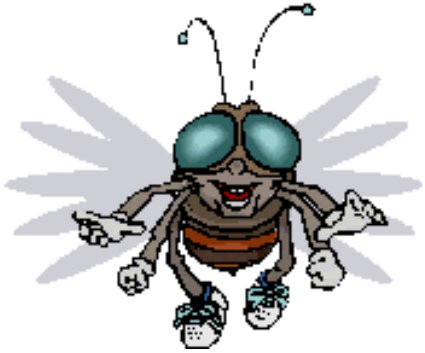
# MEDICAL arachnoentomology



# TYPE arthropods ARTHROPODA

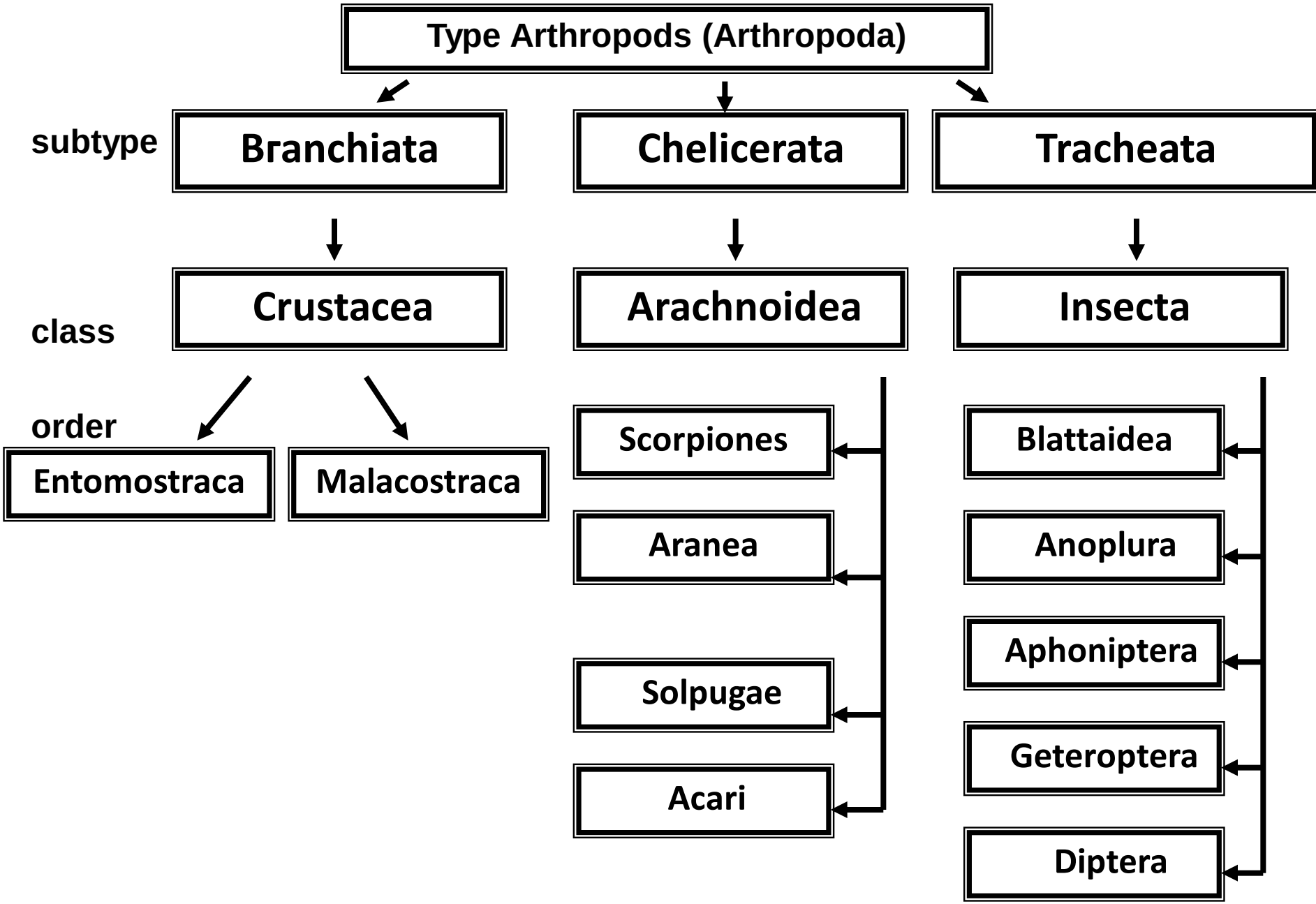
***Type of arthropods includes more than 1.5 million species. Among them:***

- *Parasites of man and animals;*
- *Intermediate hosts of the parasites,*
- *Carriers of pathogens*
- *Pathogens*
- *Venomous animals*

# General characteristics of the type

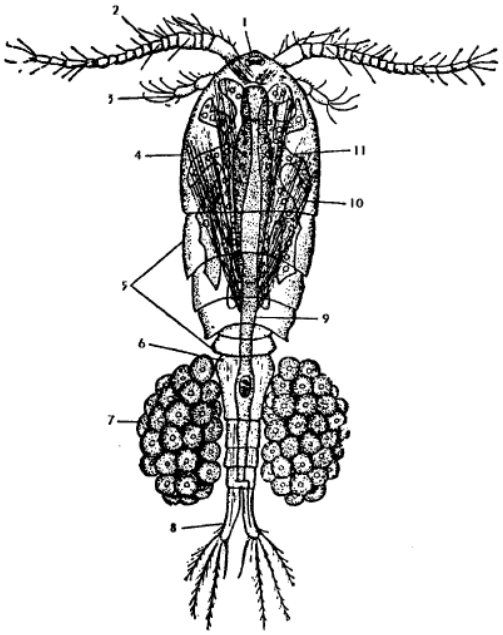
- **Develop from three germ layers ;**
- **Bilateral symmetry .**
- **Heteronomous segmentation . Segments of different areas of the body have an unequal structure. Similar segments form parts of body : head, thorax , abdomen .**
- **Limbs of arthropods – multi-parts levers that join the body with the help of the joints.**
- **They have striated muscles .**
- **Chitin cover protects the body from external influence and serves to attach muscles.**
- **Mixed body cavity.**
- **The digestive system consists of three divisions : the front , middle and rear . They have a glandula - liver.**

- **. Respiratory organs are diverse: gills , trachea and lungs.**
- **The circulatory system is not closed . Heart is on the dorsal side .**
- **Excretory organs : coxal glands in spiders , excretory gland in crustaceans , insects have Malpighian tubules and fat body .**
- **The nervous system has epipharyngeal ganglion - " brain " and the ventral nerve cord .**
- **Senses : sight, hearing , smell, touch , taste, body balance.**
- **Endocrine glands .**
- **Dioecious . Most have internal fertilization, but some - external.**
- **Development may be direct and metamorphosis : complete or incomplete.**
- **Descended from the polychaete annelids .**


Type Arthropods (Arthropoda)
subtype
Branchiata
Chelicerata
Tracheata
class
Crustacea
Arachnoidea
Insecta
order
Entomostraca
Malacostraca
Scorpiones
Aranea
Solpugae
Acari
Blattaidea
Anoplura
Aphoniptera
Geteroptera
Diptera

# Crustacea

## Entomostraca



Cyclops and Diaptomus–intermediate host of fish tapeworm and dragon worm

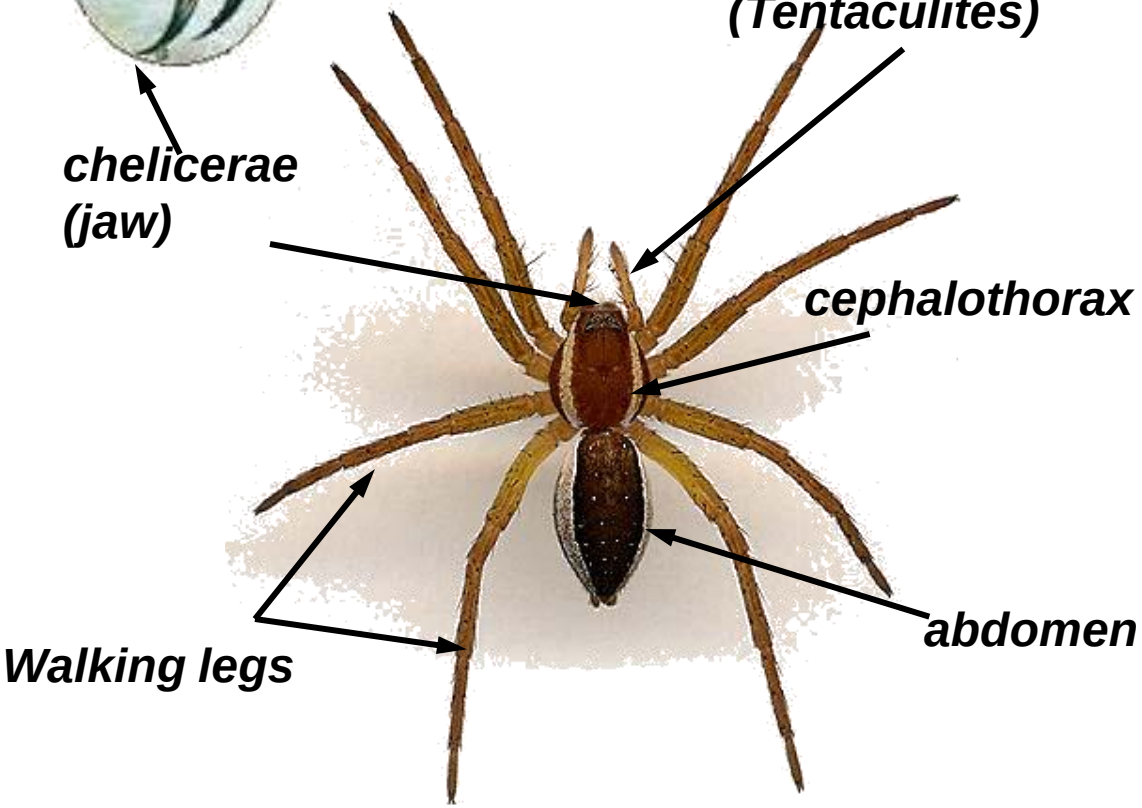
## Malacostraca

1.Food product
2. Necrophages have health value
3. Pulmonary intermediate hosts for trematode

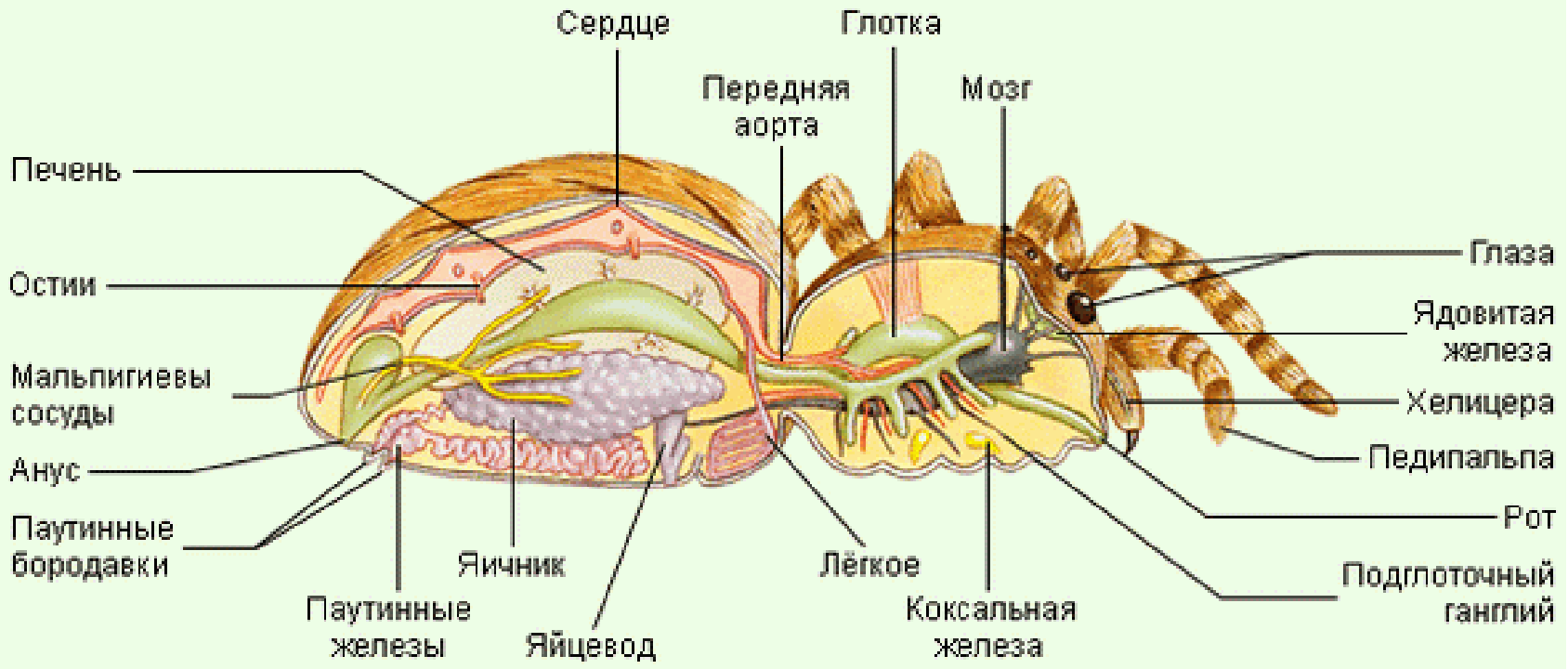
# Arachnoidea

# Typical features of a class

- *About 40,000 species live on the Earth*
- *Merged body segments - cephalothorax and abdomen.*
- *6 pairs of limbs. 2, the first pair - chelicerae and pedipalps - adapted to capture and grind food. The remaining four pairs are walking legs.*
- *Body is covered with chitinous cuticles and epidermis.*



# Internal structure of spider



# ЯДЫ ПАУКОВ

**Гемотропный яд с нейротропным действием**

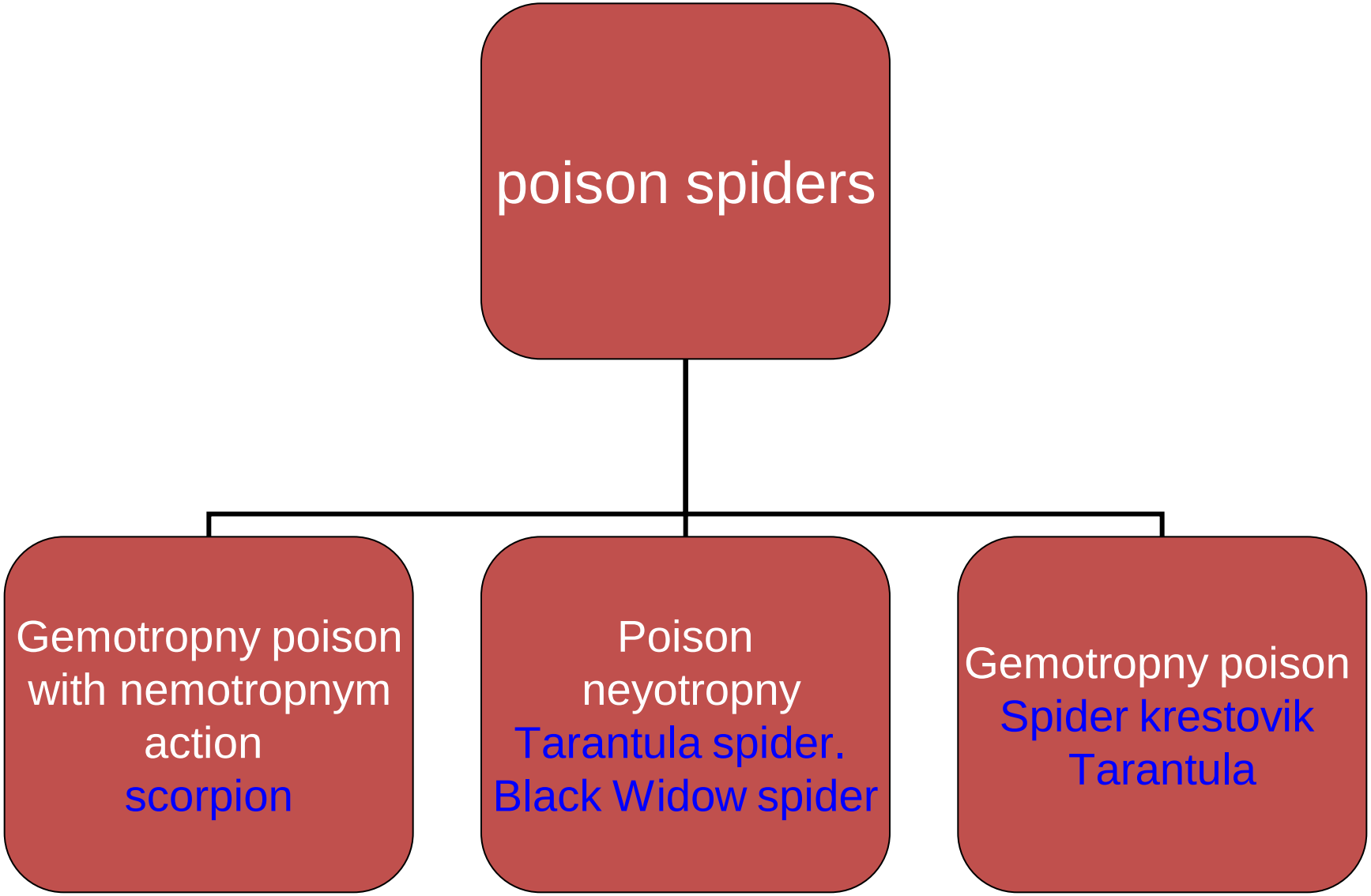
***скорпион***

**Нейротропный яд**

***паук-птицеед, паук каракурт***

**Гемотропный яд**

***паук крестовик, тарантул***


poison spiders
Gemotropny poison with nemotropnym action
scorpion
Poison neyotropny
Tarantula spider.
Black Widow spider
Gemotropny poison
Spider krestovik
Tarantula

# Arachnoidea

**Aranea**

**Scorpiones**

**Solpugae**

**Acarina**

# scorpions

**1.** Итальянский скорпион

***Euscorpius italicus***

**2.**Пестрый скорпион

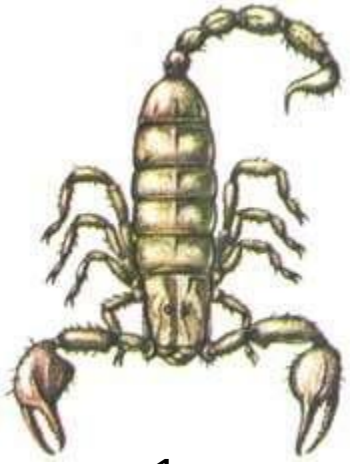
***Buthus eupeus***

**3.** Толстохвостый скорпион

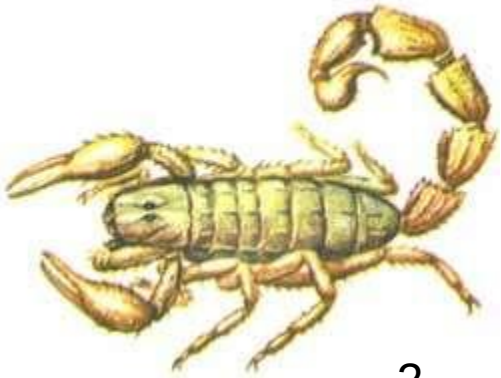
***Androctonus crassicauda***

**4.** Черный скорпион

***Orthochirus scrobiculosus***



1



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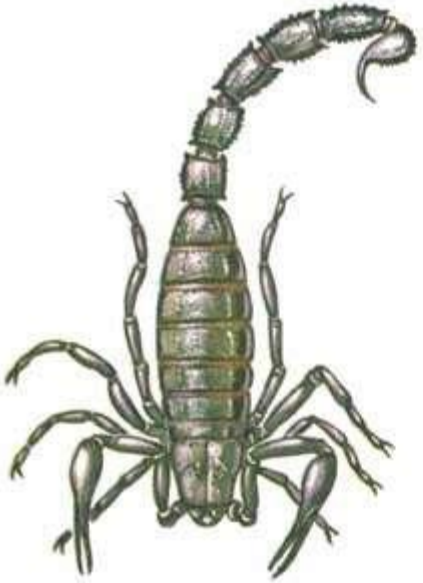

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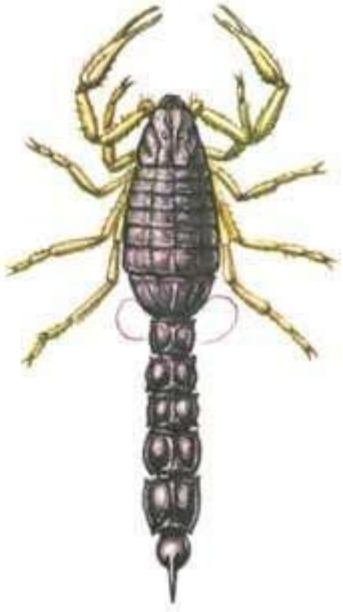


4

# Order "solpugi" (phalanges)


# poisonous spiders

***Tarantula***
***Lycosa singoriensis***

***Karakurt***

***Lathrodectus trediniguIlatus***

# ***goliath***

# ***Commonly known as the spider with a venomous apparatus.***

***Krestovik***. On the upper side of the abdomen there are white or light brown spots forming a cross. Dimensions of females are 20-25 mm, male - 10-11 mm.

# *Arachnida* – КлассПаукообразные

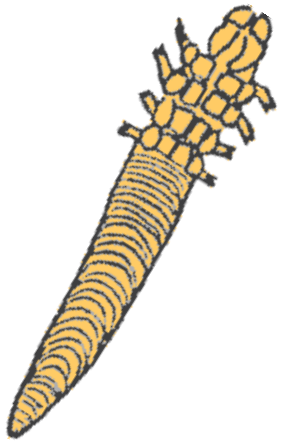
- **Order *Acariformes*** – Отряд Акариформные клещи
- ***Tyroglyphidae*** – Амбарные клещи
- ***Sarcoptoidea*** – Чесоточные клещи
- ***Sarcoptes scabiei*** – чесоточный зудень(чесотка)
- ***Demodex folliculorum*** – железница угревая ( демодекоз)

**Order *Parasitiformes*** – Отряд Паразитоформные клещи

- ***Family Ixodidae*** – Иксодовые клещи
- ***Genus Dermacentor spp.*** – Клещи рода дермацентор
- ***Genus Ixodes scapularis*** – Клещи рода иксодес
- ***Family Argasidae*** – Аргазовые клещи
- ***Genus Ornithodorus sp***. – Клещи рода орнитодорус

# Medical importance order Acarina

- **Causative agents of various human diseases**
- **Ticks – carriers of human diseases**
- **Ectoparasites - Predators: temporary bloodsucking ectoparasites**
- **The natural reservoir of various pathogens**
- **Ticks are permanent parasites of man**

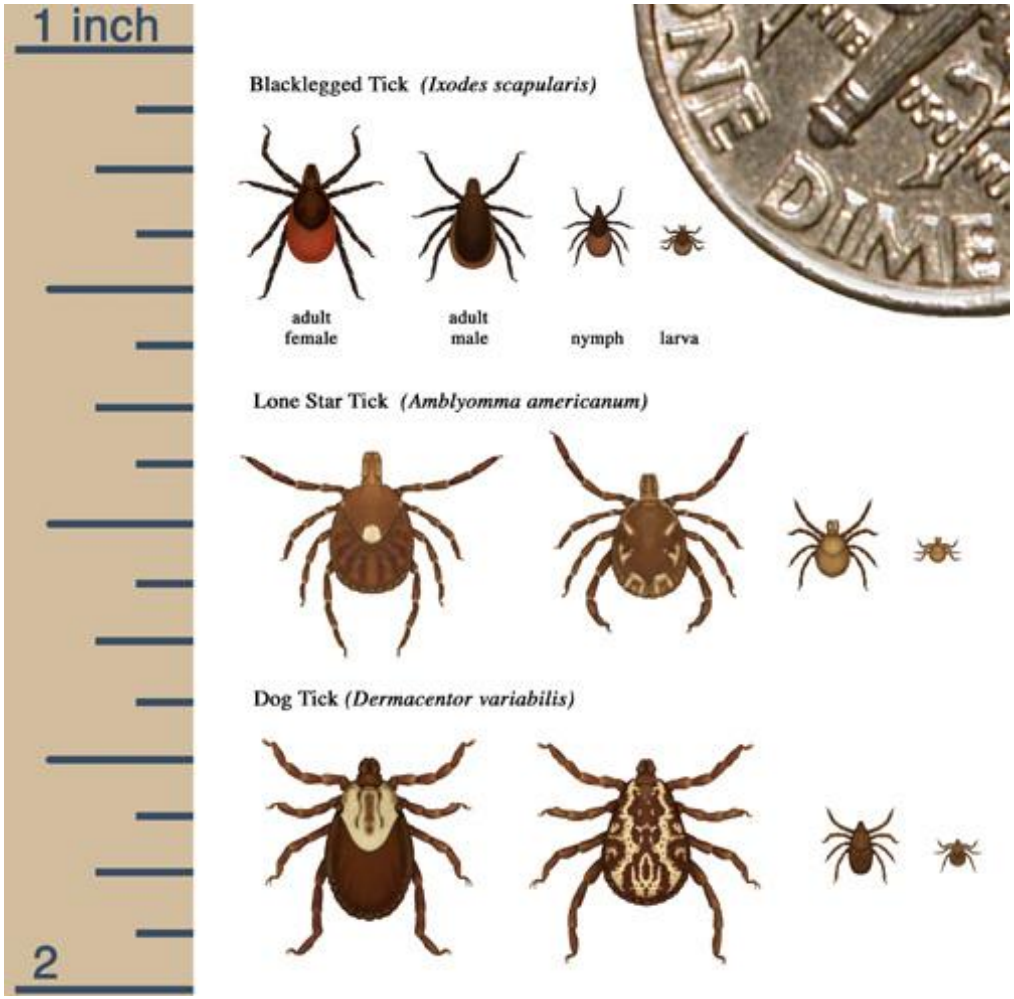


# Characteristics of the order Acarina

- **the body is not segmented, oval or spherical.**
- **The adult mites have 4 pairs of walking legs.**
- **Piercing-sucking mouthparts (chelicerae and pedipalps).**
- **Digestive organs are well developed.**
- **Breathe through the trachea, which open outwards with spiracles.**
- **Ticks are dioecious.**

# Acarina

- ***Development of mites occurs with incomplete metamorphosis.***
- ***Eggs hatch into larvae, which has three pairs of legs.***
- ***Followed by stage of nymphs. It has four pairs of limbs, but the reproductive system is not developed.***
- ***Nymph transformed into the adult stage - imago, larger by size and advanced reproductive system.***
- ***Some species have several stages of nymphs.***



# Acarina

## *Mites:*

- **Order *Parasitiformes*** – Отряд Паразитоформные клещи
- ***Family Ixodidae*** – Иксодовые клещи
- ***Genus Dermacentor spp.*** – Клещи рода дермацентор
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- ***Family Argasidae*** – Аргазовые клещи
- ***Genus Ornithodorus sp***. – Клещи рода орнитодорус

# Characteristics of the order *Parasitiformes* acarina

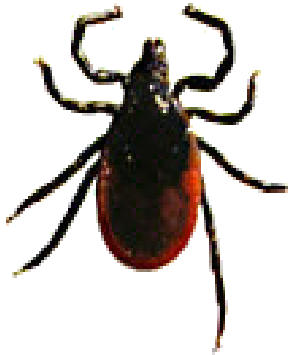
- Chelicerae and pedipalps form a head – «**kapitulyum**» that species have emerging from under the back;
- Spike has a tight chitinous guard, which covers the entire back of the males , while females have only the front part covered.

# *Family* Ixodidae (Ix.ricinus)

личинка
0,5мм

нимфа
1,5мм

мужская особь
клеща Ix. ricinus
2,5-3,5мм



до кровососания
3,5-4,5мм

женская особь
клеща Ix. ricinus


после кровососания
до 10мм

***Ixodes ricinus*** (***Собачий клещ)*** carries pathogens of tularemia and spring-summer encephalitis

**female**

**male**

***Ixodes persulkatus*** (***Таежный клещ***) -carries pathogens of taiga encephalitis

# ***Genus Dermacentor spp.*** – Клещи рода дермацентор

***Dermacentor marginatus***

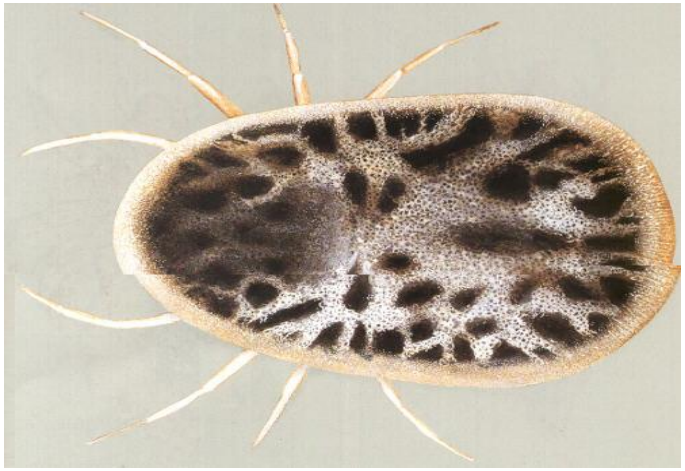
***(tulyarimii carry pathogens and Brucellosis)***

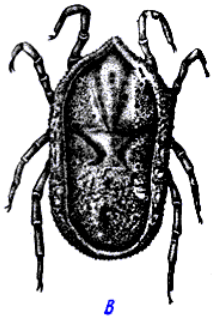
***Dermacentor nuttali*** **(tick-borne pathogens carry typhus)**

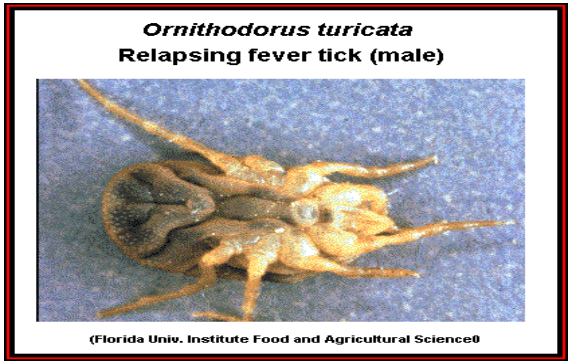


# *Family Argasidae –*

## *Genus Ornithodorus sp*. –Ornithadorus papillipes – tick-borne pathogen transferring relapsing fever)



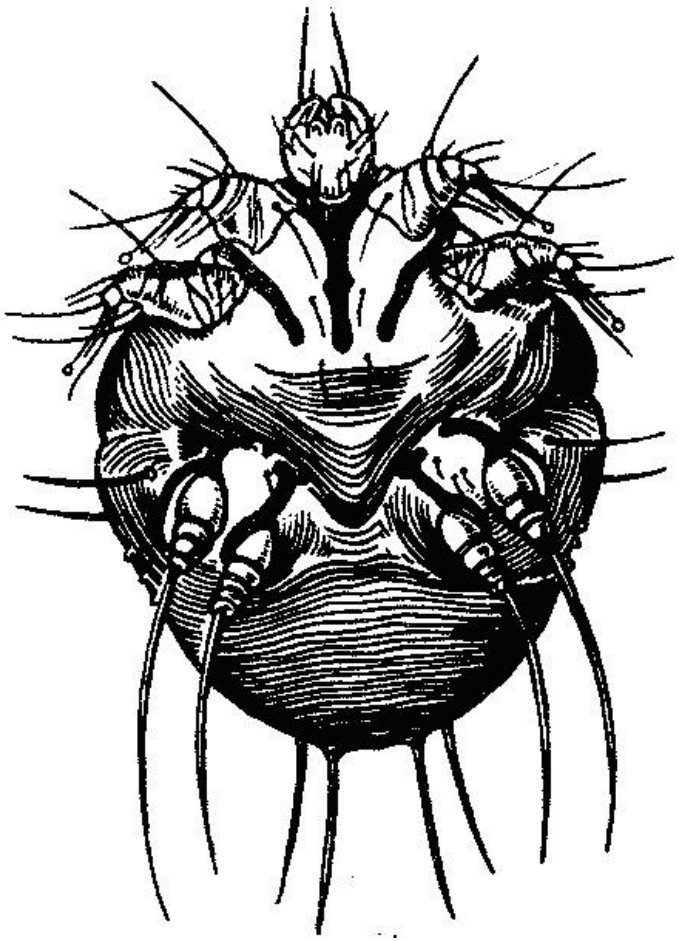




**Order *Acariformes*–**

itch mite, scabies pathogen

# Чесоточный зудень (Sarcoptes scabiei)

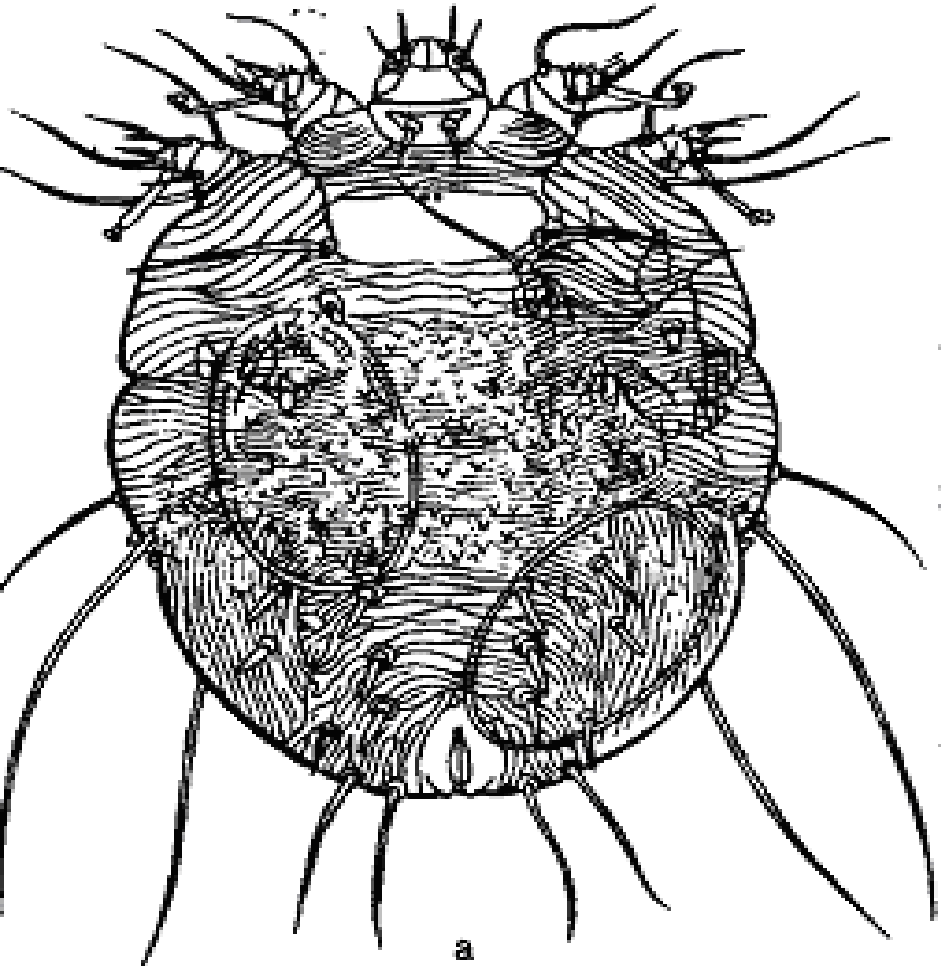


- Dimensions: 0.4 mm female, male 0.3 mm.
- Body wide-oval.
- Covered with bright transverse folds.
- Short legs that consist of six segments. The forelegs are suckers, rear - hairs.
- Scabies pathogen

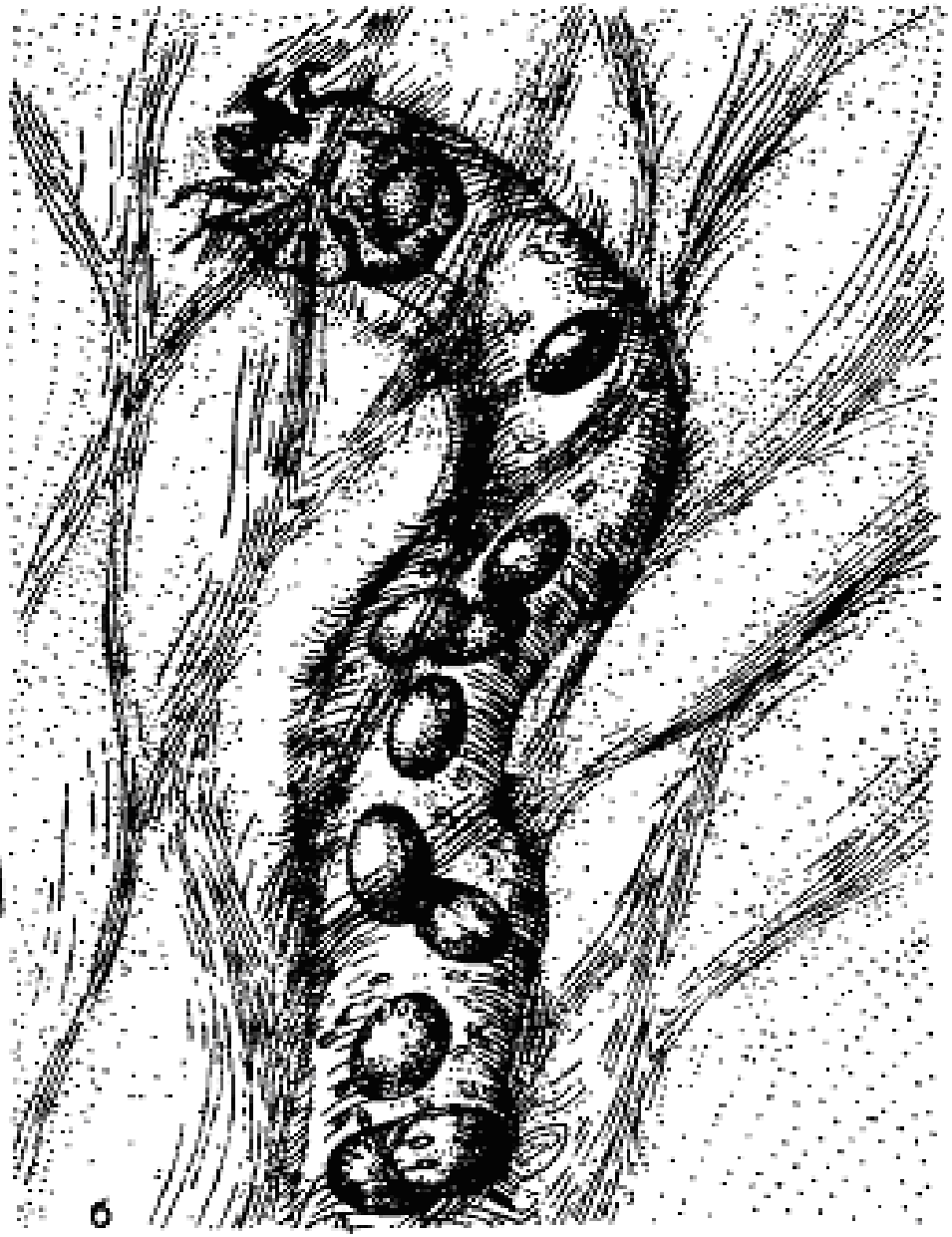
- Tick parasites in the skin of man. Eating tissue, it paves moves in the skin. During the day, the female makes 2-3 mm long gallery. Outside the moves represented by straight strips with lighter color than the surrounding tissue. At the end of the moves appear papules or vesicles, under which there are ticks. On the surface they do not form vesicles. In passages appear breeding mites. The fertilized female lays up to 20 eggs. Eggs are oval with a thin white shell .

# ***development cycle***

- Development cycle consists of the following stages: 1) embryonic development in the egg ; ***2) larva ; 3) the first nymph ; 4) second nymph ; 5) imago***. The entire period of development from egg laying to the mature form continues 9-12 days . Adult mites live about 1.5 months. Due to the high speed development the number of mites in the skin of an infected person increases rapidly. Parasites cause unbearable itching. With scratching itchy places mites get under the fingernails . Having affected skin between the fingers on his hands , a man often infects other areas of the skin with mites. Infection happens by shaking hands or by contact with things and clothes of the patient.

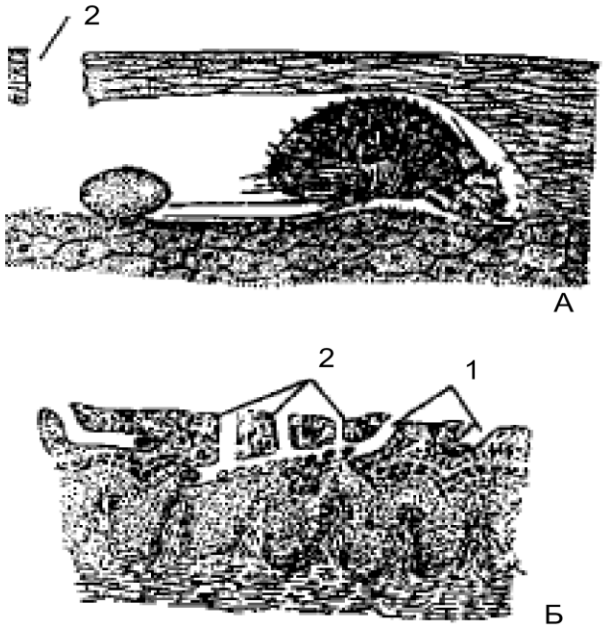


а



б

# Scabies pathogen is itch tick Sarcoptes scabiei



## *Laboratory diagnostics.*

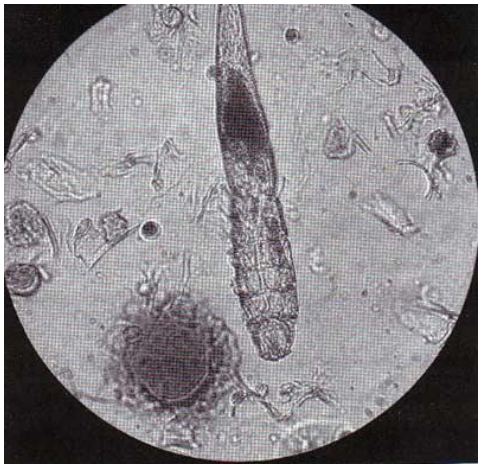
- **Diagnosis of scabies is based on a study of skin scrapings for the presence of ticks.**
- **Scraping is taken in areas with peripheral burrows and bubbles.**
- **Mites are recovered with a needle from their moves and studied under the microscope.**

# ***Demodex foliculorum***

- Mites of pathogenic significance for humans has also the name “tick” - Zheleznitsa (or ugritsa).

***They cause skin lesions - demodicosis. In case of this disease develop acne, inflammation, seborrhea, dermatitis.***

# Demodex foliculorum



- **Pathogen od demodekosis**
- **Size 0.2-0.5 mm, elongated about 15, shortened form is 18mm**

# Demodex foliculorum

Б А

**В**

**А** - adult worm; **Б** - enlarged Front end demodex;
**В** - schematic representation of demodex in the hair follicle

- Acne is a chronic dermatosis, which in the overall incidence ranges from 2 to 5%, occurs more frequently in women aged 20-40 years and is a serious cosmetic problem, especially for people with oily skin. The disease is chronic with seasonal exacerbations in spring and autumn. Acne is a disease prevalent in all climatic zones.

# localization

- Ticks can be found in the hair follicles, eyelashes, eyebrows, in the ducts of the sebaceous glands of human skin. Typical localization includes eyelids, facial skin, brows, forehead, nasolabial folds, chin, the external auditory canal. Mite waste products are the strongest allergen and contribute to the development of acne (Acne rosacea) on the face, seborrhea and causes a specific eye disease – blepharoconjuctivitis, demodectic blepharitis.

# ***Structure of the body of the parasite***

The adult demodex body has transparent color and an elongated shape, wormlike. The worm

consists of thorax and abdomen. Body is covered

with scales, helping mite to cling to the hair

follicle. In front of the body legs (or "mouth“), are located which he uses to eat the skin cells and sebum.

Mite sits in the duct with its head inside and tail outside, where eggs come from. The mite lives during several weeks; this time is enough to lay eggs in hair follicles and cebaceous glands through which it comes out on the skin surface.

A young mite develops during 2-3 days and becomes an adult in a week.

# development

- Lifespan mite weeks. During this time, the tick must lay their eggs in the hair follicles and sebaceous ducts. Eggs are carried with the current fat on the skin surface , of which hatch into larvae that settle in the mouths of the hair follicles under the scales of the epidermis. Most likely, there are formed adults - males and females , which penetrate into the depths of the excretory ducts of the sebaceous glands , swelling the population of mites. Hands man carries the eggs to other areas of the skin or they fall on the skin of another person by direct contact , development continues along the same lines . Mites thrive only on the seborrheic areas of the skin with increased salovydeleniem . On the other simply does not live demodex . Young mites develop within 2 - 3 days a week and becomes an adult mite .
    - **ОСТАВИТЬ ИЛИ УБРАТЬ**

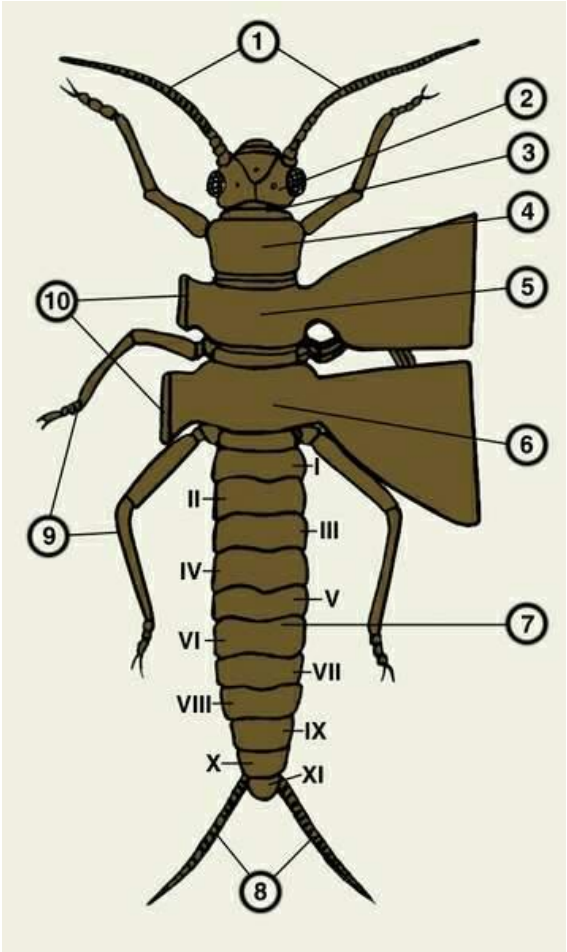
# Ways of infection

Acne is characterized by a high degree of invasiveness (infectious to others). Infection occurs through direct contact with a sick person or through undergarments or bedclothes. Some authors do not exclude the occurrence of the disease after contact with pets. The fertilized female mite lays eggs in the hair follicle. Two weeks later, from the eggs appear young mites, which coincides with the first skin rashes

# clinic of demodecosis

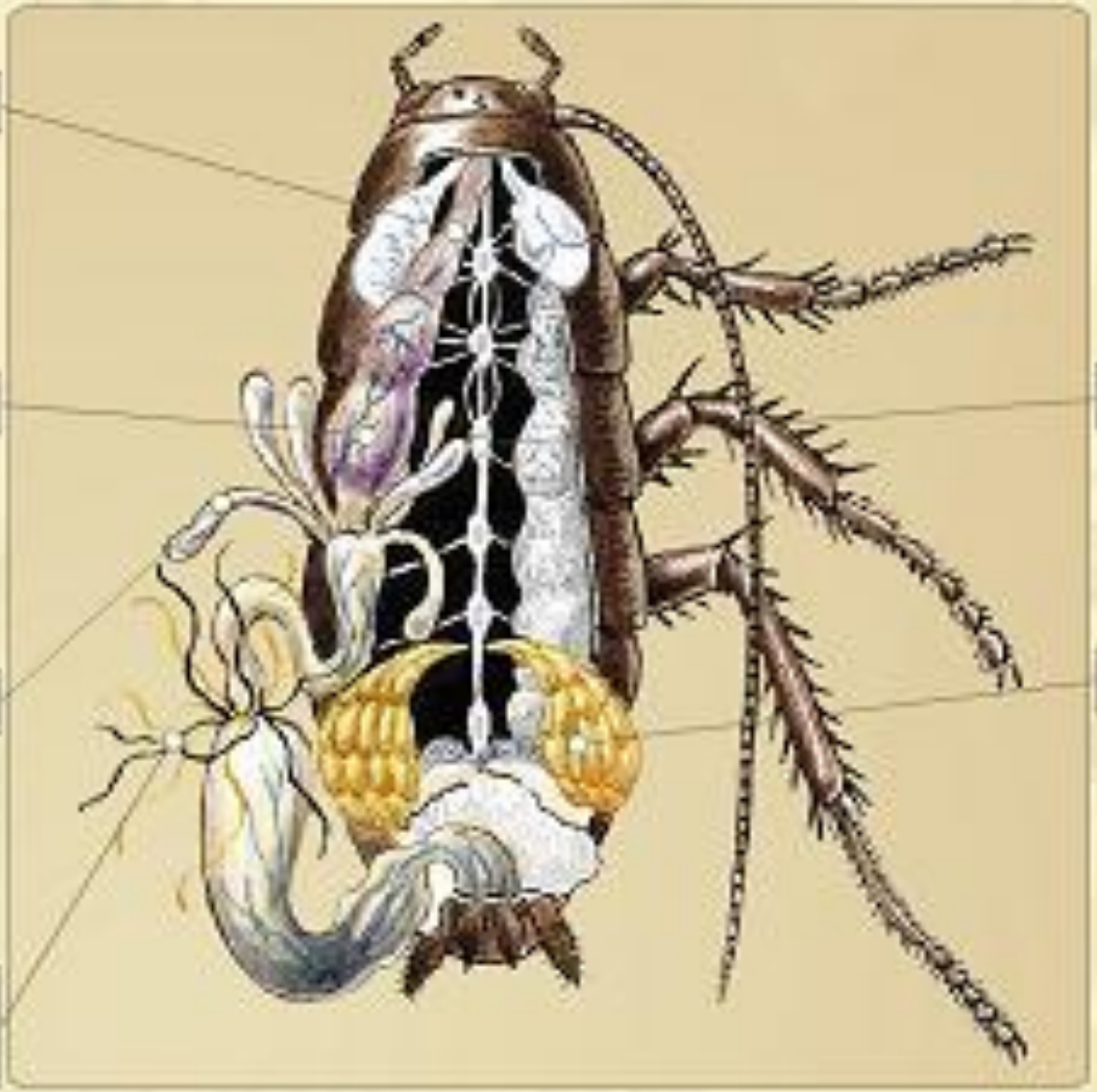
- Acne is manifested by itching , swelling, redness of the eyelid margins , the appearance of scales in the roots of eyelashes for a long time . Typically, patients complain of eyestrain . Acne is easily detected by visual inspection. Characteristics of the affected eyelid: matted cilia , surrounded by crusts; frequent sty (hordeolum), loss of eyelashes , recurrent acne, psoriasis .
- The clinical picture: rash around the mouth, on the skin of the chin , cheeks , forehead, in the eyebrows and eyelashes, redness of the skin, small pink-red nodules , covered with delicate scales.

# Class INSECTA




- **1 - an antenna;**
- **2 - head;**
- **3 - cervical spine;**
- **4,5,6 - front-, middle-and backchest departments;**
- **7 - abdomen;**
- **8 - cercuses;**
- **9 - feet;**
- **10 - wings;**
- **I-XI - abdominal segments.**

# ВНУТРЕННЕЕ СТРОЕНИЕ НАСЕКОМОГО



Пищевод

Желудок

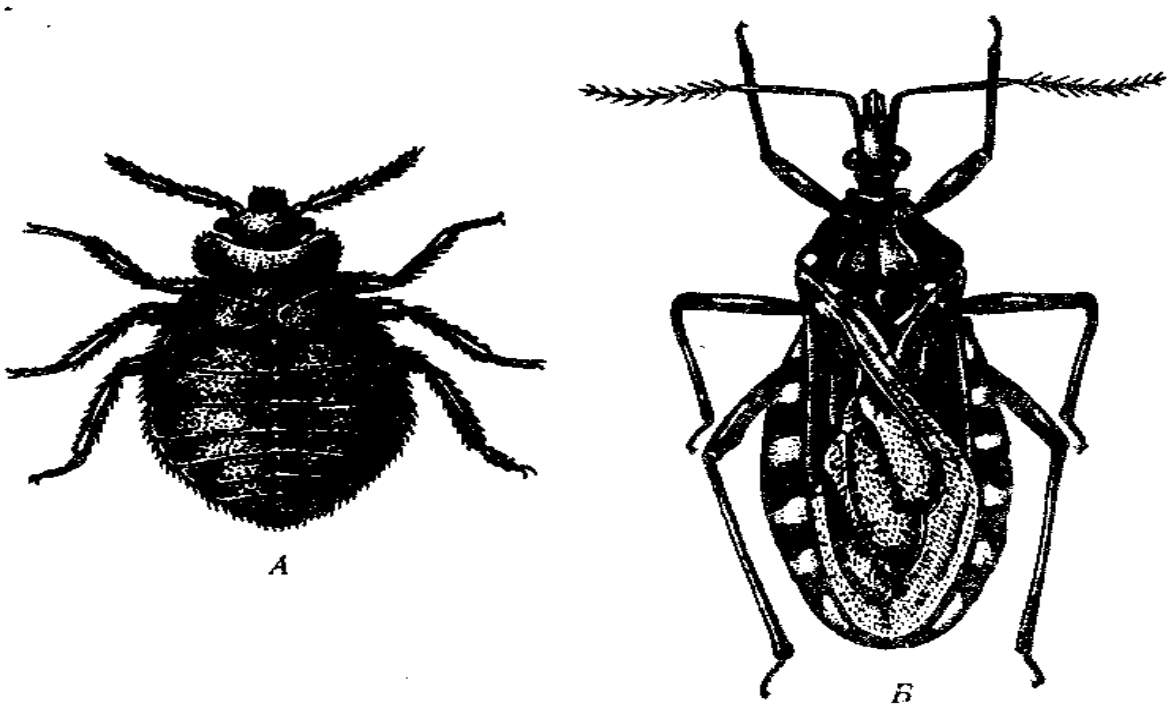
Отростки кишки

Мальпигиевы сосуды

Нервны

Яич

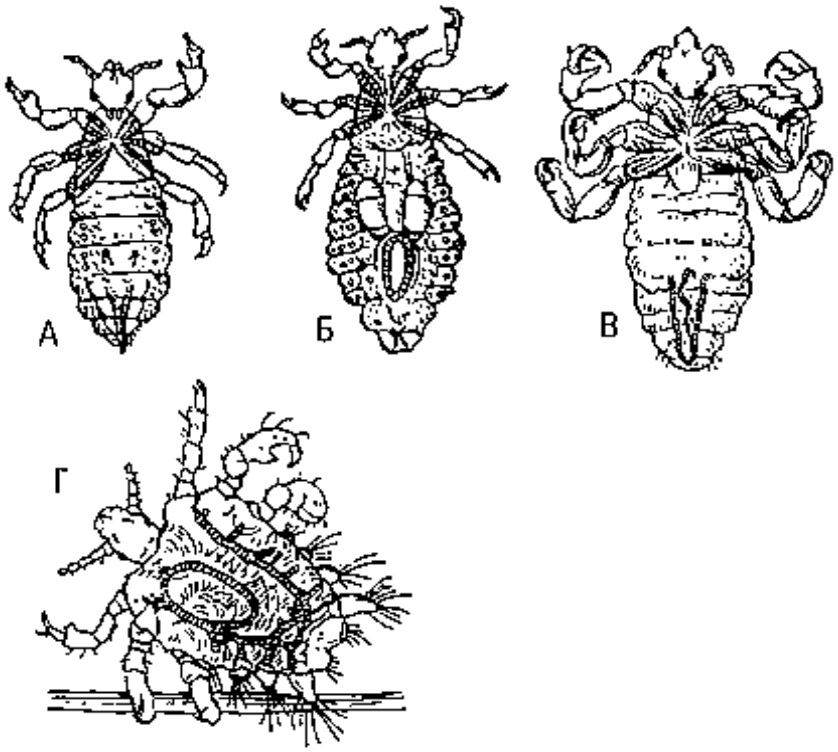
# Order Heteroptera




- Parasitic bugs.

  A - bed; B - kissing

# Order - *Anoplura*

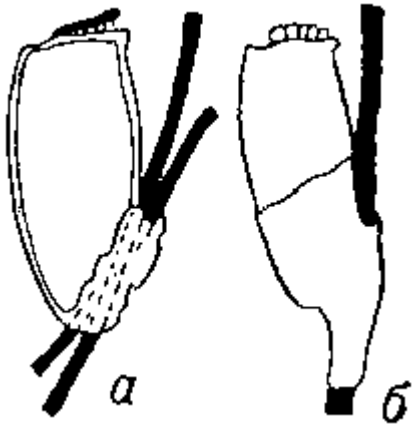



Lice (left to right):

**А** ***Head louse*** (male and female);

**В-** ***Human lice nits*** (male);

Г-below — ***Crab louse*** - ploschitsa (female)




***Human lice nits***:**(Pediculus humanus humanus , Pediculus vestimenti)**

***Head louse*** **(Pediculus humanus capitis ) ;**

***Crab louse*** **(Phthirius pubis)**

# Pediculus humanis capitis
# ( Головная вошь )

# ***Medical value***

- ***Head louse*** **-Pediculus humanis capitis** ***carries the pathogen of crummy relapsing fever***;
- ***Human lice nits*** **-Pediculus humanus humanus , Pediculus vestimenti) -**

__***carries the pathogen of crummy typhus:***

- ***Crab louse*** **-Phthirius pubis** ***causes phtiriosis***

# **Order** *Aphaniptera*

- ***Pulex irri-tans***

***(human flea)***

- ***Ceratophyllus***

***fasciatum u Xenopsylla***

***Cheopis*** ***(rat flea)***

- ***Medical value***

***Fleas carry pathogens of plague, tularemia***

# ***Family mosquito(Culicidae)***

- There are three common kinds of mosquitoes: Anopheles, Aedes and Culeh.
- Anopheles transmit human malaria parasites.
- Some species Aedes transmit pathogens of tulyaremdi, Japanese encephalitis, lymphocytic choriomeningitis virus, yellow fever, dengue fever and anthrax.
- Certain types (Suleh) transmit Japanese encephalitis virus.

## Features of mosquito genera *Anopheles*.

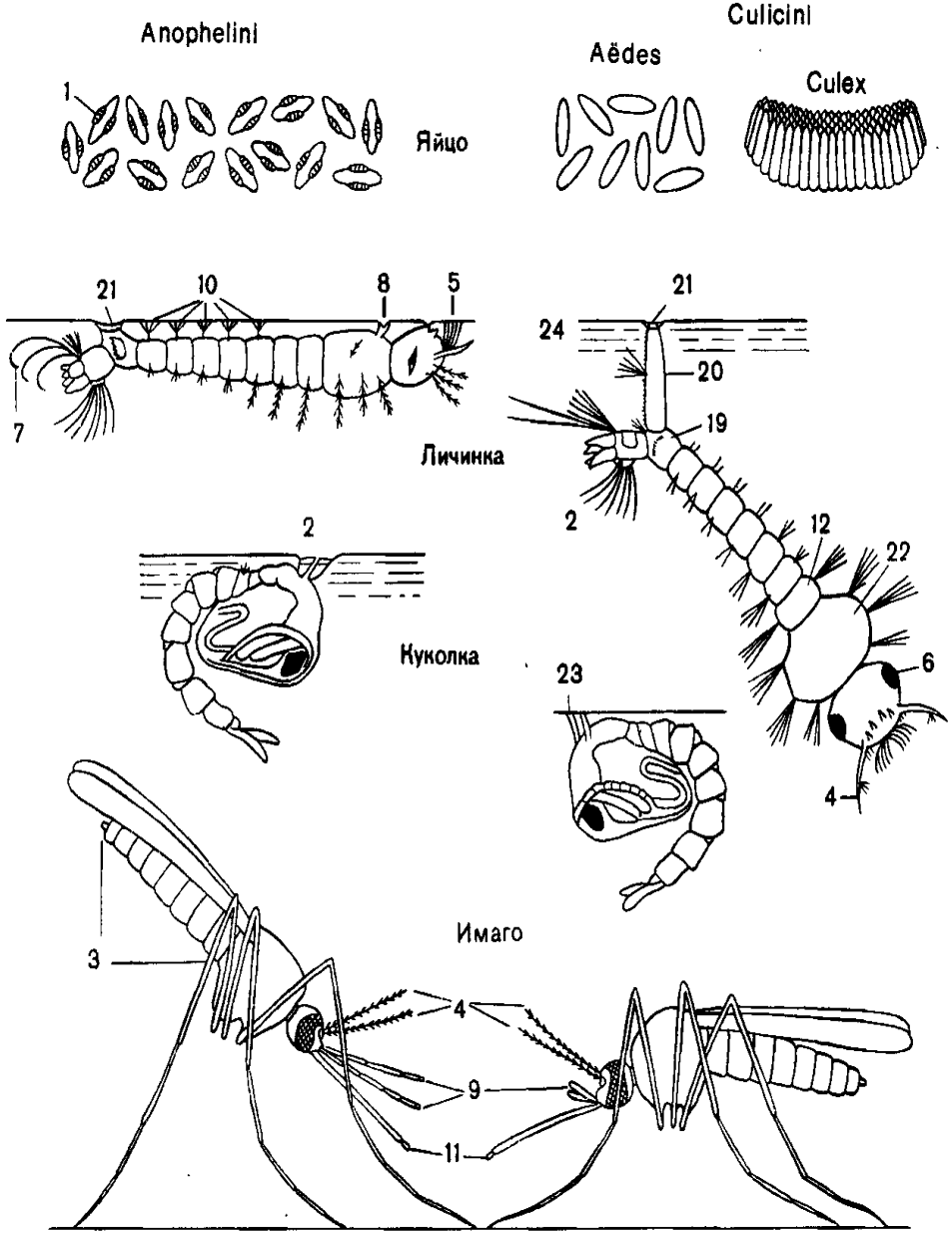
**Lays eggs in ponds of stagnant water or low flow, the number of eggs in one clutch varies from 60 to 350; laid randomly on water surface.An gg has a swimming camera.**

**•The larva has no breathing siphon. Pupa has a respiratory siphon of conical shape.**

**When they land abdomen is dropped away from the substrate (at an angle).**

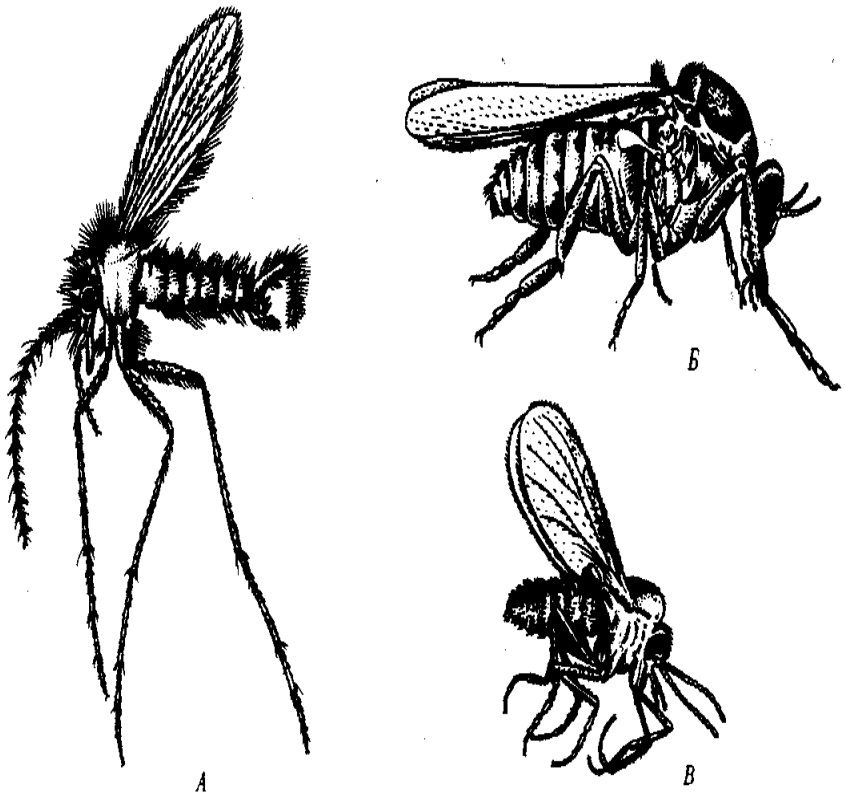
## Culex.

**•Eggs are laid in groups, in the form of a boat, do not have a breathing siphon. A larva has no siphon. A pupa has a cylindrical shape siphon. When they land abdomen is parallel to substrate.**



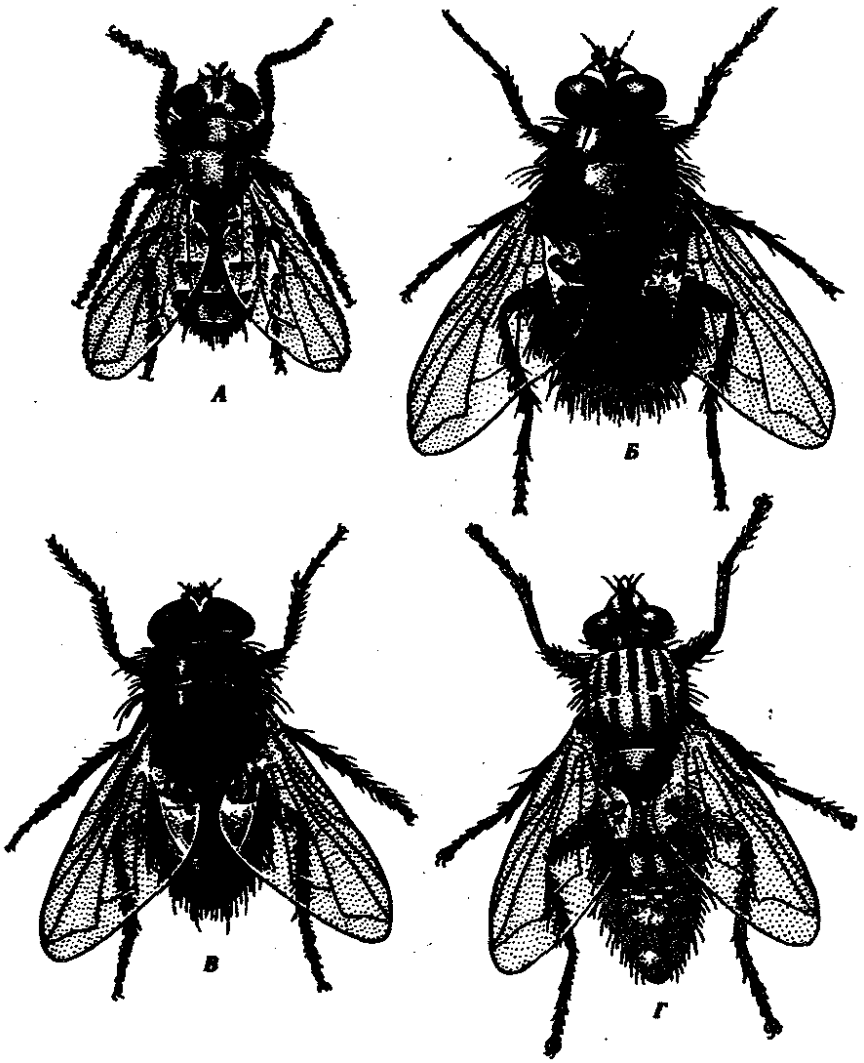
# Small bloodsucking Diptera

- А - the mosquito;
- Б - midge;
- В - biting midges (лат. Ceratopogonidae

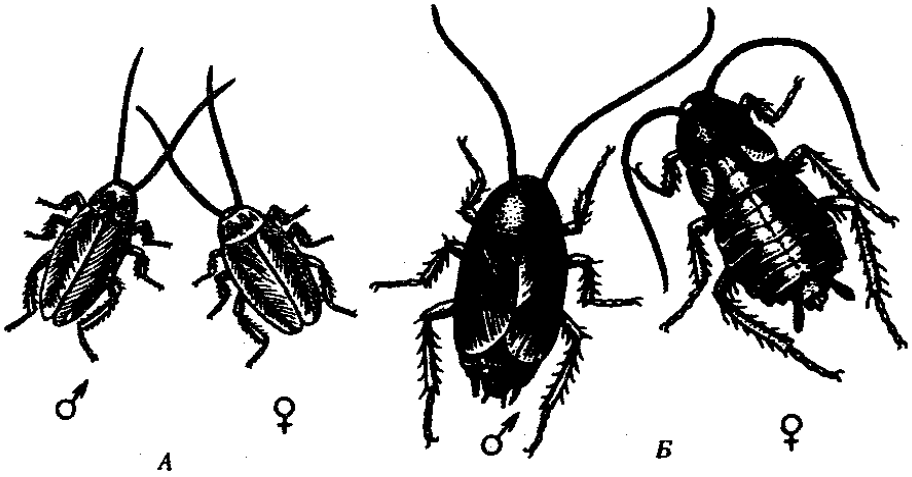


# synanthropic flies

- А - room;
- Б - blue meat;
- В – green-bottle;
- Г - gray meat.



# Cockroaches




- *А - red; Б - Black*