Fleas & lice

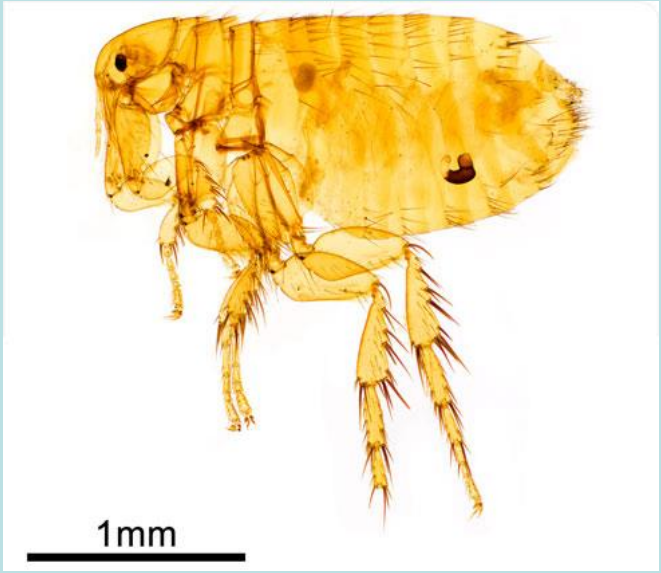
Objectives

- Scientific names of fleas & lice of medical importance,
- Morphology & lifecycle
- Medical importance
- Control

Fleas

Blood sucking ectoparasites (temporary)

- **Classification**
- Phylum- Arthropoda
- Class –Insecta
- Order- Siphonaptera



Medical importance

Disease transmission

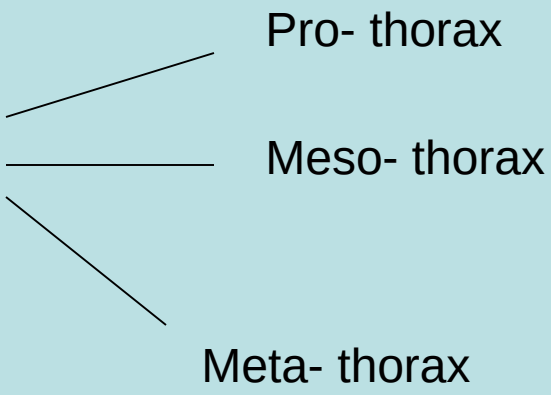
Biting nuisance

Morphology

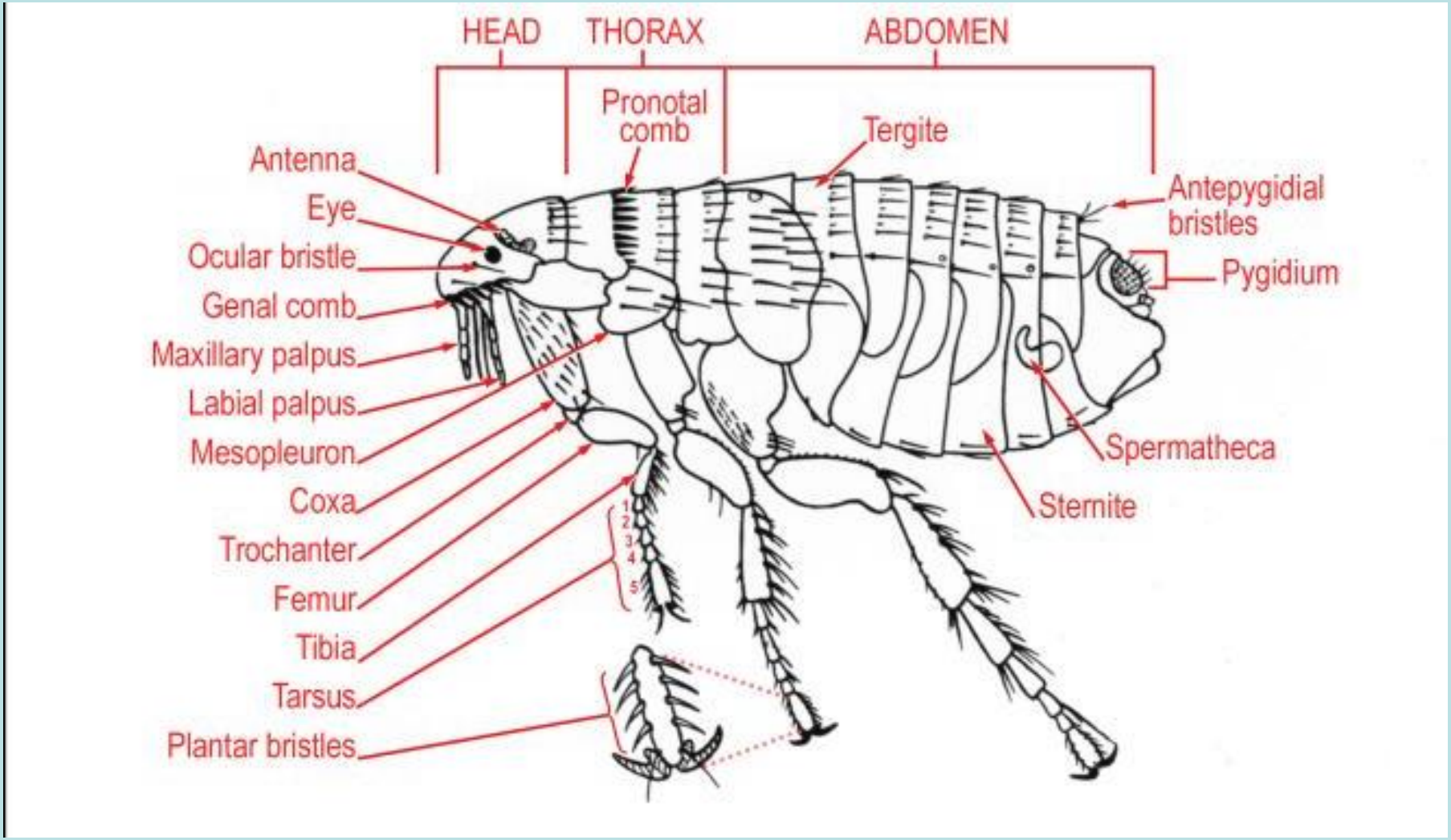
- Size 1-4mm, wingless
- Brown in colour
- 3 pairs of powerful legs- hind pair specialised for jumping
- Laterally compressed body (head, thorax & abdomen)
- Most of the body is covered with bristles & small spines
- Mouth parts pointed downwards

- Head is roughly triangular
- Genal comb on the inferior margin of the head of some species

- Thorax 3 segments



- Pronotal comb on the post margin of the pronatum of some species
- Some genera are combless

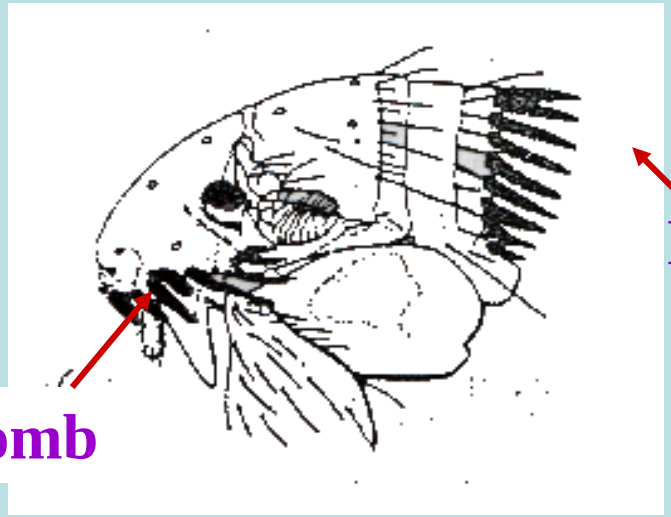

HEAD
THORAX
ABDOMEN
Pronotal comb
Tergite
Antenna
Eye
Ocular bristle
Genal comb
Maxillary palpus
Labial palpus
Mesopleuron
Coxa
Trochanter
Femur
Tibia
Tarsus
Plantar bristles
Antepygidial bristles
Pygidium
Spermatheca
Sternite
1
2
3
4
5

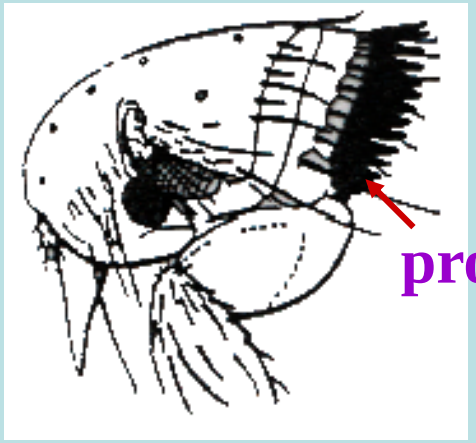
- Some species have a meral rod in the sternite above the middle pair of legs.

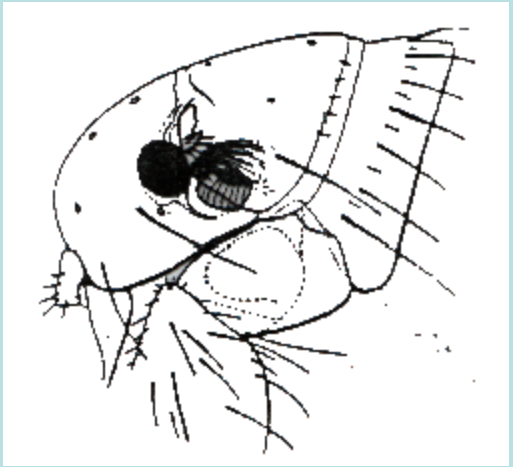
- The meral rod & the combs (genal & pronotal) are important in species identification

Heads of fleas of different species

Dog flea



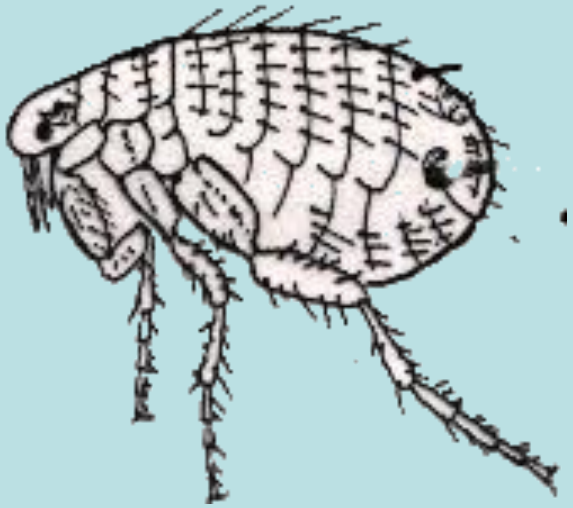




Rat flea
Nosopsyllus

Rat flea
xenopsylla

Sexes separate



Male flea

- Tip of the abdomen pointed and upturned
- No spermatheca

Female flea

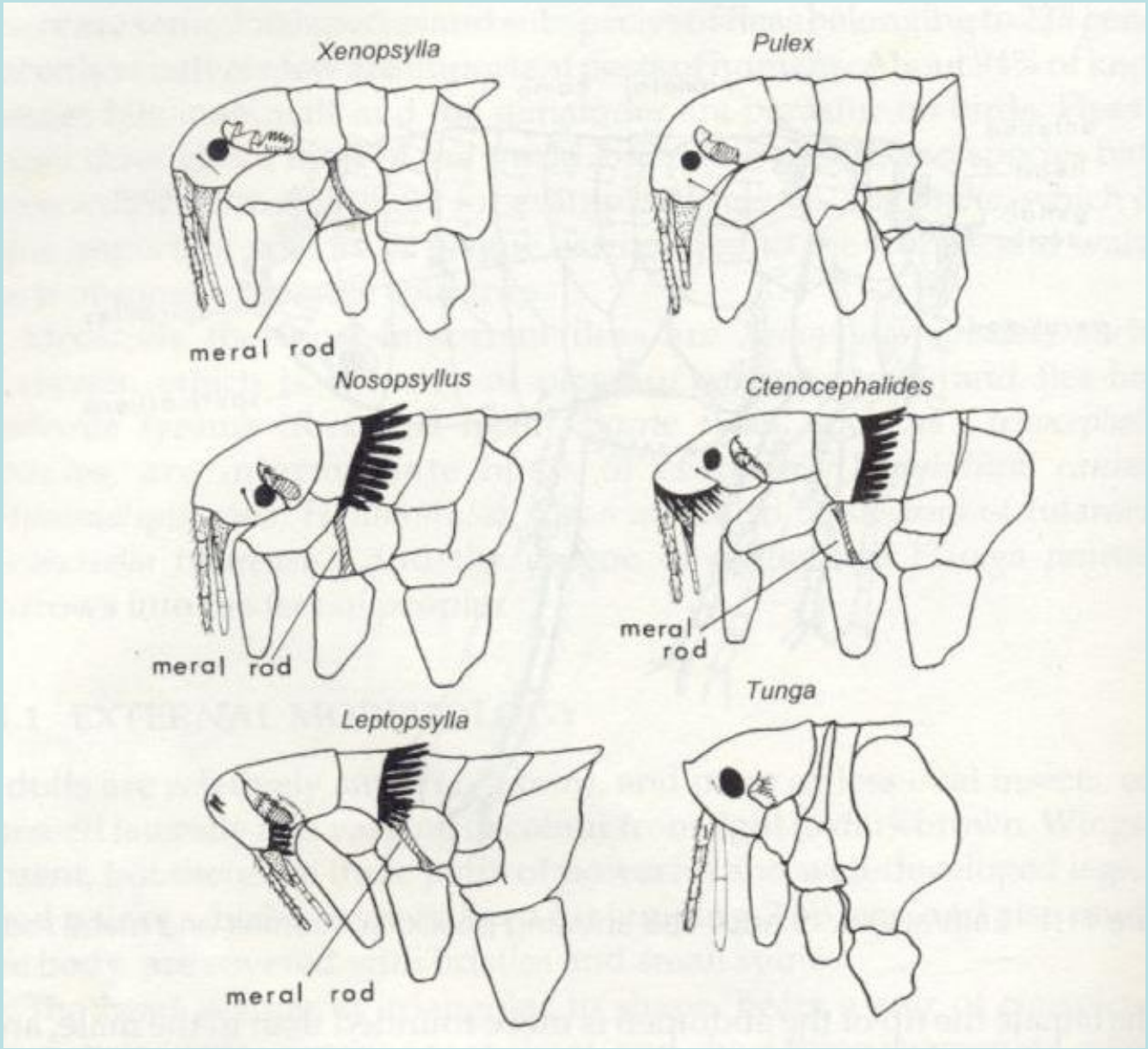
- Abdomen has the organelle spermatheca
- Posterior end of abdomen rounded

Behaviour

- Adults feed on blood
- Larvae feed on organic debris & faeces of adults
- Partial host specificity –attack humans in the absence of their preferred hosts
- Rapidly abandon dead hosts
- Withstand considerable desiccation & starvation

- Species affecting man

- *Pulex irritans* (human flea)
- *Ctenocephalides canis* (dog flea)
- *Ctenocephalides felis* (cat flea)
- *Xenopsylla cheopis* (rat flea)
- *Tunga penetrans* (sand flea)


Xenopsylla
meral rod
Pulex
Nosopsyllus
meral rod
Ctenocephalides
meral
rod
Tunga
Leptopsylla
meral rod

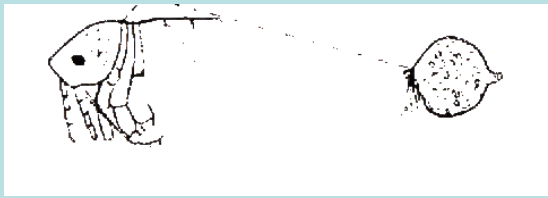
ORDER SIPHONAPTERA

FAMILY **PULICIDAE**

COMBLESS FLEAS

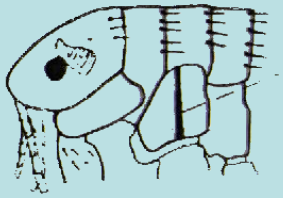
COMBED FLEAS

Genus *Tunga*

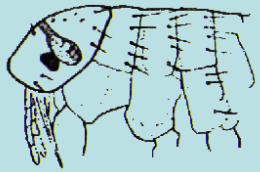


GENUS

XENOPSYLLA



PULEX



GENUS

NOSOPSYLLUS

CTENOCEPHALIDES

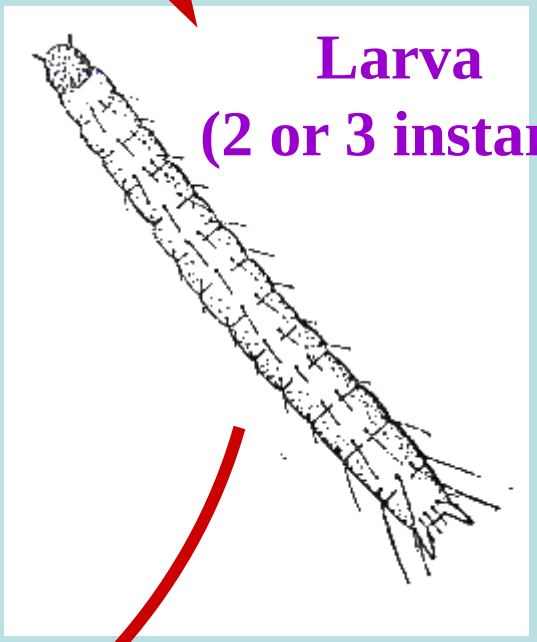
LEPTOLSYLLA

SIPHONAPTERA
(fleas)

LIFE CYCLE OF A FLEA

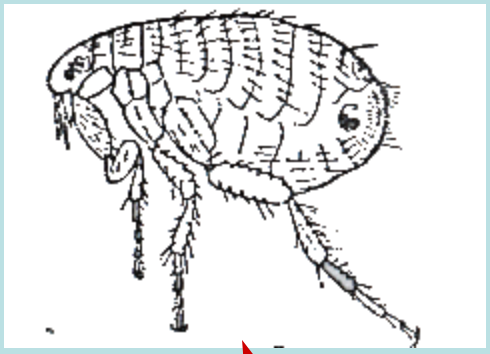
eggs

Larva
(2 or 3 instars)



Cocoon containing pupa

Adult



Disease transmission

Plague (*Y. pestis*)

Endemic typhus (*R. typhi*)

Dipilidiasis (*D. caninum*)

Rat tape worm infection (*H. diminuta*)

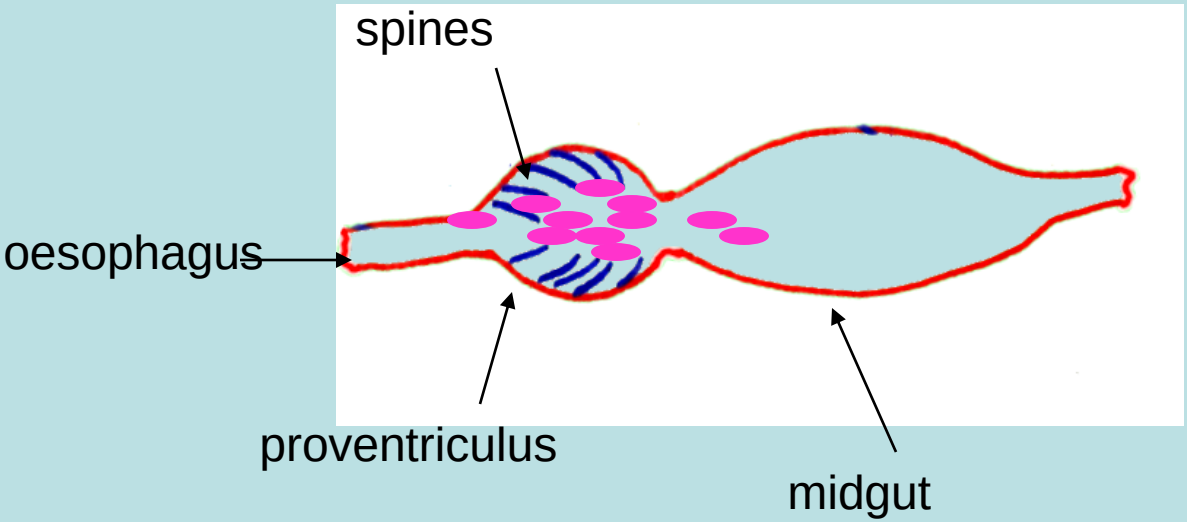
Biting nuisance

Intense itching may occur in sensitised individuals

Mechanisms of disease transmission

Plague

- Bite of “blocked flea”- regurgitation (X. *cheopis)*



Endemic typhus (*X. cheopis, P. irritans*)

- Faeces coming in contact with mucus membranes

Cestodes

- Accidental ingestion of an infected flea with larval tape worms (flea is the intermediate hosts for these tape worms)

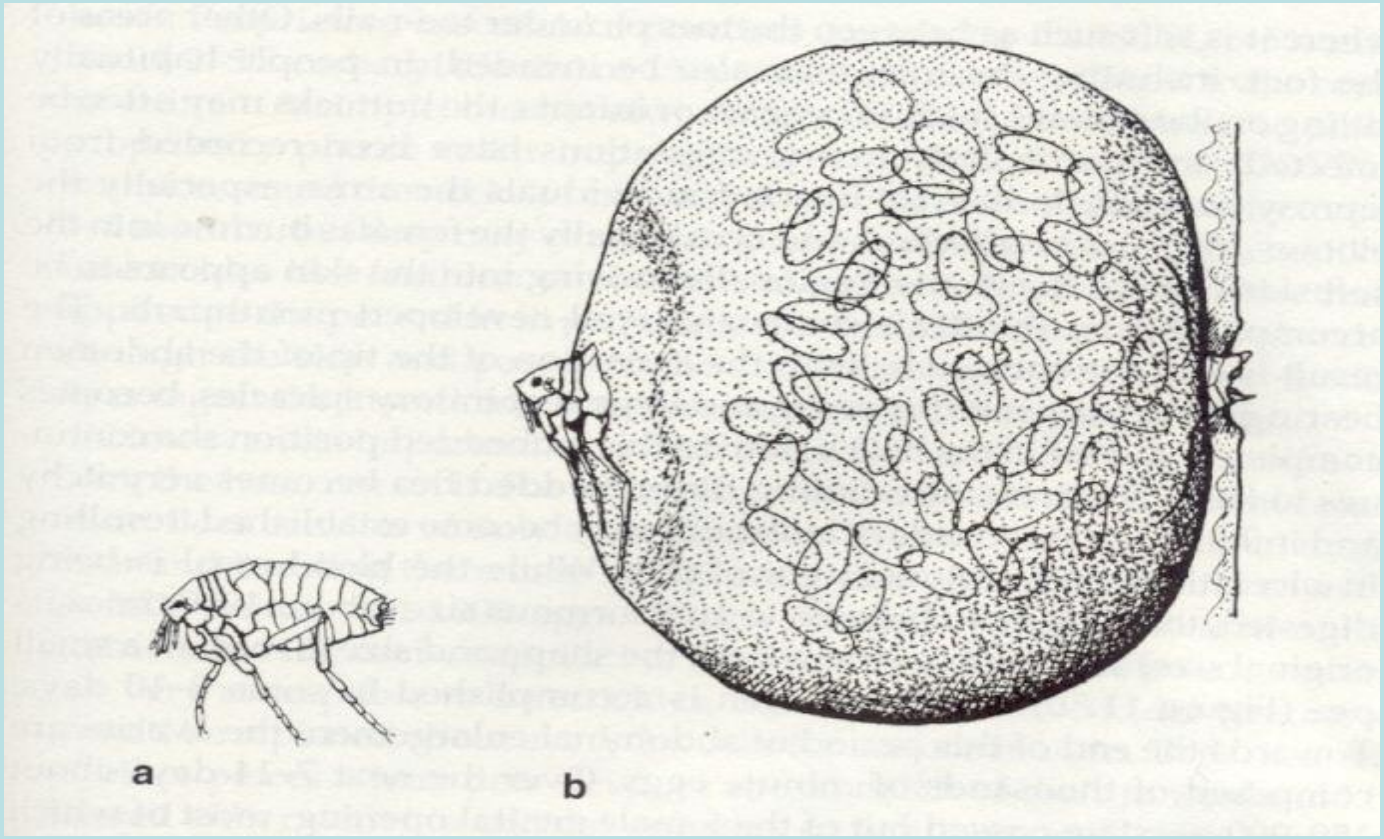
H. diminuta (vector flea-*Xenopsylla* spp)

D. caninum (vector flea-*Ctenocephalides*)

Tunga penetrans (sand flea)

- “jigger flea”- Africa, Central & South America
- Not reported in Sri Lanka
- Both sexes feed on blood
- Females also burrows into skin between toes & under toe nails
- Burrowing flea enlarges to a ball shape and expel eggs
- Results in a painful ulcer
- Treated by surgical removal

Morphology
Small-1mm
Very short thoracic segments
Lack spines/ bristles on the body
No genal / pronotal combs



Flea control

- Dusting of pets with insecticidal powders
- Insecticides applied to environment of hosts(beds, kennels, rat runways etc)

Lice

- Order – Anoplura
- 3 varieties infect man
- *Pediculus humanus var capitis* (head louse)
- *Pediculus humanus var corporis*(body louse)
- *Pthirus pubis* (pubic/ crab louse)

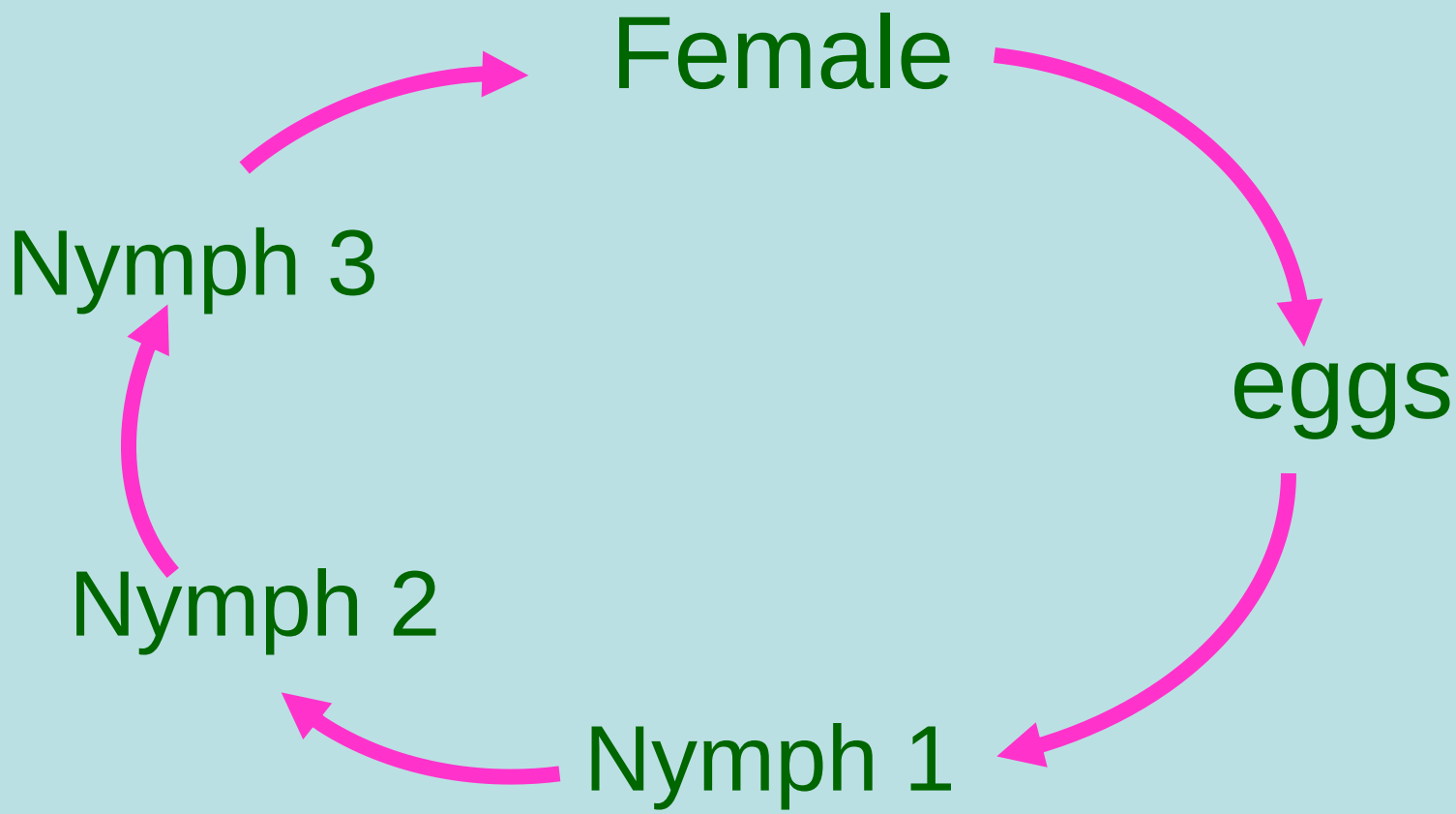
- Obligatory ectoparasites
- Both sexes feed on blood

Morphology

- Small-(2-4mm), beige- grey in colour,
- Dorsoventrally flattened bodies
- Wingless with a leathery integument
- Mouth parts modified for piercing & sucking (tube like)
- Tip of abdomen rounded in ♂ and bifurcated in ♀.
- Short legs adapted for clinging
- Head & body lice have identical morphology

General Life Cycle

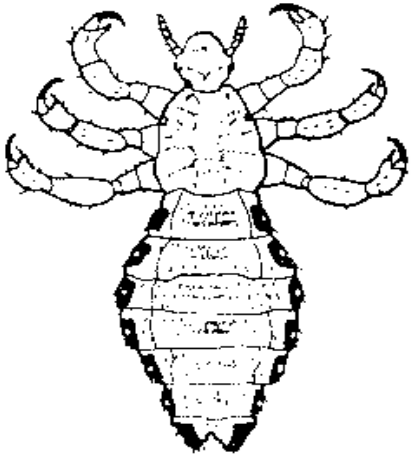
Louse



Nypmhs resemble adults but smaller in size

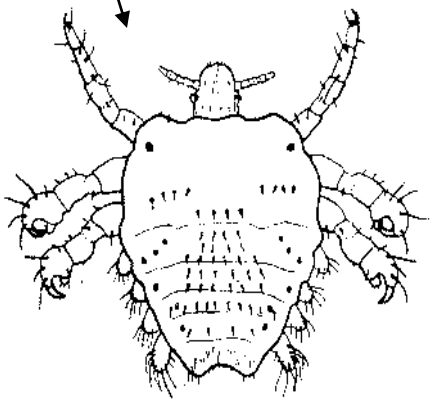
Hemimetabolus life cycle

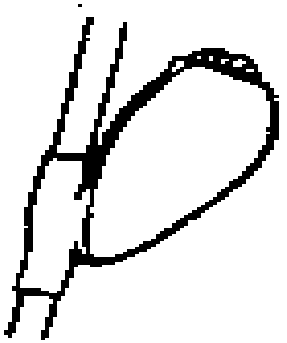
Head / body louse ♀



Nits cemented to hair/ clothing

Pubic louse ♀





P. humanus capitis (head louse)

- Adult habitat- head of humans, nits cemented to base of hairs
- Transmission - close contact, sharing of combs & hair brushes
- Cause pediculosis- enlargement of occipital & other cx nodes, itching of scalp due to sensitisation to louse saliva
- No disease transmission
- Heavy infection- lousy feeling

P. humanus corporis (Body louse)

- Adult habitat- clothing & skin where clothes touch the body, visits the skin to feed

- Spread by close contact & sharing of clothes

Medical importance

- Vector of spirochaetes & rickettsia
- Pruritus
- Vagabonds disease
- Allergy to louse faeces

Disease transmission

Epidemic typhus (*R. prowazaki*) infection spread by contamination of wounds & mucus membranes by louse faeces

Trench fever (*R. quintana*)

crushing the louse

Louse borne epidemic relapsing fever (*B. recurrentis)*- crushing the louse

Pthirus pubis (pubic louse)

- Small
- Broad fat body with poorly defined thorax & abdomen
- 2nd & 3rd pairs of legs enlarged (crab like appearance)
- Habitat- pubic hair, eye lashes & brows
- Transmission –sexual contact, rarely infected fomites
- No disease transmission, allergic reactions in sensitised individuals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Treatment

Head & pubic lice

- Application of shampoos & lotions containing insecticides

0.5% malathion, Permethrin,DDT, BHC, Carbaryl

- Removal of nits with combs
- Whole family should be treated

Body louse

- Changing & washing the clothes in hot water (>60 °C), ironing
- Blowing of insecticidal powders between body & underclothes

Summary

- Fleas & lice are blood sucking ecto-parasites
- Fleas have holometabolus life cycle
- Medical importance- vectors of plague, endemic typhus & intermediate host of tape worms, *H.diminuta & D.caninum*
- Lice -3 types,
- Life cycle- hemimetabolus
- Only body lice are vectors; Tx. epidemic typhus, trench fever & louse borne relapsing fever
- Controlled with insecticidal lotions, 0.5% malathion, permethrin, BHC
- Body lice- Washing the clothes in very hot water