Invertebrate diversity research and conservation in Estonia: our overlooked majority

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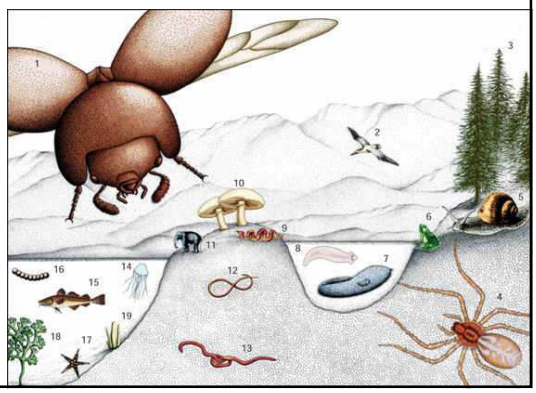
ENVIRONMENTAL BOARD

NEGLECTED INVERTEBRATES

- too abundant – cannot be exterminated
- too small – most, for most of the time, invisible
- too few knowledges – marginal in academic reseach, funding and applied issues
- lack of charisma and poor public perception

DIVERSE INVERTEBRATES

- taxa
- ecological niches
- life history strategies
- functional roles
- endemism and refuges



Species-scape by Wheeler 1990

VALUABLE INVERTEBRATES

- most important component of fauna, both in number of species and biomass
- important source of food for mankind and domestic animals
- ecosystem services
- pests, parasites, diseases, vectors
- aesthetic and scientific value

INVERTEBRATE VS OTHER GROUPS

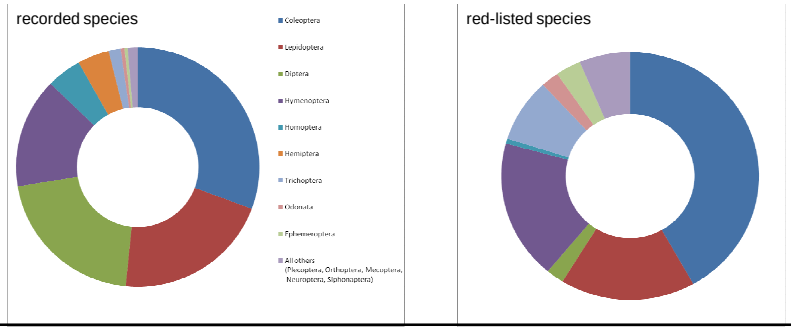
- invertebrates - 55% of the identified biota in Estonia (but 80% globally), fungi+lichens 20%, vascular plants+mosses 8%, vertebrates 2%
- diversity research workforce roughly evenly partitioned among groups
- number of invertebrate species present is unknown and they are relatively undescribed, whilst that of vertebrates and plants is almost completely known

INVERTEBRATE CONSERVATION

- few well-structured conservation programs
- minimal legislative protection
- outside mainstream conservation policy

WHICH SPECIES AND WHY?

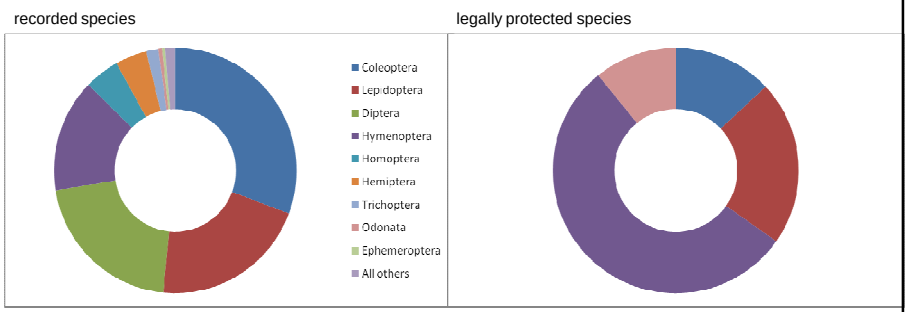
- species-of-concerne vs recorded insect species
- red-list (2008) species:
  - ✓ significant inconsistency between lists with respect to relative predominance of orders represented (G=4,756, df=9, p<0,000001)
  - ✓ *Coleoptera*, *Lepidoptera* and *Hymenoptera* dominate in red list assessment (32, 21 and 17% of total, respectively)
  - ✓ also *Trichoptera*, *Ephemeroptera* and *Plecoptera* disproportionately over-represented
  - ✓ few *Diptera, Homoptera* and *Hemiptera* considered



WHICH SPECIES AND WHY?

- legally protected insect species (46 spp)
  - representation completely independent of the total number of species

    (G=2,617, df=9, p<0,000001)
  - disproportion much more apparent



WHICH SPECIES AND WHY?

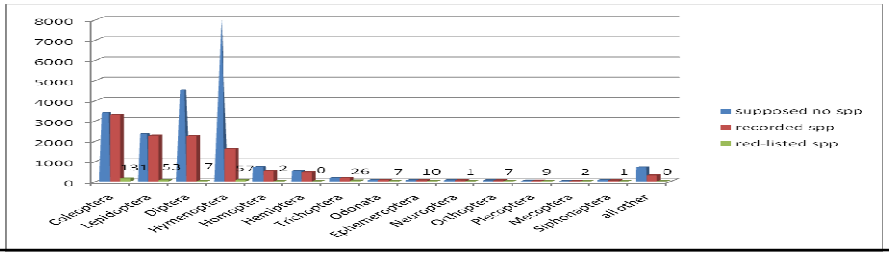
• inherent species endangerment is markedly different among taxonomic groups?

• disproportionate representation of charismatic taxa

- ✓ *Hymenoptera* (bumblebees and red wood ants)
  15% registered taxa vs. 54% legally protected all taxa
- ✓ *Orthoptera* occur on red-list at a frequency 7 times and Odonata 4 times greater than that expected by their recorded species numbers alone
- ✓ *Diptera* are 9 times less likely to be listed
- ✓ water-related insect orders (*Trichoptera, Ephemeroptera* and *Plecoptera*) as traditional biological indicators

FACTORS STRESS INVERTEBRATE DIVERSITY KNOWLEDGE AND CONSERVATION

- extensive taxonomic bias in academic research and funding
  - predominance skewed towards vascular plants and vertebrates (birds)
  - specialist-associated bias (*Hymenoptera Aculeata* and *Formicidae* vs *Diptera* and *Coleoptera*)



FACTORS STRESS INVERTEBRATE DIVERSITY KNOWLEDGE AND CONSERVATION

- historic bias in nature conservation traditions in Estonia
  - natural monuments (ancient trees, erratic boulders, beautiful landscapes)
  - flagship species (birds, mammals, plants)

FACTORS STRESS INVERTEBRATE DIVERSITY KNOWLEDGE AND CONSERVATION

- critically insufficient taxonomy formal training in general and in invertebrates particularly
  - academic taxonomic capacity globally and locally in severe decline
  - threefold reduction in formal biodiversity training at university undergraduate level compared with 30 years ago
  - shrinking approach among academic biologists
  - taxonomic incapacity of conservation practicioners causing fatal developments

- Will amateurs, barcoding, e-taxonomy etc fill all the gaps and do the job for us?
- Who will make proper inventories, analyses or decisions for conservation purposes in future?

THE CHALLENGE FOR DIFFERENT INSTITUTIONS

- need for certain collaboration between environmental administrators, conservation biologists and academic taxonomists
- evidence-based approach - conservation management decisions should be made on the basis of scientific evidence, rather than on feelings or previous experience of experts

THE CHALLENGE FOR DIFFERENT INSTITUTIONS

- invertebrates should be integrated into mainstream biodiversity and conservation biology research, practice and legislation
- a strong improvement of taxonomic training and expertise with shared standards is essential to support conservation activities at all levels
- fulfil the great need for empirical data on diversity, ecology, distribution in most taxa of invertebrates