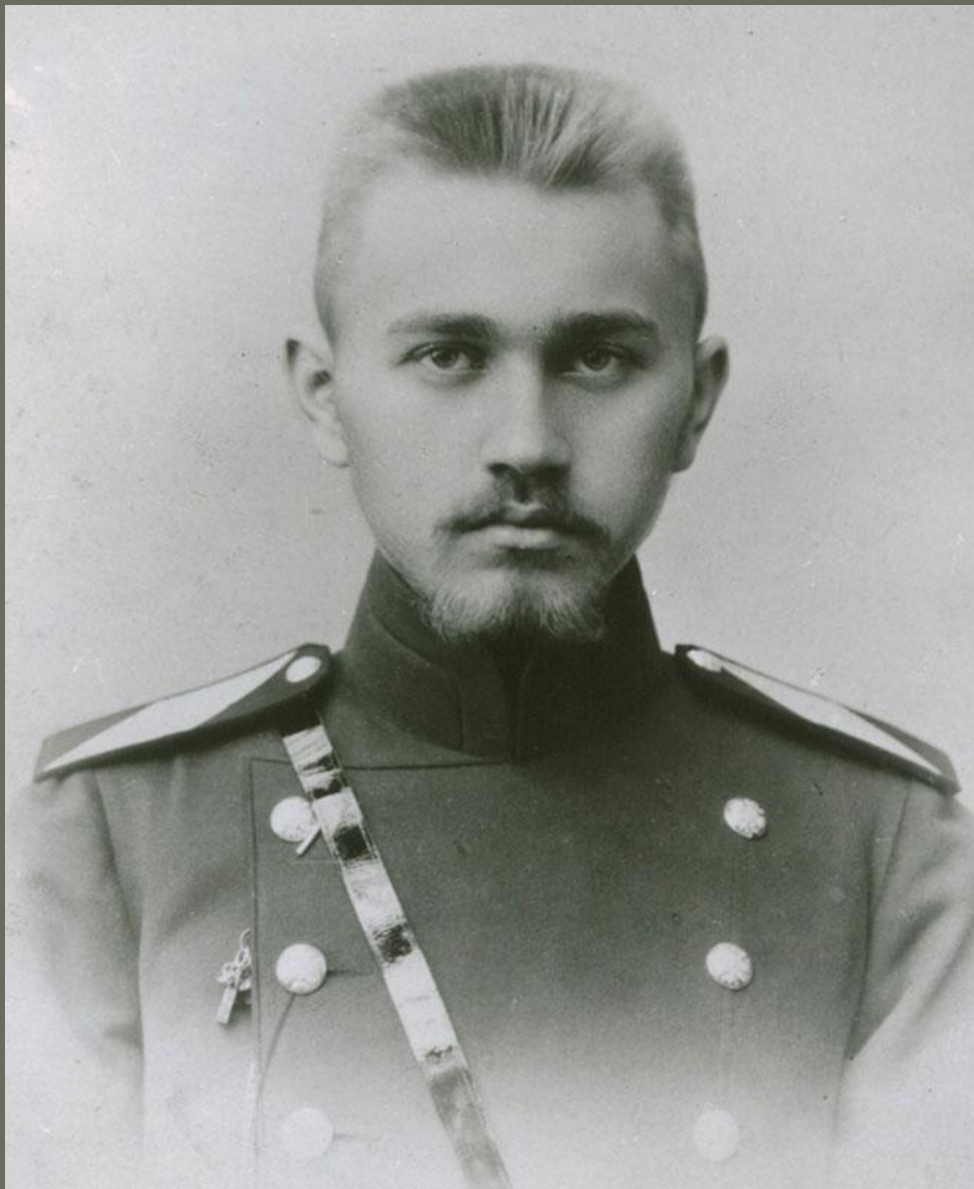


# ТЕМА ЛЕКЦИИ 08:

**Медицинская**

**арахноэнтомология.**



Выдающийся зоолог,  
энтомолог и  
паразитолог.

Создатель учения о  
природной очаговости  
трансмиссивных  
болезней.

Евгений Никанорович Павловский  
(1884-1965 гг.)

# “Очаговая триада” трансмиссивного заболевания

1. Популяция **возбудителя**
2. Популяция **хозяев** возбудителя
3. Популяция **переносчика**

# Переносчики

(кровососущие членистоногие)

## Доноры

(дикие животные,  
чаще – грызуны)

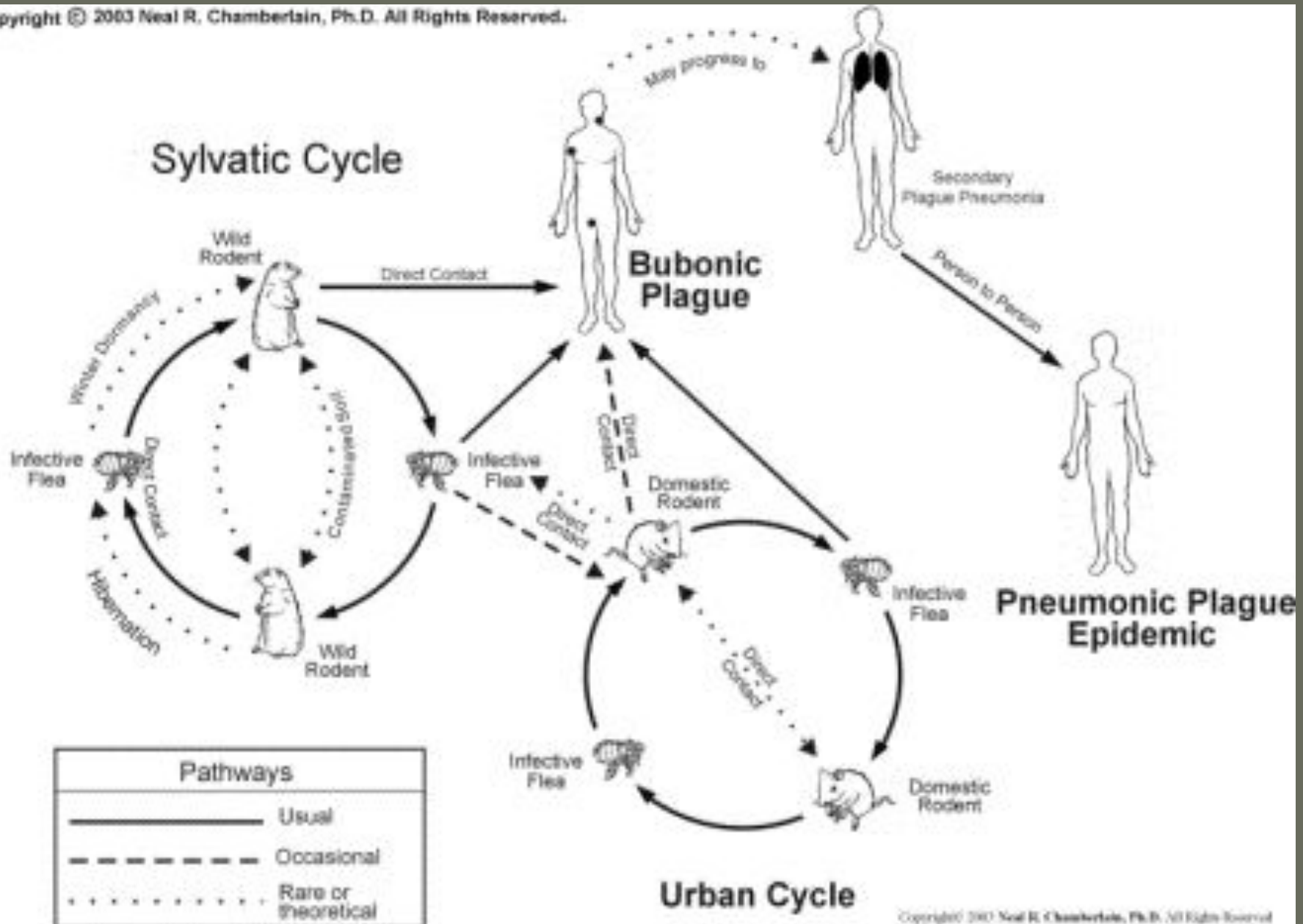
## Реципиенты

(дикие  
животные)

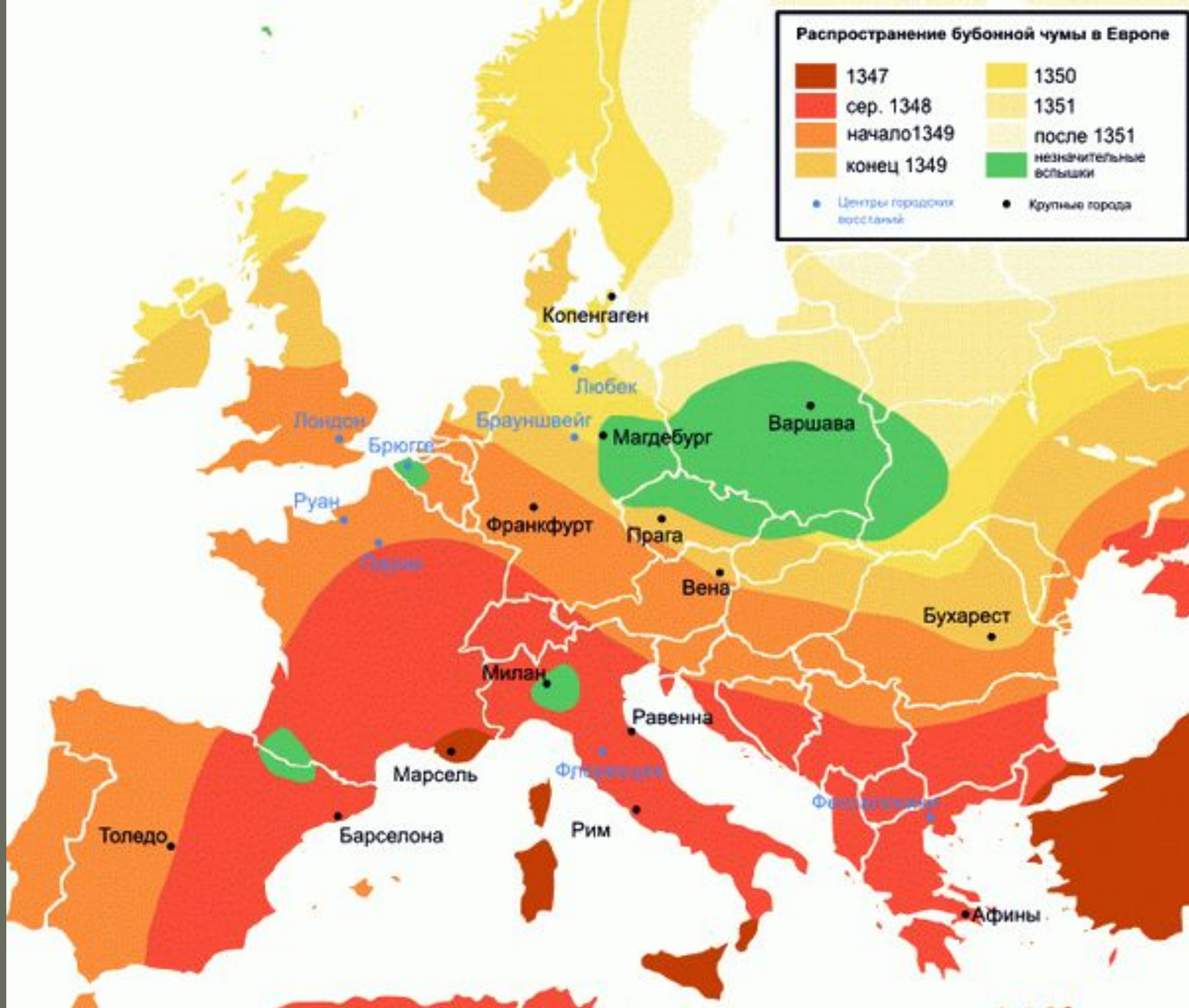


# Схема природного очага чумы





Распространение бубонной чумы в Европе



**1. Природные очаги**  
(клещевой энцефалит)

**2. Синантропные очаги** (чесотка)

**3. Антропургические очаги**  
(описторхоз в местах искусственных  
водоемов)

**4. Смешанные очаги**  
(трихинеллез)



# Профилактика ПОВ

1. Оздоровление ландшафта
2. Специфическая вакцинация
3. Неспецифическая профилактика

# ПАУКООБРАЗНЫЕ

## СКОРПИОНЫ, ПАУКИ, КЛЕЩИ



The class includes  
more than 35.000 species.

cephalothorax  
abdomen



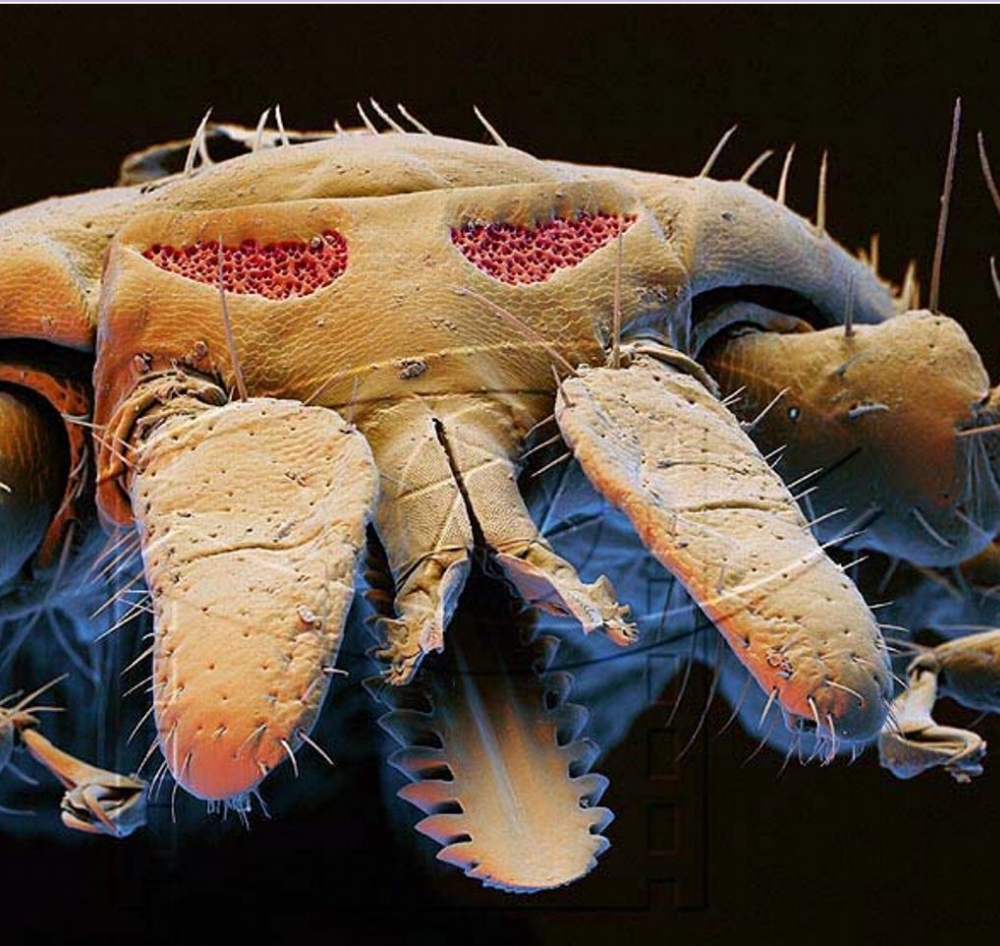
The antennae are absent.

4 pairs of legs

The representatives of Scorpions and Spiders are the toxic animals.

The Acari can be the vectors and can parasitize in humans organs and tissues.

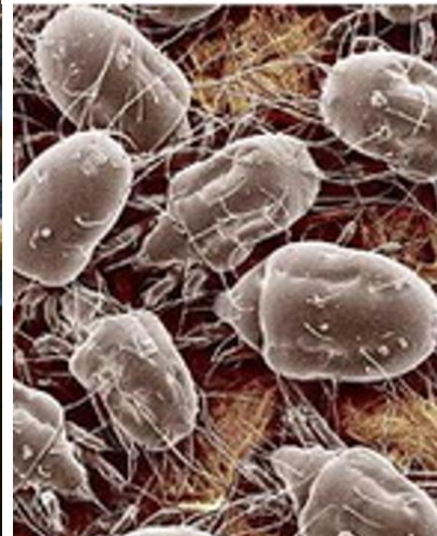
## КЛЕЩИ



Acari include ticks, mites

Most mites are free-living.

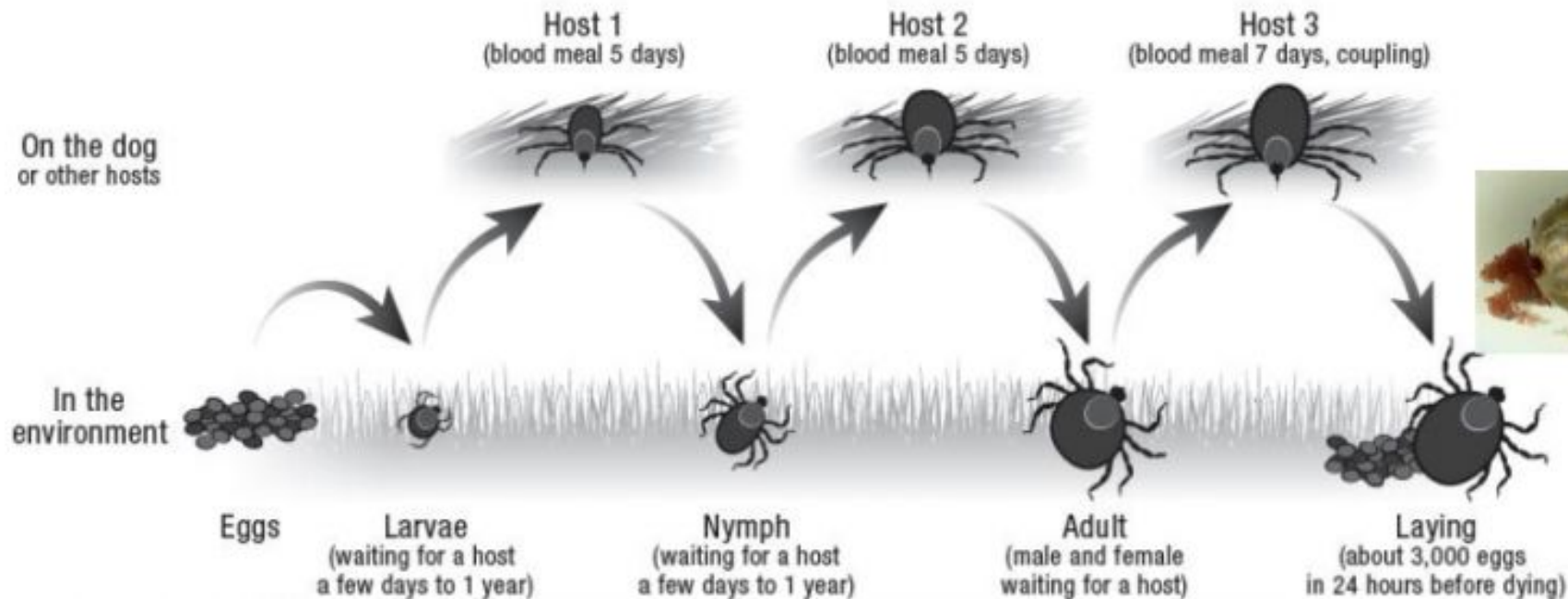
Ticks transmit the widest variety of pathogens of any blood sucking arthropod, including bacteria, rickettsiae, protozoa, and viruses.

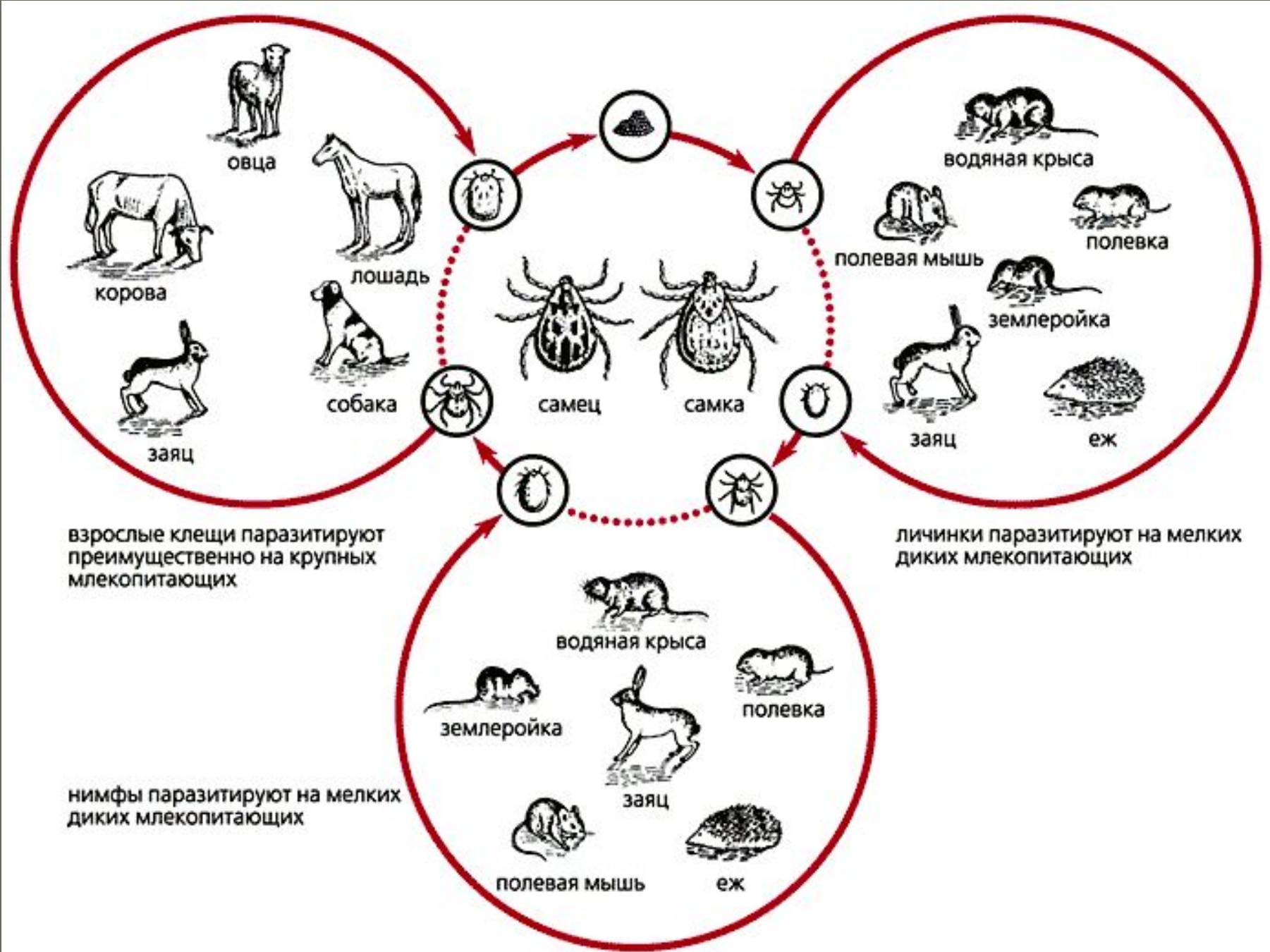


# СЕМЕЙСТВО ИКСОДОВЫЕ КЛЕЩИ



# Жизненный цикл иксодовых клещей





# СЕМЕЙСТВО ИКСОДОВЫЕ КЛЕЩИ



**Собачий клещ**



**Таёжный клещ**

***Ixodes ricinus* and *Ixodes persulcatus*.**

# Dermacentor sp. and Haemophysalis sp.



Пастбищный клещ



*Dermacentor reticulatus*



*D. occidentalis*



*D. variabilis*



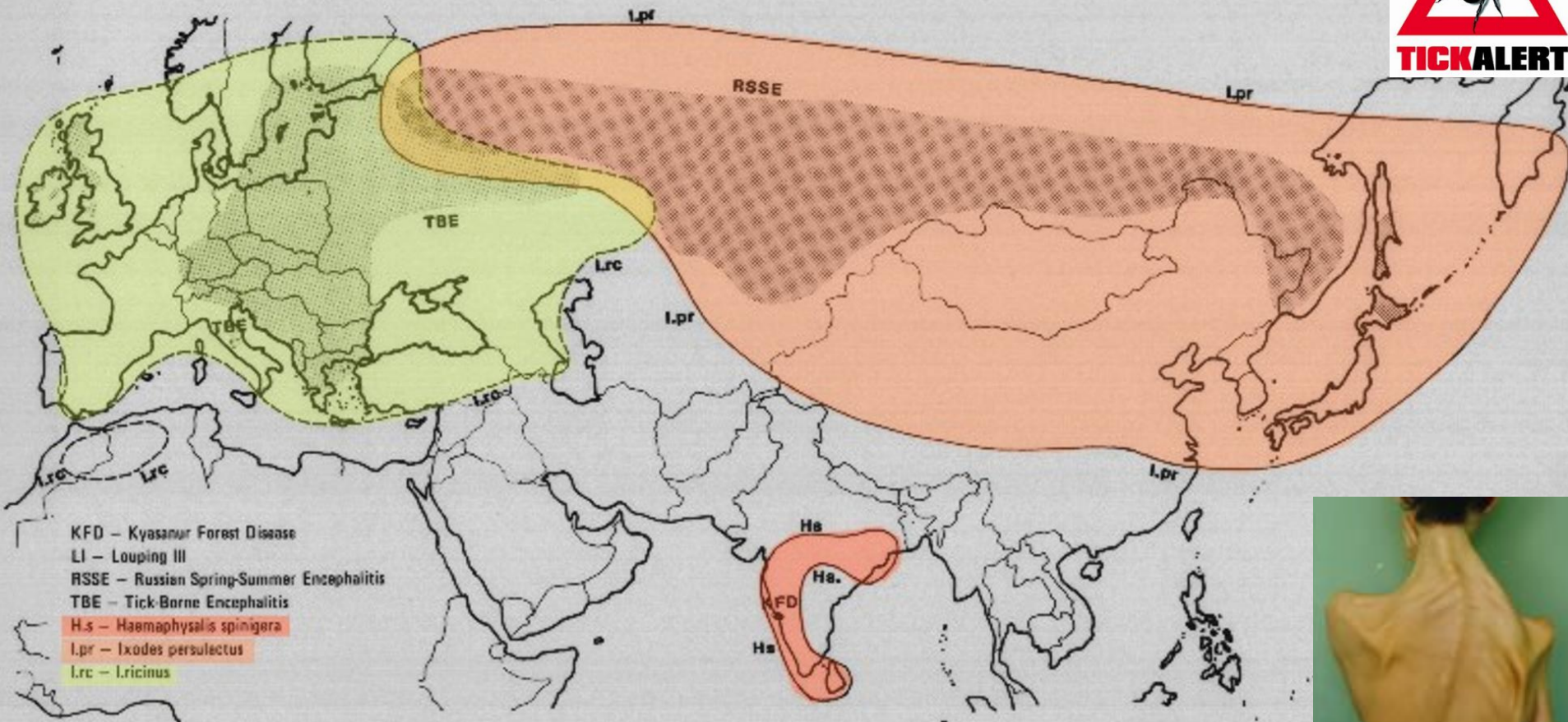
*Haemophysalis concinna*



# Распространение таёжного и собачьего клещей



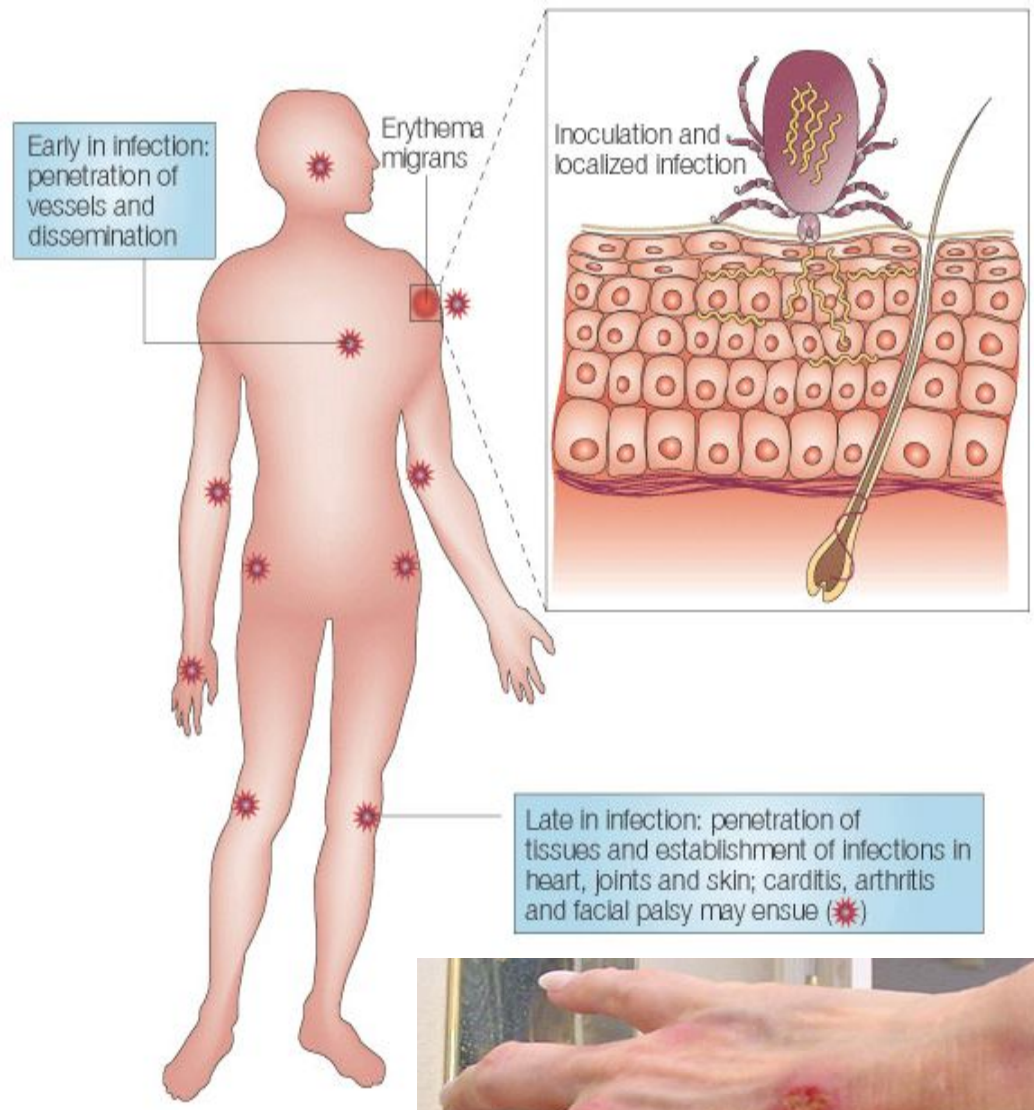
Distribution of Louping Ill, Tick-Borne Encephalitis, Russian Spring-Summer Encephalitis, and Kyasanur Forest Disease and their Main



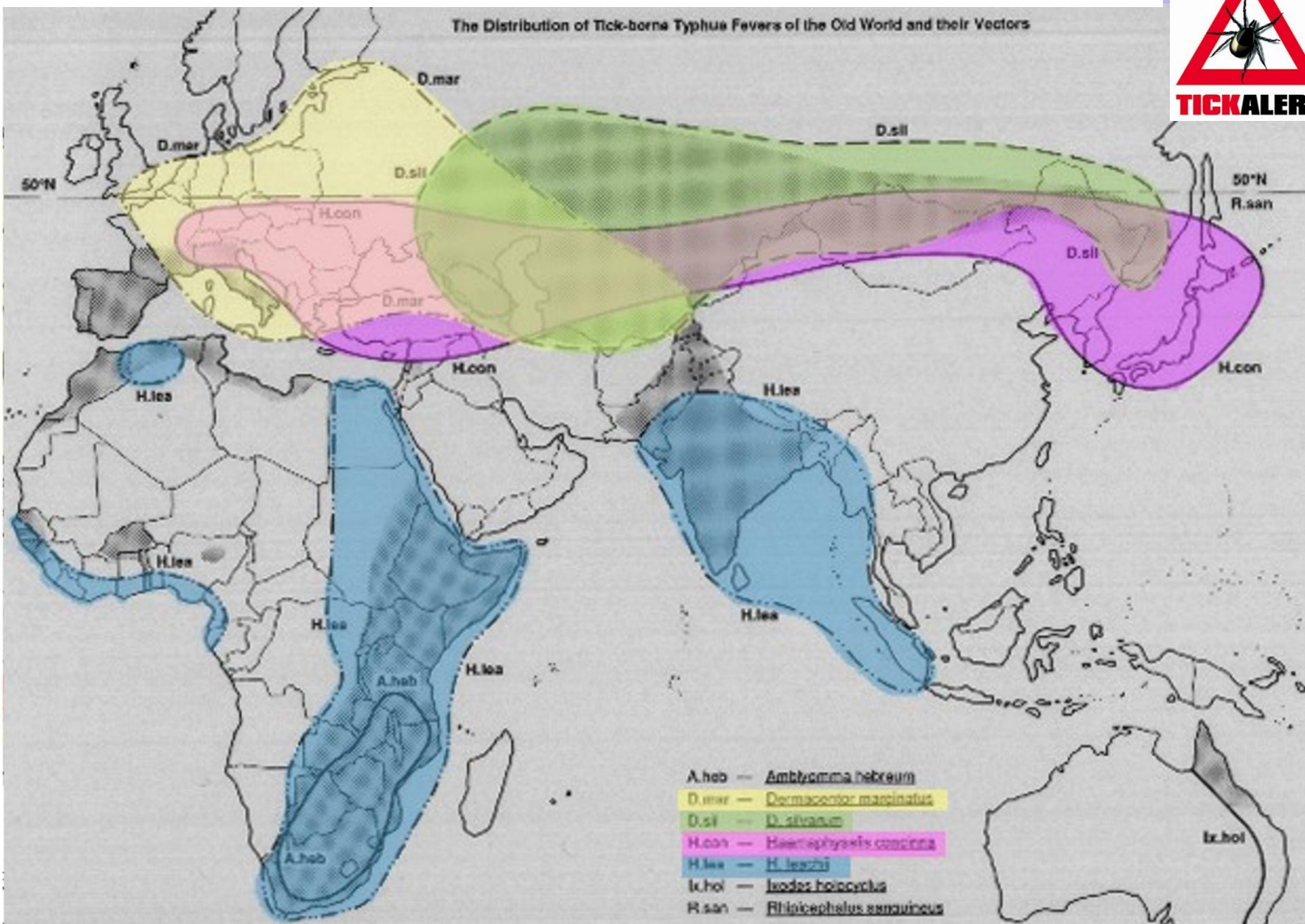
Europe, Eurasia and temperate Asia, South Africa, North America.

**Туляремия, болезнь Лайма, клещевой весенне-летний энцефалит, бабезиоз, анаплазмоз, эрлихиоз, боррелиоз, арбовирусная инфекция, Q-лихорадка, колорадская клещевая лихорадка**

# Болезнь Лайма

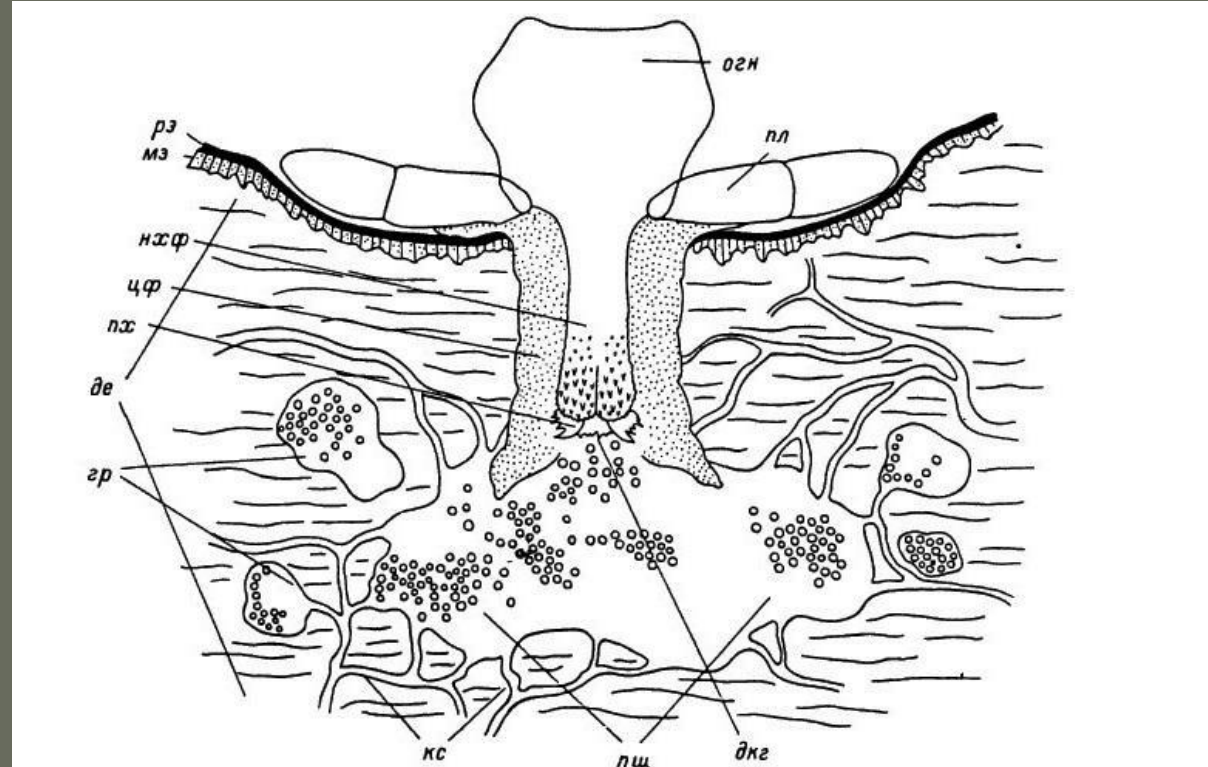


# Распространение пастищных клещей



**Клещ валера**  
**поздравляет всех с началом**  
**сезона и приглашает на шашлыки**





Ротовые органы питающейся самки *Hyalomma asiaticum* в коже хозяина.

нхф — наружный хелицеральный футляр; цф — цементный футляр; па — пальцы хелицер; дкг — дистальный конец гипостомы; де — дермальный слой кожи; кс — кровеносные сосуды.

# Если клещ укусил

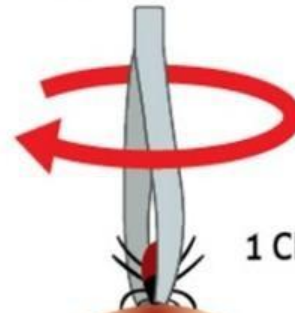


**Захватите клеща как можно ближе к головке**



**Неправильное извлечение клеща**

## Как достать клеща самостоятельно:



1 СПОСОБ

- Возьмите зажим (подойдет обычный пинцет)
- аккуратно зажмите им клеща, как можно ближе к хоботку
- не выпуская клеща, сделайте несколько полных оборотов (2–3) пинцета в одном направлении (чаще советуют крутить по часовой стрелке)
- клещ должен выйти полностью



2 СПОСОБ

- Возьмите кусок прочной нити
- сделайте петлю и затяните ее как можно ближе к хоботку
- натяните нитки
- начните закручивать нитки, немного покачивая их из стороны в сторону
- клещ должен выйти полностью

2

Вытащить нужно вместе с головой! (Чтобы не загноилась ранка.)

3

Голова клеща оторвалась? Вынимайте ее иголкой, как занозу!



4

Отнесите клеща на анализ в лабораторию санэпидемстанции.



5

**НЕОБХОДИМО ОБЯЗАТЕЛЬНО ОБРАТИТЬСЯ К ВРАЧУ!**



6

Через 10 дней после укуса сдайте кровь на боррелиоз и энцефалит.

7

Еще через 2-3 недели сдайте анализы на антитела к вирусу клещевого энцефалита и вирусу боррелиоза, – для подтверждения диагноза и оценки иммунитета вашего организма.

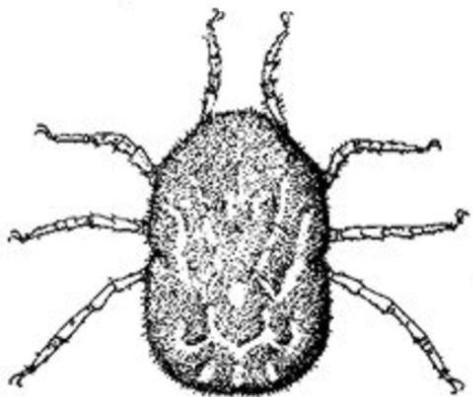


# СЕМЕЙСТВО

# АРГАЗОВЫЕ КЛЕЩИ



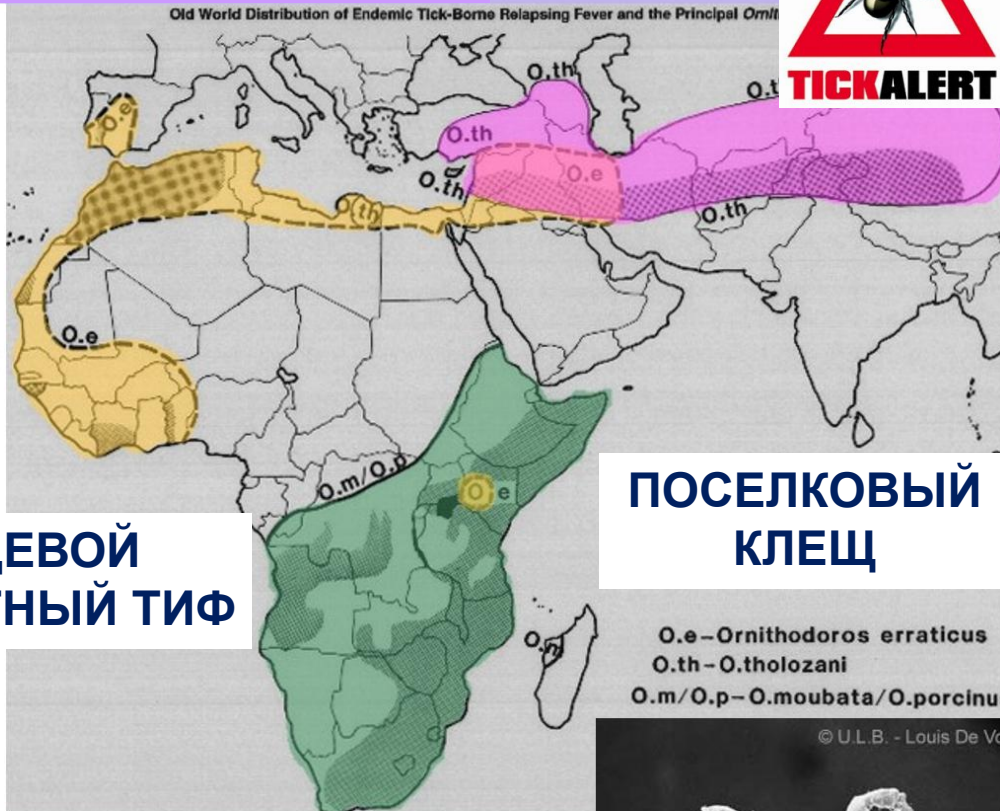
Ornithodoros sp.



dorsal

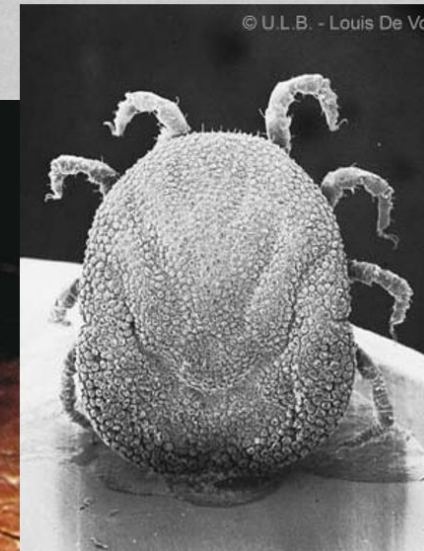
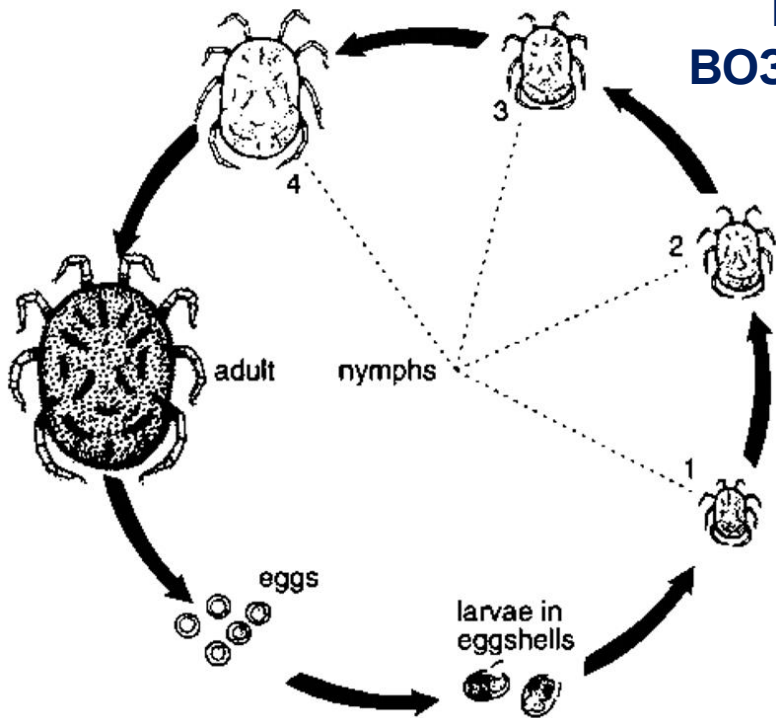


ventral

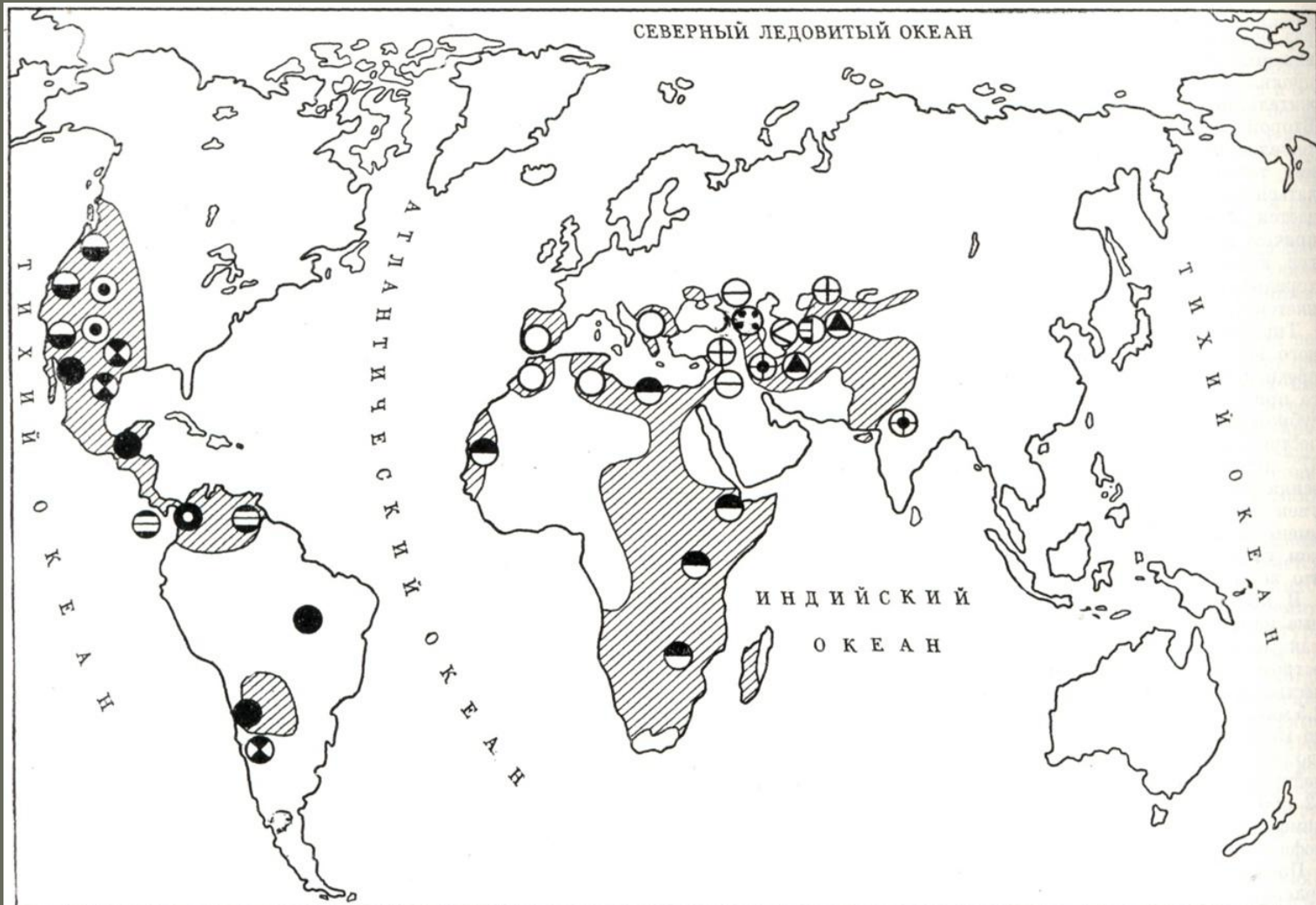


**КЛЕЩЕВОЙ  
ВОЗВРАТНЫЙ ТИФ**

**ПОСЕЛКОВЫЙ  
КЛЕЩ**



© U.L.B. - Louis De Vos




II

 *O. alactagalis*

 *O. cholodkovskyi*

 *O. erraticus*

 *O. hermsi*


 *O. moubata*

 *O. nereensis*

 *O. normandi*

 *O. papillipes*


 *O. parkeri*

 *O. rudis*

 *O. talaye*

 *O. tartakovskyi*

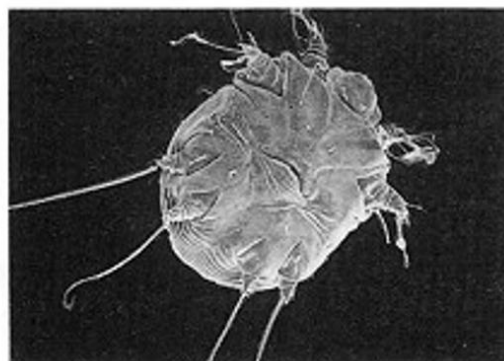
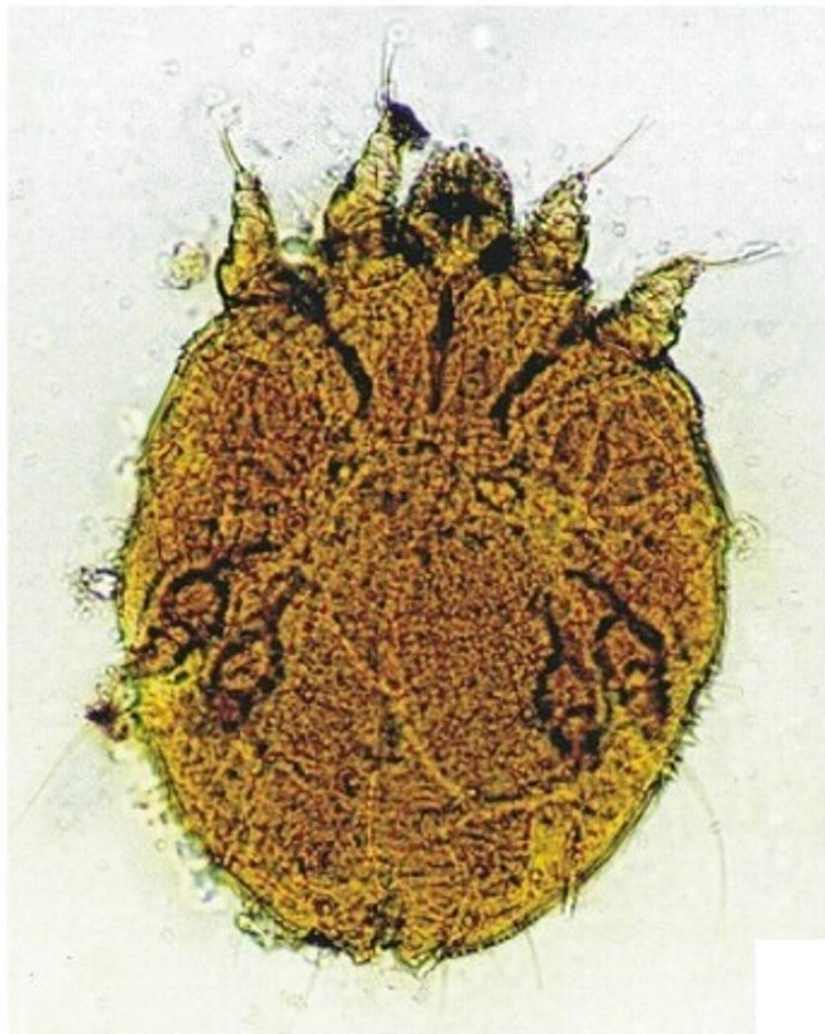
 *O. tholozani*

 *O. turicata*

 *O. verrucosus*

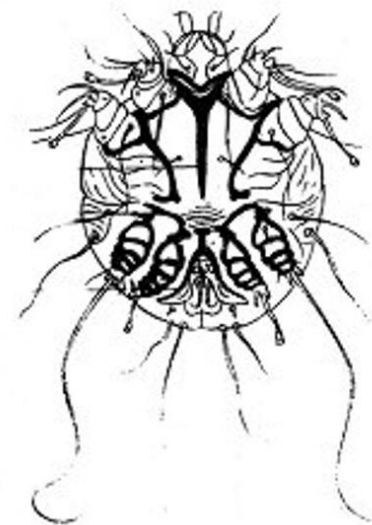


## Чесоточный клещ

*Sarcoptes scabiei*

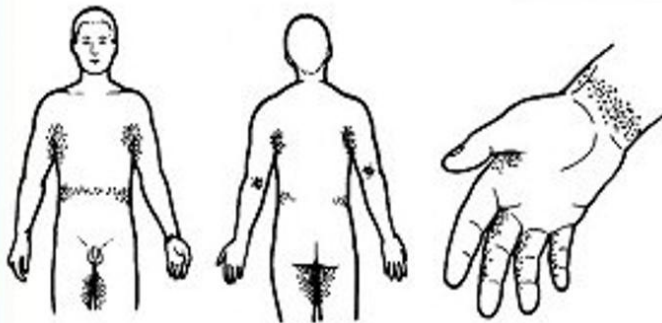
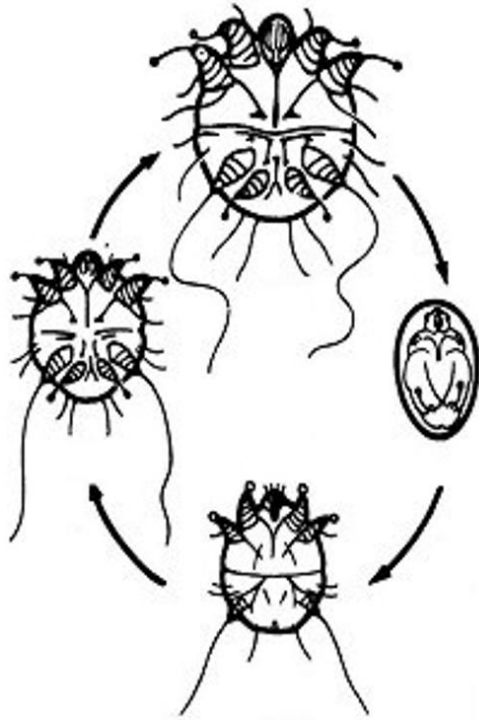
Sarcoptid mite adult. Ventral surface shows the anterior pair of legs ending in stalked discs and the posterior pair in long hair bristles. SEM  $\times 800$

From: Viora Zeman Scanning Electron Microscopy of Medically Important Parasitology



# Family Acariformes.

## Sarcoptes scabiei



Location of lesions on body

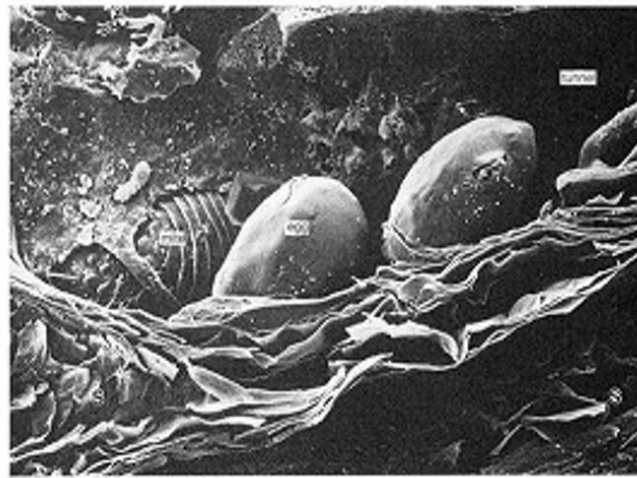
Lesions on hand



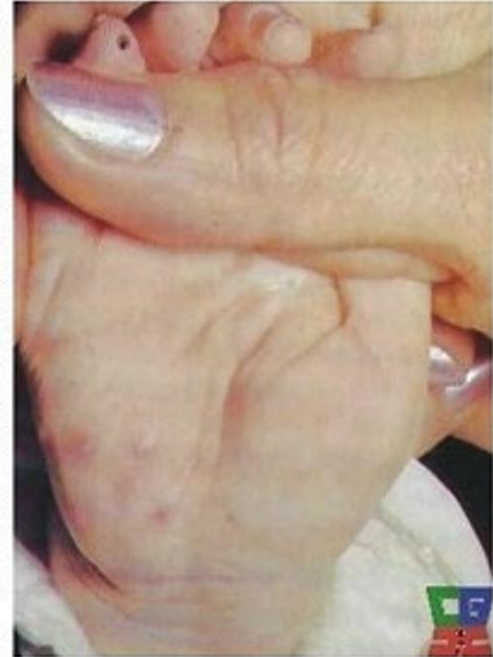
Sarcoptes mite adult female lying in a tunnel. SEM x3000.  
From: Vijay Zaman Scanning Electron Microscopy of Medically Important Parasitology



Mite eggs lying in a tunnel. SEM x1000  
From: Vijay Zaman Scanning Electron Microscopy of Medically Important Parasitology



Mite and eggs at higher magnification. SEM x3000  
From: Vijay Zaman Scanning Electron Microscopy of Medically Important Parasitology



Scabies, showing typical early papular lesion on the web of fingers. (Courtesy of Dr V.S. Rajan).

From: Zaman- Atlas of Medical Parasitology

# Family Acariformes.



**Scabies burrows**  
the foot of an infant



Secondary erythema in scabies



**Scabies, pustule formation and severe secondary bacterial infection involving most of the body.**

From : Zaman-Atlas of Medical Parasitology



**Scabies, showing papular lesions on the dorsal surface of the forearm.**

From : Zaman-Atlas of Medical Parasitology



**Scabies, ulceration and secondary bacterial infection on the web of fingers. (Courtesy of Dr V.S. Rajan).**

From : Zaman-Atlas of Medical Parasitology



**Scabies, chronic infection of the scrotum resulting in nodule formations in the skin. (Courtesy of Dr V.S. Rajan).**

From : Zaman-Atlas of Medical Parasitology

# Spiders and Scorpions



karakurt



brown recluse spider



black widow



(Lycosa) wolf spider



Italian  
scorpion



multicolored  
scorpion



DAY 3



DAY 4 КОРИЧНЕВЫЙ ПАУК



DAY 5



DAY 6



DAY 9

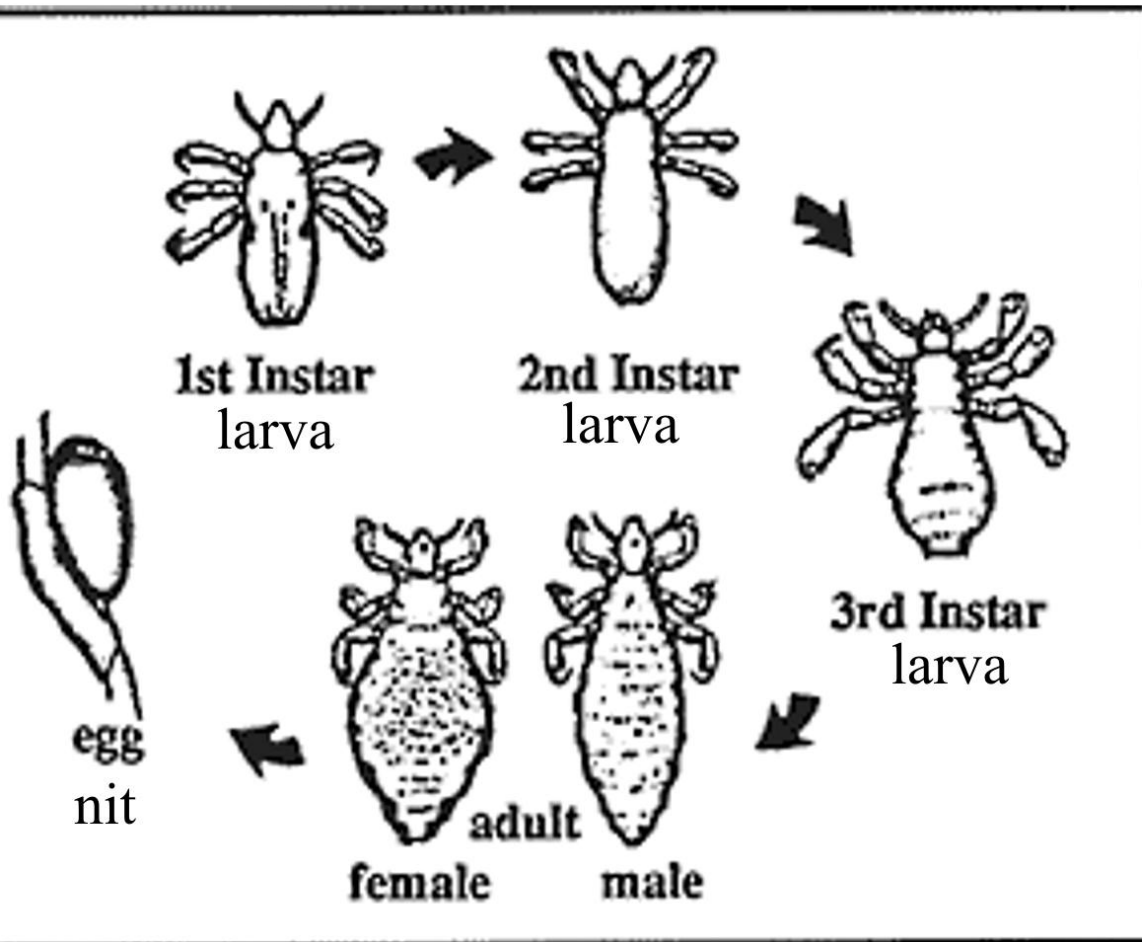


DAY 10

# Насекомые

Отряд Вши, семейство Pediculidae (the lice).

Lice are grayish in color, are characteristically dorsoventrally flattened and both apterous (wingless) sexes feed on blood.

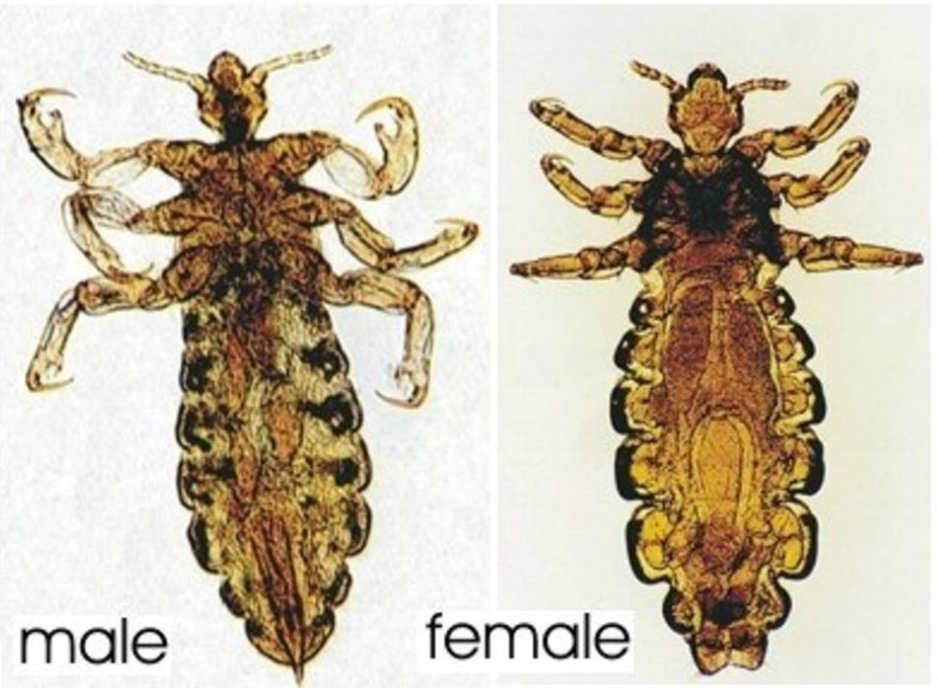


© 1997 Richard C. Russell

# ГОЛОВНАЯ ВОШЬ

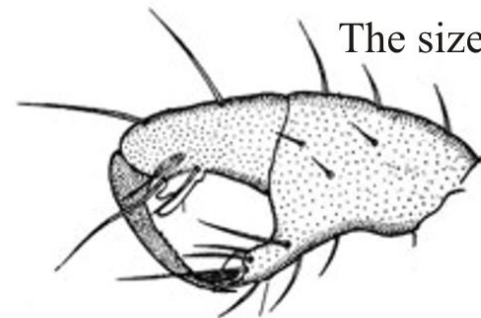
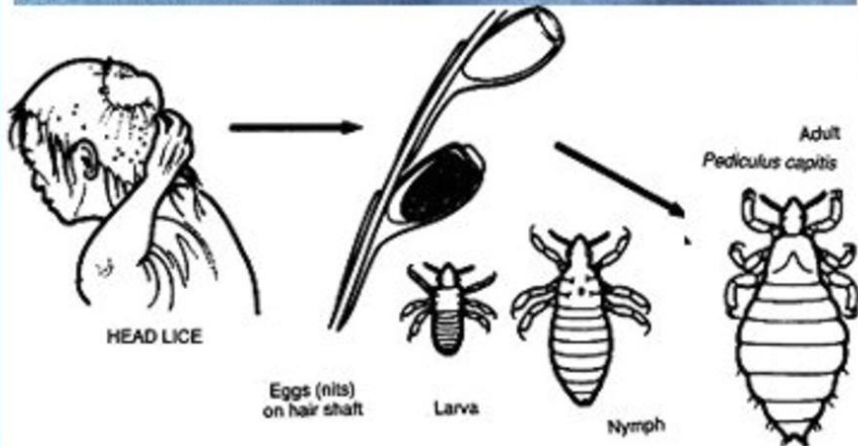
Place of localization: on the back of the neck and behind the ears.

## Pediculus humanus capitis



male

female



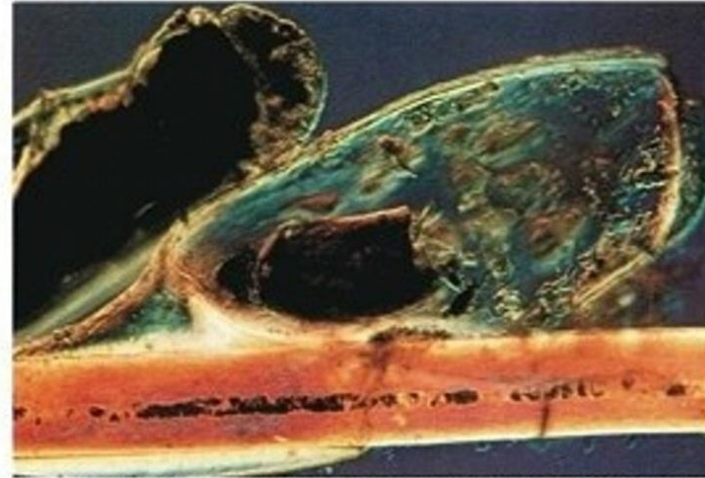
The size is about 2-3 mm.

# The head louse

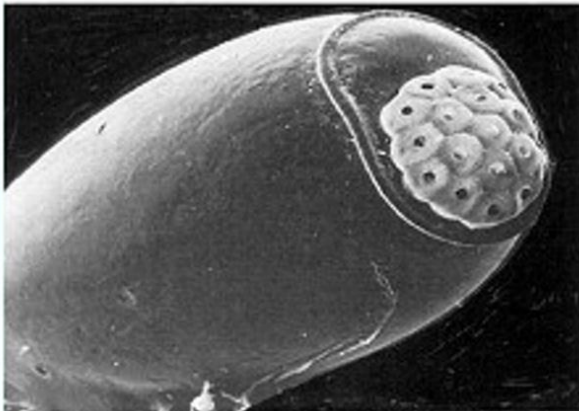
## Egg of Louse



***Pediculus capitis*** head louse  
not known to be a disease vector.

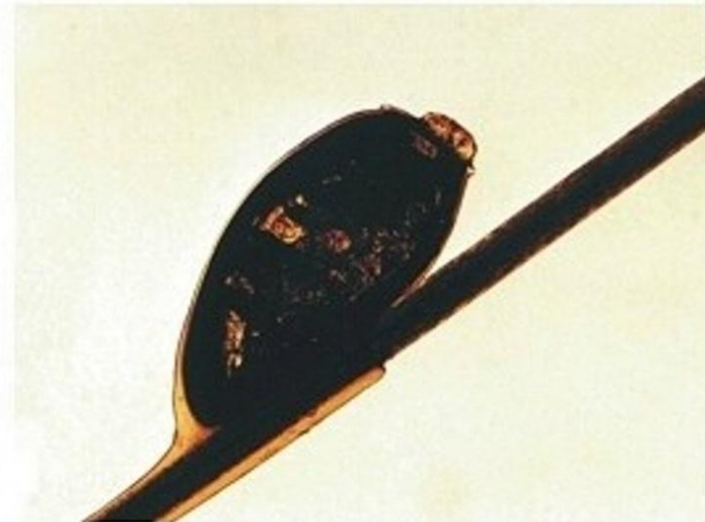


Eggs of head louse (nits). The eggs are firmly cemented to the hair when they are laid. In this case 2 eggs are visible, 1 contains a nymph (dark in colour) and the other is empty. Interference contrast. From : Zaman-Atlas of Medical Parasitology



*Pediculus humanus* egg showing the operculum which has small perforations. SEM  $\times 2000$ .

From: Vigar Zaman Scanning Electron Microscopy of Medically Important Parasitology

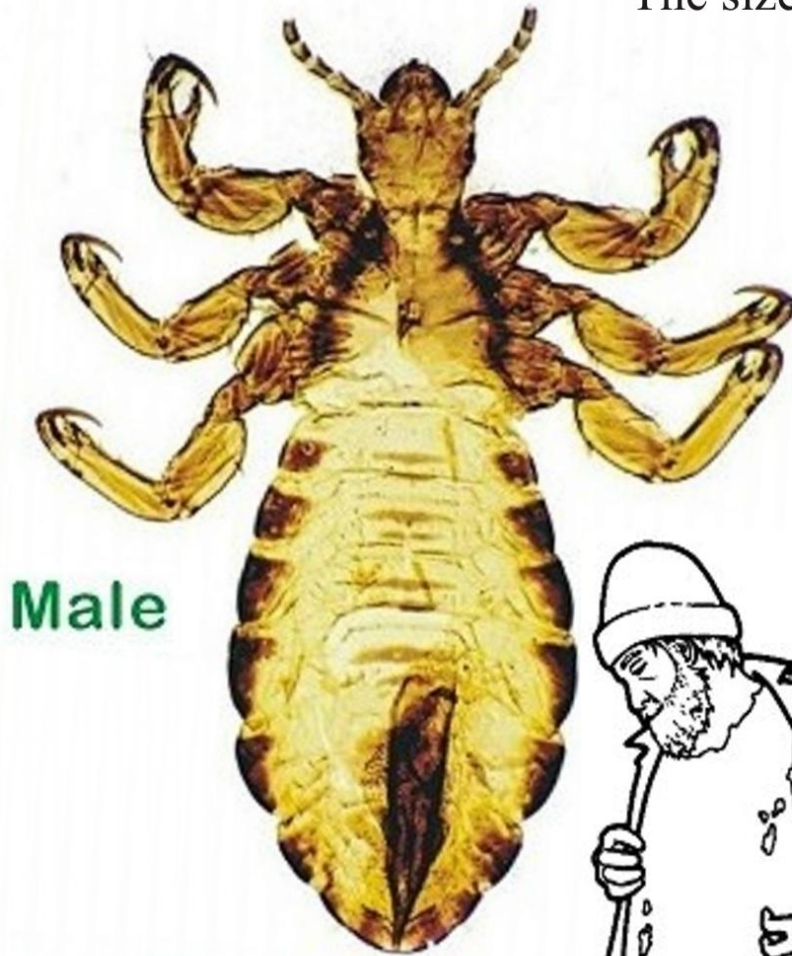




# Платяная вошь

## Pediculus humanus humanus

The size is about 4-5 mm.

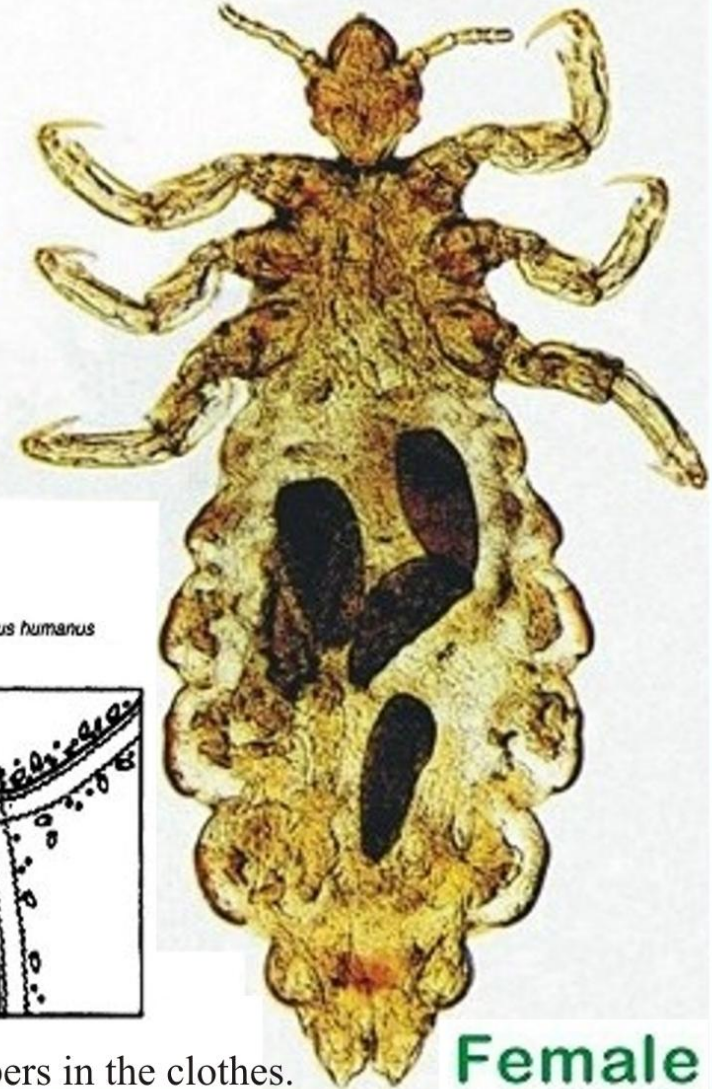


Male



BODY LICE

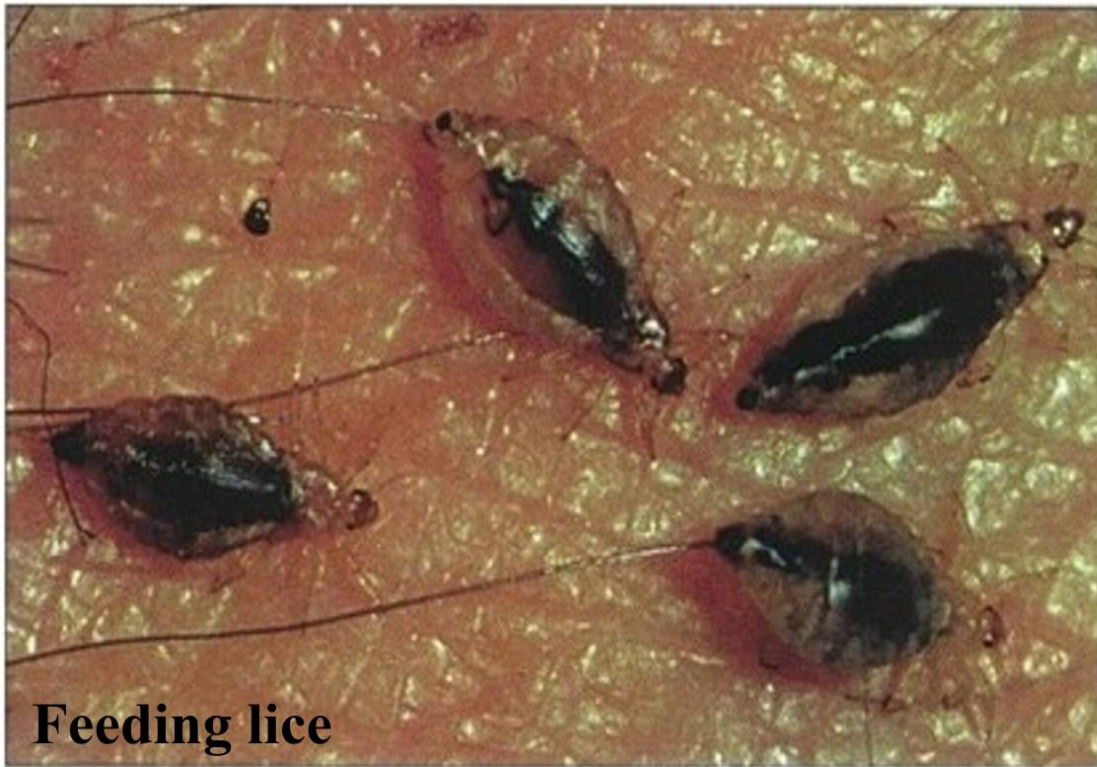
*P. humanus humanus*



Female

Place of localization: in their host's clothing, nits are cemented to fibers in the clothes.

# The body louse



Feeding lice



Louse-borne relapsing fever in an Ethiopian transmitted by body lice  
fever, jaundice and large petechial haemorrhages on the trunk

**Вши – специфические переносчики**

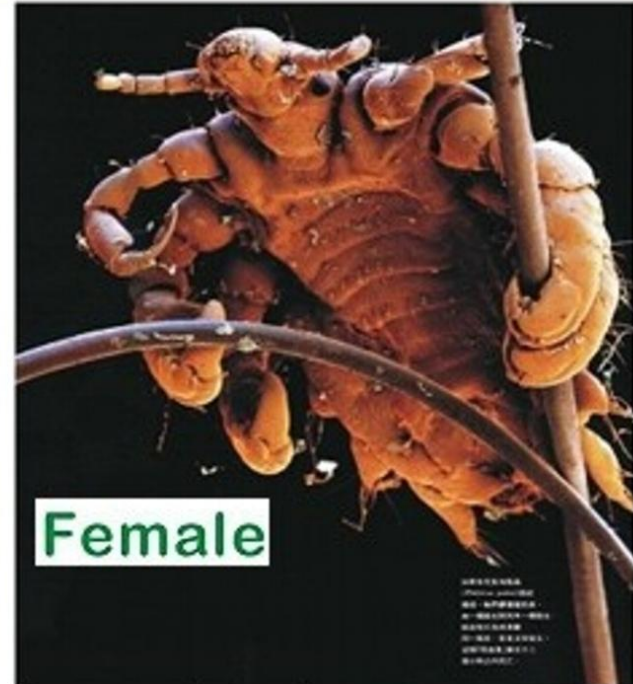
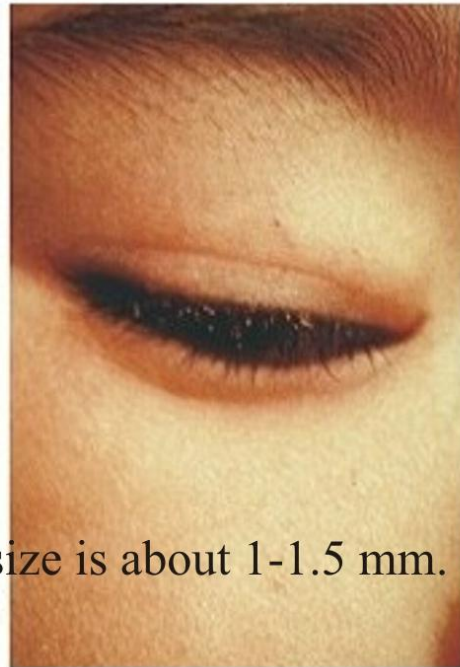
**спирохет *Borrelia recurentis* – возвратный тиф;**

**риккетсий *Rickettsia prowazekii* – эндемический сыпной тиф;**

***R. wolhynica* – волынская лихорадка**

# *Phthirus pubis* — Лобковая вошь

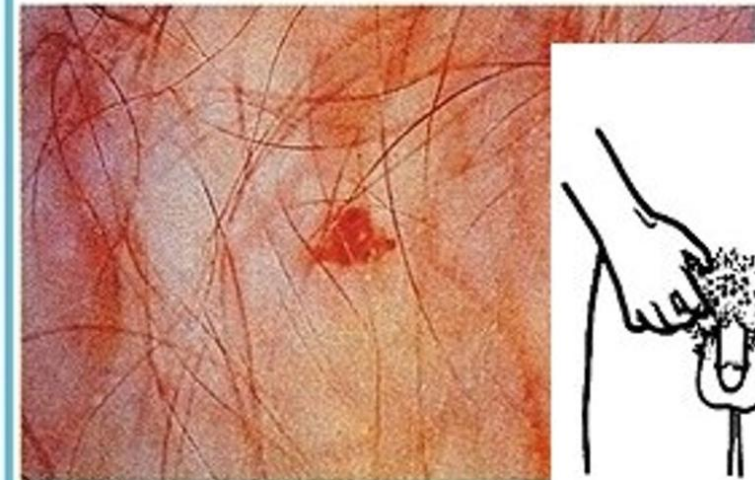
Place of localization: the pubic region, in the armpits, beard, mustache, eyebrows and eyelashes.



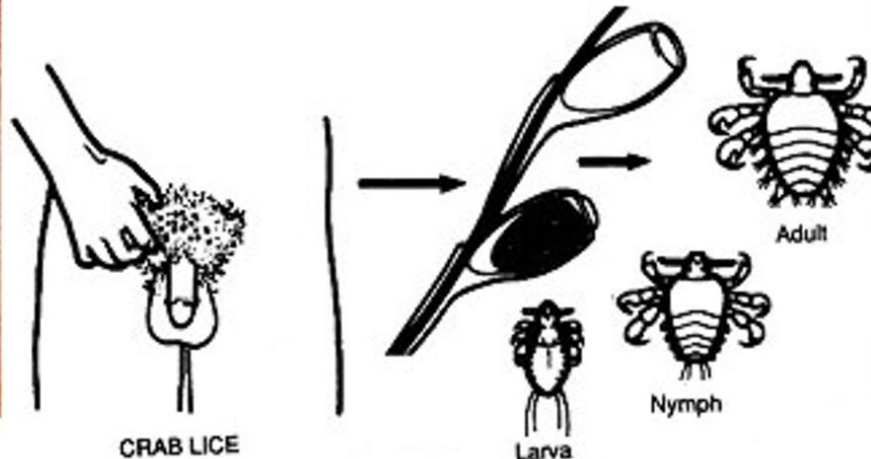
Female

The size is about 1-1.5 mm.

*Phthirus pubis* 'crab' louse commonly spread during sexual intercourse  
Sites infected other than the pubic area include the eyelashes

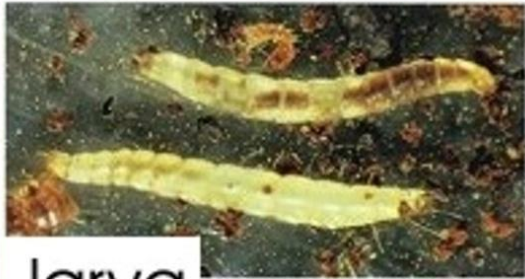


Louse and scratches



Male

# Отряд Блохи

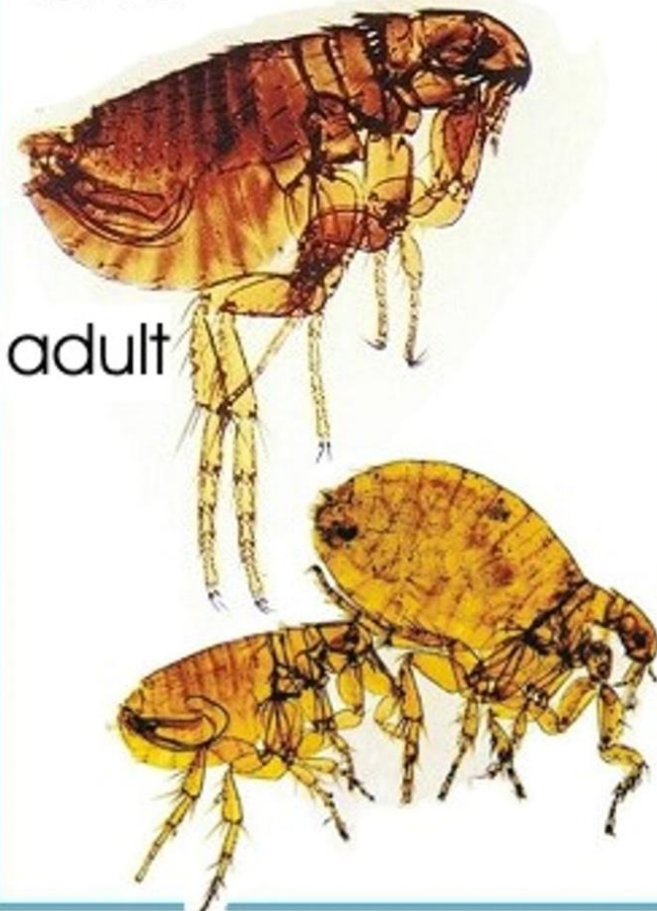


larva

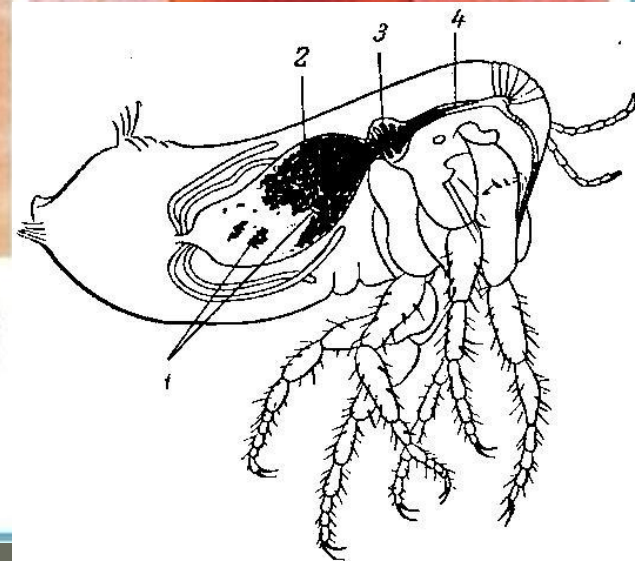
## *Xenopsylla cheopis*



A flea (*Xenopsylla cheopis*) taking a blood meal on a human subject. Note that the flea lifts itself almost vertically upwards during the act of feeding.

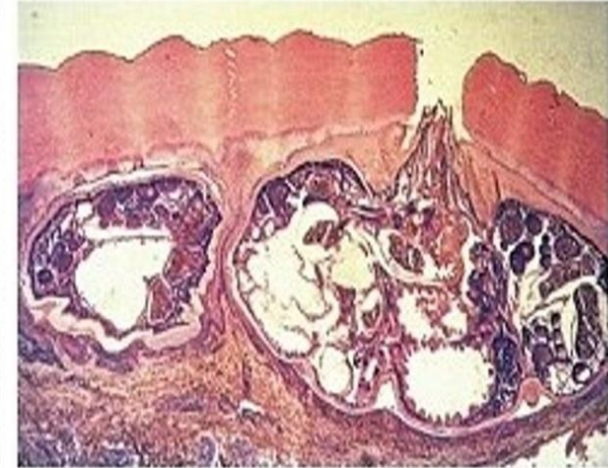
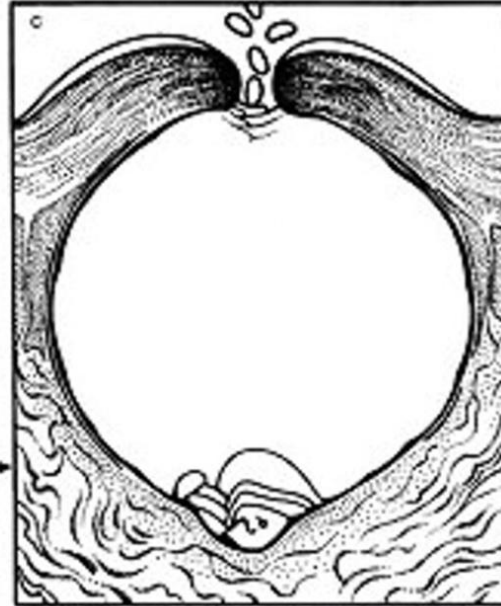


adult



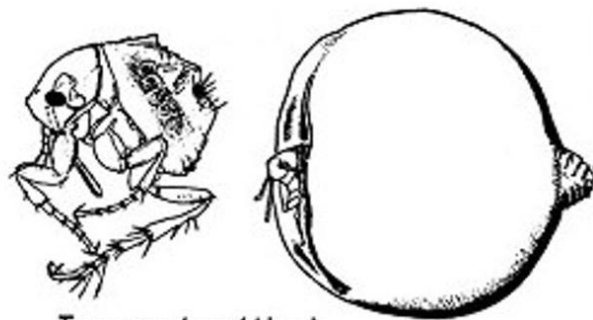
# Order Siphonaptera (the fleas).

*Tunga penetrans* – chigoe, or sand flea.



**Section of female *T. penetrans* in the skin**

The gravid female buries itself in the skin, often under the toenails, and swells up to the size of a small pea. Eggs are laid through the entry hole.



*Tunga penetrans* (chigoe)



**Jigger flea being removed from toe**

Habitual sufferers shell the gravid females out of the skin with a pin or sliver of bamboo



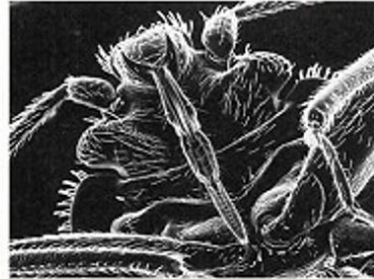
# Order Hemiptera (the bugs).

## Family Reduviidae ('kissing' or 'assassin' bugs).

### Triatoma



Male *Triatoma infestans* feeding on a human arm  
'assassin' or 'kissing' bugs transmit *T. cruzi* while feeding



### bed bug



(*CIMEX LECTULARIUS*)



Reduviid bug, in this case *T. rubrofasciata*, is seen feeding.  
Note the head is elongated and the dorsum of the thorax is covered by a shield like structure (pronotum). From : Zaman-Atlas of Medical Parasitology



Bed bug (*Cimex lectularius*) taking a blood meal on a human subject.  
From : Zaman-Atlas of Medical Parasitology



# Order Blattoptera (the cockroaches).

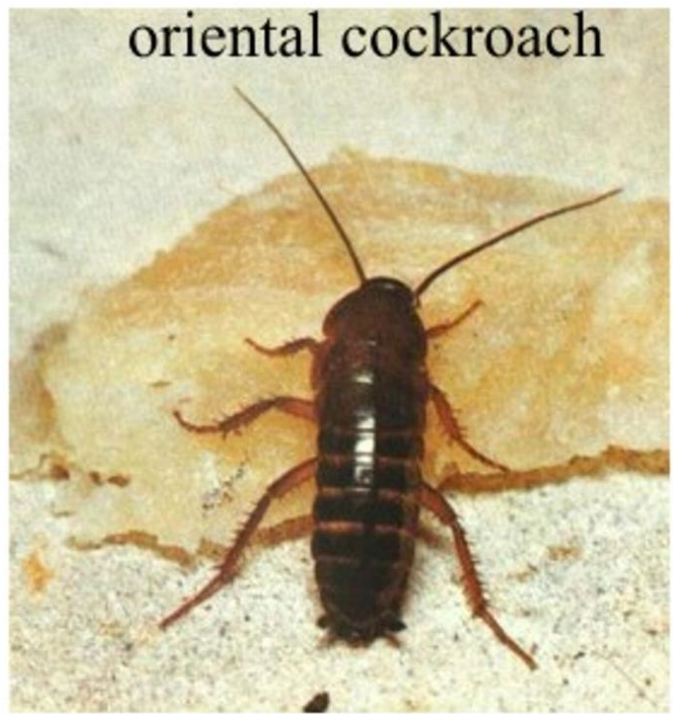


German cockroach



*Blatella germanica*

oriental cockroach



*Blatta orientalis*

American cockroach



*Periplaneta americana*

# Order Diptera (the flies).

## Family Culicidae (the Mosquitoes).



*Aedes* are laid singly. They often have a conspicuously sculptured surface



*Anopheles* eggs have lateral floats. They tend to aggregate on the water surface forming 'Chinese figure' patterns



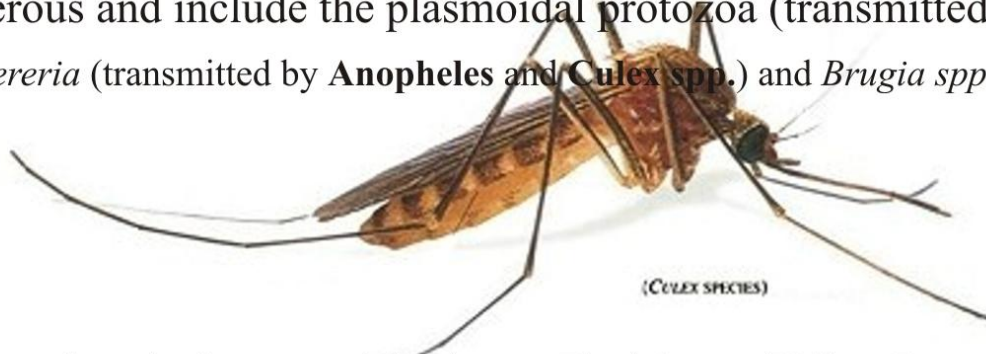
*Anopheles* eggs, with a larva emerging. The eggs have distinct lateral floats which easily differentiates them from *Culex* eggs.  
From: Zahran- Atlas of Medical Parasitology



*Culex quinquefasciatus* (left) with a longer siphon and several pairs of lateral setae hairs  
*An. (S.) aegypti* (right) with a short siphon and single hair hair



they are vectors are numerous and include the plasmodial protozoa (transmitted by **Anopheles spp.**) and the filarial nematode *Wuchereria* (transmitted by **Anopheles** and **Culex spp.**) and *Brugia spp.* (transmitted by **Aedes spp.**).



(*Culex* species)

species of genus *Aedes* can transmit such viruses as: Arboviruses, Flaviviruses (Yellow Fever, Dengue), and Alphaviruses.



# Order Diptera (the flies).

## Family Culicidae (the Mosquitoes).



**Anopheles gambiae biting** Malaria is transmitted by female Anopheles mosquitoes. Most species bite indoors at night but some are outdoor feeding. The adults are recognised by the antennae and palps. (x 4)



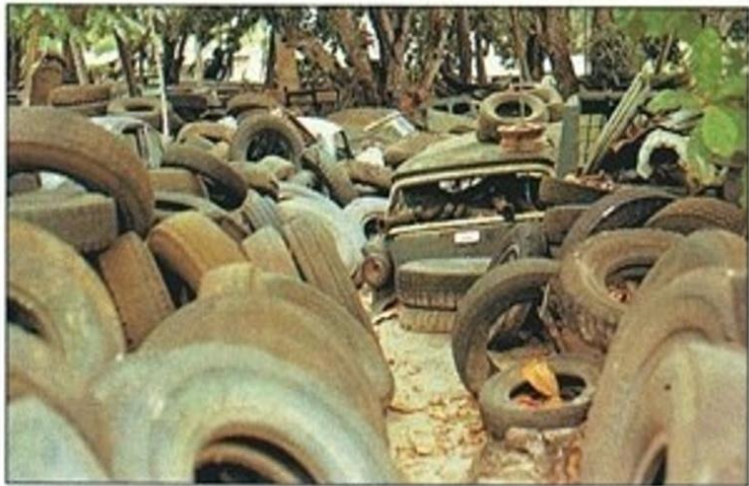
**Aedes aegypti taking a blood meal on a human subject.** Frontal view showing the typical lyre shape marking on its thorax.



是蚊、虎蚊及家蚊的近親

# Order Diptera (the flies).

## Family Culicidae (the Mosquitoes).



*Ae. (Stegomyia) aegypti* and *Ae. (Stegomyia) albopictu*.  
Larval breeding in discarded motor tyres



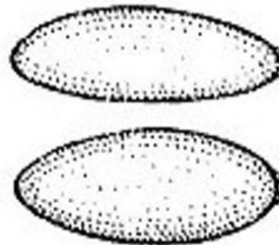
有些蚊子會在即將  
被水淹沒的潮濕地面產卵



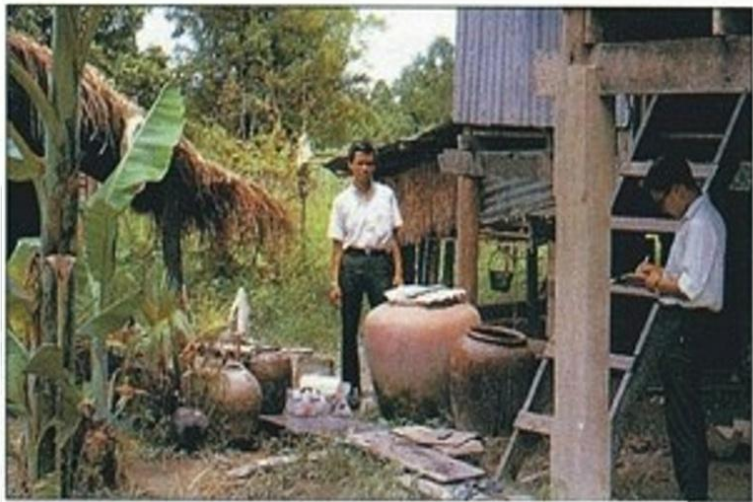
新生代在這片水鄉澤國中  
進入發育過程的第二時期



*Aedes* are laid singly. They often have  
a conspicuously sculptured surface



*Ae. aegypti* larva during the process of emergence.  
Interference contrast. From: Zaman Atlas of Medical Parasitology



*Ae. (Stegomyia) aegypti* and *Ae. (Stegomyia) albopictu*.  
Larval breeding in water storage jars

# Order Diptera (the flies).

## Family Simuliidae (blackflies).

### Simulium sp. (BLACK FLIES)



**Simulium ochraceum**  
the most important vectors of onchocerciasis in Central America



**Adult Simulium damnosum** 'buffalo flies'

### Tsetse Flies



Tsetse Flies (*Glossina*)



The mounted specimen shows the position of the mouthparts before feeding. The palps are held horizontal to the body and the tsetse (biting part) is pushed vertically



**Tsetse fly feeding**  
The common vectors of *T. b. gambiense* in West Africa



Adult *Glossina* in a resting position. The wings partially or completely overlap each other and extend beyond the body. It can be easily distinguished from other biting flies by a prominent forwardly projecting proboscis. The flies vary in length from 6-15mm. From: Zamen-Atlas of Medical Parasitology



Larva, pre-pupa and pupa of *Glossina morsitans* tsetse fly



*G. palpalis fuscipes*  
*G. tachinoides*



## Family Glossinidae, genus Glossina - the tsetse's.

# Order Diptera (the flies).

## Family Psychodidae (sandflies).

### Lutzomyia longipalpis



Close-up view of *Lu. longipalpis*



Adult female *Lu. longipalpis* biting

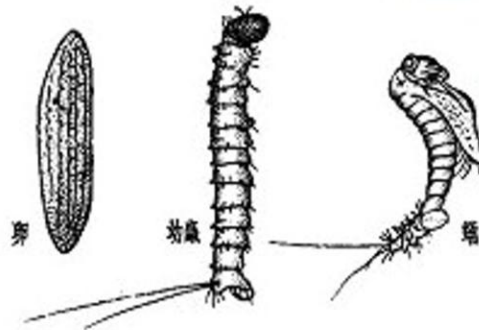


Reaction to sandfly bites



Sandfly belong to the genus *Phlebotomus*. Note the proboscis. The wing is surrounded by a fringe of hairs and the wing v

From: Zeman Atlas of Medical Parasitology



Third instar larva of *Phlebotomus perfiliewi*

Leishmania are transmitted by sandflies of the genus *Phlebotomus* in the Old World and Far East. The photograph shows the larva of *P. perfiliewi*, which is a vector of leishmaniasis in Southern Europe



Pupa of *Lutzomyia longipalpis* transmits visceral leishmaniasis in Brazil

# Order Diptera (the flies).



Family Tabanidae - horseflies, deerflies.



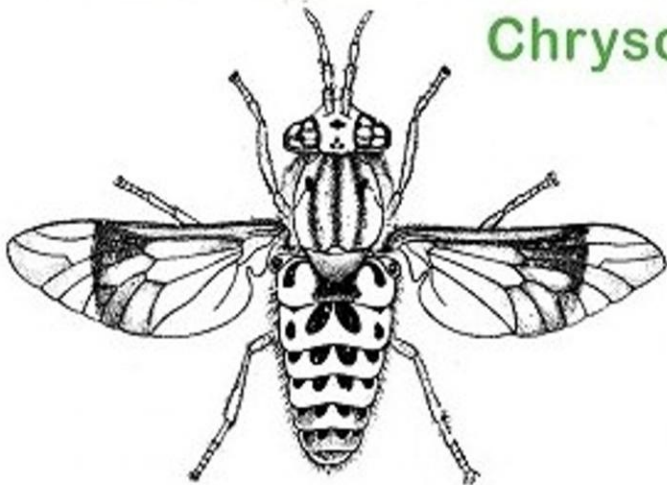
Female *Chrysops silacea*

Female *C. dimidiata*

Tabanid flies of the genus *Chrysops* transmit loiasis  
the most important vectors in Nigeria, Cameroons, Congo highlands



*Chrysops* sp.

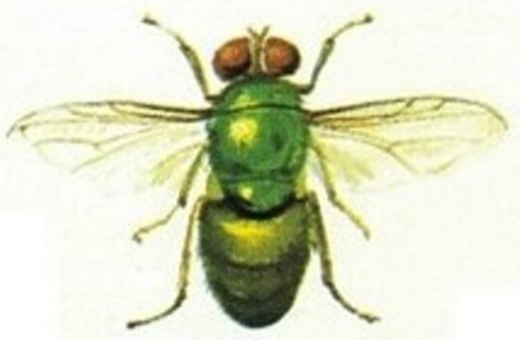


(*TABANUS ATRATUS*)



# Order Diptera (the flies).

Family Muscidae - the flies. Family Oestridae - the gadflies.



Lucilia caesar



Oestrus ovis

Musca domestica  
HOUSE FLIES



Calliphora  
Blow flies



Fannia canicularis



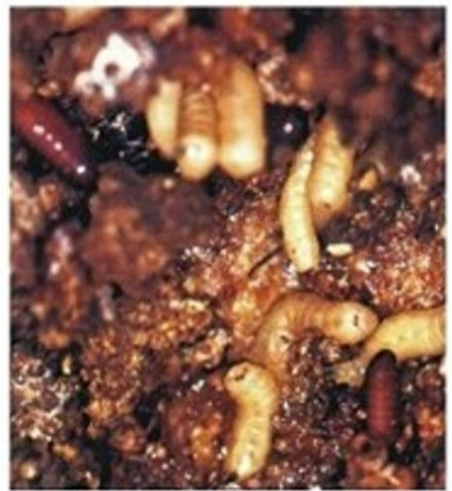
flesh fly  
Sarcophagidae  
Wohlfahrtia magnifica  
Sarcophaga  
haemorrhoidalis



Gasterophilus  
intestinalis



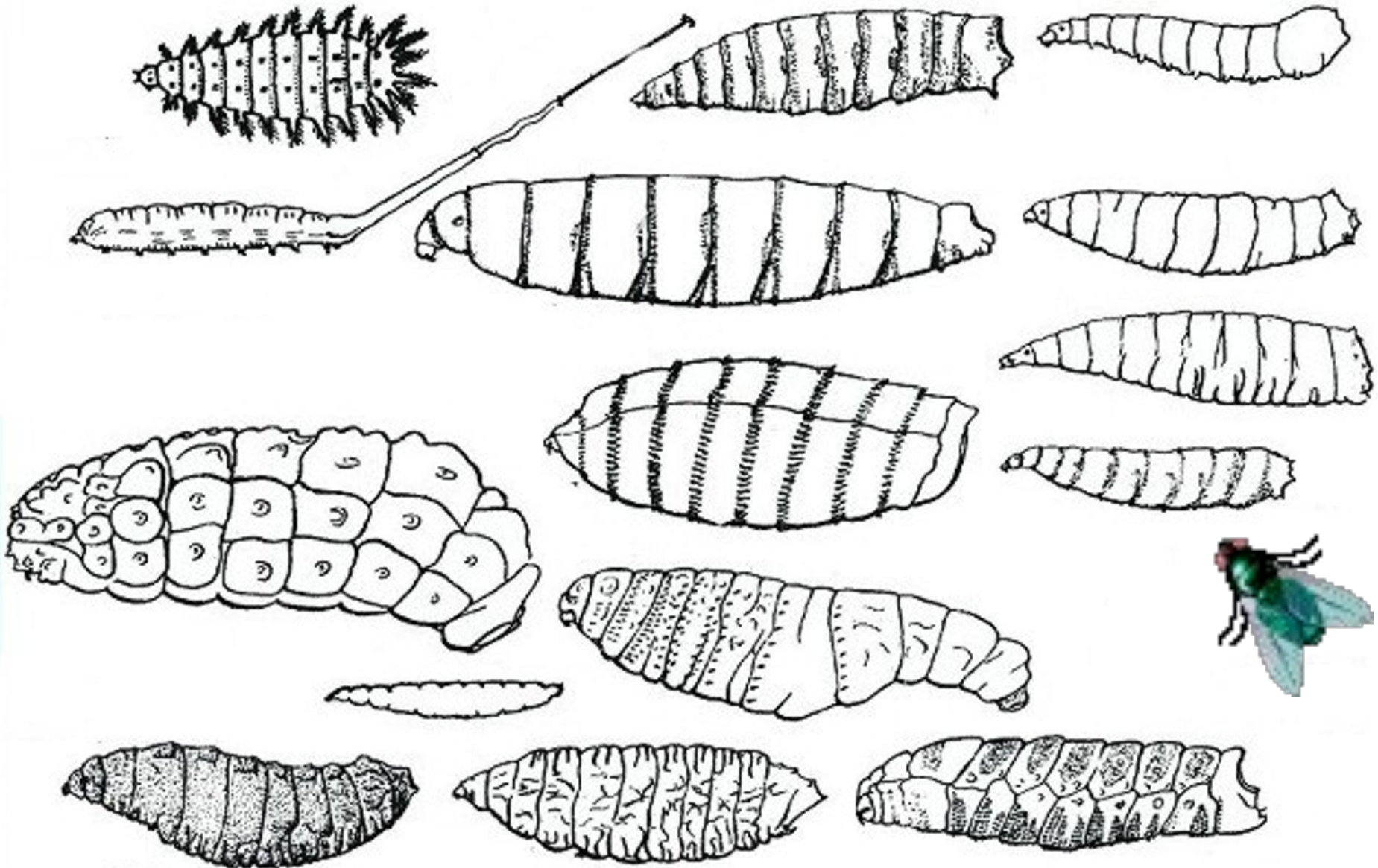
Parasarcophaga crassipalpis



Musca domestica 蛹

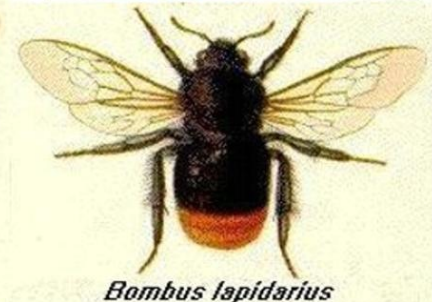
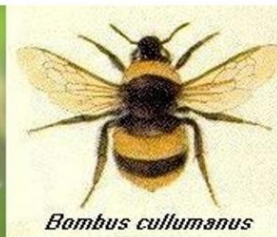
## Order Diptera (the flies).

There are the agents of myiasis - the disease caused by larvae of flies.



Order Hymenoptera. Fire ants, bee, wasp, bumble-bee.

# Fire ants





Caterpillars of butterflies

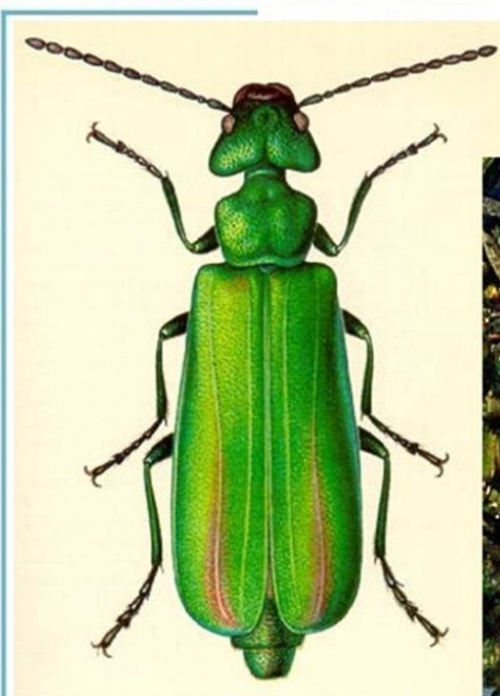


Lepidopterism and erusism

**Order Lepidoptera.**

**Order Coleoptera.**

**Spanish fly**



Order Coleoptera. Blister beetles, bombardier beetle.



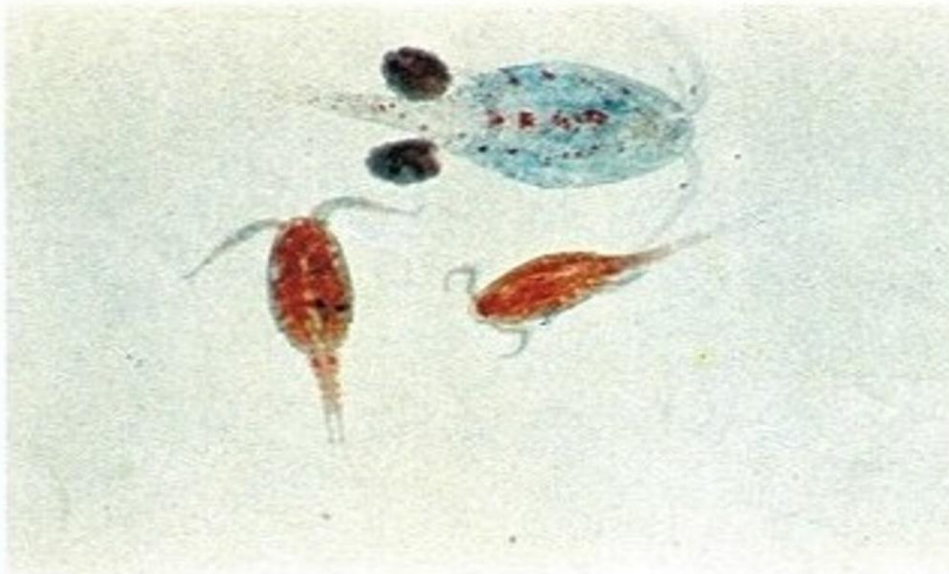
**bombardier beetle**



**blister beetles**



## Cyclops sp.



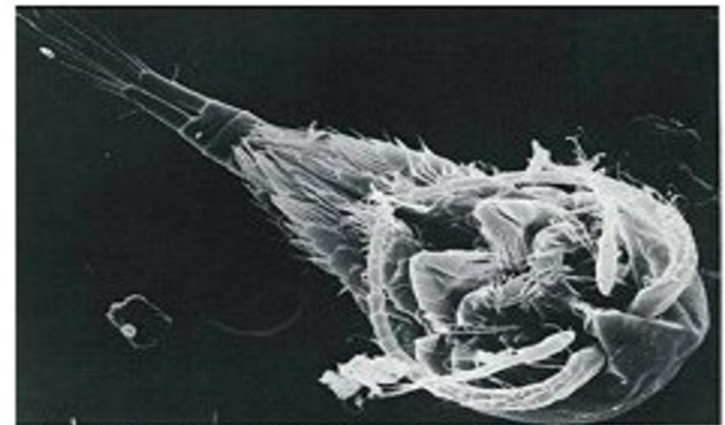
**Cyclops sp.** These copepods are intermediate hosts of different parasites. One of them can be seen carrying egg sacs.

From : Zaman- Atlas of Medical Parasitology



Cyclops sp. An intermediate host of *Dracunculus medinensis*. These are small crustaceans (Copepoda) with a segmented body. In this lateral view the four thoracic segments and their appendages can be seen. The abdomen is narrow and devoid of appendages. x 300.

From: Yigir Zaman Scanning Electron Microscopy of Medically Important Parasitology



Cyclops sp seen from the ventral side. Note the presence of two antennae. One is large and curved and the other elongated and small. x 200.

From: Yigir Zaman Scanning Electron Microscopy of Medically Important Parasitology

