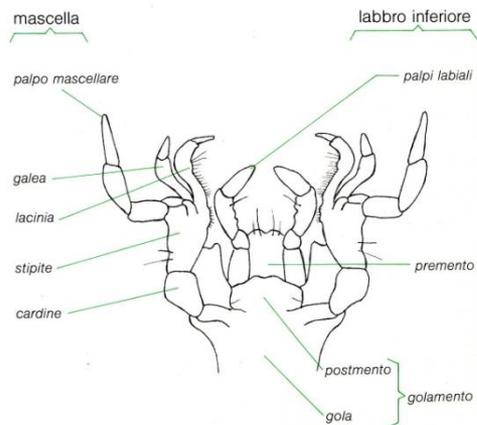
▽ labbro superiore



▽ mandibola



▽ complesso maxillo-labiale

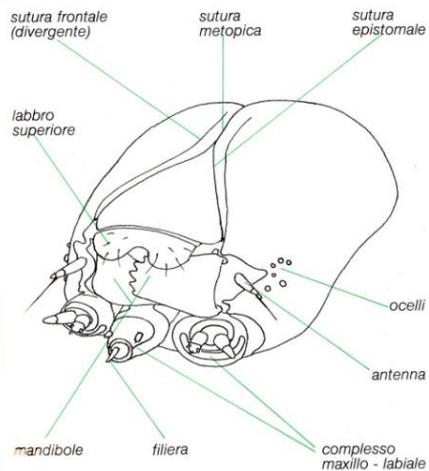


Apparato boccale

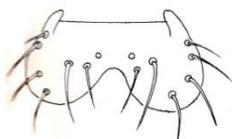
masticatore, larva di lepidottero



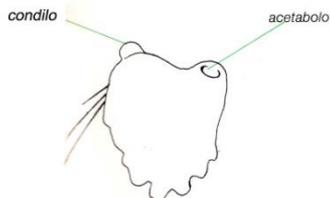
▽ CAPO VISTO SUBORALMENTE



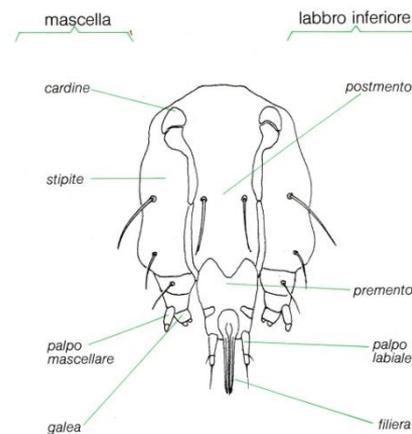
▽ labbro superiore



▽ mandibola (vista post.)

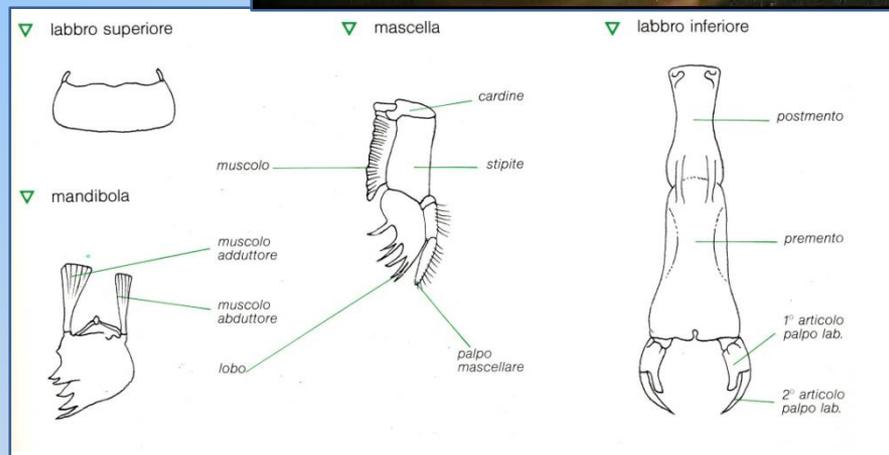
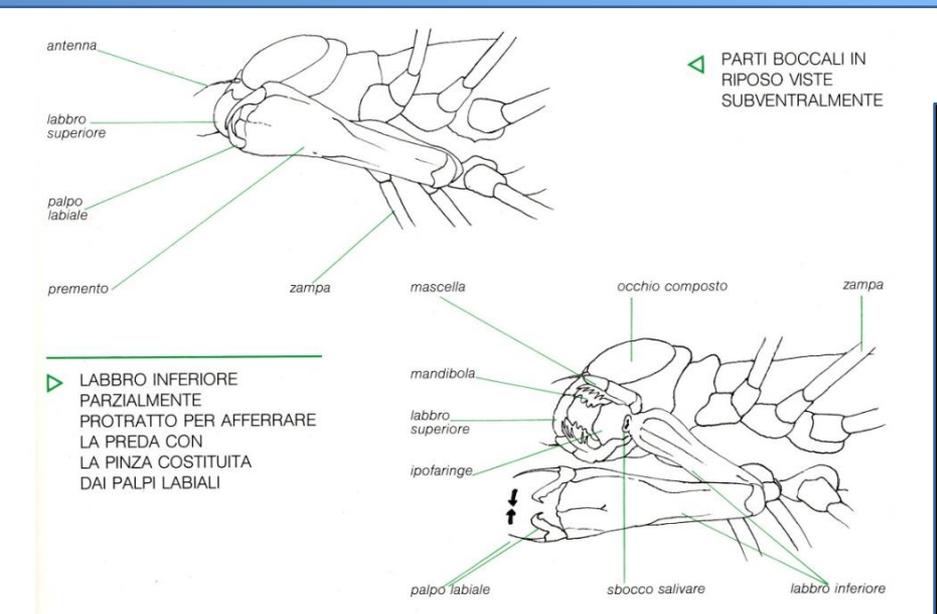


▽ complesso maxillo - labiale (visto post.)



Apparato boccale

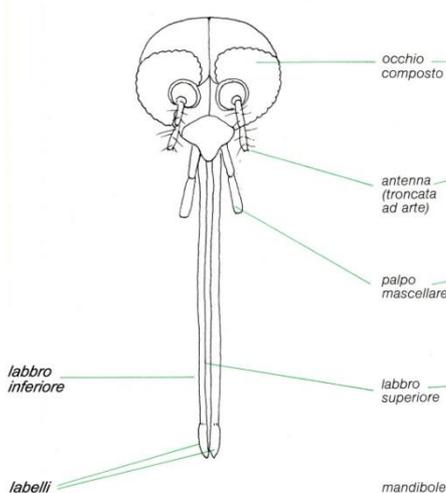
masticatore, odonato



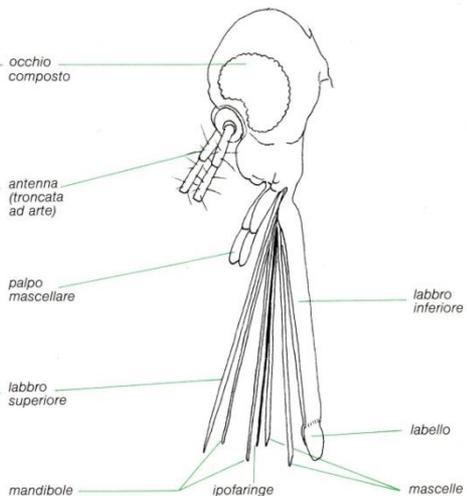
Apparato boccale

pungente-succhiante, dittero culicide

CAPO VISTO FRONTALMENTE CON PARTI BOCCALI IN RIPOSO

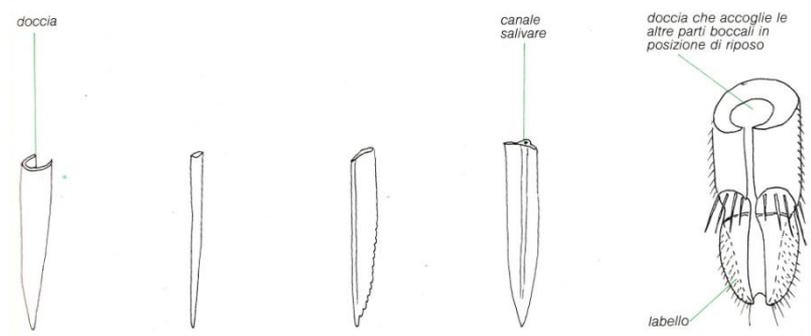


CAPO VISTO LATERALMENTE CON PARTI BOCCALI SEPARATE AD ARTE



PARTI BOCCALI (DETTAGLI DELLE ESTREMITÀ DISTALI)

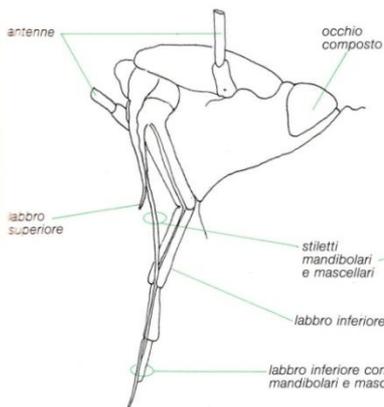
- ▼ labbro superiore
- ▼ mandibola
- ▼ mascella (galea o licinia)
- ▼ ipofaringe
- ▼ labbro inferiore (parte distale del premento e labelli)



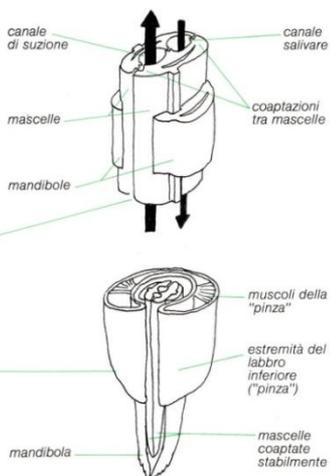
Apparato boccale

pungente-succhiante, eterottero

▽ CAPO CON PARTI BOCCALI



▽ SPACCATO DELLE PARTI BOCCALI A DIVERSO INGRANDIMENTO E LIVELLO



▽ PARTI BOCCALI

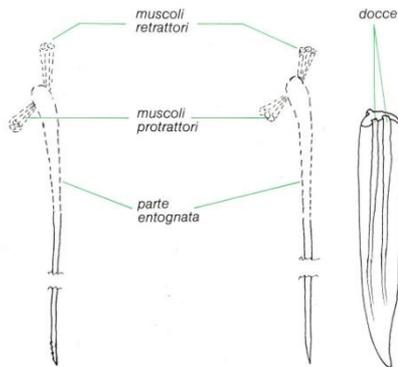
▽ labbro superiore



▽ mandibola



▽ mascella



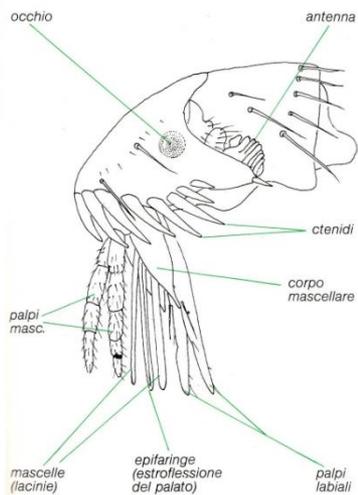
▽ labbro inferiore



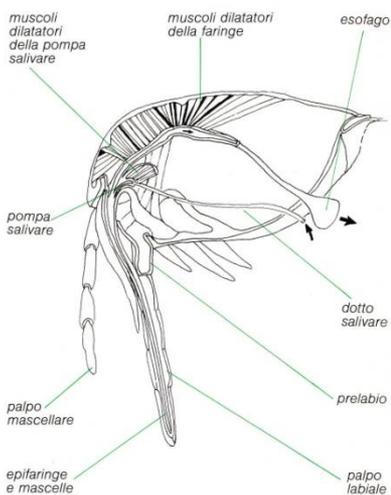
Apparato boccale

pungente-succhiante, sifonattero

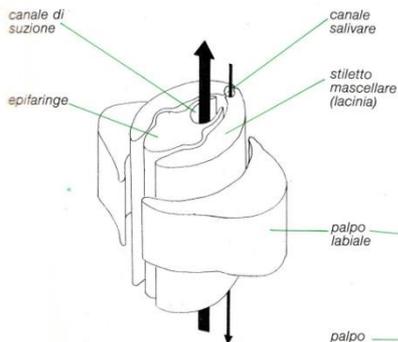
▽ CAPO DI PROFILO CON PARTI BOCCALI SEPARATE



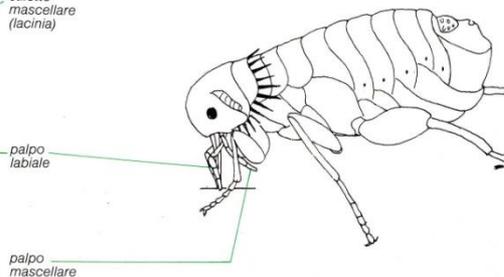
▽ CAPO CON PARTI BOCCALI IN POSIZIONE DI SUZIONE (SEZ. LONGITUDINALE)



▽ SPACCATO DELLE PARTI BOCCALI IN POSIZIONE DI SUZIONE



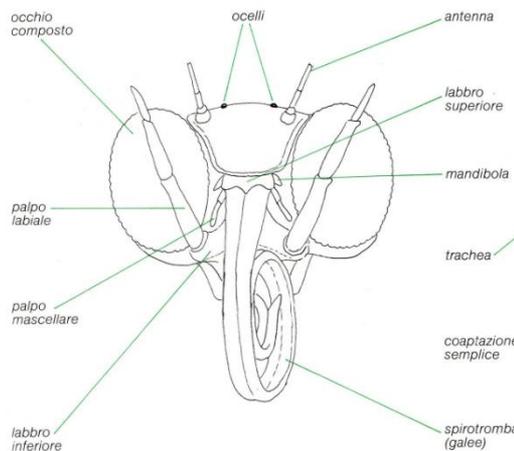
▽ PULCE MENTRE PUNGE CON IL FASCIO DEGLI STILETTI (EPIFARINGE E LACINIE) AFFIANCATI DAI PALPI LABIALI



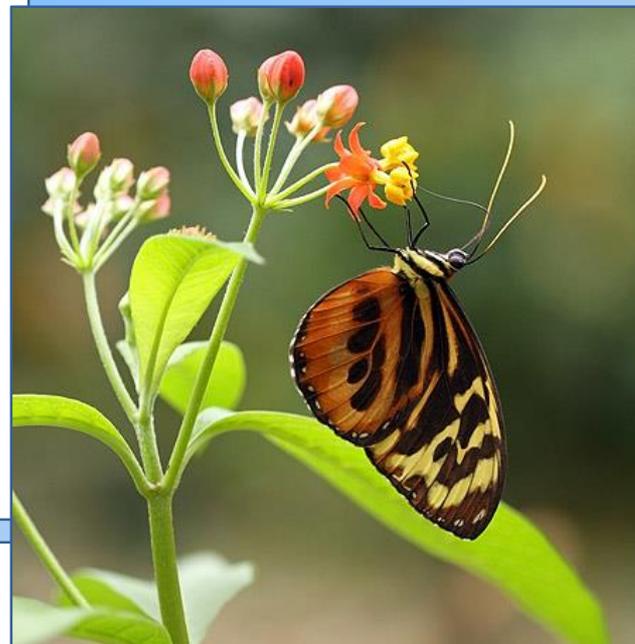
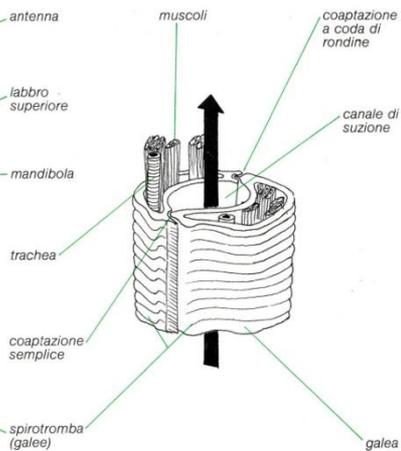
Apparato boccale

succhiante-non perforante, lepidottero

CAPO CON PARTI BOCCALI



SPACCATO DI SPIROTRROMBA (PARTE PROSSIMALE)

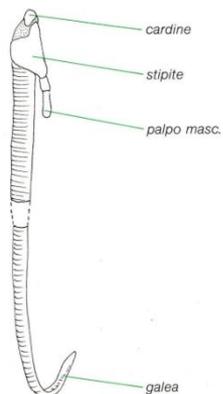


PARTI BOCCALI

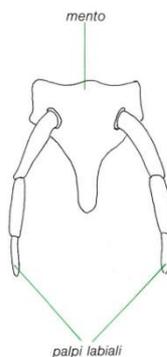
labbro superiore



mascella



labbro inferiore



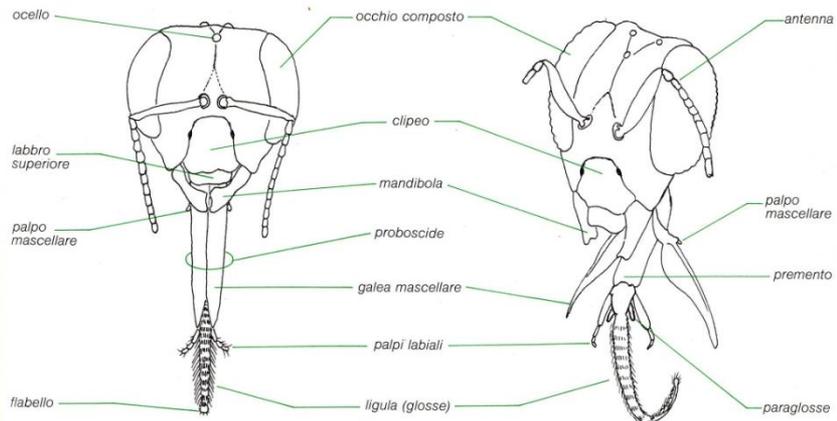
mandibole



Apparato boccale

lambente-succhiante, apoideo

▽ CAPO VISTO FRONTALMENTE E SUBLATERALMENTE CON PARTI BOCCALI SEPARATE AD ARTE

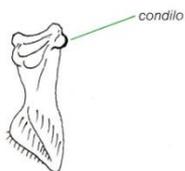


▽ PARTI BOCCALI

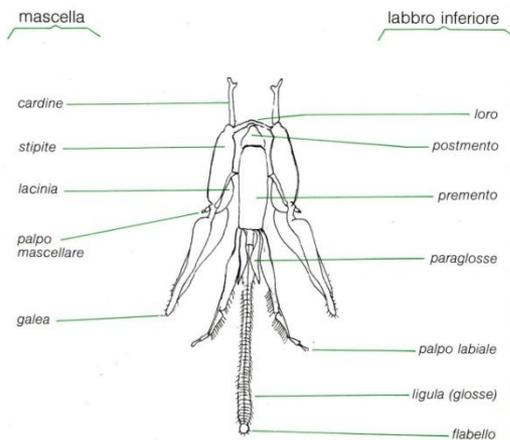
▽ labbro superiore



▽ mandibola (lato interno)



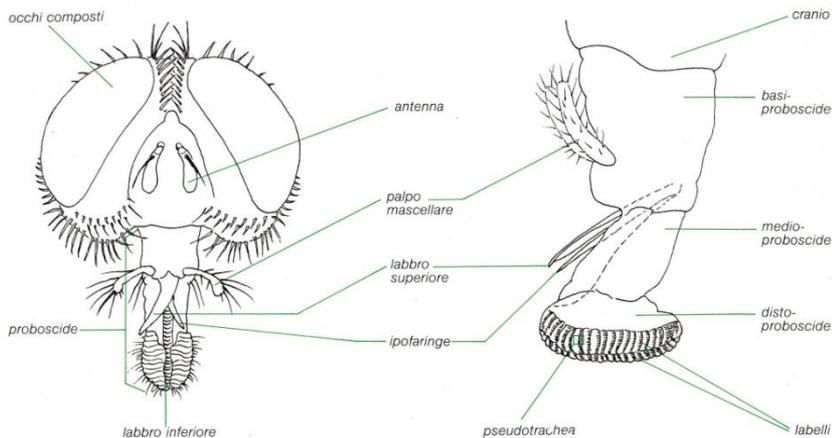
▽ complesso maxillo-labiale (visione ventrale)



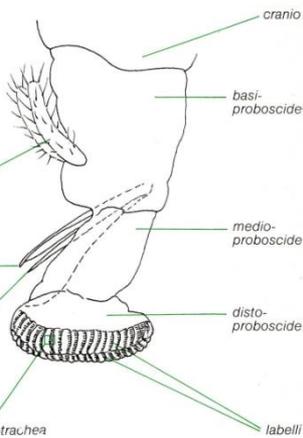
Apparato boccale

lambente-succhiante, dittero

▽ CAPO VISTO FRONTALMENTE CON PARTI BOCCALI SEPARATE AD ARTE

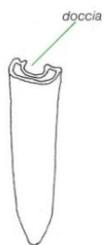


▽ PROBOSCIDE DI PROFILO



▽ PARTI BOCCALI

▽ labbro superiore



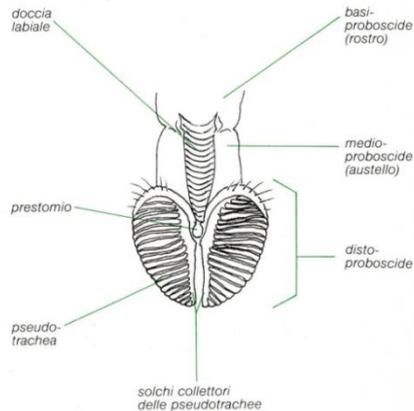
mandibole scompare

▽ ipofaringe



mascelle ridotte ai palpi

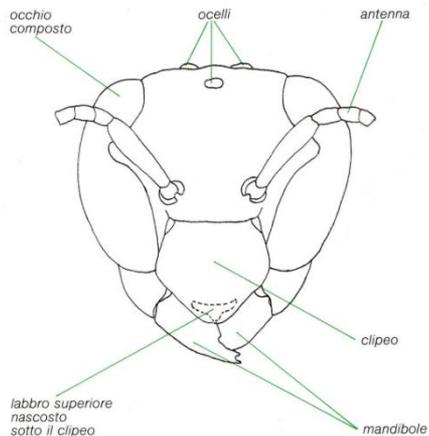
▽ labbro inferiore (visto frontalmente e subventralmente)



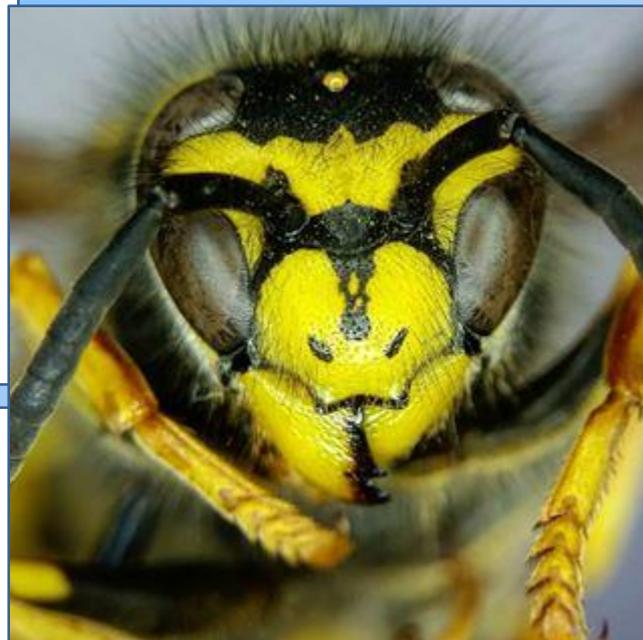
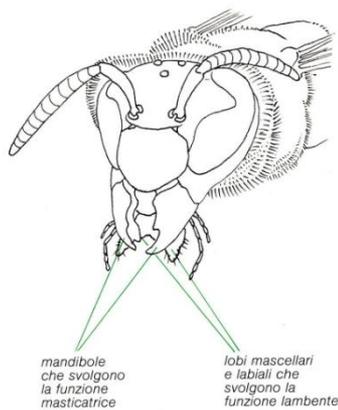
Apparato boccale

masticatore-lambente, vespoideo

CAPO VISTO FRONTALMENTE



FUNZIONI DELLE APPENDICI BOCCALI



PARTI BOCCALI

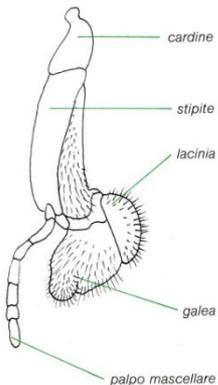
labbro superiore



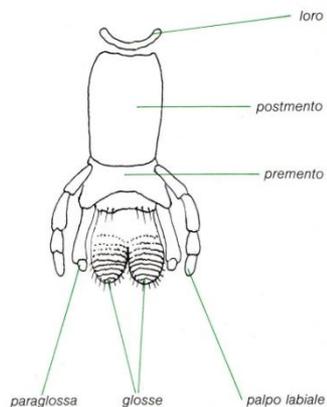
mandibola



mascella



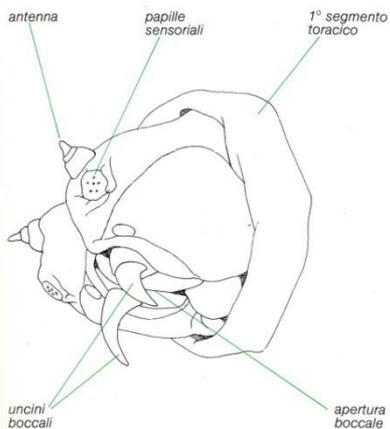
labbro inferiore



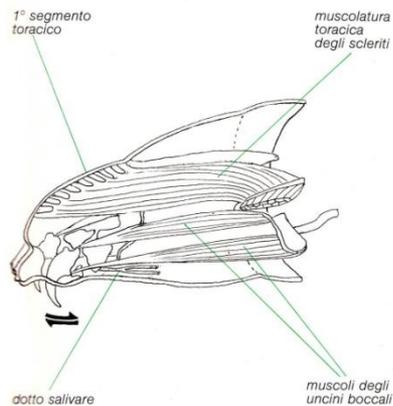
Apparato boccale

dilaniante, larva dittero brachicero

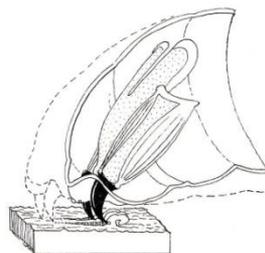
▽ CAPO VISTO SUBVENTRALMENTE



▽ APPARATO CEFALO - FARINGEO E RELATIVA MUSCOLATURA

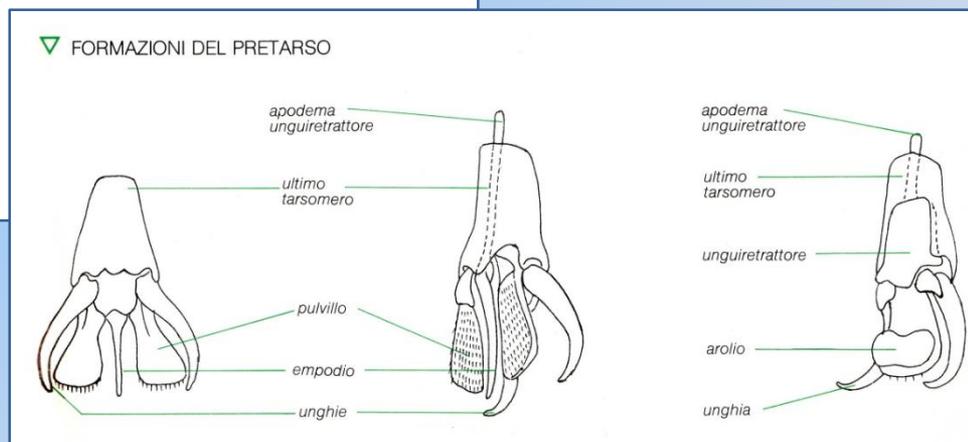
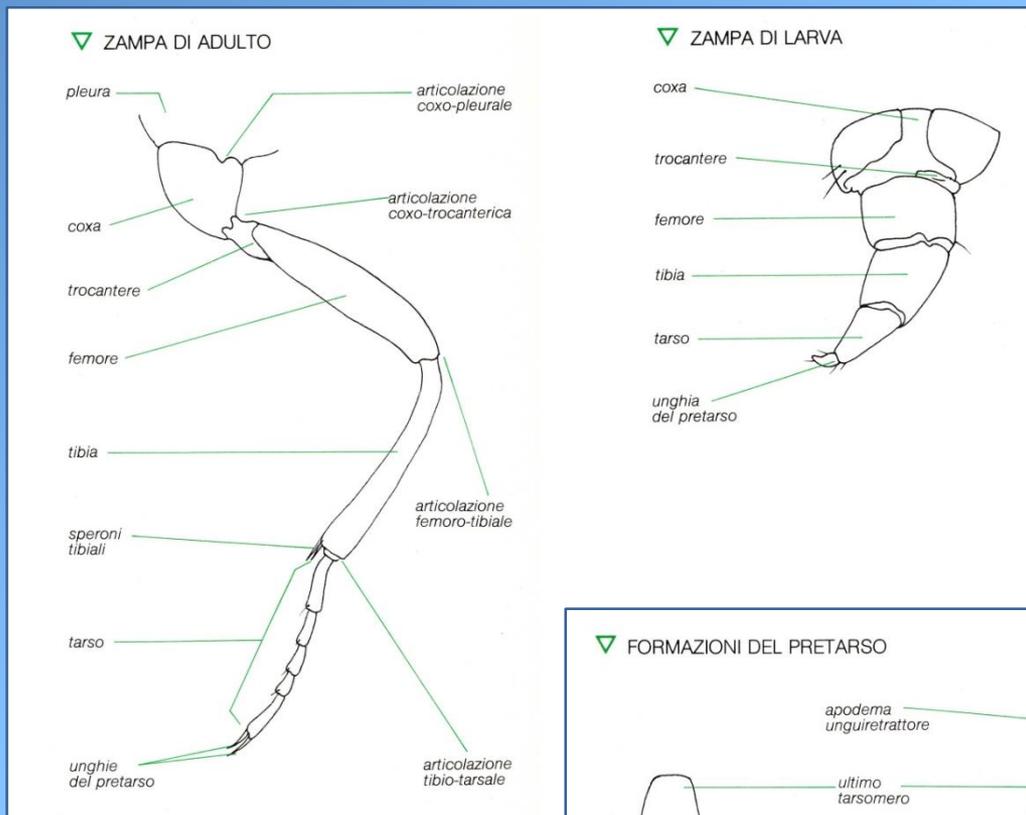


▽ FUNZIONE DILANIANTE DEGLI UNCINI BOCCALI



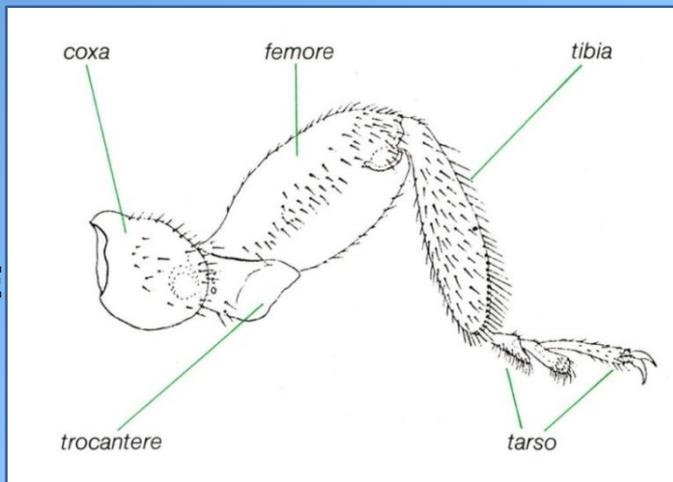
Zampe

struttura generale

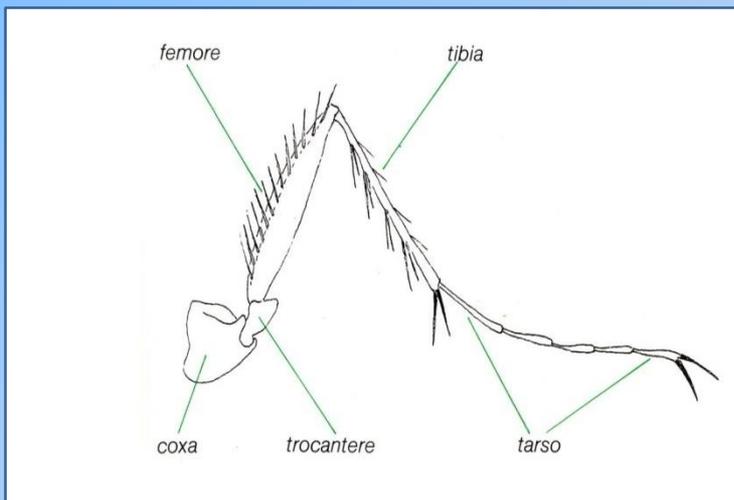


Zampe locomotorie

DEAMBULATORIE



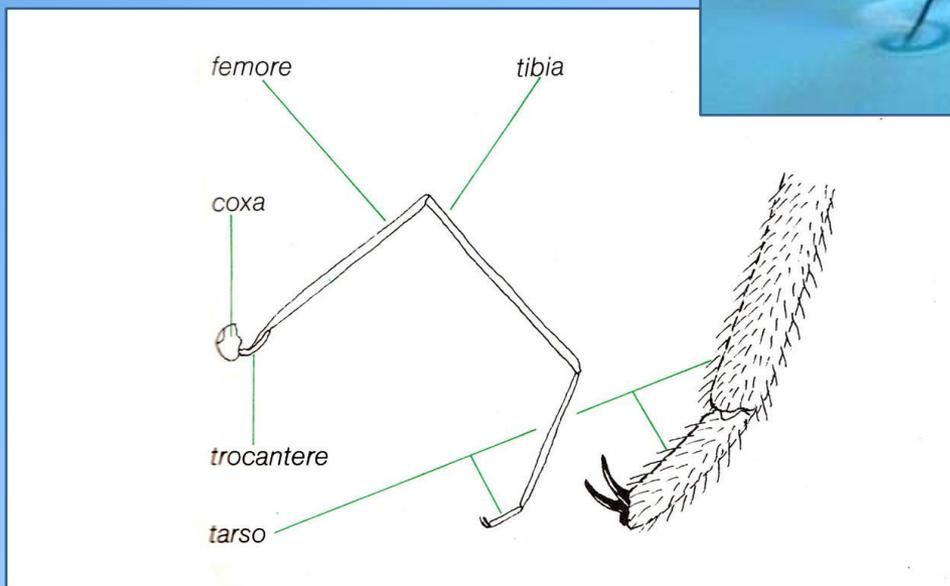
CURSORIE



Zampe

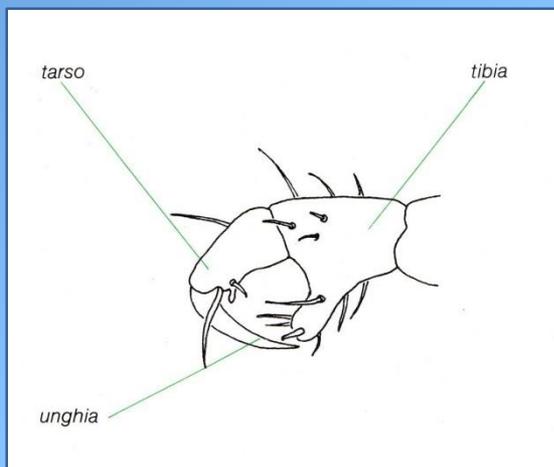
locomozione

**PER MUOVERSI
SULLA
SUPERFICIE
DELL'ACQUA**

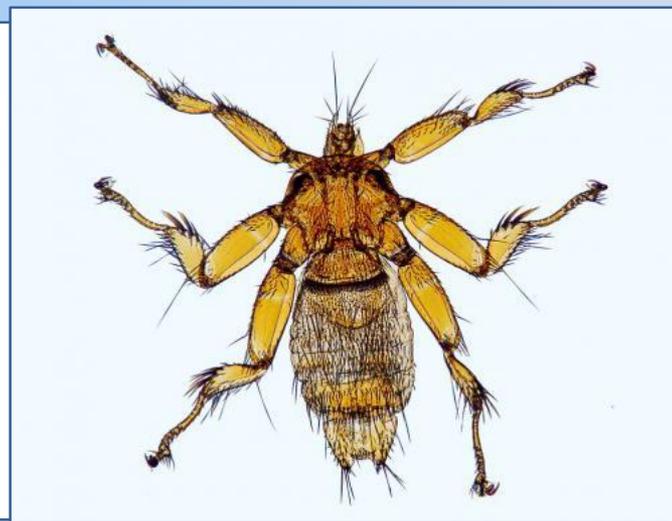
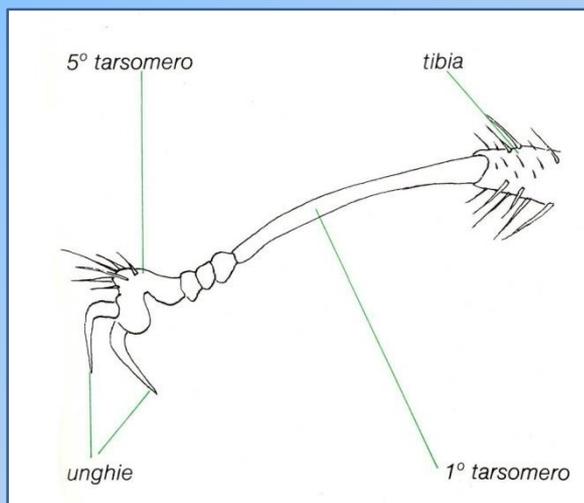


Zampe prensili

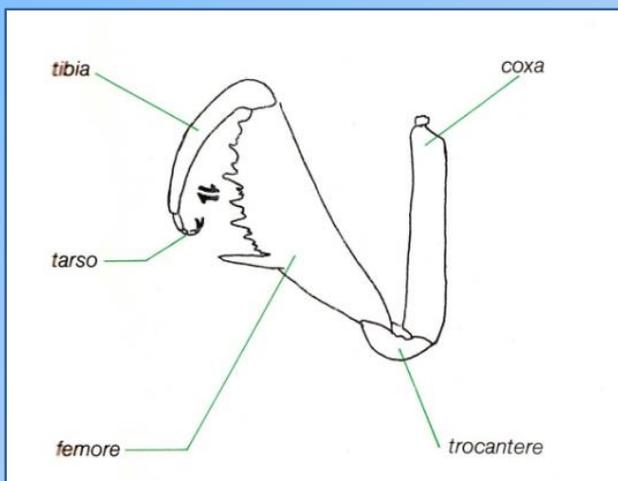
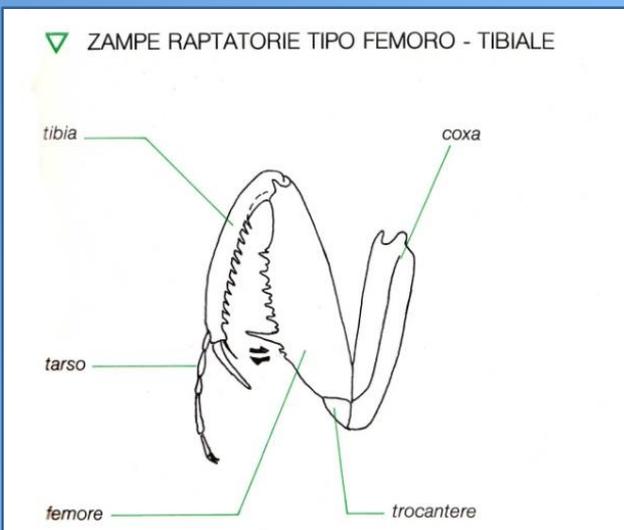
**TIPO
UNGUI-TIBIALE
(pidocchio
[Anoplura])**



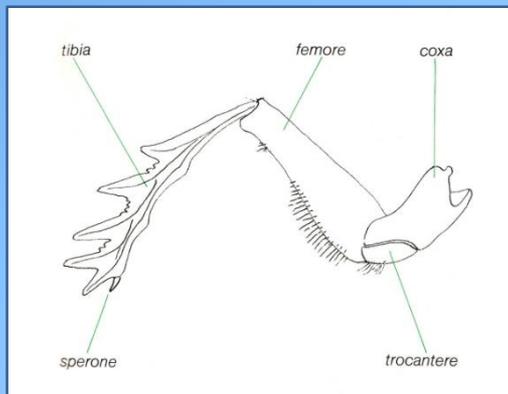
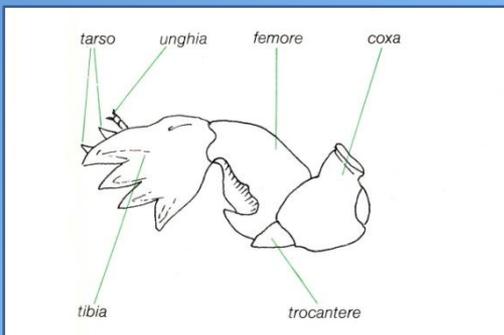
**TIPO
UNGUI-TARSALE
(Nittirebide
[Diptera])**



Zampe raptatorie

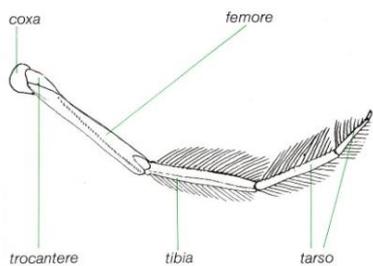


Zampe fossorie

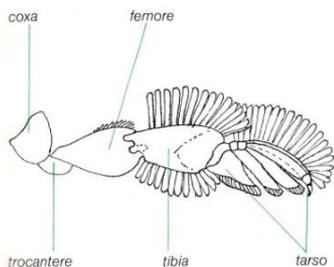


Zampe natatorie

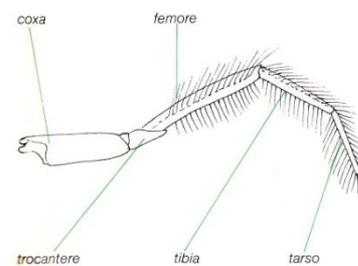
▽ ZAMPE POSTERIORI NATATORIE



▽ ZAMPE MEDIE E POSTERIORI NATATORIE

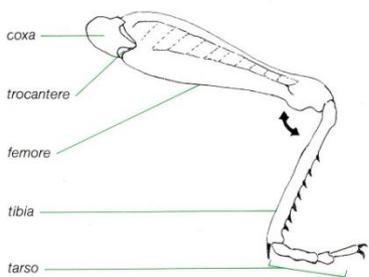


▽ TUTTE LE PAIA DI ZAMPE NATATORIE

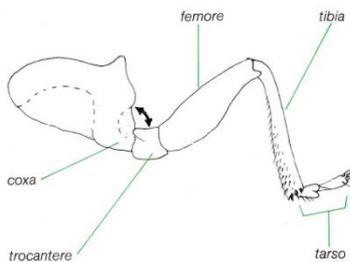


Zampe saltatorie

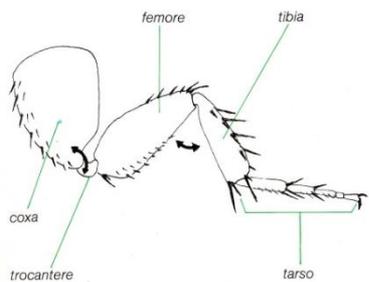
▼ ZAMPA SALTATORIA TIPO FEMORO - TIBIALE



▼ ZAMPA SALTATORIA TIPO COXO - TROCANTERICA

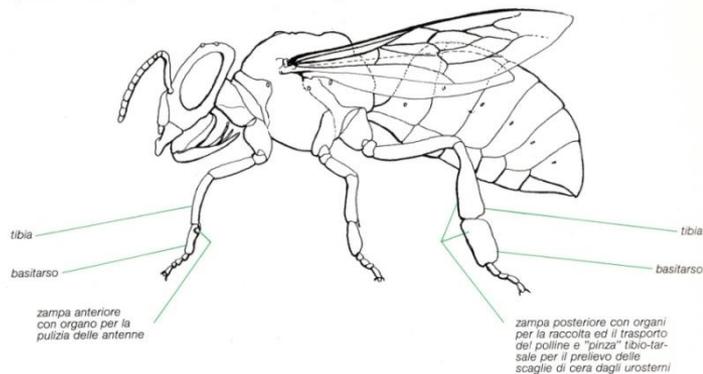


▼ ZAMPA SALTATORIA TIPO COXO - TROCANTERICA E FEMORO - TIBIALE

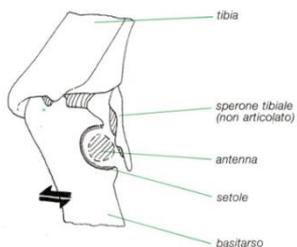


Zampe ape operaia

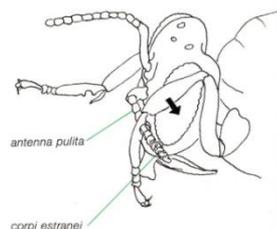
▽ APE OPERAIA (PRIVATA DELLA FOLTA PELURIA)



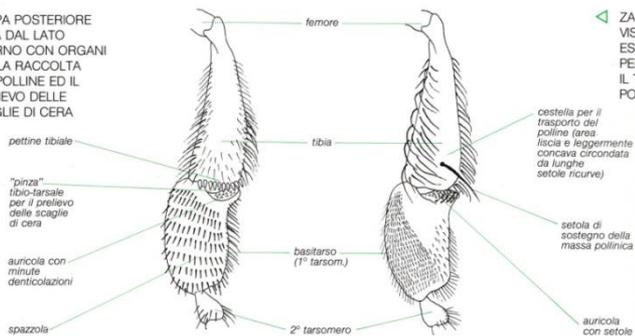
▽ ORGANO TIBIO-TARSALE PER LA PULIZIA DELLE ANTENNE



▽ MODALITÀ DI PULIZIA DELLE ANTENNE



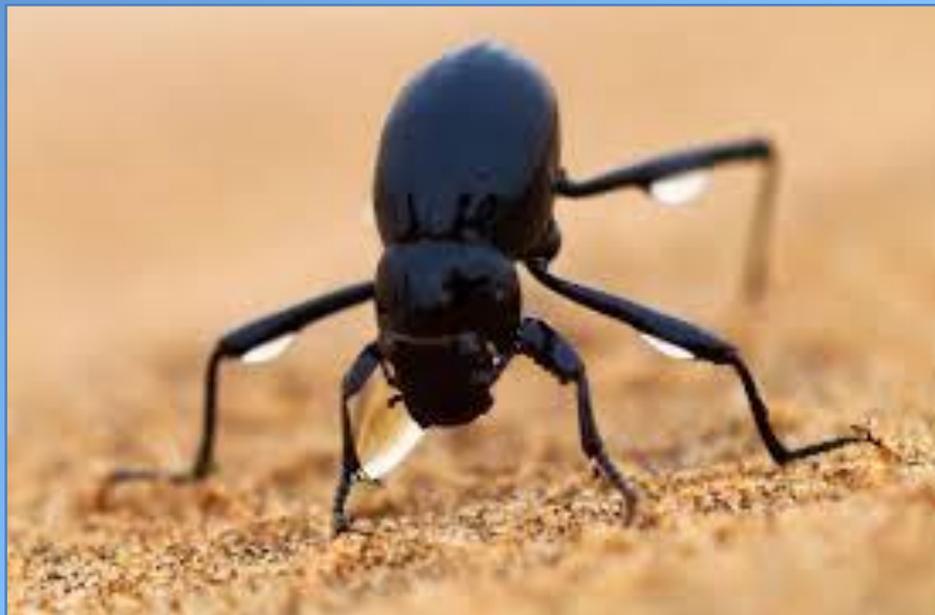
▷ ZAMPA POSTERIORE VISTA DAL LATO INTERNO CON ORGANI PER LA RACCOLTA DEL POLLINE ED IL PRELIEVO DELLE SCAGLIE DI CERA



◁ ZAMPA POSTERIORE VISTA DAL LATO ESTERNO CON ORGANI PER L'ACCUMULO ED IL TRASPORTO DEL POLLINE



Adattamenti all'ambiente ambienti xerici (deserti e ... spiagge)



Onymacris sp.
(Tenebrionidae)



Adattamenti all'ambiente

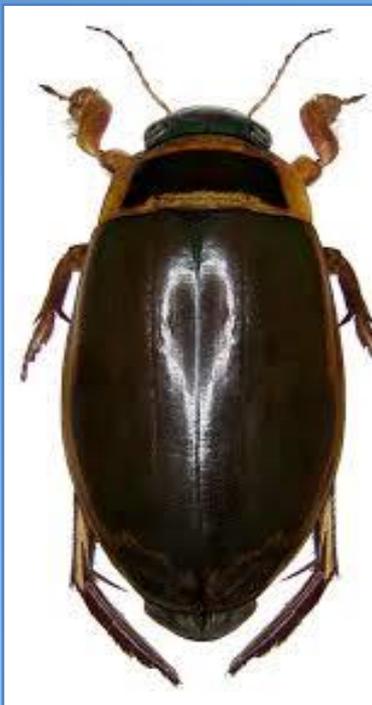
ambienti xerici (deserti e ... spiagge)



Pimelia spp.
(Tenebrionidae)



Adattamenti all'ambiente ambienti acquatici



Ditiscide
Dytiscus marginalis Linné
(Dytiscidae)



Adattamenti all'ambiente

Dytiscus - predazione



Adattamenti all'ambiente

ambienti acquatici - libellule



Adattamenti all'ambiente

ambienti acquatici - eterotteri



Nepa



Notonetta



Gerride



Adattamenti all'ambiente ambienti acquatici



Larve di zanzara

Tricotteri



Vivere in casa altrui

mirmecofili e termitofili (ospiti, spesso, indesiderati)



Aenictotera chapmanni Wassman
(Staphylinidae: Aleocharinae)



*Eucorythoderus
incredibilis*
Murayama
(Corythoderinae)

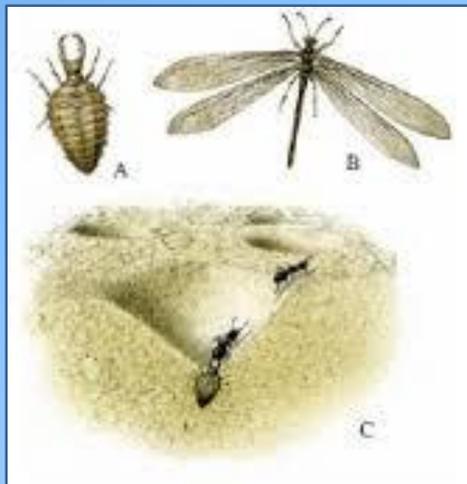
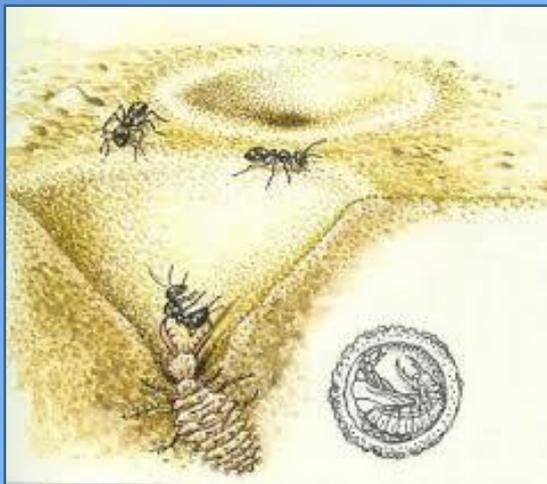


Parassitoidi: vivere in un corpo altrui (ospiti sicuramente indesiderati)



Regimi alimentari

predatori – larva di formicaleone



Regimi alimentari

predatori – larva e adulto di Cicindelide



Regimi alimentari

fitofagia



Maggolino
Melolontha melolontha (Linné)
Melolonthidae

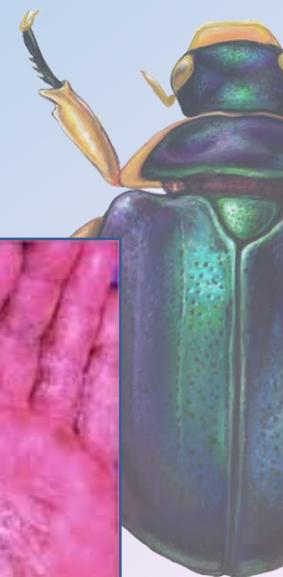


Regimi alimentari

fitofagia



Processionaria del pino
Thaumetopea pityocampa
(Notodontidae)



Regimi alimentari

predatori



Sicofante

***Calosoma sycophanta* Linné, 1758**

Coleoptera: Carabidae



Regimi alimentari

fitofagia



Dorifora della patata
Leptinotarsa decemlineata (Say)
(Chrysomelidae)

Regimi alimentari

fitofagia



Punteruolo rosso
Rhynchophorus ferrugineus (Olivier)
(Dryophthoridae)



Regimi alimentari

fitofagia: carpofagia



Balanino delle castagne
Curculio elephas (Gyllenhal)
(Curculionidae)



Regimi alimentari

fitofagia: micofagia



Diaperis boleti (Linné)
(Tenebrionidae)



Odonteus armiger (Scopoli)
(Bolboceratidae)



Quando il rifiuto diventa risorsa

insetti “spazzini”: necrofagia



Nicrophorus vespillo (Linné)
(Silphidae)



Regimi alimentari

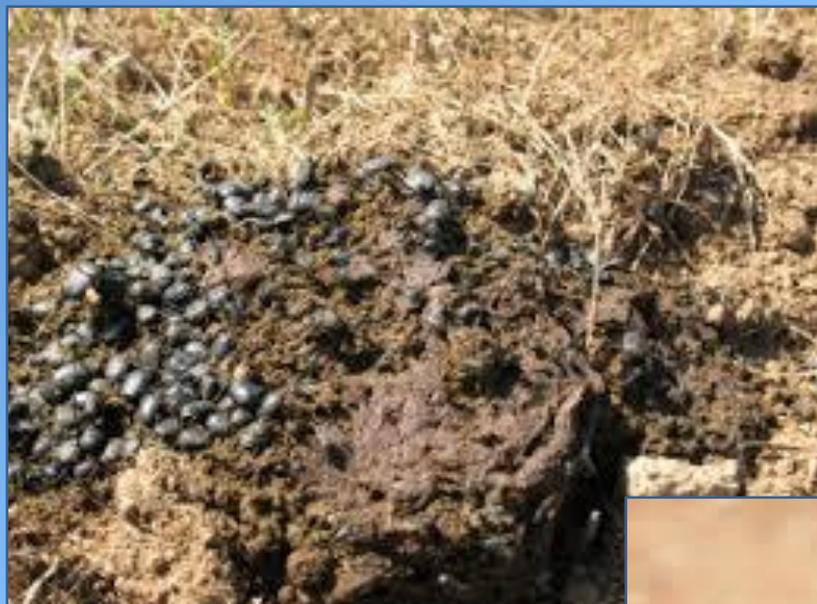
coprofagia



Scarabaeoidea “Laparosticta”

Regimi alimentari

coprofagia

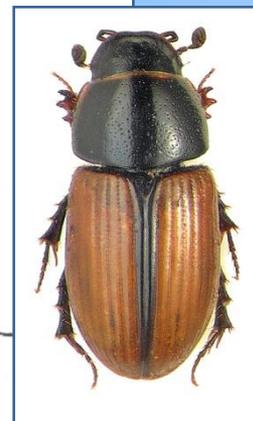
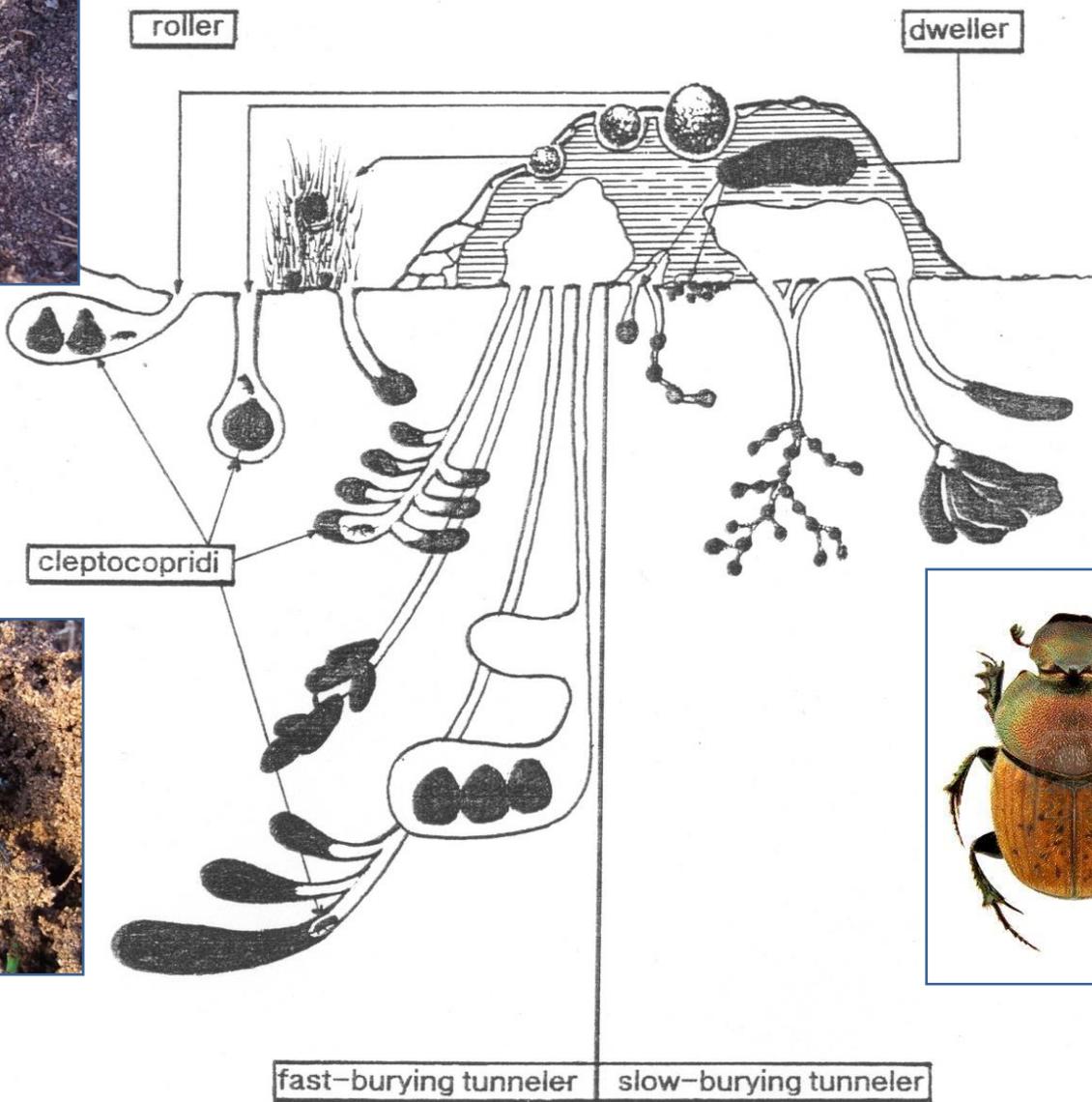


Pascolo bovino nei dintorni di Madonna di Castro (6.IX.2006).

Si può notare la contemporanea presenza sul pascolo di sterchi a diverso grado di degradazione da parte della fauna coprofaga:

- A) sterco fresco;
- B) sterco parzialmente disgregato;
- C) sterco completamente disgregato.





Insetti a casa nostra: coinquilini o padroni?



Pesciolino d'argento [*Lepisma spp.*, ex Thysanura]



Zanzara
Culex spp. [Diptera]



Mosca domestica
Musca domestica Linné, 1758
Diptera



Insetti a casa nostra: coinquilini o padroni?



Insetti a casa nostra: coinquilini o padroni?



Insetti a casa nostra: coinquilini o padroni?



Tarlo
Anobium punctatum (De Geer)
(Anobiidae)



Betilide



Cimice dei letti – *Cimex lectularius* Latreille



Insetti a casa nostra: coinquilini o padroni?



Tarma
Tineola [Lepidoptera]



***Stegobium paniceum* (Linné)**
(Anobiidae)



Tonchio del pisello
Bruchus pisorum (Linné)
Chrysomelidae: Bruchinae



Calandra del grano
Sitophilus granarius (Linné)
(Dryophthoridae)



Insetti come cibo ... e io ti mangio!



Insetti nell'arte

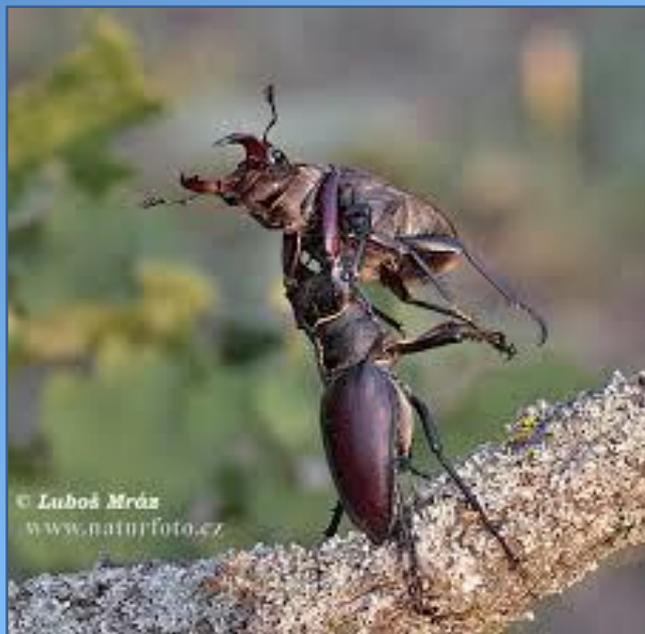
Sfinge testa di morto
Acherontia atropos Linné
(Lepidoptera: Sphingidae)



Cervo volante
Lucanus cervus (Linné)
(Coleoptera: Lucanidae)



Insetti e religioni



Cervo volante
***Lucanus cervus* (Linné)**
(Coleoptera: Lucanidae)



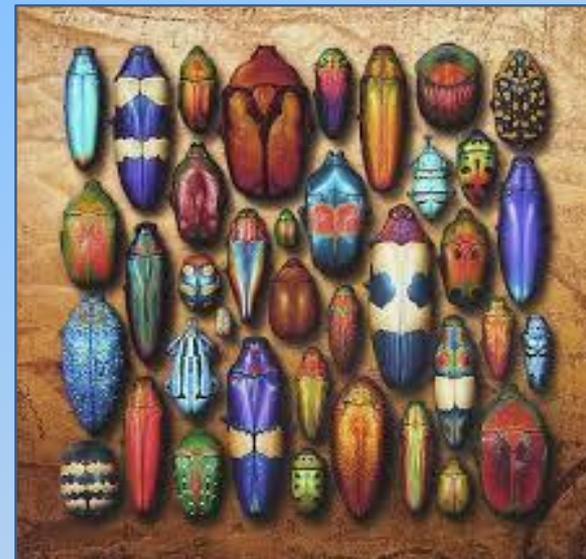
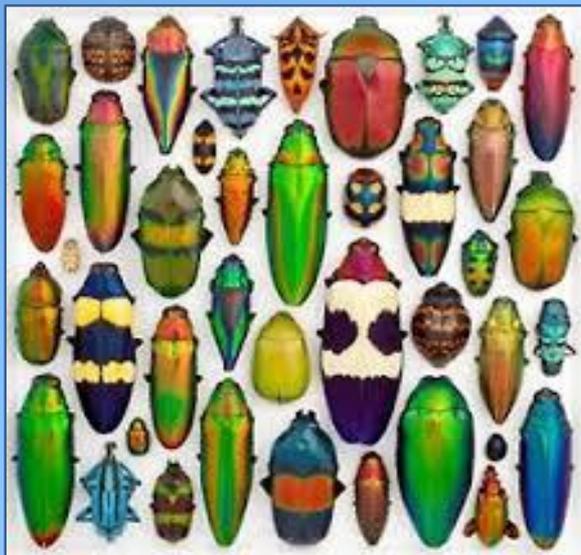
Insetti e religioni



Scarabeo sacro
Scarabaeus
(Coleoptera: Scarabaeidae)



Insetti e moda



Insetti e “medicina”



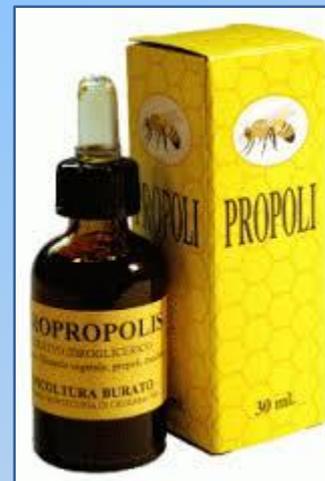
Dorylus (Hymenoptera: Formicidae)



Insetti e “medicina”



Asticoterapia (o Larvoterapia)



Cantaride officinale
Lytta vesicatoria Linné
Coleoptera: Meloidae



Insetti e “industria”



Baco da seta - *Bombyx mori* (Linné) [Lepidoptera: Bombycidae]



Cocciniglia del carminio – *Dactylopius coccus* (O.G. Costa) [Homoptera: Coccoidea]

...e ricordatevi che...

