The hidden and unknown biodiversity of dead wood: Saproxylic Collembola in forests of Northern hemisphere

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Springtails (Collembola) – systematic position

- Phyllum: **Arthropoda** Latreille, 1829

- Subphyllum: two concepts –

Pancrustacea Zrzavy & Stys, 1997 (hexapods and crustaceans)
Atelocerata Heymons, 1901 (hexapods and myriapods)

- Superclass: **Hexapoda** Blainville, 1816 (Insecta *sensu lato*)

- „Apterygota”
- „Entognatha” – Collembola, Protura and Diplura

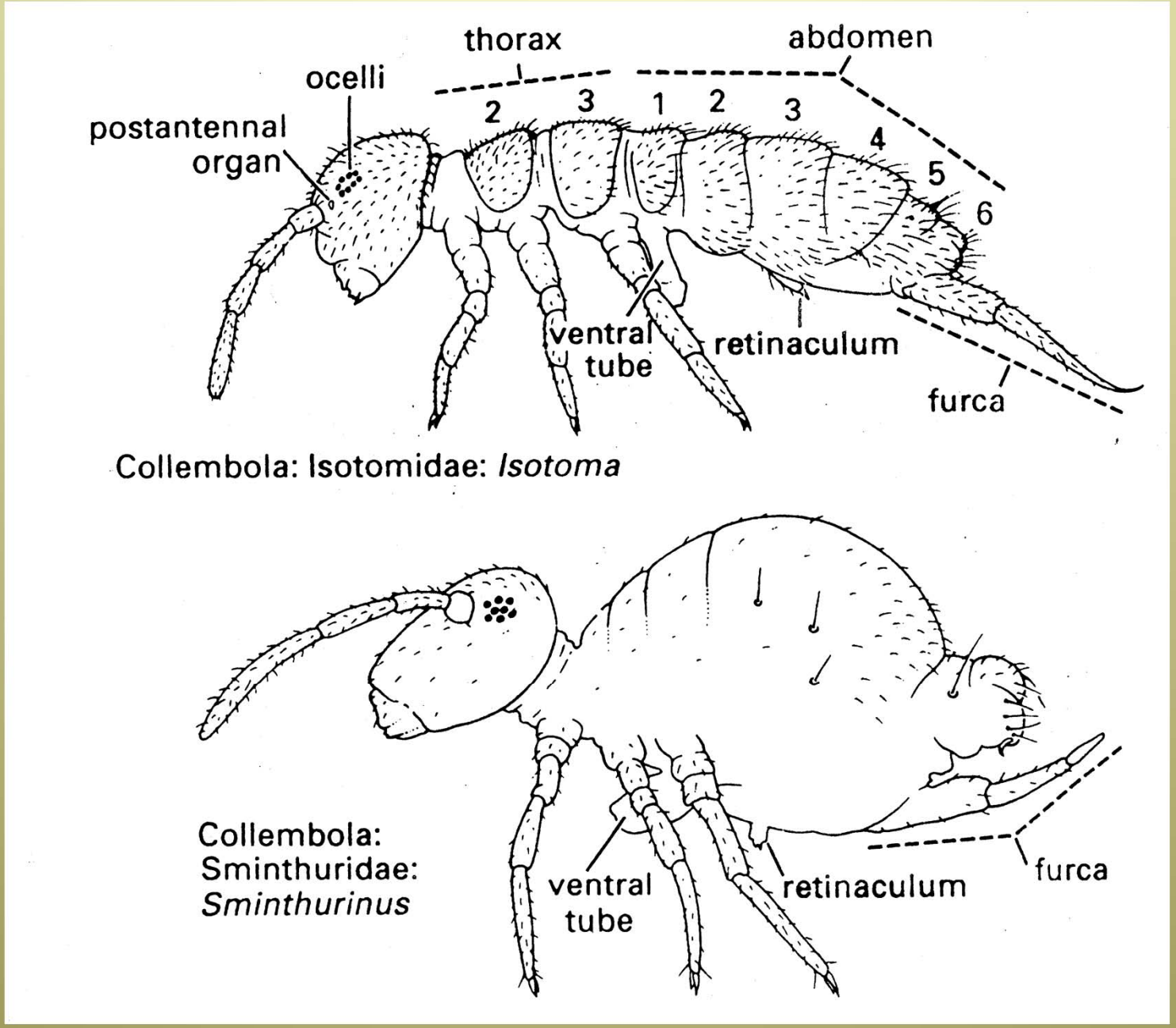
Class: **Collembola** Lubbock, 1870

Rhyniella praecursor (the early Devon ca 400 milion years ago, the first and oldest hexapods, terrestial arthropods or animal?)

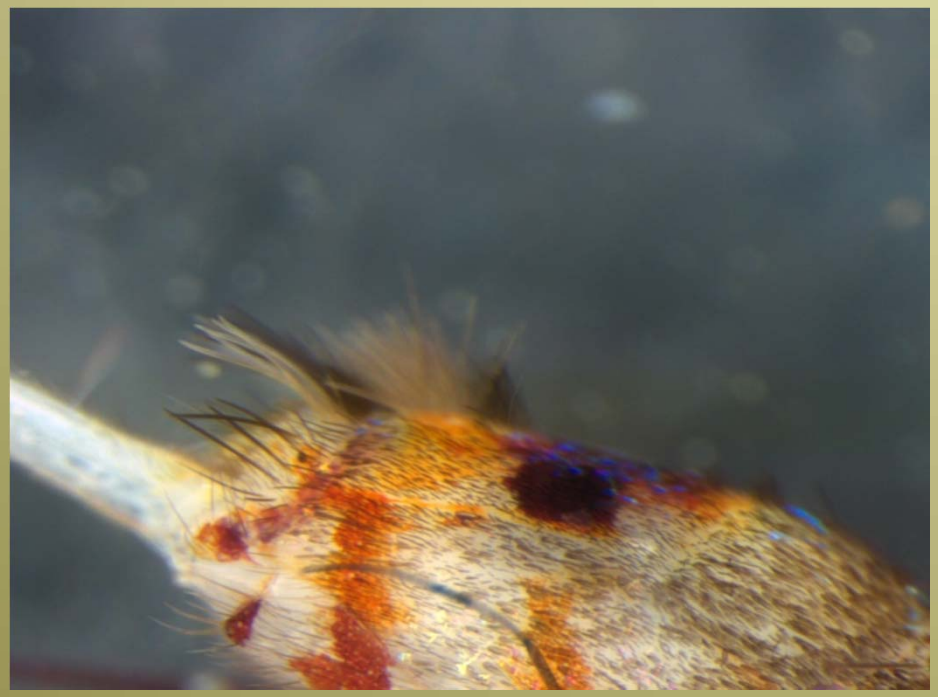
Springtails – morphology

- Body size: 0.12-17 mm; body shape: elongate, cylindrical, flattened or globular; colour:uniformly pigmented, bluish or white.
- three tagmae: head (antennae and eyes), thorax (legs) and abdomen (6 segments).
- Unique structures: postanntennal organ, ventral tube and jumping organ.

Springtails – morphology



Springtails – morphology



Springtails – ecology

- direct development
- food (polyphagous): fungal hyphae, decaying vegetation, organic detriturus, algae, lichens, micro-organisms, some genera and species carnivorous.
- very widespread and abundant group, almost all habitats, huge aggregates on snow (common name „snow fleas”).
- life-forms: atmobionts, hemiedaphons and euedaphons.
- important roles in nutrient recycling, initial stages of decomposition, structure of soils, growth of mycorhizae, food of many predators.
- ca 8000 species and 600 genera described.

Springtails and dead wood

knowledge notably incomplete

scaterred notes – taxonomic and faunistic literature

absence (practically) of saproxylic forms

the exception: Uchidanurinae – ‘giant’ springtails, Onychiurinae – *Hymenaphurura polonica*

Springtails of old-growth forests (Polish Carpathians)

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the aim: the springtail fauna of old-growth forests

years 1998-2003

3 sites - natural and protected forests

150 springtail species

40 species (saproxylophilous and saproxylobionts) found in samples with wood material (bark, fine branches, rooting logs; fungi, mosses and lichens on decayed wood)

true saproxylic forms? i. e. members of the subfamily Neanurinae, *Folsomia inoculata*, *Stenaphorurella denisi*, *H. polonica*, *Orthonychiurus rectopapillatus*

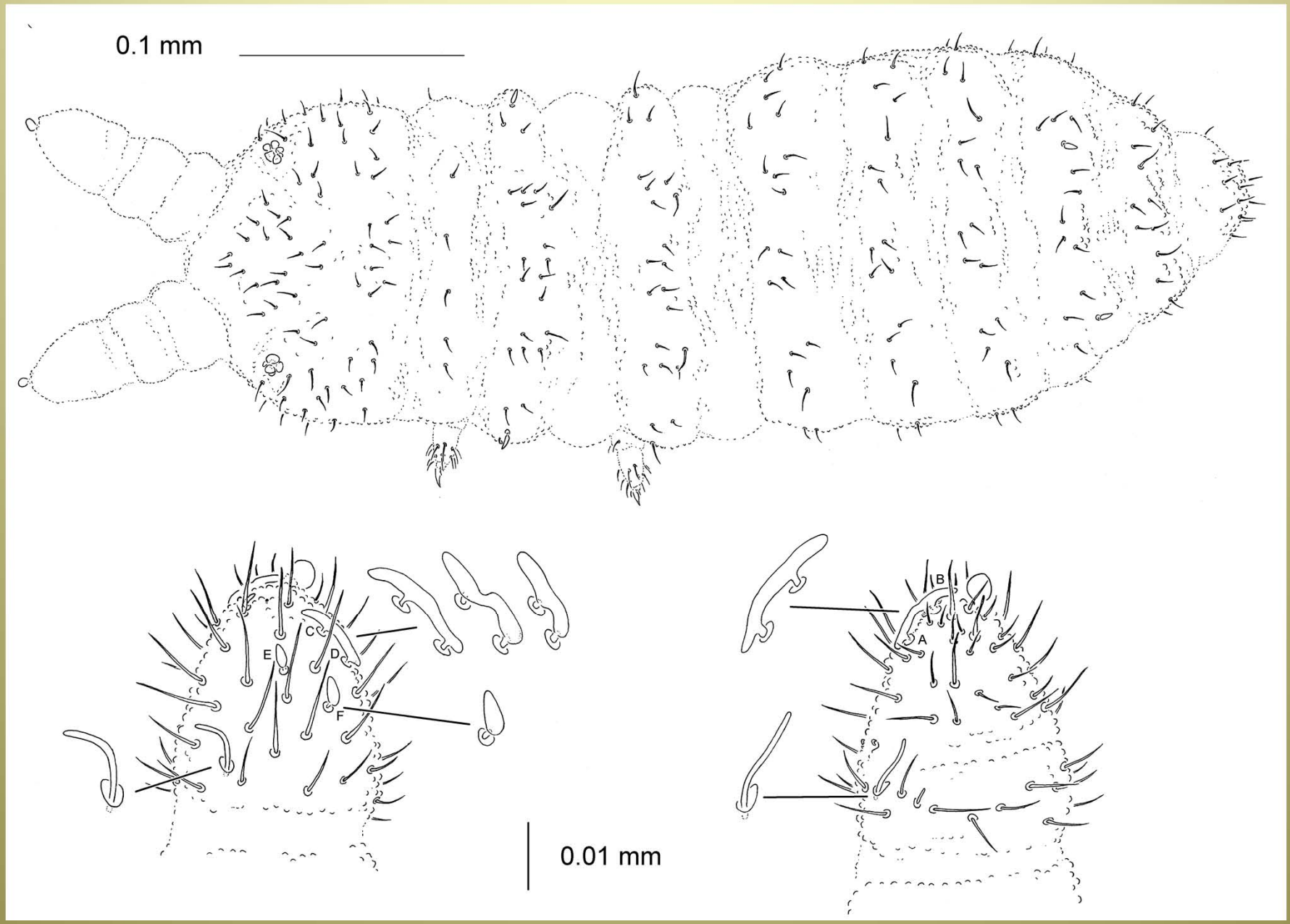
new species for science

Dicyrtoma fusca (Lubbock, 1873)

Tetrodontophora bielanensis (Waga, 1842)

dead wood – source of new undesribed species

Micranurida bescidica Smolis & Skarżyński, 2004



subfamily: Neanurinae

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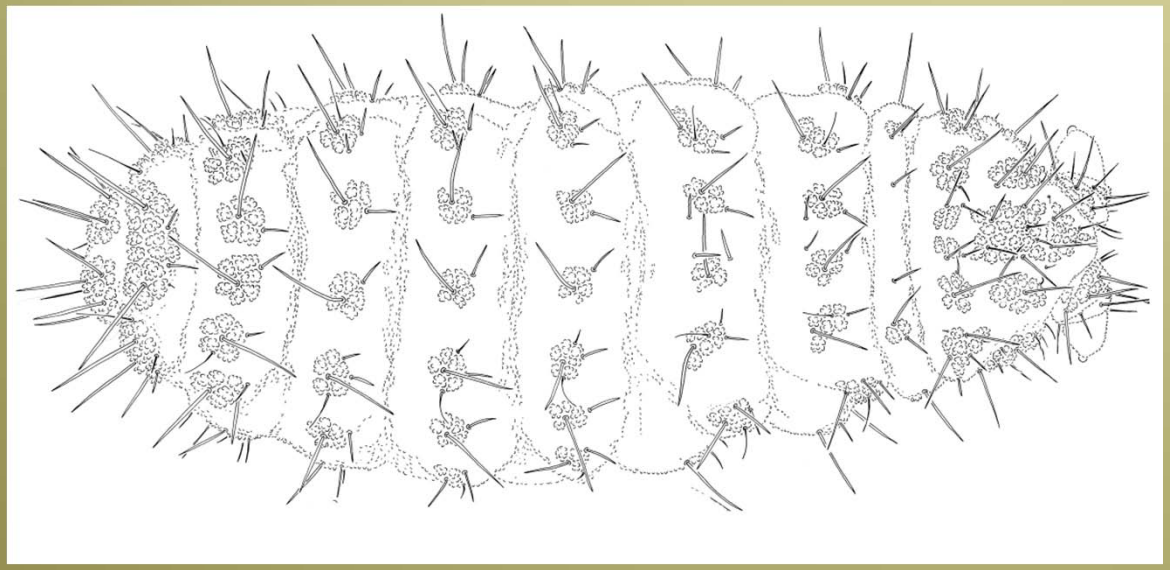
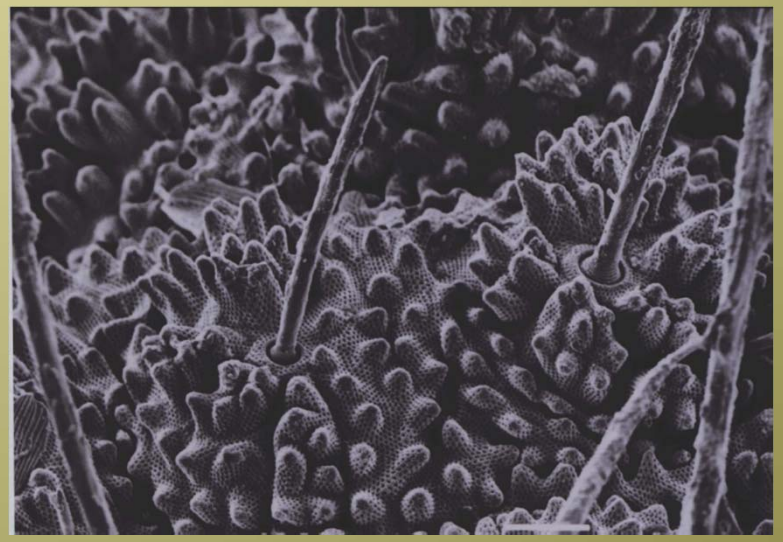
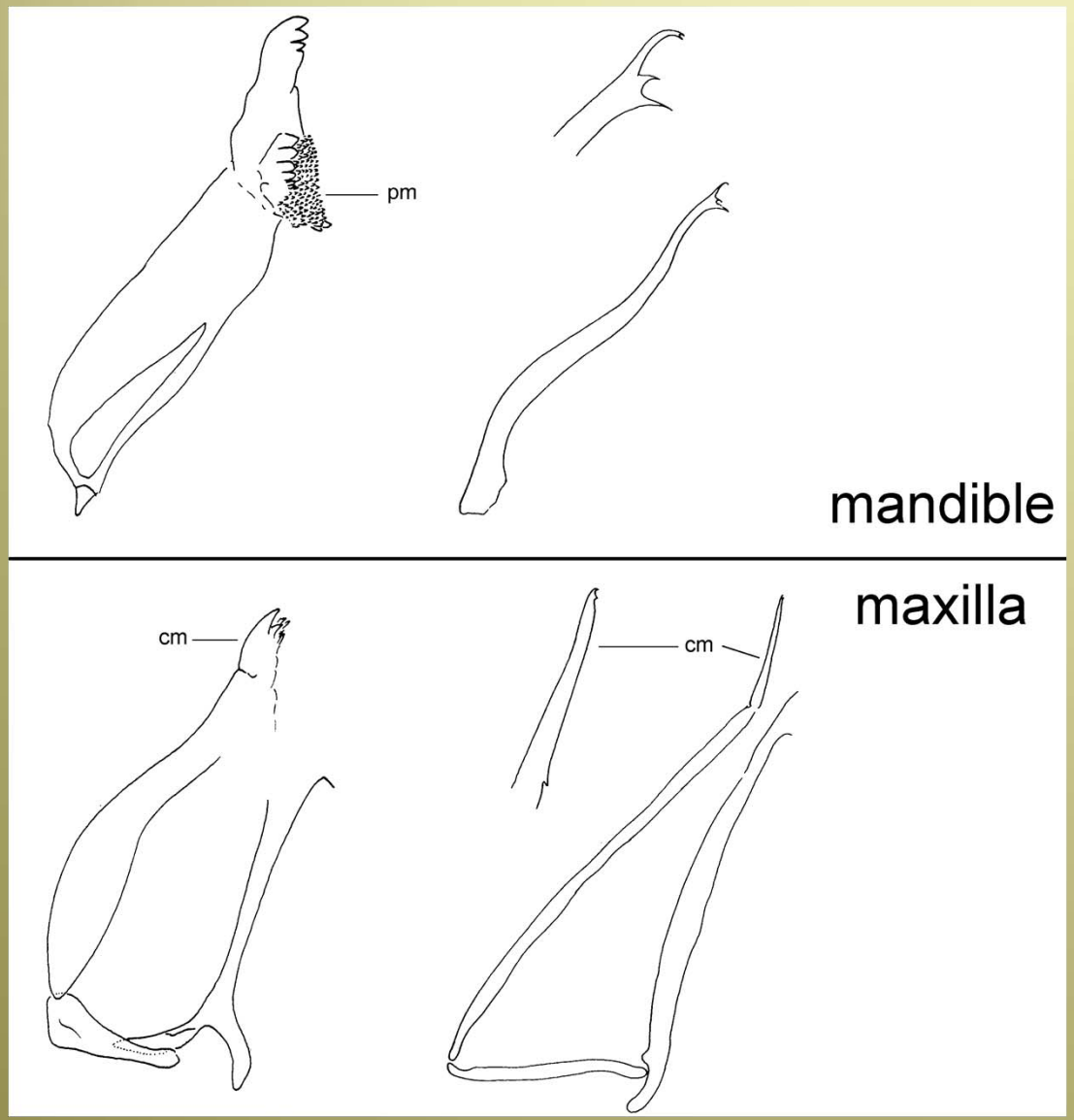




subfamily: Neanurinae
chewing vs piercing and sucking forms



Springtails associated with downed woody material (DWM) in old-growth forest in Oregon, USA

Springtails of DWM (USA, Oregon)

Aims:

a) to investigate species richness associated with DWM

b) to asses the number of saproxylic and saproxylofilous species

c) to investigate the features of the springtail wood-dependent community

Sites:

coniferous old-growth stand dominated by Douglas-fir, western hemlock and western cedar at lower elevations (1st and 2nd sites)

coniferous old-growth stand dominated by noble fir, Pacific silver fir, and Douglas-fir at upper elevations (3rd site)

decidous stand dominated by black cottonwodd, red alder, bigleaf maple and california hazelnut at lower elevations (4th site)

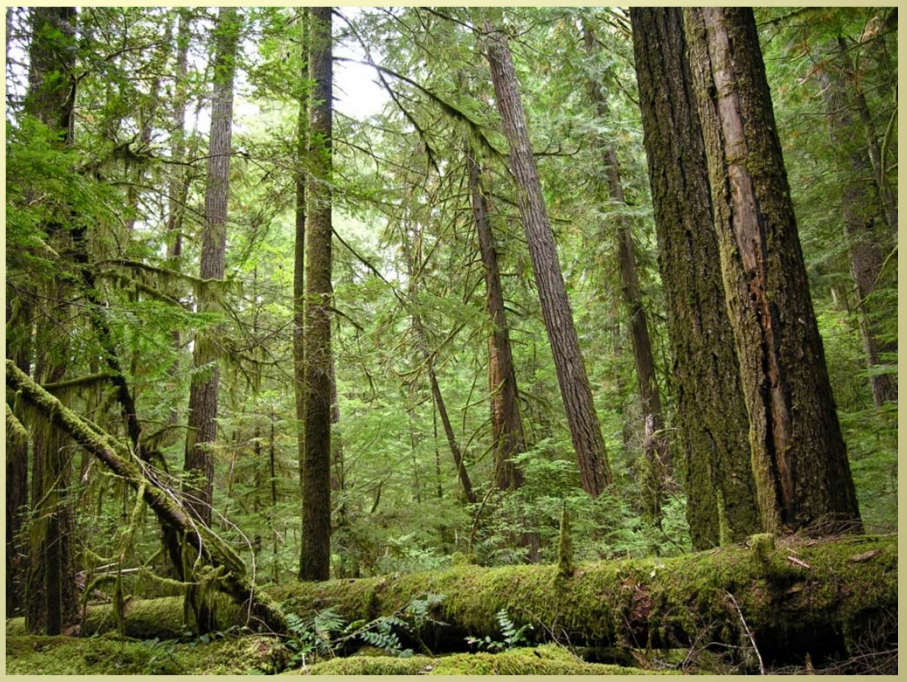
Collection Methods:

an aspirator

decaying wood samples (without bark)

for comparison – soil, litter, bark samples

Springtails of DWM (USA, Oregon)



Springtails of DWM (USA, Oregon)

Results and Conclusions:

- ca 3400 of individuals belonged to **40** species of 29 genera and 7 families,
- members of Onychiuridae, Neanuridae, Isotomidae and Entomobryidae dominated, absence of Hypostruridae and Odontellidae,
- **6** species are new to science (?),
- 16 species were very rare in samples (less than 10 spec.),
- **10** species common (more than 50 spec.),
- **5** species are **saproxylic** forms (not found in soil/litter samples),
- saproxylic species are **specialists**, they are sensitive to the tree species,
- morphologically saproxylic springtails resemble euadphic forms – reduction of eyes, pigmentation, jumping organ
- springtail fauna of DWM includes atmobiotic forms, saproxylic and euedaphic forms.

Springtails of DWM (USA, Oregon)

a new undescribed neanurid species

Thank you!