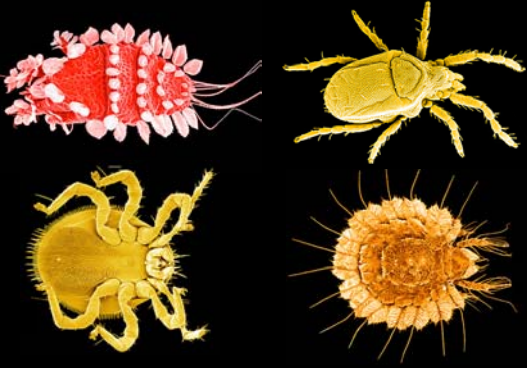


## ACARI – MITES & TICKS



## ORDER ACARI (MITES & TICKS)

- **PHYLUM = ARTHROPODA**
- **SUBPHYLUM = CHELICERATA**  
(Horseshoe Crabs, Arachnida, and Sea Spiders)
- **CLASS = ARACHNIDA**  
(Spiders, Mites, Harvestmen, scorpions etc.)

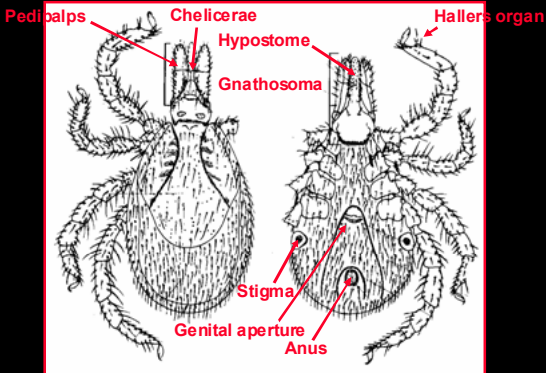
## MITES & TICKS - Acari

- Small to very small animals (< 1 mm).
- Predators, scavengers, herbivores, parasites, and omnivores.
- Approx. 50.000 described species.
- Approx. 500.000-1.000.000 estimated species.
- Approx. 800 species in Denmark.
- Approx. 200 species of mites in 1 m<sup>2</sup> of litter from a temperate forest.
- To be found everywhere (also in the oceans; down to 5 km depth).

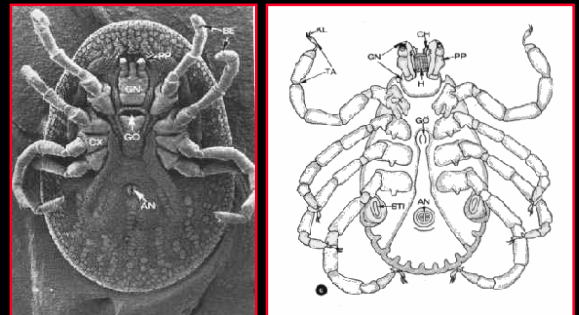
## Mite Synapomorphies

- Coxae of pedipalps with rutella.
- Max. 3 pairs of lyriforme organs on sternum.
- Solid food particles can be consumed (internal digestion)!
- Pygidium absent (also Araneae)
- Spermatozoa without flagellum (also Palpigrada & Solifugae)
- Stalked spermatophore (also Pedipalpi)
- Ovipositor (also Opiliones)

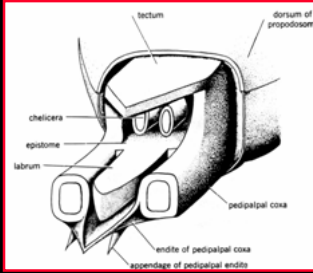
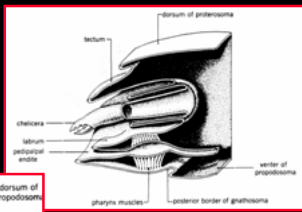
## MORPHOLOGY - MITES



## MORPHOLOGY - MITES



## Mite-morphology Gnathosome



## Classification

### 2. suborders

- **ANACTINOTRICHIDA (Parasitiformes)**  
(approx. 10.000 species)  
Birefringent setae absent (no optically active actinochetin in setae)  
"Haller's organ"  
Trichobothria absent
- **ACTINOTRICHIDA (Acariformes)**  
(approx. 38.000 species)  
Birefringent setae present  
Claws on pedipalps absent  
Legs regenerate within body

## Classification

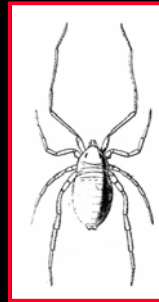
### SUBORD. ANACTINOTRICHIDA (PARASITIFORMES)

- Infraord. Opilioacarida (Notostigmata)
- Infraord. Holothyrida (Tetrastigmata)
- Infraord. Gamasida (Mesostigmata)
- Infraord. Ixodida (Metastigmata)

### SUBORD. ACTINOTRICHIDA (ACARIFORMES)

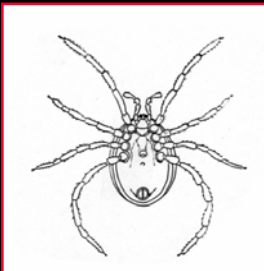
- Infraord. Trombidiformes (Prostigmata)
- Infraord. Oribatei (Cryptostigmata)
- Infraord. Astigmata (Acaridida)

### Infraorder: Opilioacarida – "Harvetsmen-Mites"



- One family, 20 species.
- Large mites (>1 mm) that looks like Harvestmen.
- Segmented abdomen retained.
- 4 pairs of dorsal spiracles on abdomen.
- Warm temperate and tropical areas (for instance Middle East area)

### Infraorder: Holothyrida – "Ocean Island Mites"



- 3 families.
- Large mites (>2-5 mm)  
Look like Predator Mites (Gamasida).
- Lives on oceanic islands in the southern hemisphere.

### Infraorder: Gamasida – "Predator Mites/Rovmider"

- 77 families, 5.000 species.
- Small to large mites (<2 mm).
- Free living predators, commensals and parasites.
- Spiracles close to the legs.
- Some species are used for biological control of spider mites.

Chicken Mite



## Infraorder: Gamasida – "Predator Mites"

Spider mite

Biological control!



Predator mite

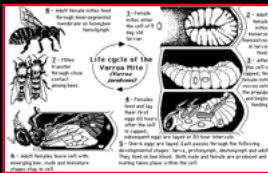
## Infraorder: Gamasida – "Predator Mites"

Tropical predator mites



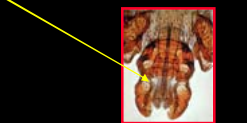
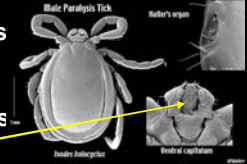
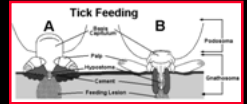
## Infraorder: Gamasida – "Predator Mites"

Varroa Mite – Family – Varroidae  
• a parasite on honey Bees!



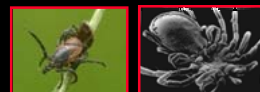
## Infraorder: Ixodida – "Blodmider/Flåter"

- 3 families, ca. 800 species
- Include largest known mites.
- All species are hematophagous ectoparasites on vertebrates and many species transmit diseases to humans and domestic animals.
- Mouth parts with characteristic hypostome
- The European Castor Bean Tick (Skovflåten) is common in Denmark



Video video ...

## *Ixodes ricinus* – "European Castor Bean Tick/Skovflåt"

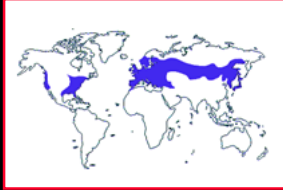


***Ixodes ricinus* – "European Castor Bean Tick/Skovflåt"**

**"Lyme disease – Borreliose"**



*Borrelia burgdorferi*  
"Spirochete bacteria"



**Infraorder: Trombidiiformes (Prostigmata)  
"Spider mites, Gall mites etc."**

- 136 families, approx. 14.000 species
- Predators, plant feeders, fungivores, parasites – of medical importance and many agricultural pest species.
- Gnathosome with "peritremes" close to spiracles.
- Spiracles anterior and close to gnathosome



**Spider mites (spindemider) – Family Tetranychidae**

w. stiletto-shaped chelicerae and spinning glands on the tip of labrum (gnathosom), serious pest species.

**Infraorder: Trombidiiformes  
"Hair follicle mites, Velvet mites m.m."**

**Hair follicle mites - Hårsækmider – Family Demodicidae**  
• Check each other!

**Velvet mites – Fløjlsmider – Family Trombidiidae**

• Red velvet mite is very common on the forest floor. Predators.



**Infraorder: Trombidiiformes**

**"Chiggers" larvae – Familien Trombiculidae**

• In Denmark only known to be a problem in Thisted (Augustmider Augustknopper).

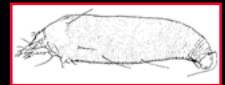


**Infraorder: Trombidiiformes**

**"Gall mites"**

**Gall mites – Family Eriophyidae**

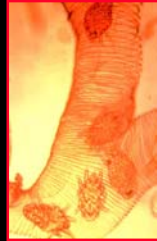
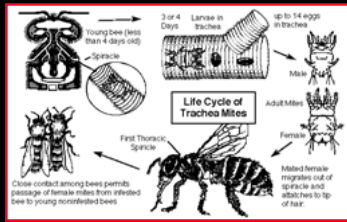
- Tiny mites w. only 2 pair of legs
- The cause of galls on Maple, Alder, Apple Lime etc.
- Some species are pests.



## Infraorder: Trombidiiformes

### Honeybee tracheal mite – Family Tarsonemidae

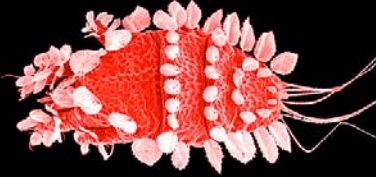
- Tiny small mites that lives in the tracheae of bees.



## Infraorder: Trombidiiformes "Peacock mites"

These "decorated" peacock mites also belong to the infraorder. Here represented by the genus *Tuckerella* from the family Tuckerellidae.

- Pest on citrus.



## Infraorder: Oribatei – "Soil mites Mosmider/Pansermider"

- 150 families, 7.000 species, strongly sclerotized (armored), and often sculptured.
- Spiracles hidden at the basis of the legs.
- Lives in soil and play a major role in decomposition (of dead plant material)
- Can act as intermediate hosts for tape worms.



## Infraorder: Oribatei – "Soil mites" morphological diversity



## Marie Hammer 1907-2002

- Oribatid mites
- World fauna = 150 families  
1000 genera & 7000 species
- Field work in USA, Canada, Greenland/Denmark, Iceland, Mexico, Argentina, Bolivia, Peru, Chile, Ecuador, Panama, Hawaii, Fiji, New Zealand, Papua New Guinea, Pakistan, Indonesia, Tonga, West Samoa, Tahiti, Java, & Bali.
- Described 1000 new species
- Described 150 new genera



## Infraorder: Astigmata

- 70 families, approx. 5.000 species.
- Many important species, several important pest species and parasites.
- No spiracles (therefore named Astigmata)
- Characteristic deutonymph – called "Hypopus" w. reduced gnathosoma and "suckers" used to attach to passing objects such as insects (Phoresi).



## Infraorder: Astigmata

• This also include mites in our homes ....



House dust mites/  
Sengemider –  
*Dermatophagoides*



Feeds on dead  
epidermis cells  
and other organic  
debris

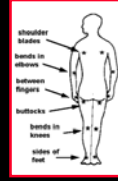


Storage mites  
House itch mite/  
Husmider –  
*Glycyphagus*



## Infraorden: Astigmata

• Scabies/"fnat" og "skab", caused by the itch mite/fnatmide (*Sarcoptes scabiei*).



0.2-0.4 mm



## Infraorden: Astigmata

• Other strange adaptations ....

Koala Fur mite –  
Family Atopomelidae



## Infraorder: Astigmata

• Other strange adaptations ...

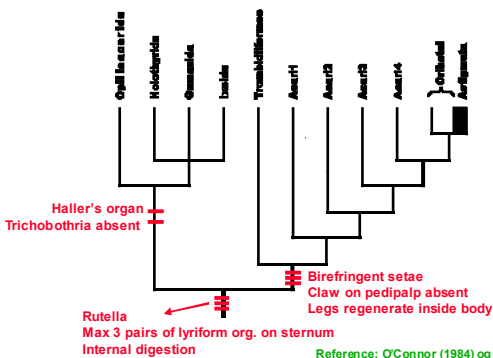
Feather mites/Fjermitter –  
Family Pterolichoidae



Precopulatory mate guarding!

## ACARI - PHYLOGENY

suborder **Anactinotrichida**      suborder **Actinotrichida**



## ACARI - PHYLOGENY

Order **Parasitiformes**      Order **Acariformes**

