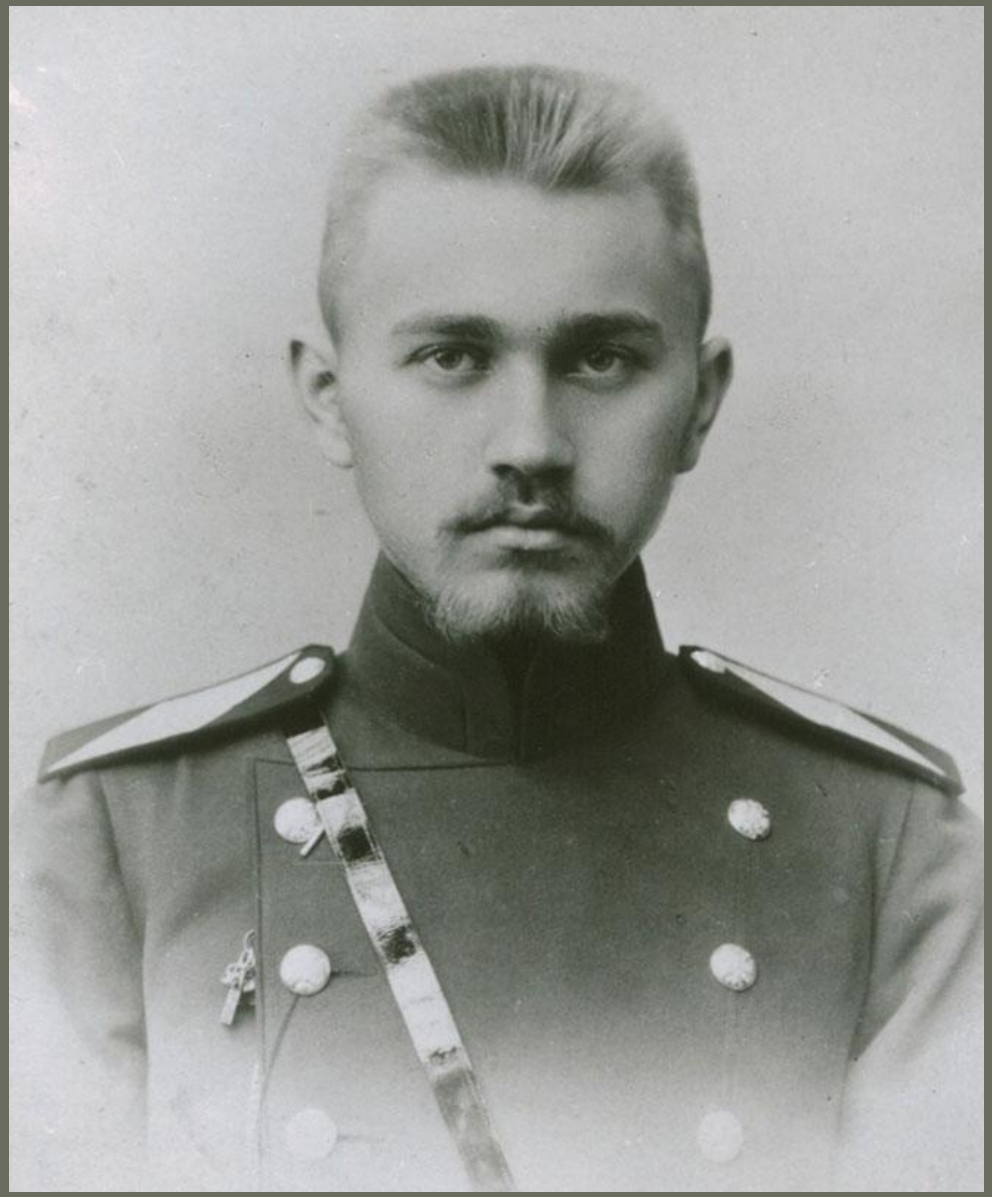
ТЕМА ЛЕКЦИИ 08:

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

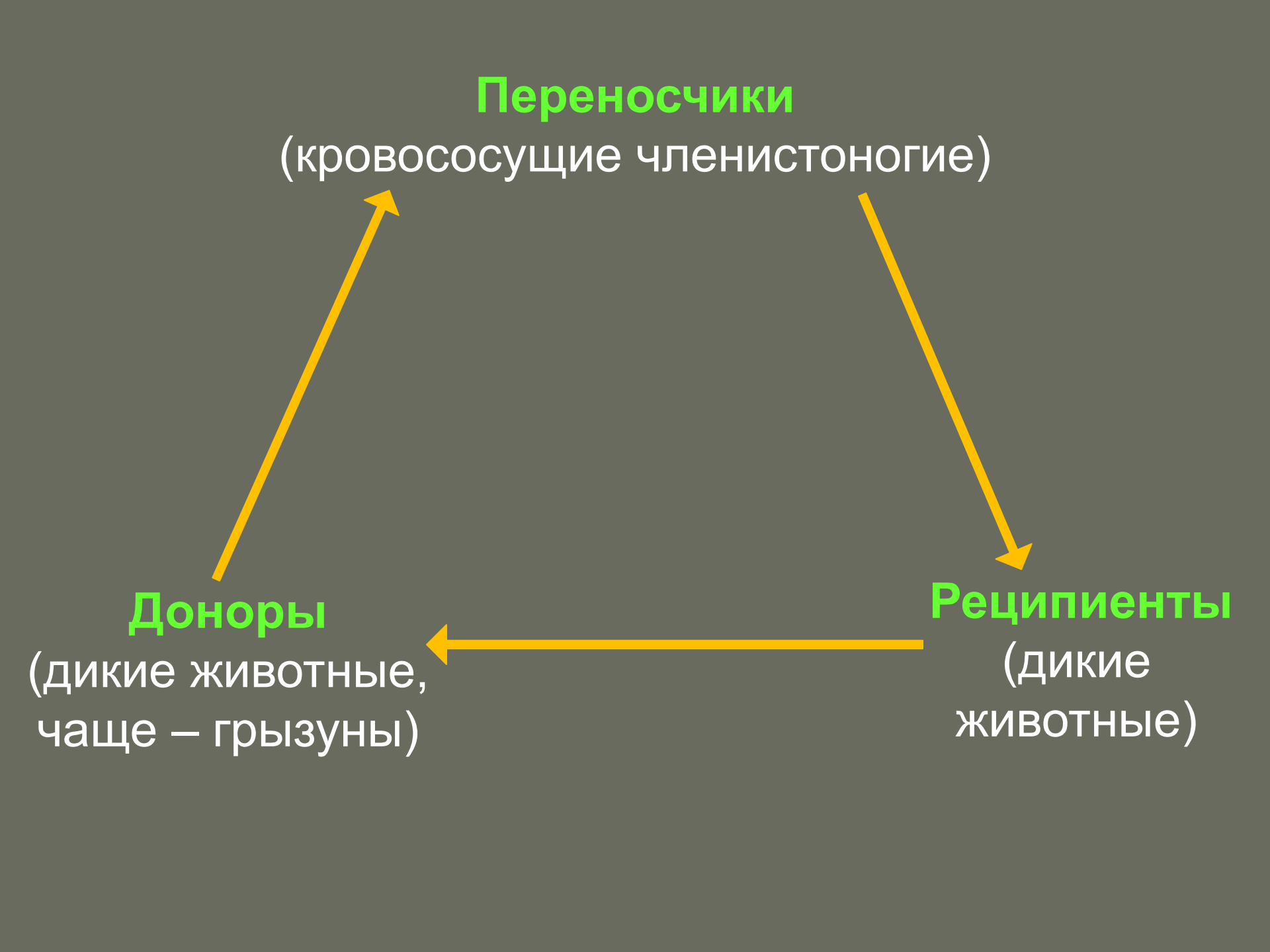

Переносчики
(кровососущие членистоногие)
Реципиенты
(дикие
животные)
Доноры
(дикие животные,
чаще – грызуны)

Схема природного очага чумы

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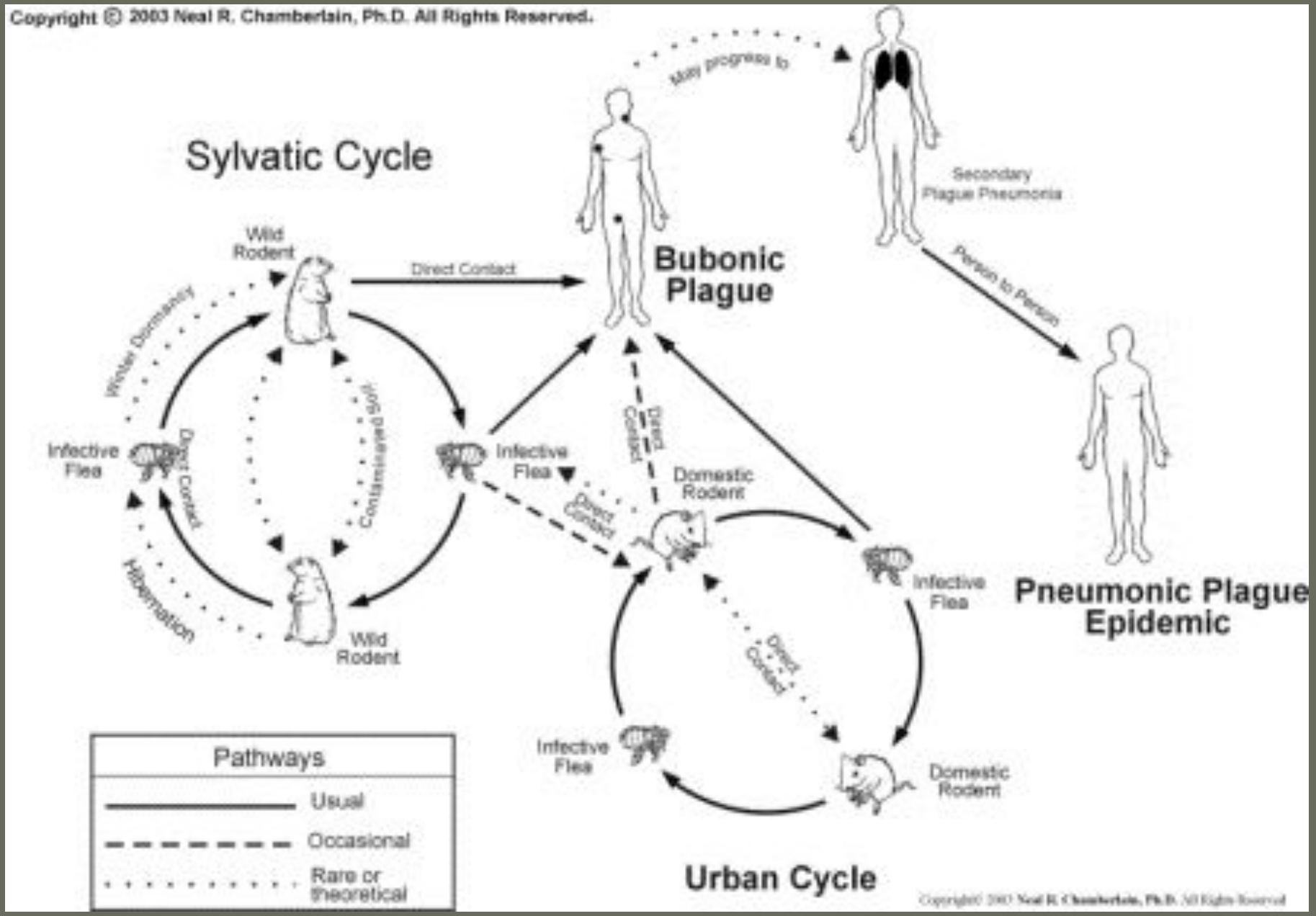
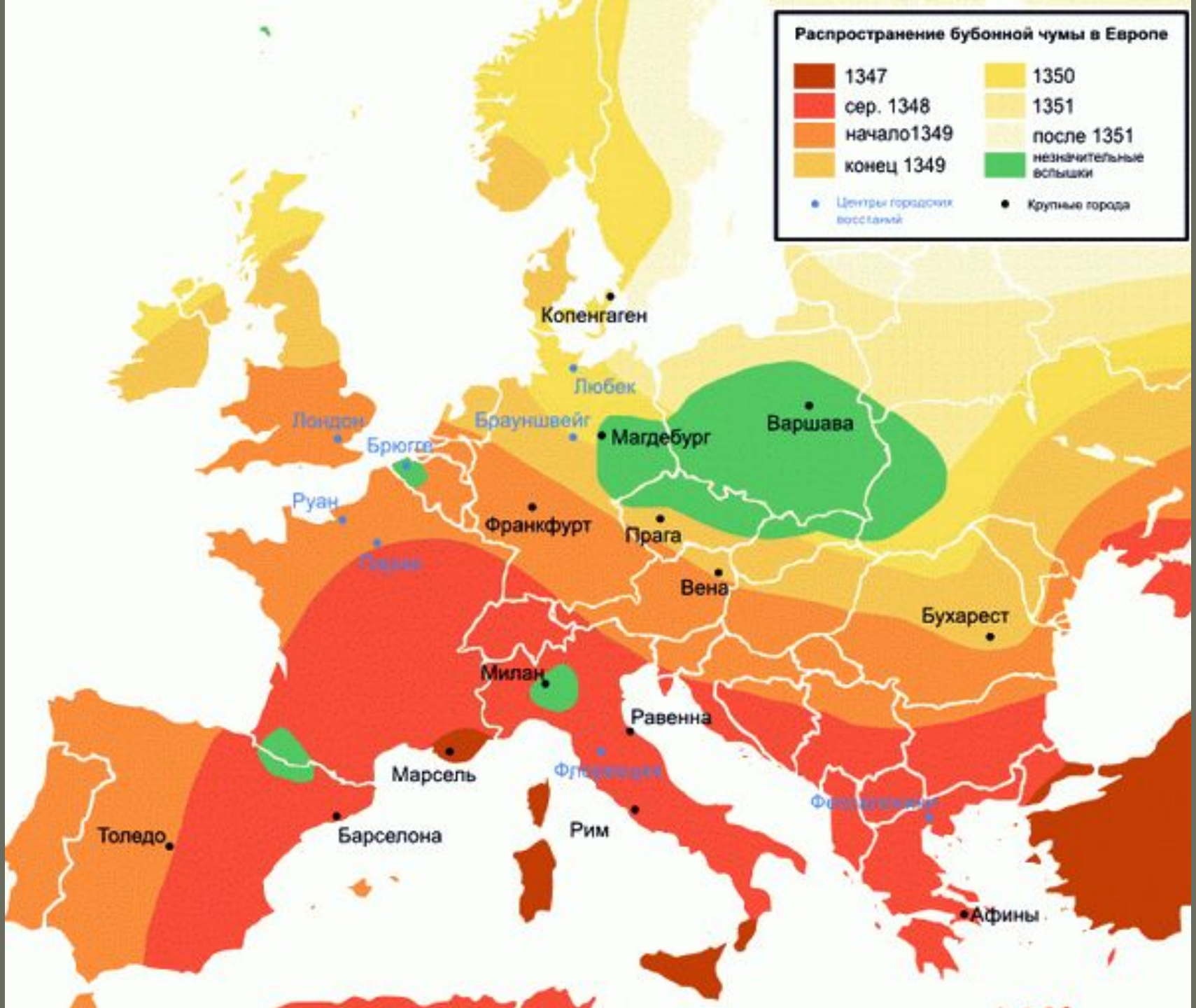



Распространение бубонной чумы в Европе
1347
сер. 1348
начало1349
конец 1349
1350
1351
после 1351
незначительные вспышки
Центры городских восстаний
Крупные города
Копенгаген
Любек
Брауншвейг
Магдебург
Варшава
Лондон
Брюгге
Руан
Франкфурт
Прага
Вена
Бухарест
Милан
Равенна
Марсель
Барселона
Толедо
Рим
Афины

1. Природные очаги
(клещевой энцефалит)

2. Синантропные очаги (чесотка)

3. Антропургические очаги
(описторхоз в местах искусственных водоемов)

4. Смешанные очаги
(трихинеллез)

Профилактика ПОБ

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

ПАУКООБРАЗНЫЕ

СКОРПИОНЫ, ПАУКИ, КЛЕЩИ

The class includes

more than 35.000 species.

cephalothorax

abdomen

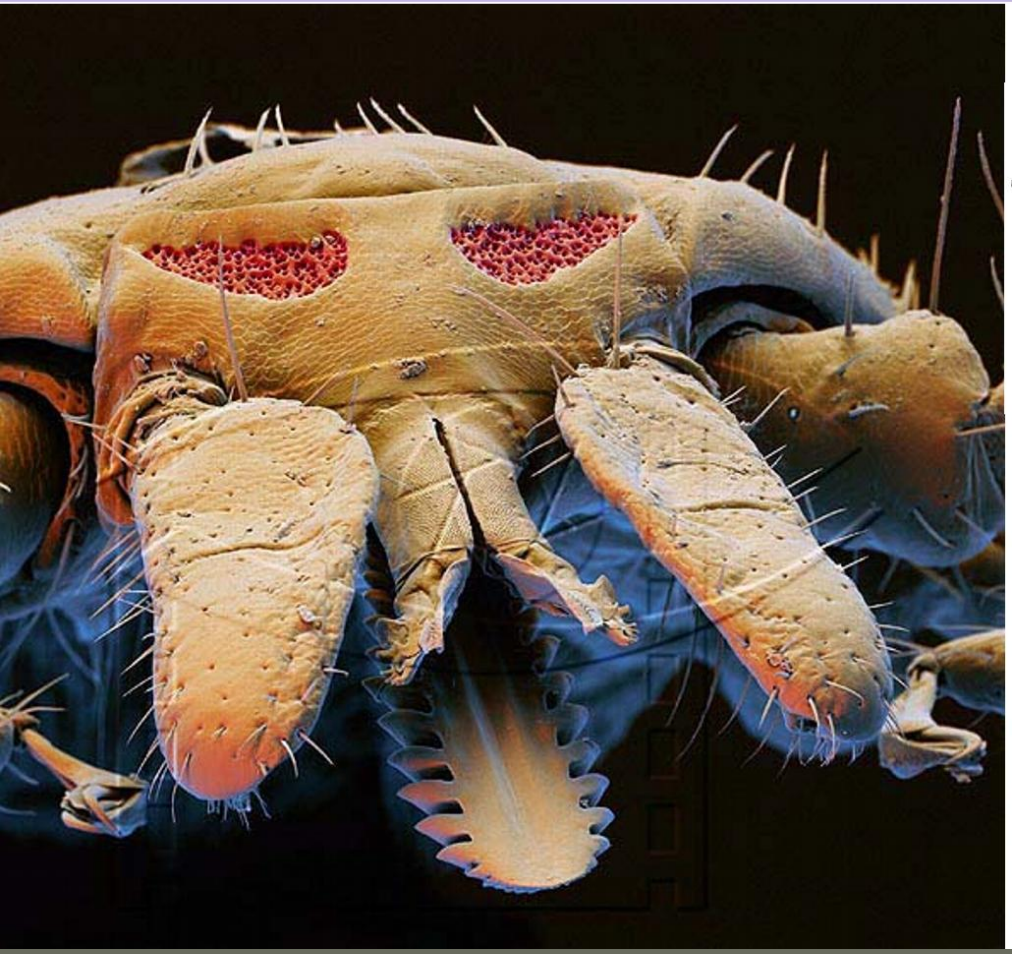
The antennae are absent.

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



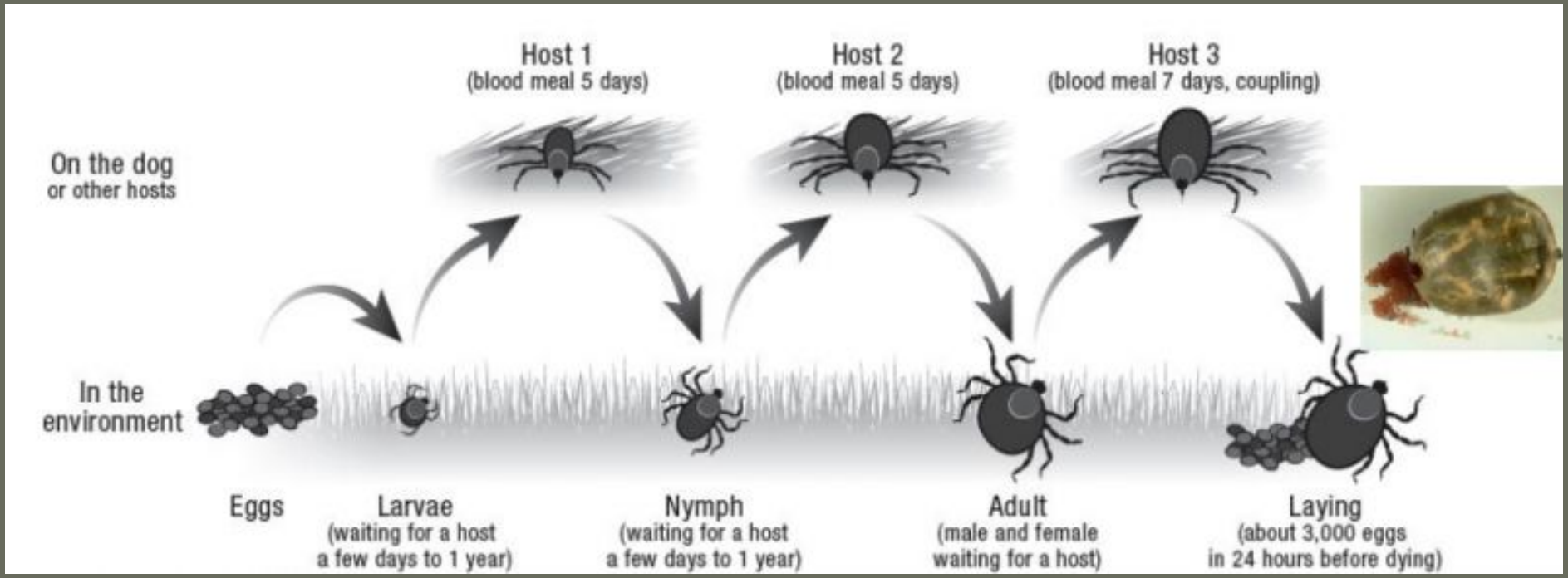
Acari include ticks, mites

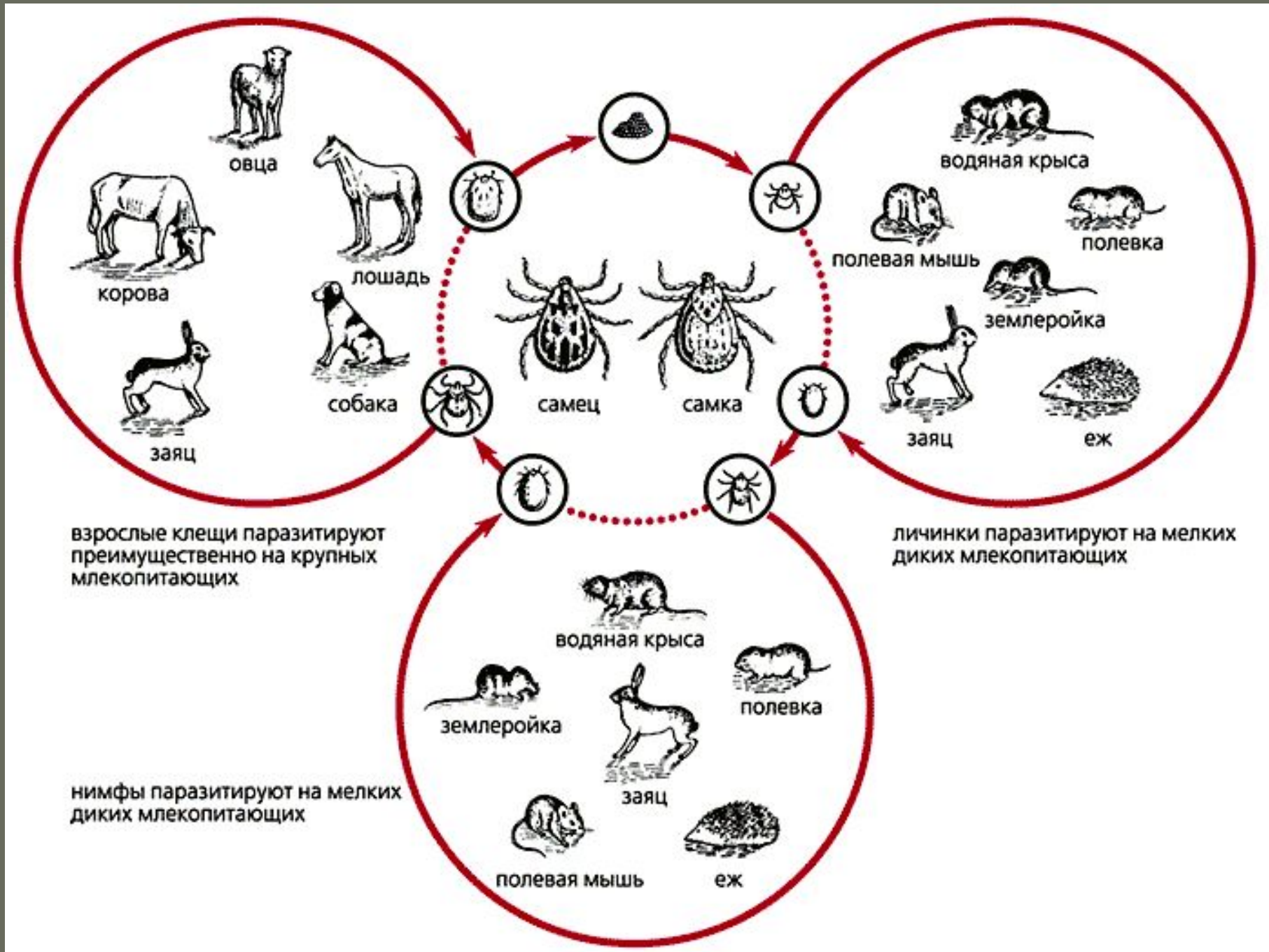
Most mites are free-living.

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




овца
лошадь
корова
собака
заяц
самец
самка
водяная крыса
полевая мышь
полевка
землеройка
заяц
еж
водяная крыса
землеройка
полевка
заяц
полевая мышь
еж
взрослые клещи паразитируют преимущественно на крупных млекопитающих
личинки паразитируют на мелких диких млекопитающих
нимфы паразитируют на мелких диких млекопитающих

СЕМЕЙСТВО **ИКСОДОВЫЕ КЛЕЩИ**

Собачий клещ

Таёжный клещ

Ixodes ricinus and **Ixodes persulcatus.**

Dermacentor sp. and Haemophysalis sp.

Пастбищный клещ

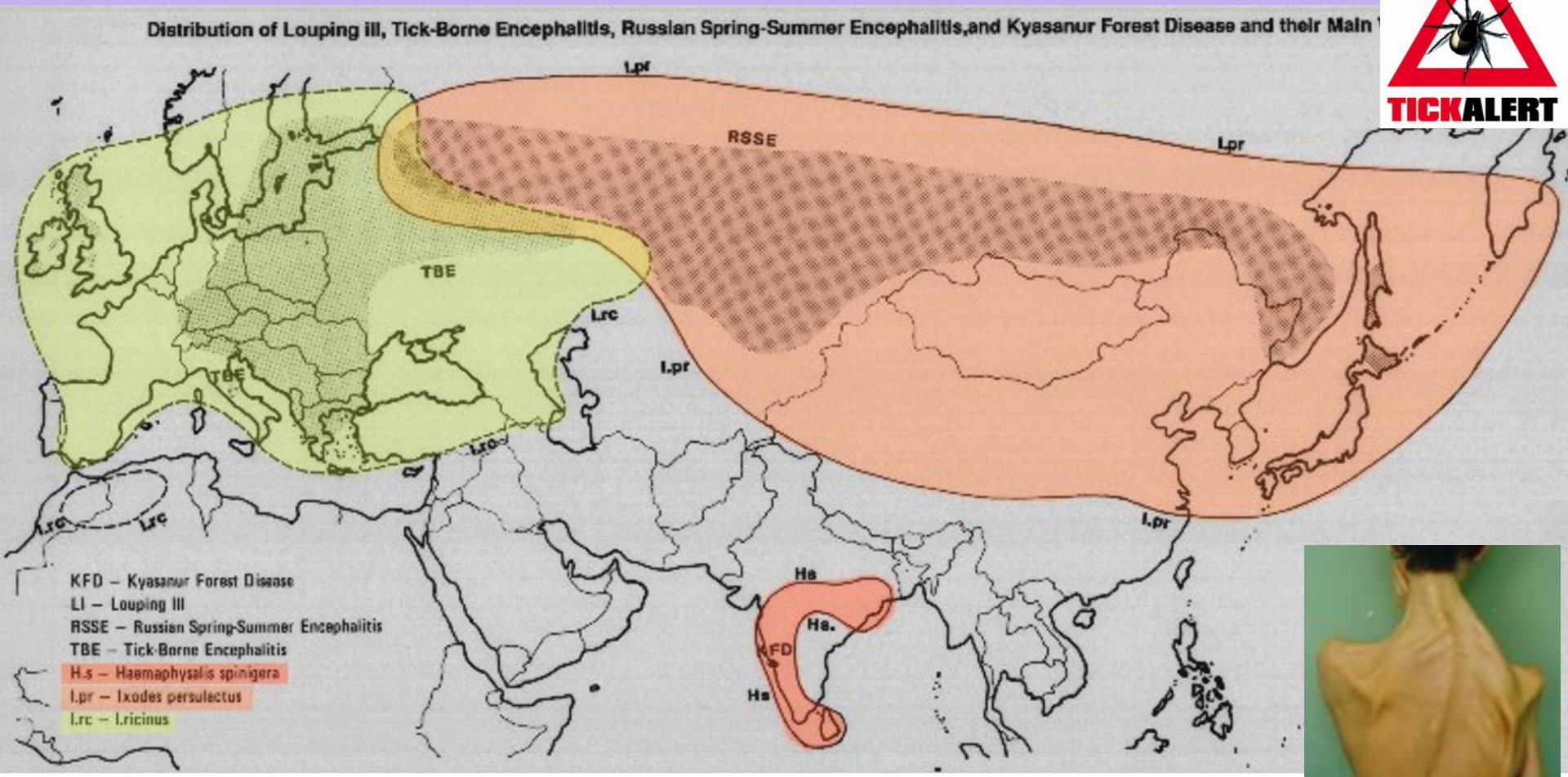
Dermacentor reticulatus

D. occidentalis

D. variabilis

Haemophysalis concinna

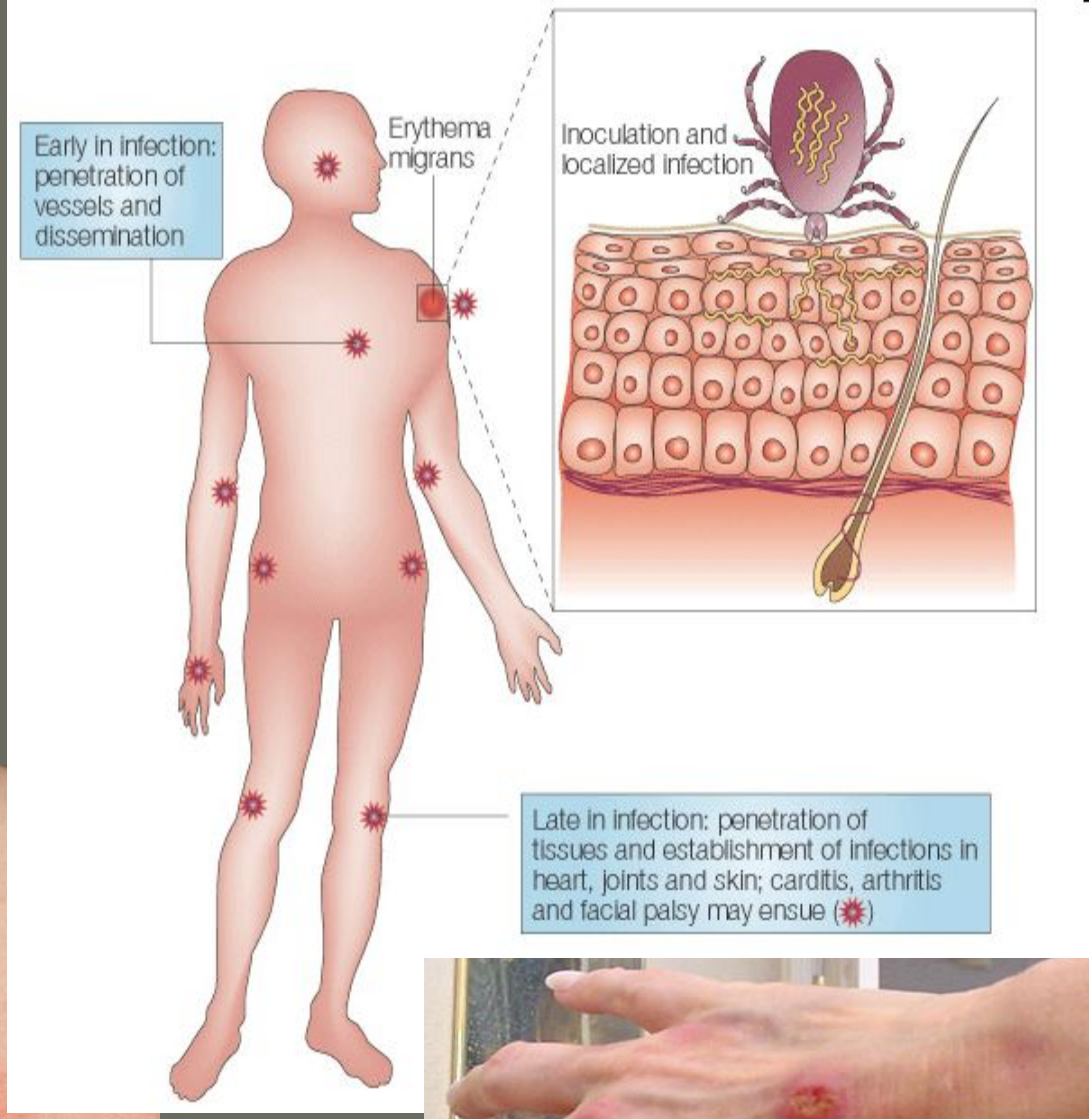
Распространение таёжного и собачьего клещей



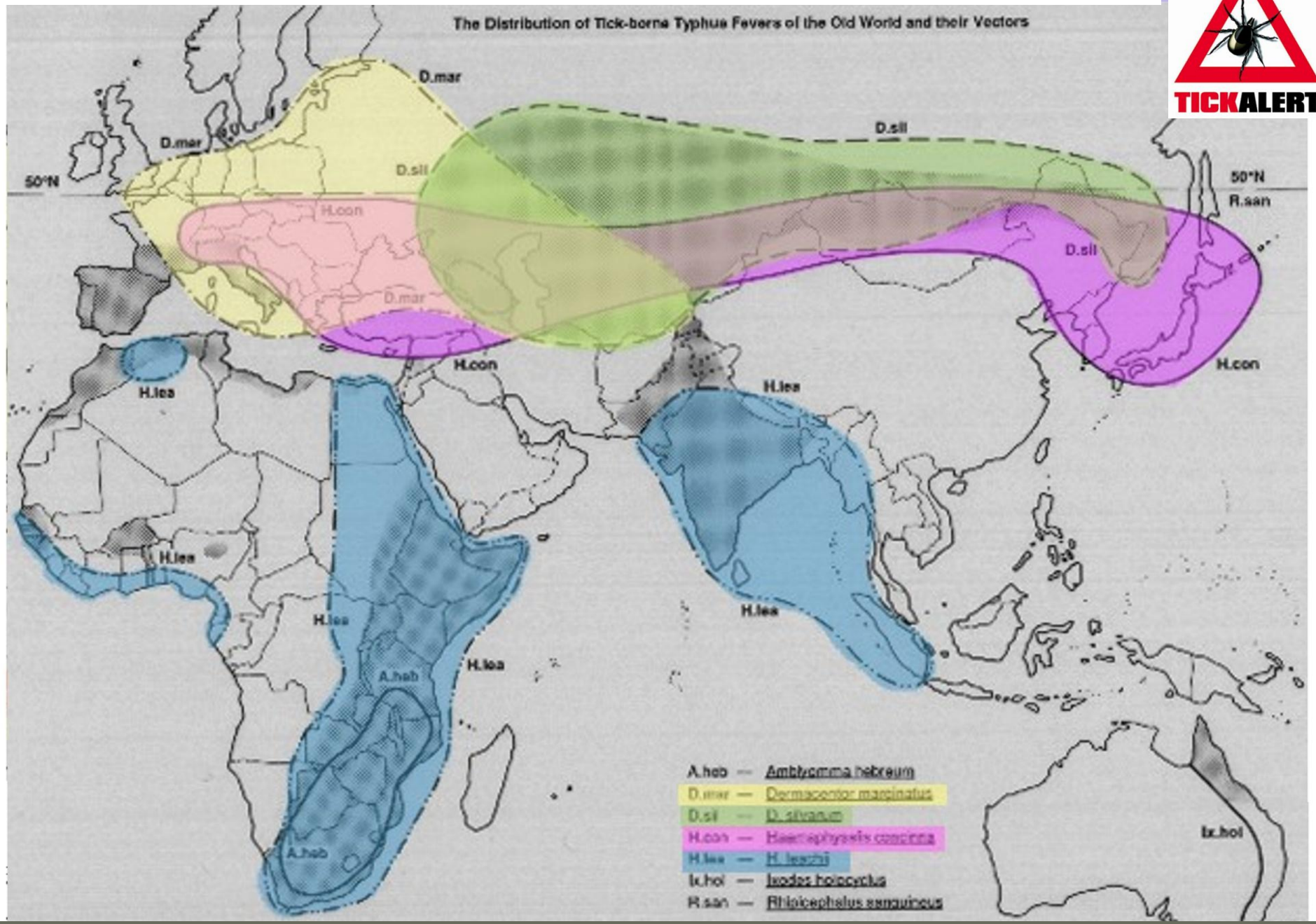
Europe, Eurasia and temperate Asia, South Africa, North America.

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

Болезнь Лайма

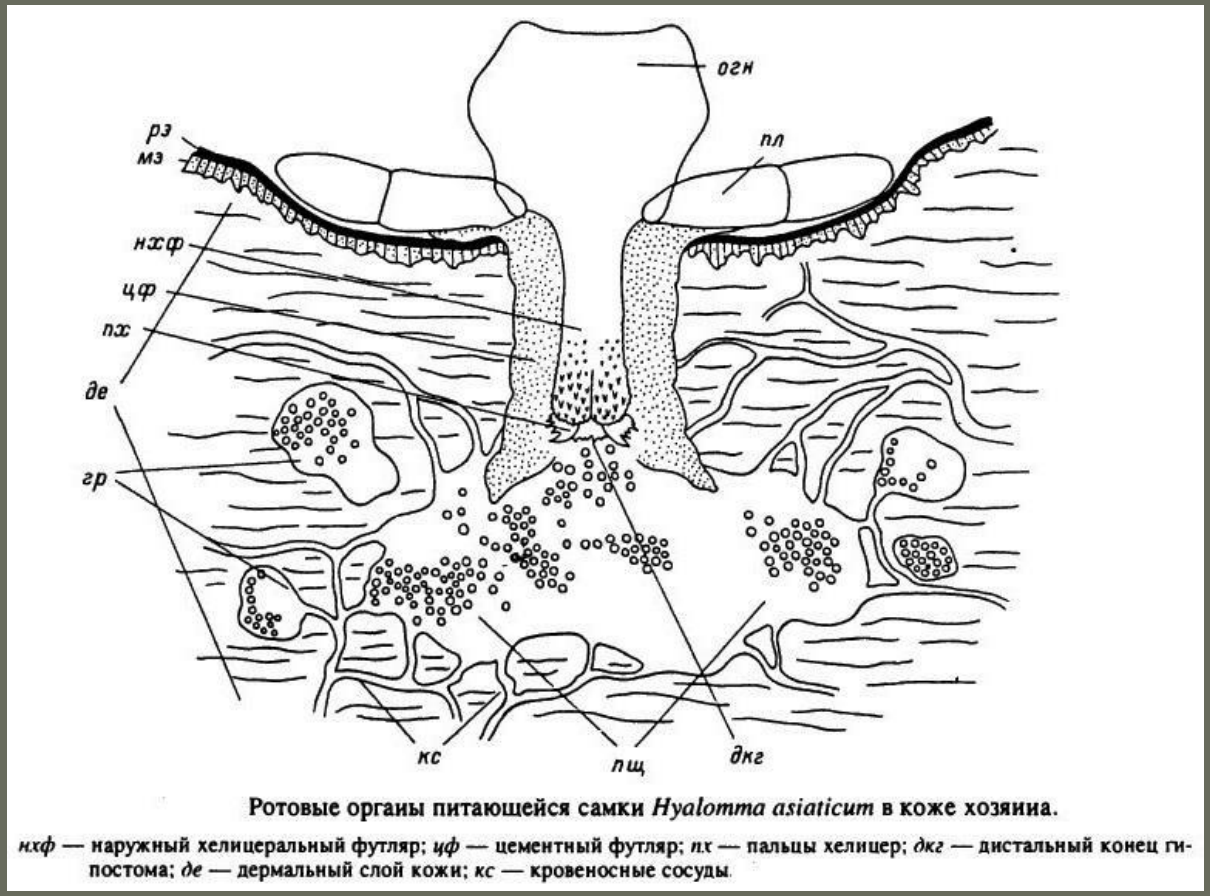


Распространение пастбищных клещей



Клещ валера

поздравляет всех с началом сезона и приглашает на шашлыки

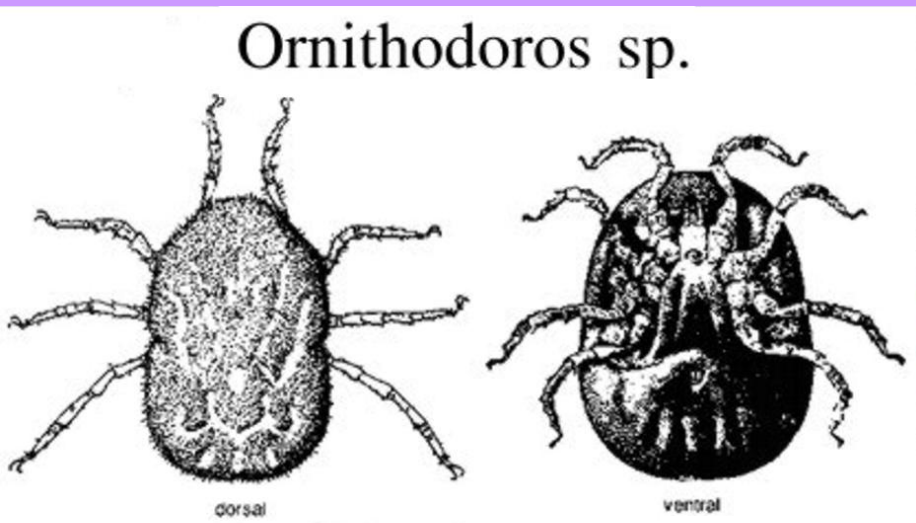


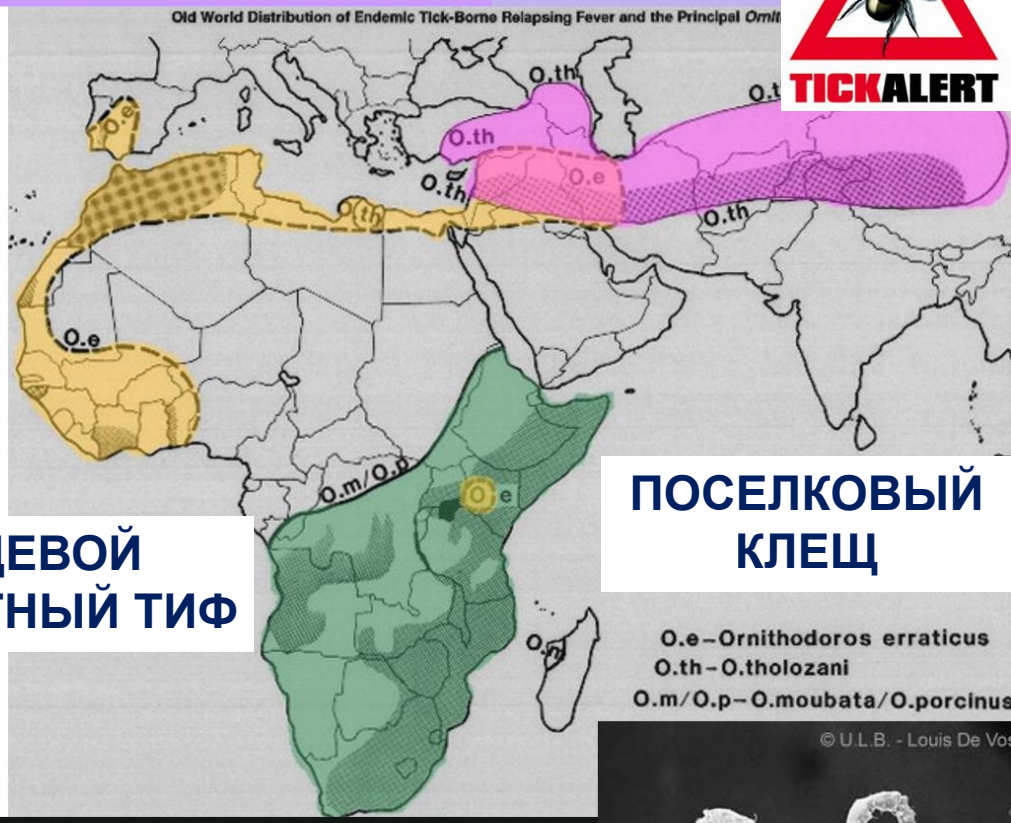
Ротовые органы питающейся самки *Hyalomma asiaticum* в коже хозяина.

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

Если клещ укусил

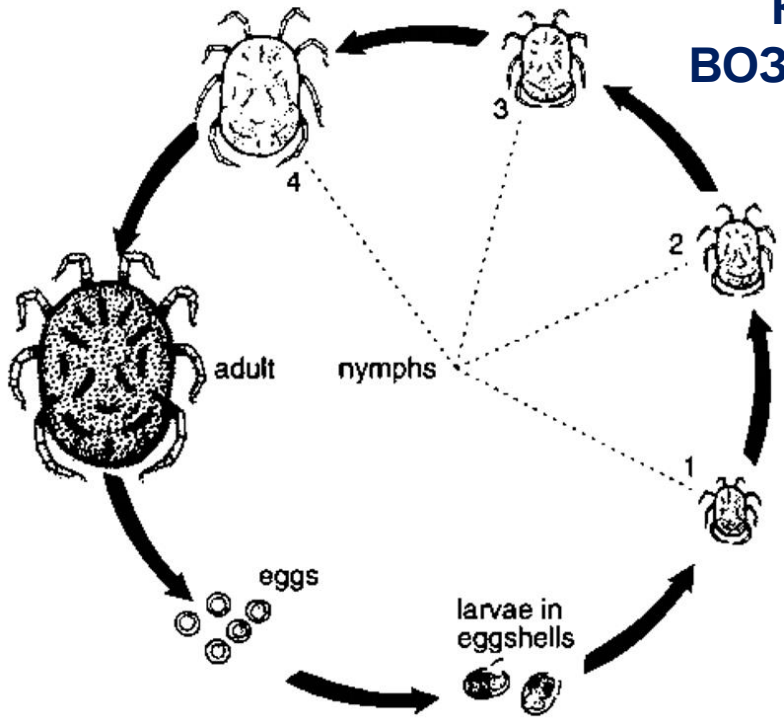
СЕМЕЙСТВО **АРГАЗОВЫЕ КЛЕЩИ**

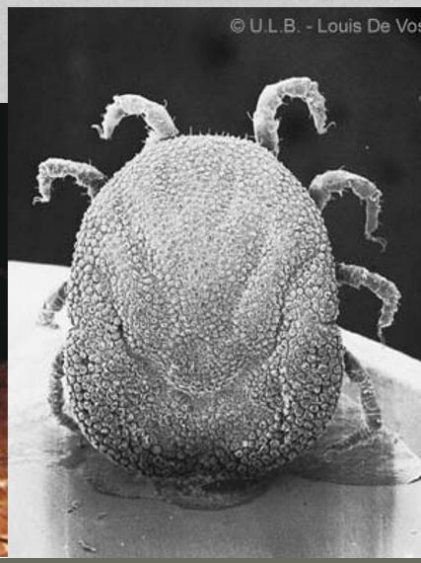


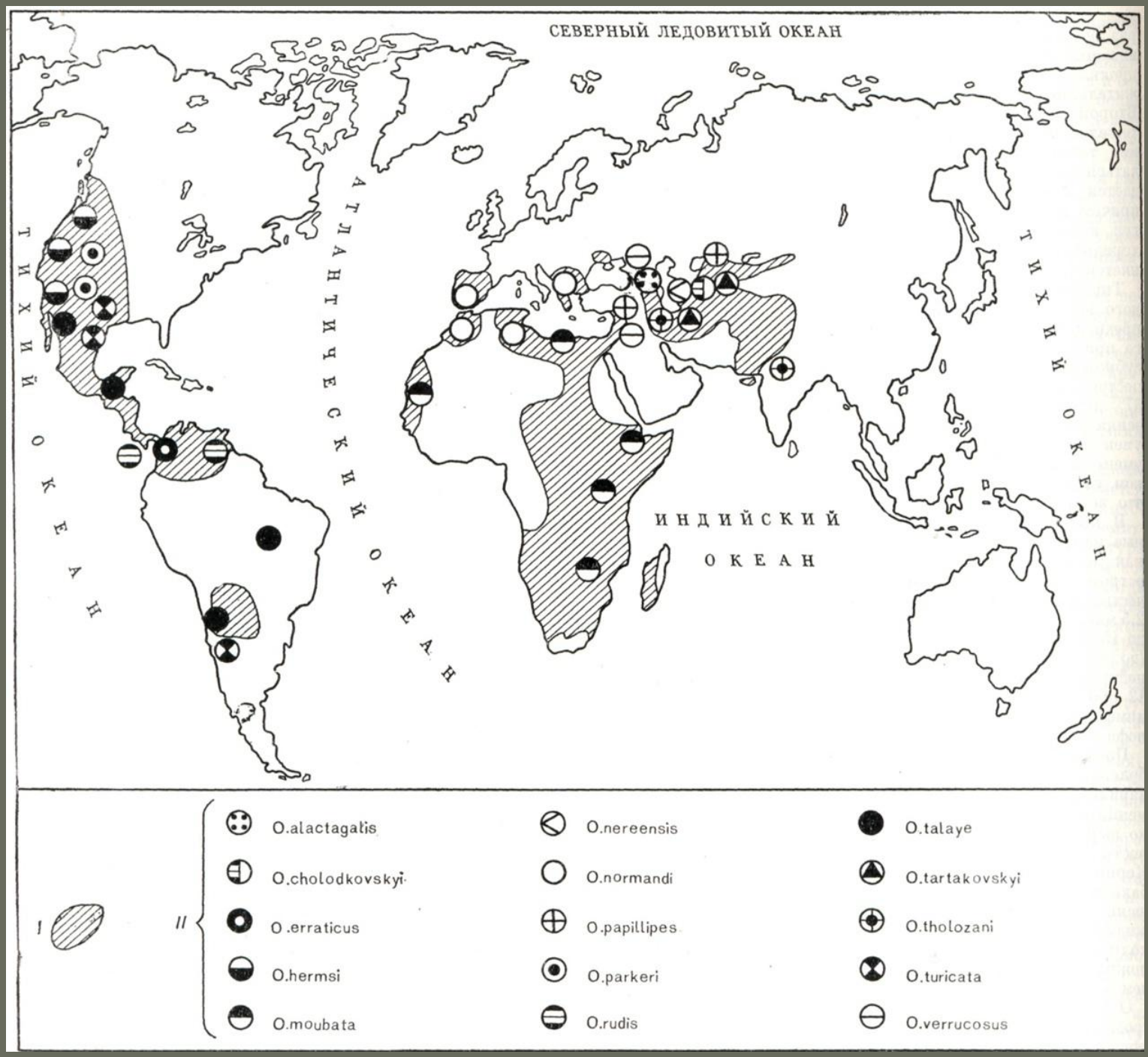


КЛЕЩЕВОЙ ВОЗВРАТНЫЙ ТИФ

ПОСЕЛКОВЫЙ КЛЕЩ



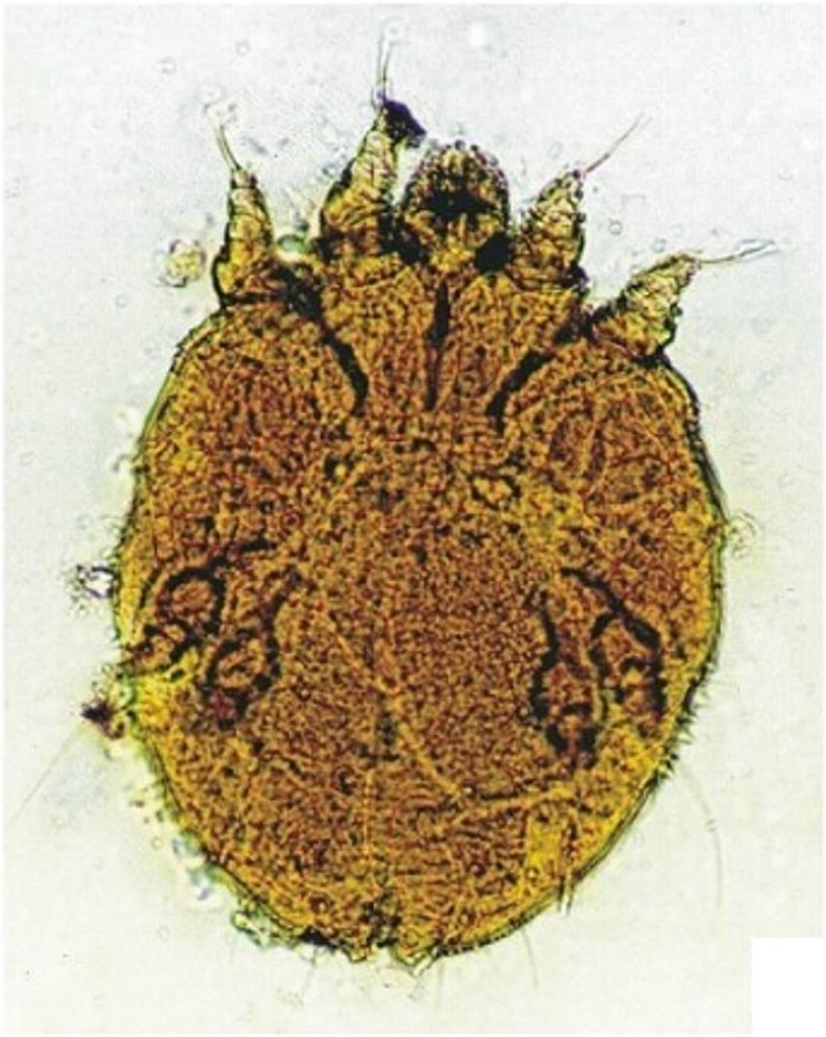


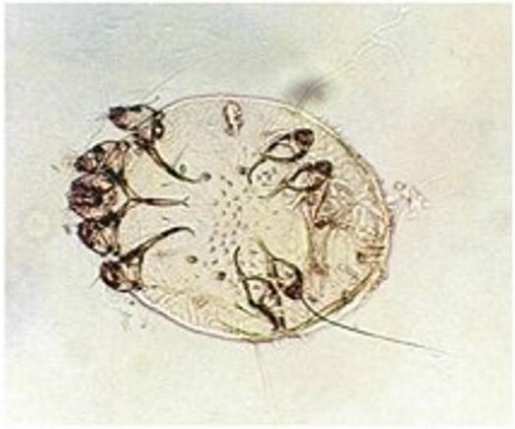

СЕВЕРНЫЙ ЛЕДОВИТЫЙ ОКЕАН
ТИХИЙ ОКЕАН
АТЛАНТИЧЕСКИЙ ОКЕАН
ИНДИЙСКИЙ ОКЕАН
ТИХИЙ ОКЕАН
I
II
O.alactagalis
O.cholodkovskyi
O.erraticus
O.hermsi
O.moubata
O.nereensis
O.normandi
O.papillipes
O.parkeri
O.rudis
O.talaye
O.tartakovskyi
O.tholozani
O.turicata
O.verrucosus

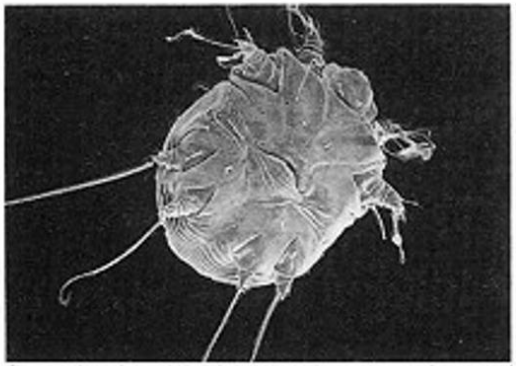
СЕМЕЙСТВО **АКАРИФОРМНЫЕ КЛЕЩИ**

Чесоточный клещ

Sarcoptes scabiei





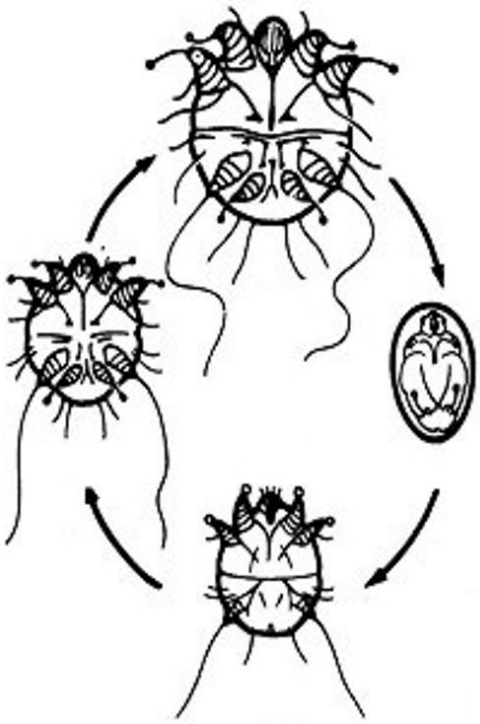


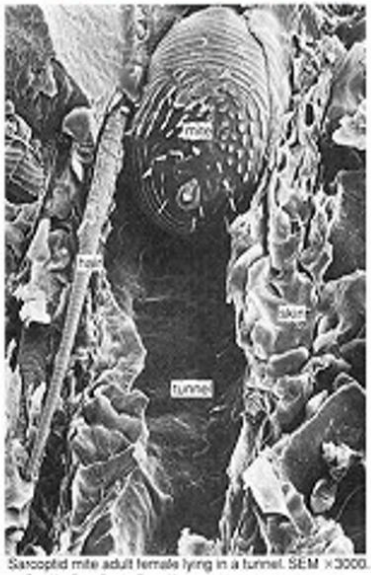
Sarcoptid mite adult. Ventral surface shows the anterior pair of legs ending in stalked discs and the poaterior pair in long hair bristles. SEM ×800

From: Vicar Zaman Scanning Electron Microscopy of Medically Important Parasitology

Family Acariformes.

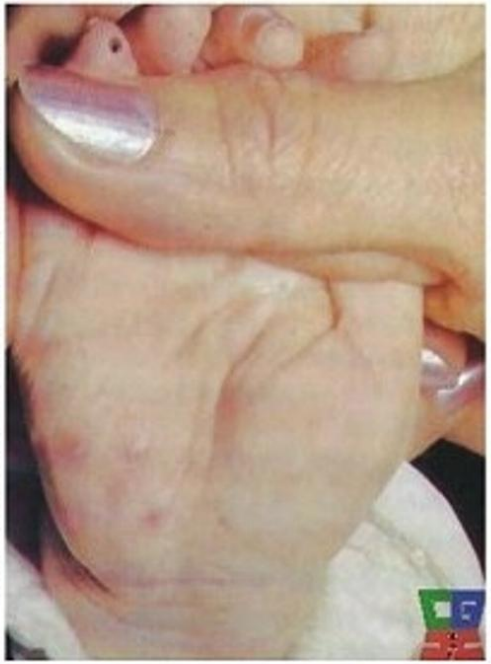
Sarcoptes scabiei

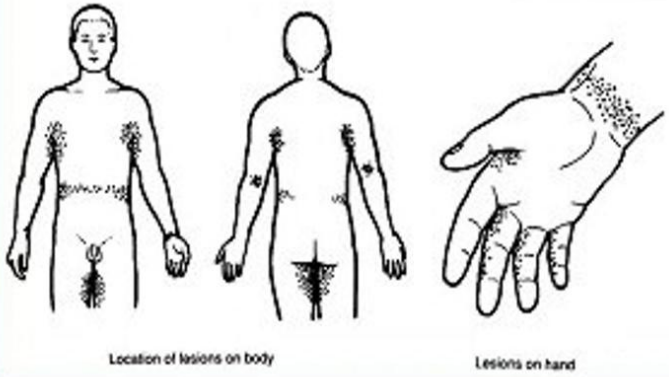




Sarcoptid mite adult female lying in a tunnel. SEM ×3000.
From: Vicar Zaman Scanning Electron Microscopy of Medically Important Parasitology

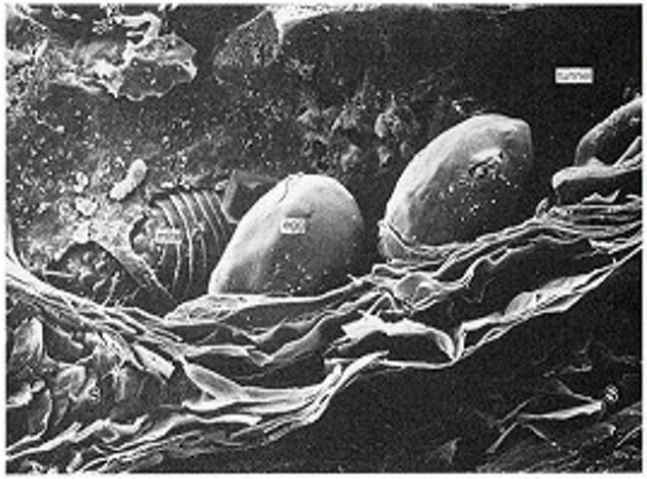
Mite eggs lying in a tunnel SEM ×1000
From: Vicar Zaman Scanning Electron Microscopy of Medically Important Parasitology





Location of lesions on body

Lesions on hand



Mite and eggs at higher magnification. SEM ×3000 From: Vicar 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.

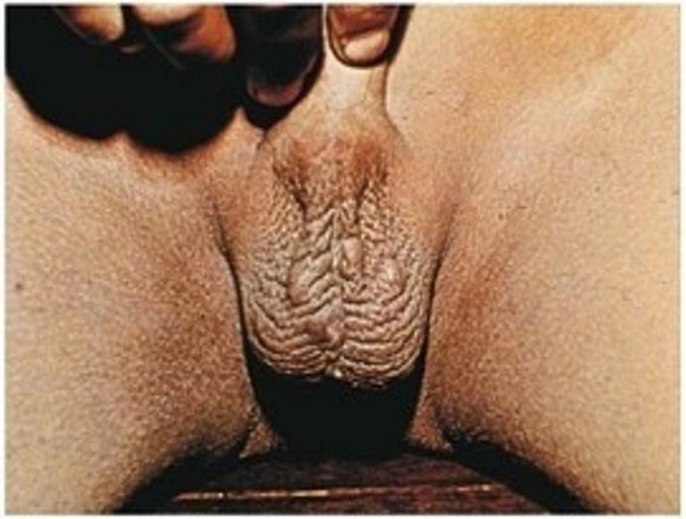
Scabies burrows
the foot of an infant

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. (Cour- tesy 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

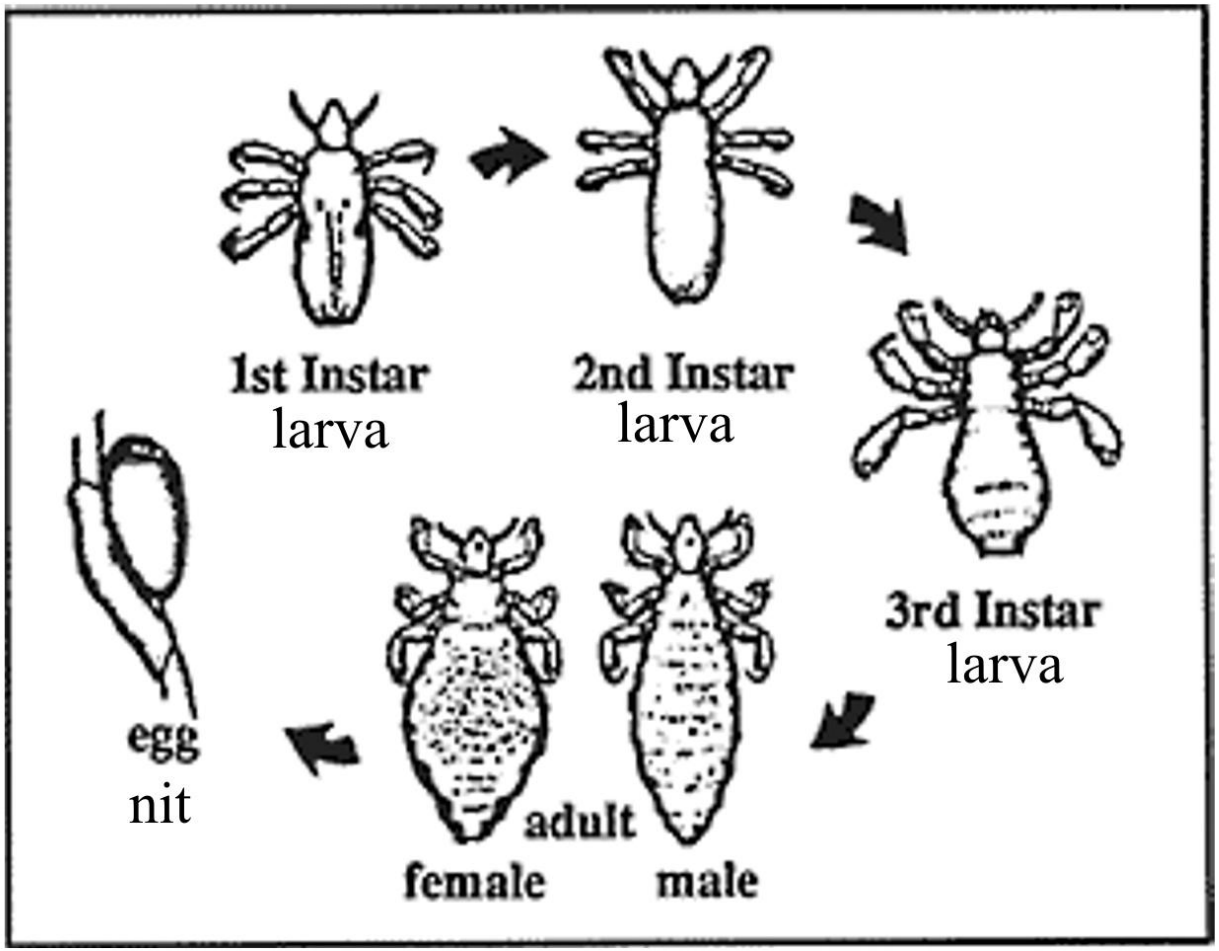
DAY 9

DAY 10

Насекомые

Отряд Вши, семейство **Pediculidae (the lice).**

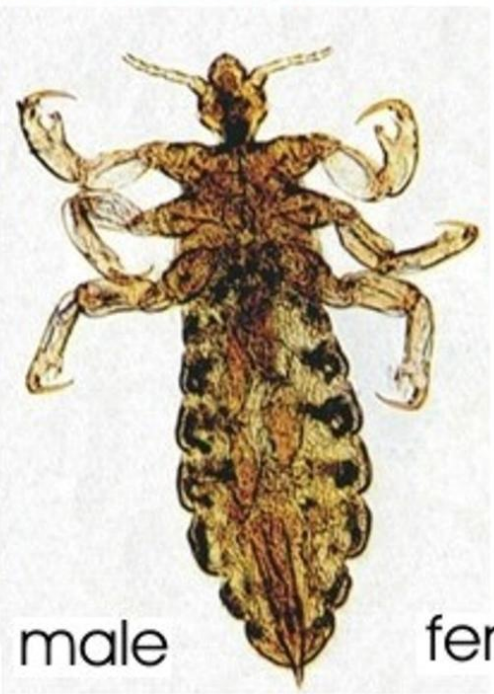
Lice are grayish in color, are characteristically dorsoventrally flattened and both apterous (wingless) sexes feed on blood.

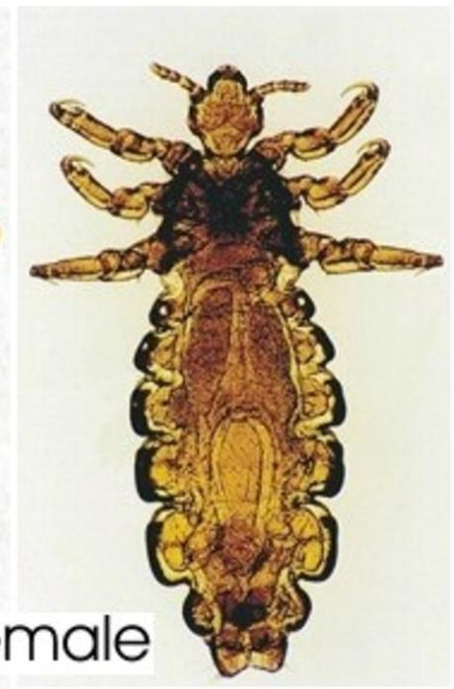


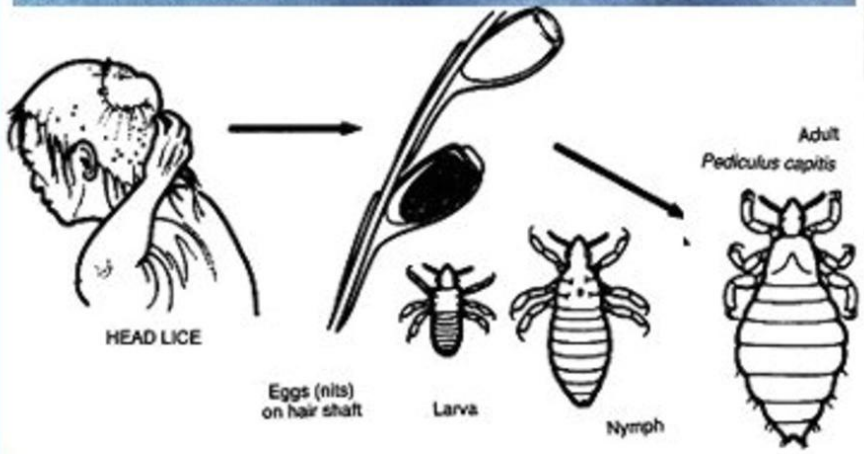
Головная вошь

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

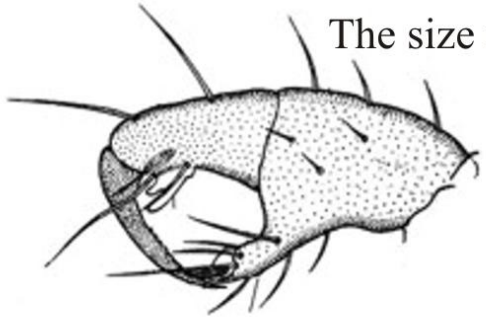
Pediculus humanus capitis







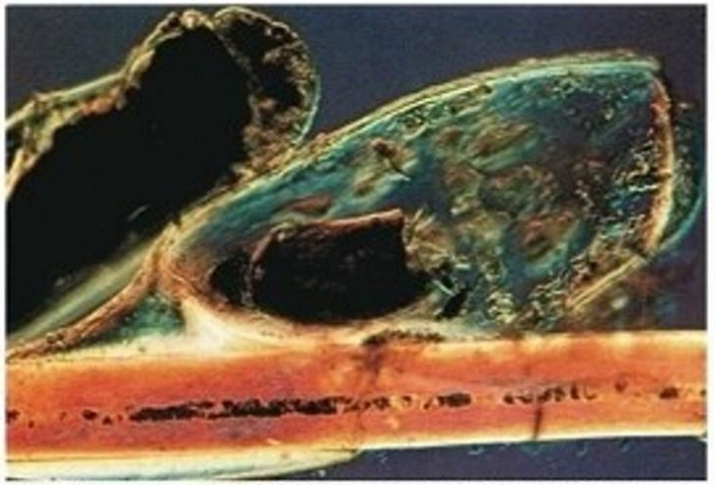
The size is about 2-3 mm.



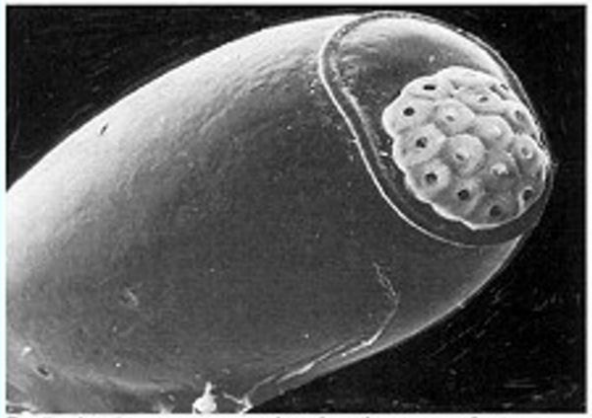
The head louse

Egg of Louse

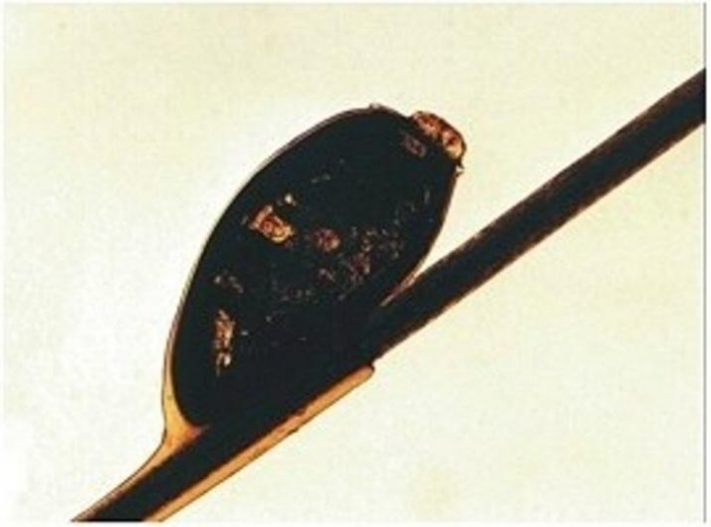
Pediculus capitis head louse
not known to be a disease vector.



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



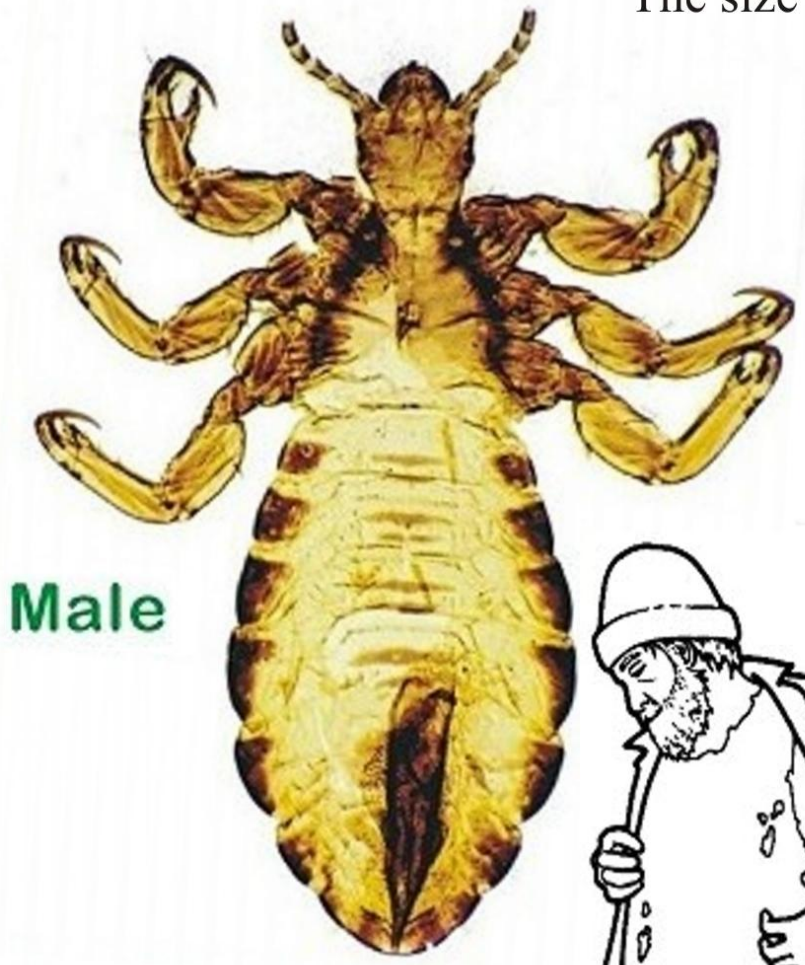
Pediculus humanus egg showing the operculum which has small perforations. SEM ×2000.
From: Viqar Zaman Scanning Electron Microscopy of Medically Important Parasitology

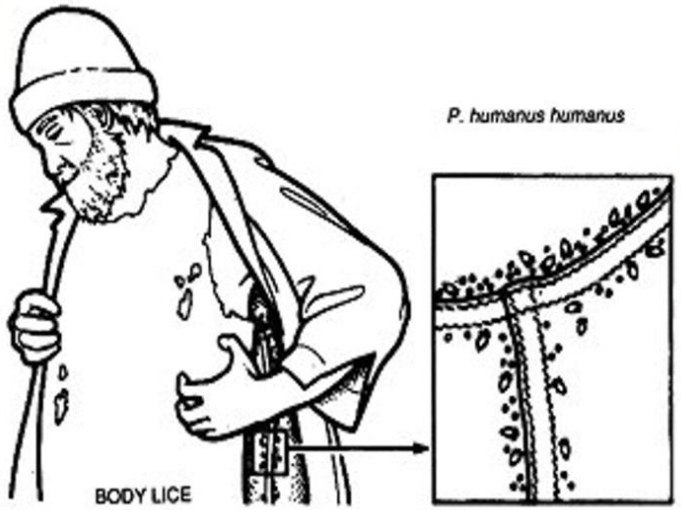


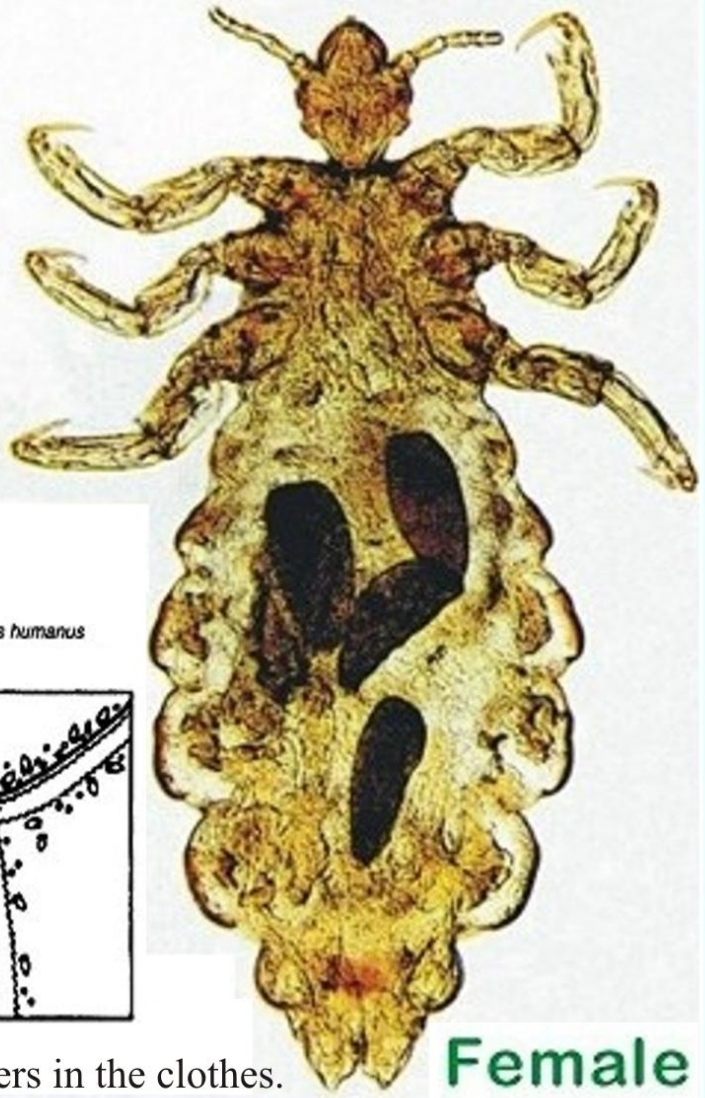
Платяная вошь

Pediculus humanus humanus

The size is about 4-5 mm.







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;

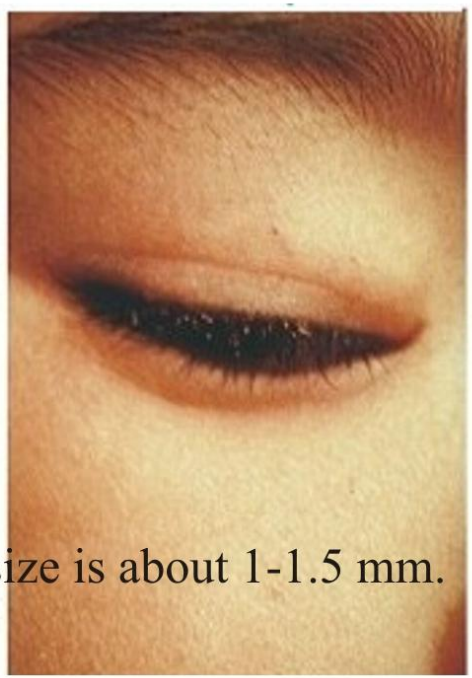
риккетсий *Rickettsia prowazekii* – эндемический сыпной тиф;

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

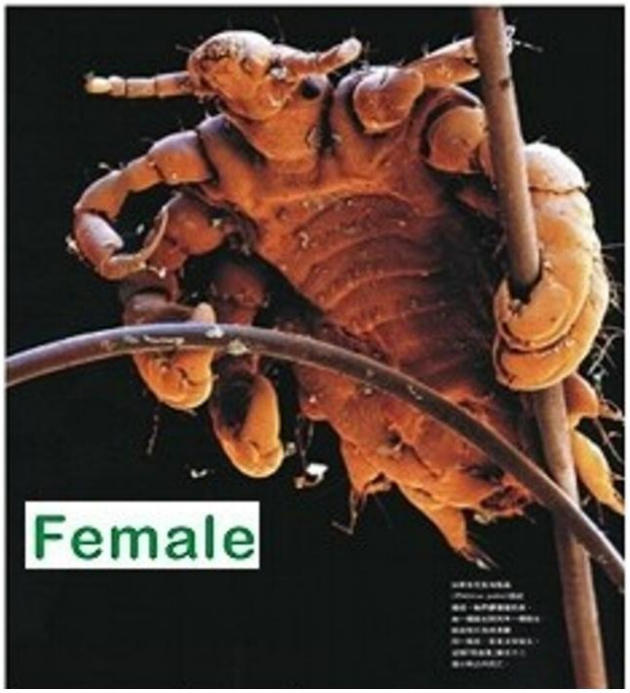
Phthirus pubis – Лобковая вошь

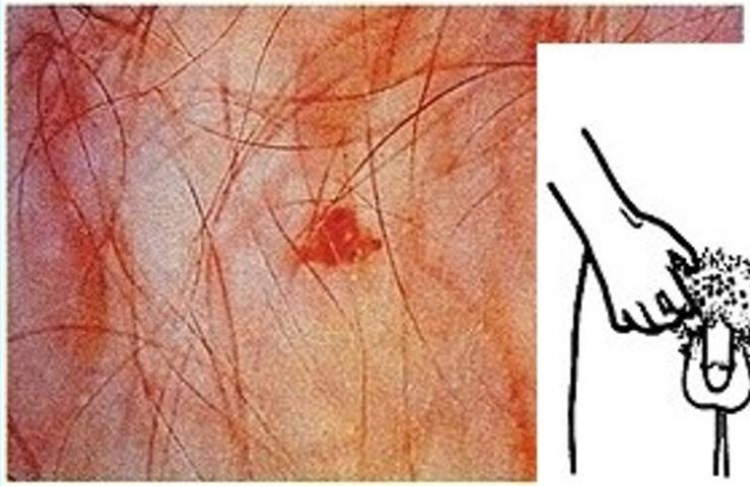
Place of localization: the pubic region, in the armpits, beard, mustache, eyebrows and eyelashes.

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



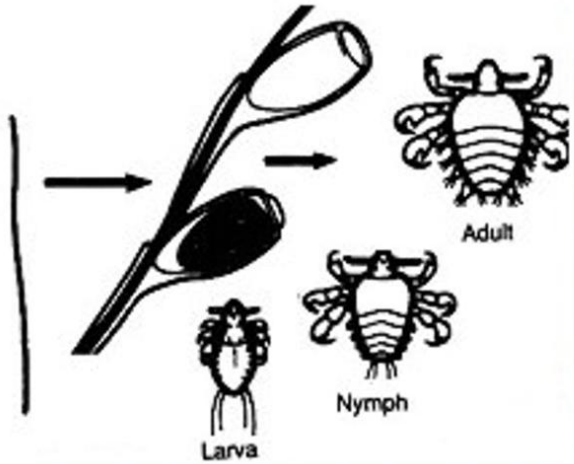
The size is about 1-1.5 mm.

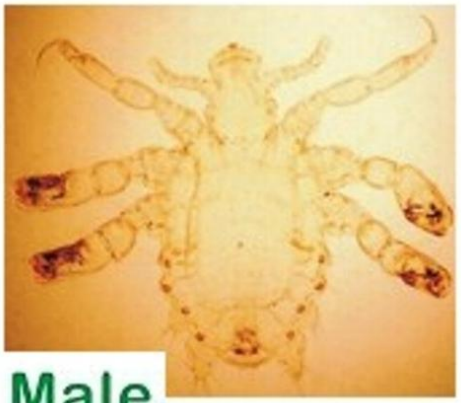




Louse and scratches

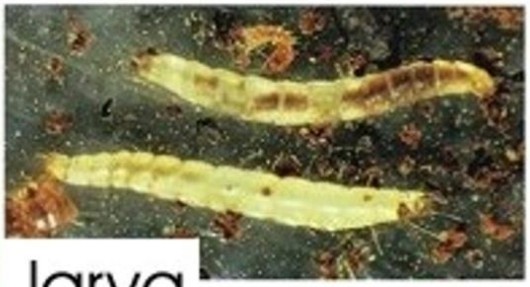
CRAB LICE





Male

Отряд Блохи

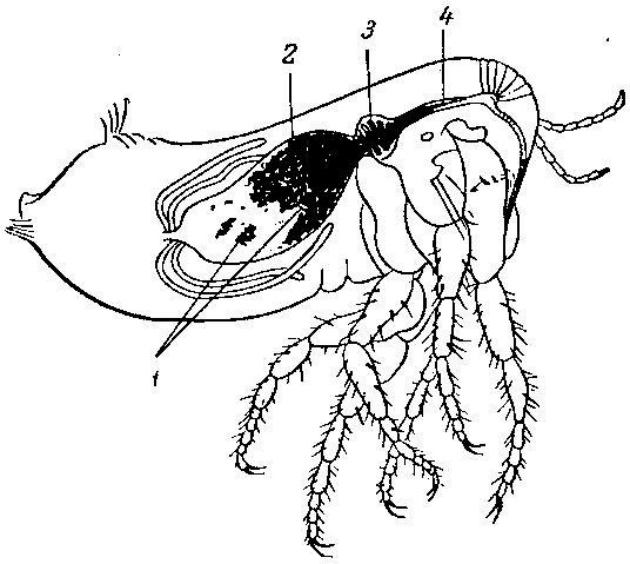


larva

adult

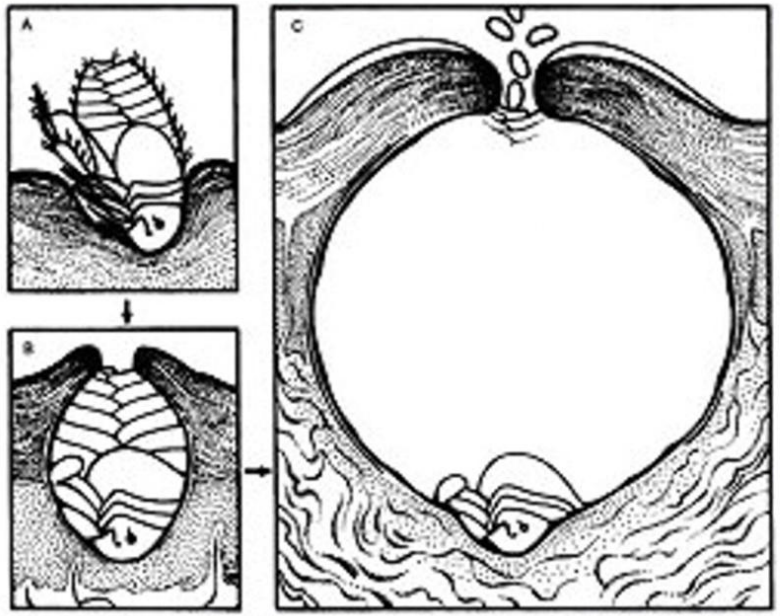
Xenopsylla cheopis

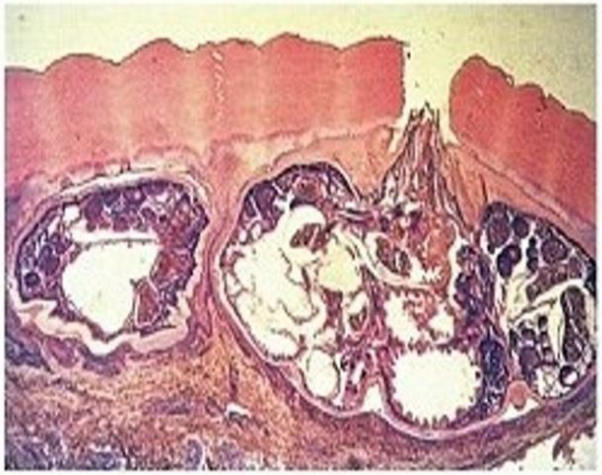
A flea (Xenopsylla cheopis) taking a blood meal on a human subject. Note that the flea lifts itself almost vertically upwards during the act of feeding.



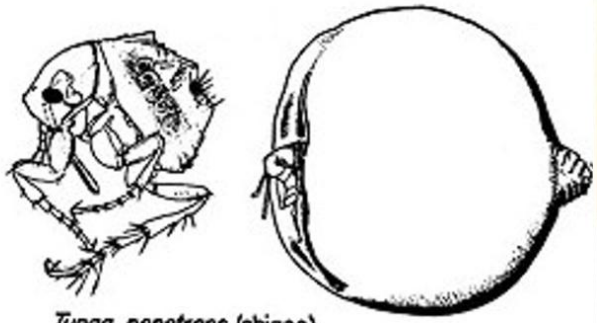
Order Siphonaptera (the fleas).

Tunga penetrans – chigoe, or sand flea.

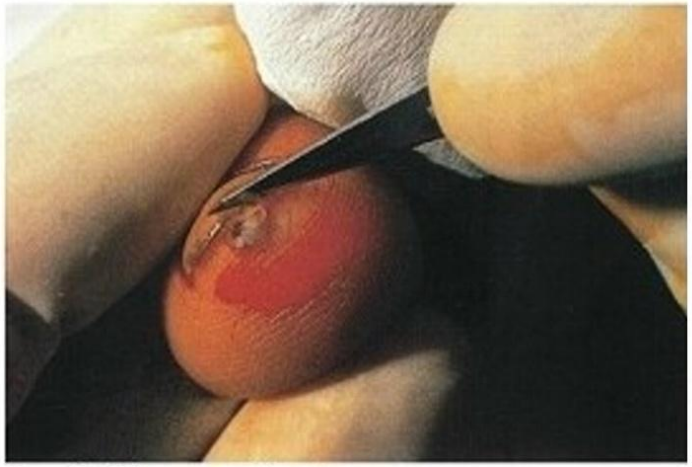




Section of female *T. penetrans* in the skin
The gravid female buries itself in the skin, often under the toenails, and swells up to the size of a small pea. Eggs are laid through the entry hole.



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

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

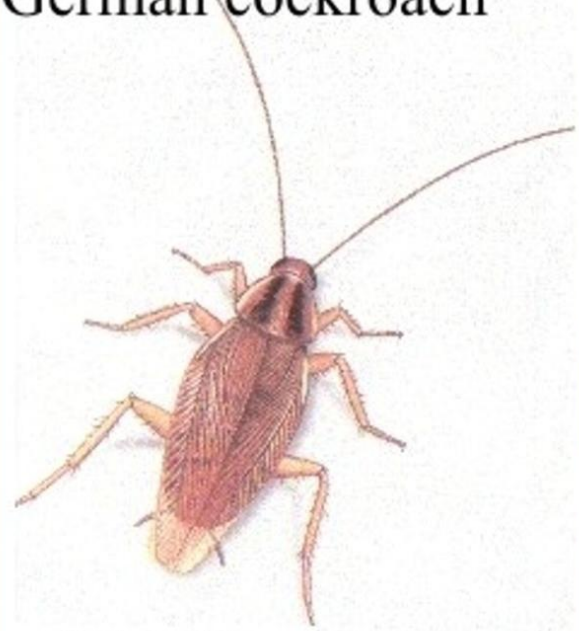
bed bug

(*CIMEX LECTULARIUS*)

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

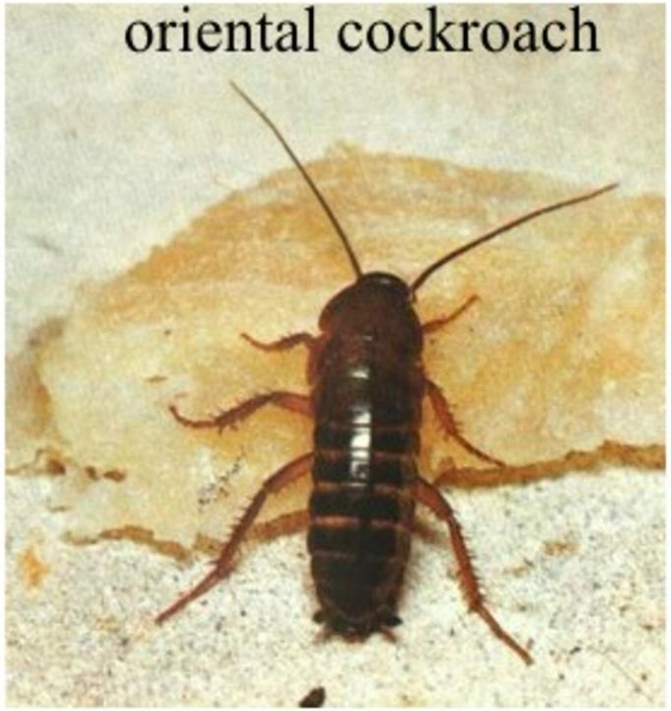
Order Blattoptera (the cockroaches).

German cockroach



Blatella germanica

oriental cockroach



Blatta orientalis

American cockroach

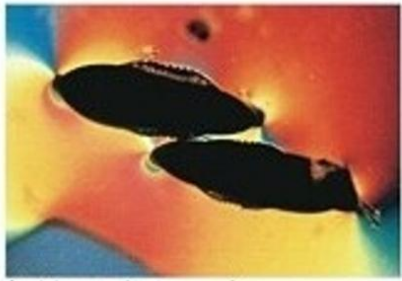
Periplaneta americana

Order Diptera (the flies).

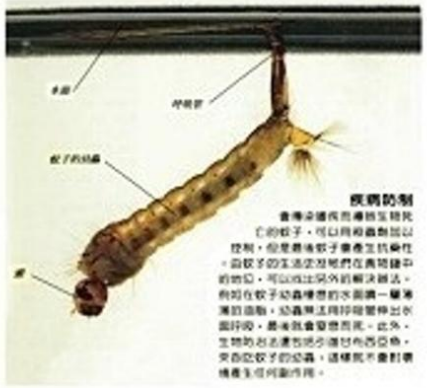
Family Culicidae (the Mosquitoes).

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

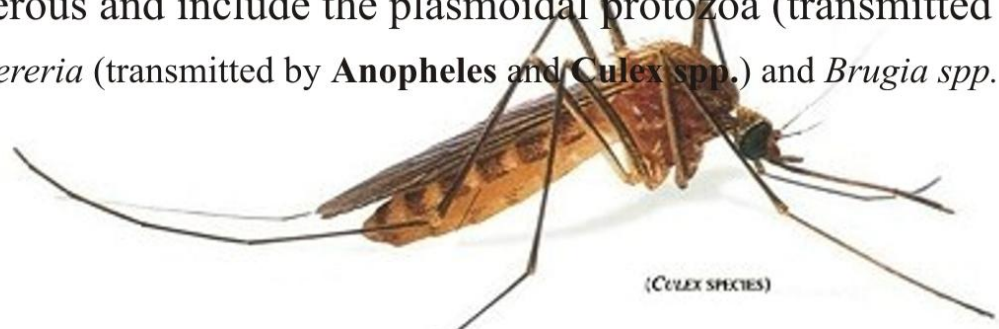
Anopheles eggs have lateral floats. They tend to aggregate on the water surface forming 'Chinese figure' patterns



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



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



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

Order Diptera (the flies).

Family Culicidae (the Mosquitoes).

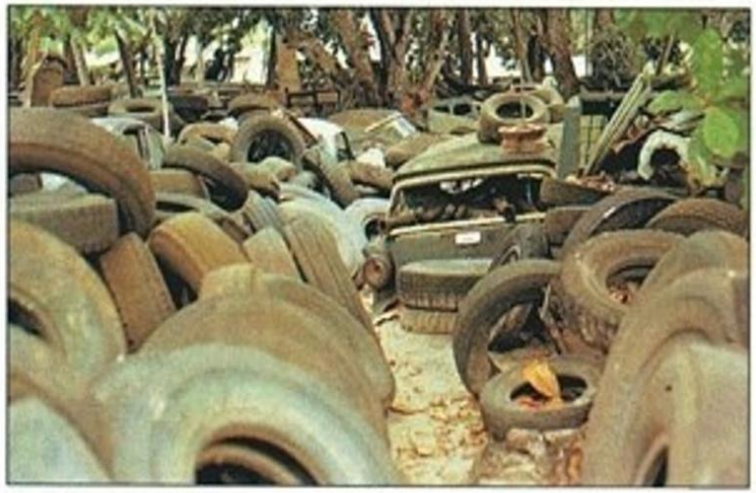
***Anopheles gambiae* biting** Malaria is transmitted by female *Anopheles* mosquitoes. Most species bite indoors at night but some are outdoor feeding. The adults are recognised by the antennae and palps. (× 4)

South American species of malarial mosquito (*Anopheles albimanus*) feeding from human arm

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

Order Diptera (the flies).

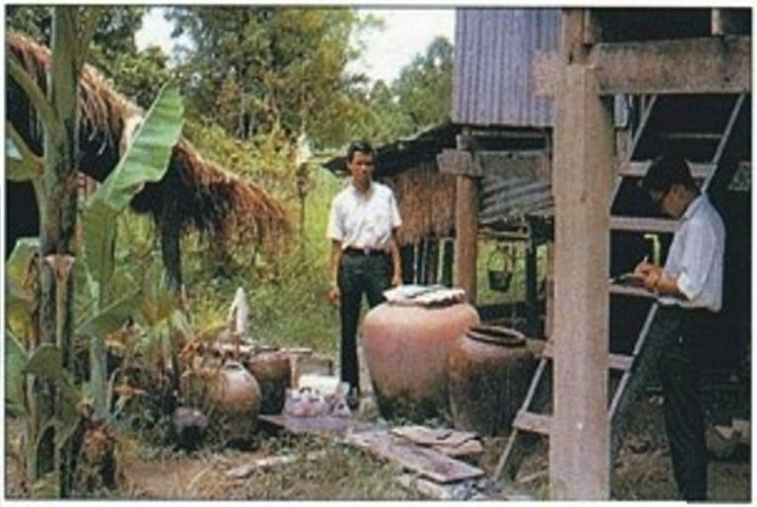
Family Culicidae (the Mosquitoes).



Ae. (Stegomyia) aegypti and *Ae. (Stegomyia) albopictu*

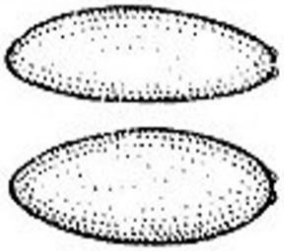
Larval breeding in discarded motor tyres

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



Ae. (Stegomyia) aegypti and *Ae. (Stegomyia) albopictu*

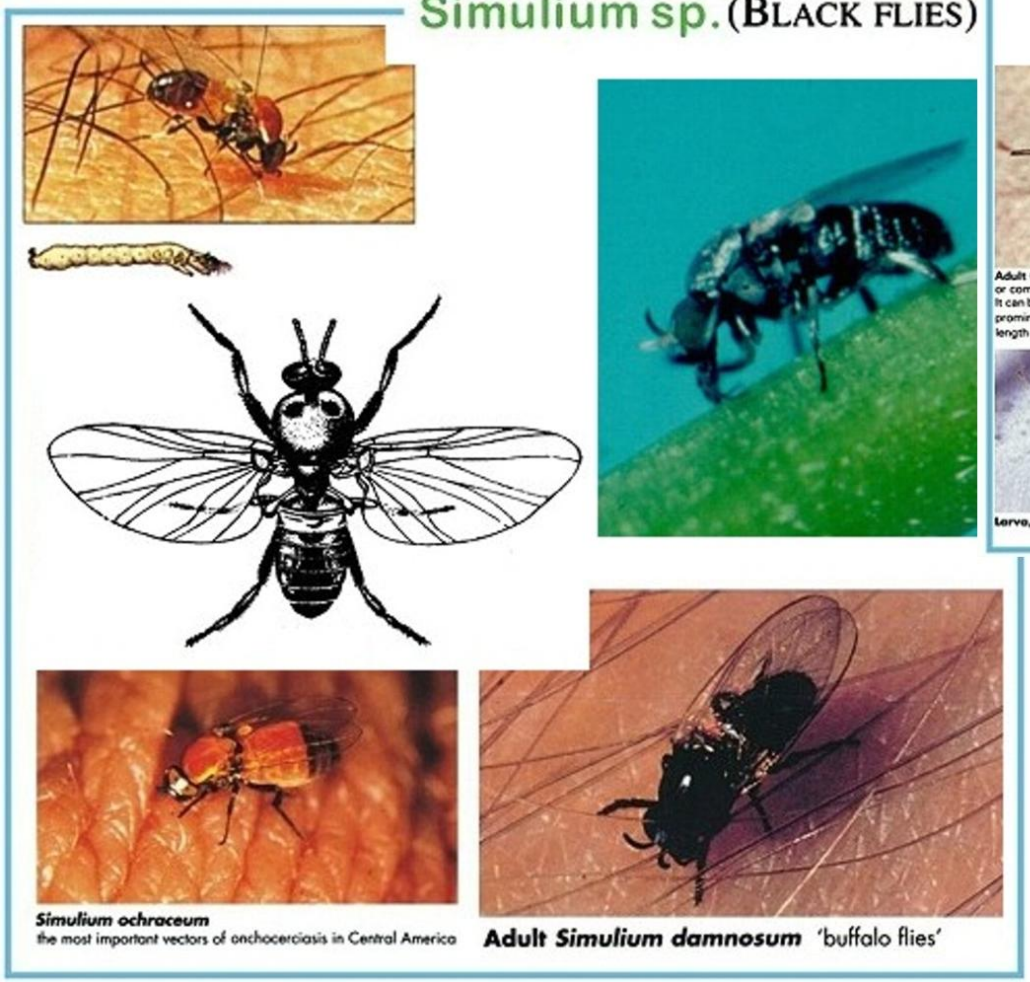
Larval breeding in water storage jars

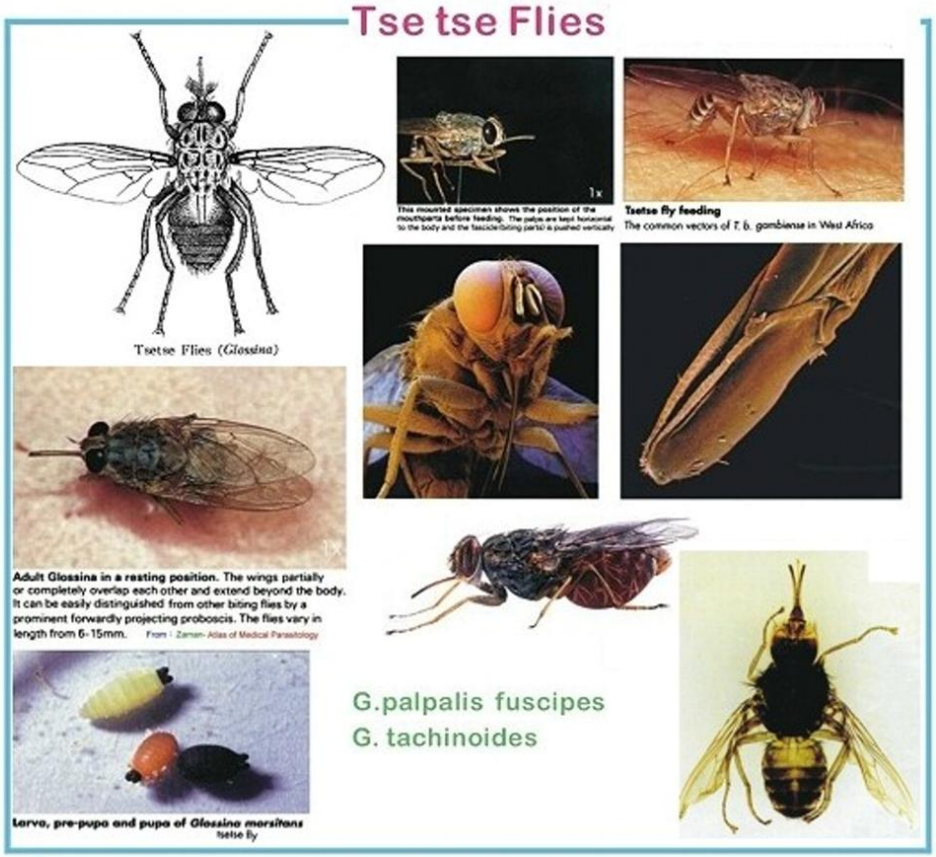


Ae. aegypti larva during the process of emergence. Interference contrast. From : Zaman- Atlas of Medical Parasitology

Order Diptera (the flies).

Family Simuliidae (blackflies).





Family Glossinidae, genus Glossina - the tsetse's.

Order Diptera (the flies).

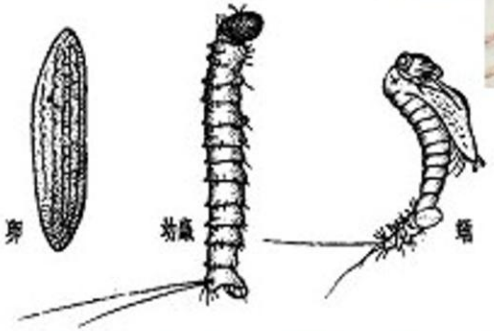
Family Psychodidae (sandflies).

Lutzomyia longipalpis

Close-up view of *Lu. longipalpis*

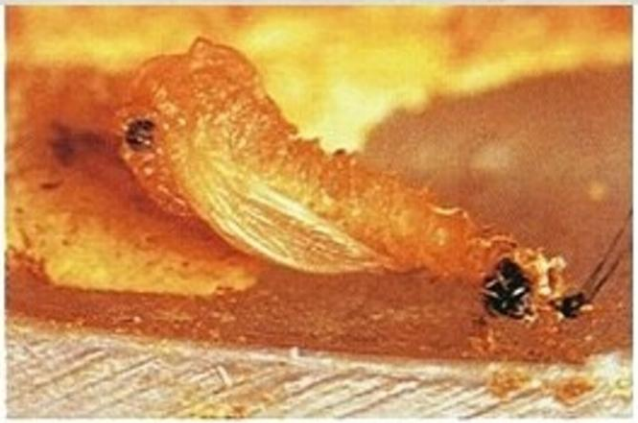
Sandfly belong to the genus *Phlebotmus*. Note the pres
The wing is surrounded by a fringe of hairs and the wing

Adult female *Lu. longipalpis* biting



Reaction to sandfly bites

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

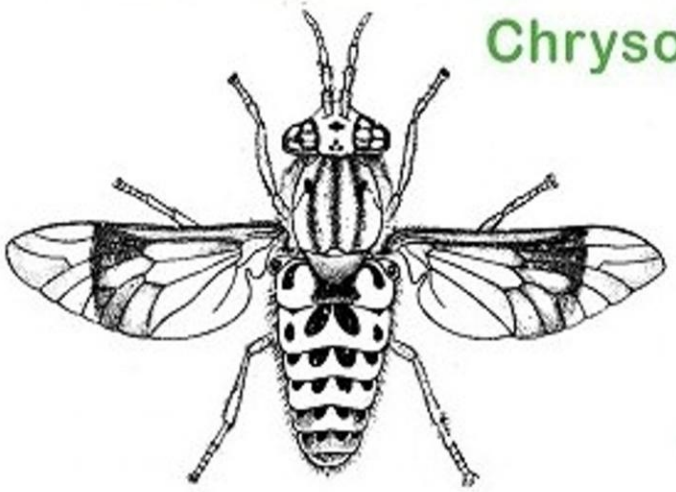
Order Diptera (the flies).

Family Tabanidae - horseflies, deerflies.

Female *Chrysops silacea*

Female *C. dimidiata*

Tabanid flies of the genus *Chrysops* transmit loaiasis
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

Gasterophilus intestinalis

Parasarcophaga crassipalpis

flesh fly

Sarcophagidae

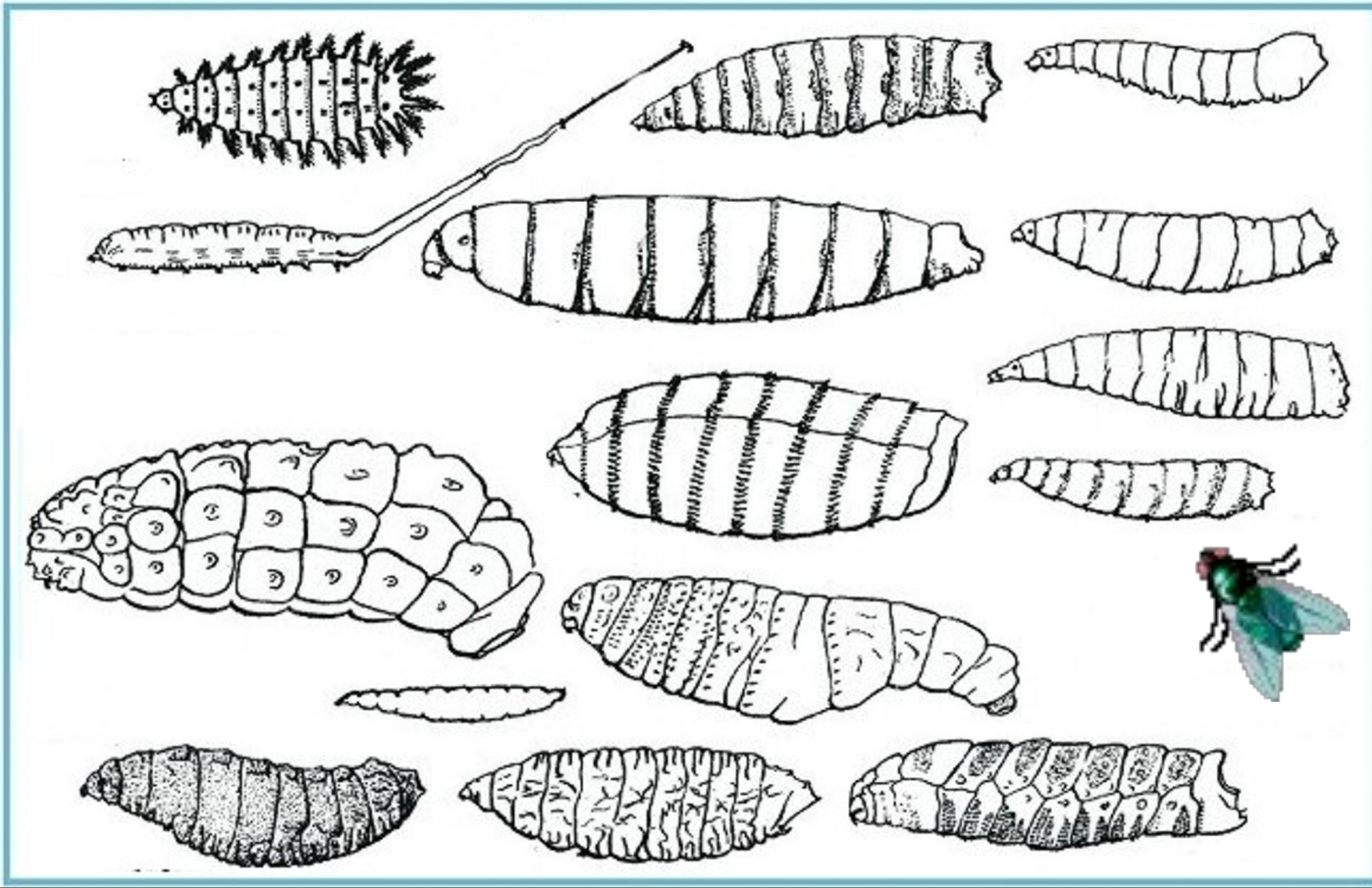
Wohlfahrtia magnifica

Sarcophaga haemorrhoidalis

Musca domestica 蛹

Order Diptera (the flies).

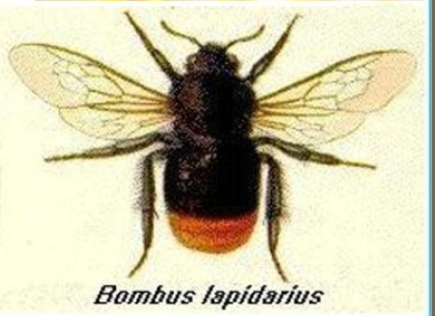
There are the agents of myiasis - the disease caused by larvae of flies.



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

Fire ants

Bumble-bee



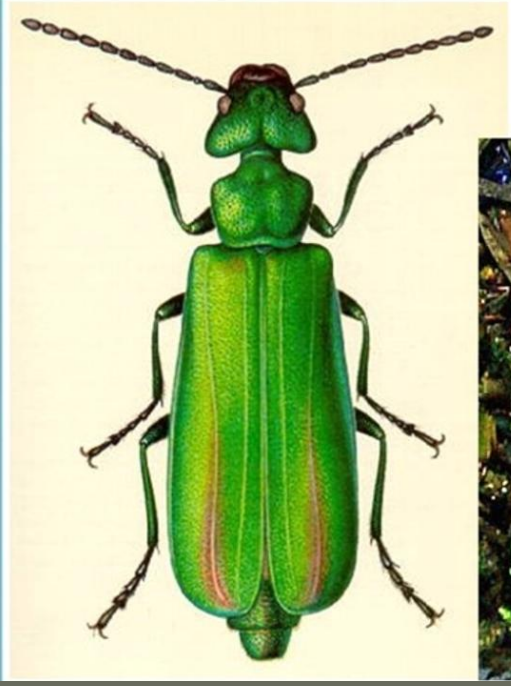
Caterpillers of butterflies

Lepidopterism and erusism

Order Lepidoptera.

Order Coleoptera.

Spanish fly



Order Coleoptera. Blister beetles, bombardier beetle.

bombardier beetle

blister beetles

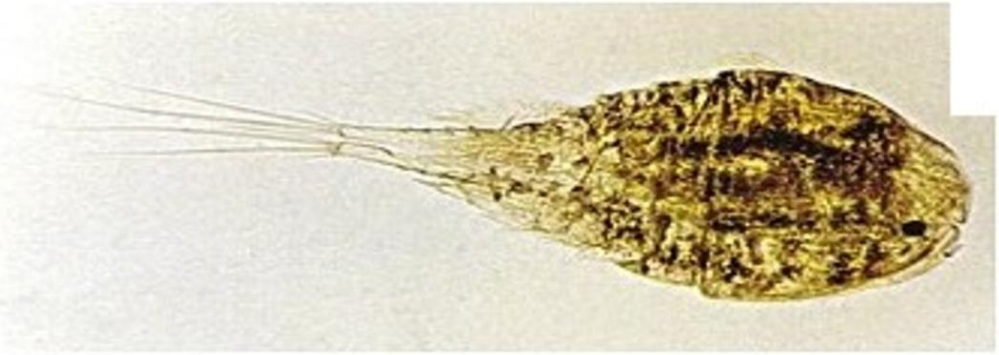
Class Crustacea.

Order Cyclopoidade or Copepods.

Cyclops sp.

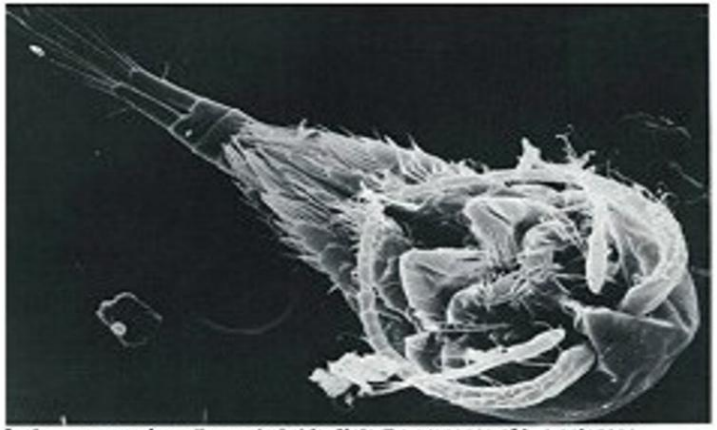
Cyclops sp. These copepods are intermediate hosts of different parasites. One of them can be seen carrying egg sacs.

From : Zaman- Atlas of Medical Parasitology



Cyclops sp. An intermediate host of *Dracunculus medinensis*. These are small crustaceans (Copepods) 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: Vigar 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: Vigar Zaman Scanning Electron Microscopy of Medically Important Parasitology