

Cost effective and ecological relevant testing using invertebrate species: new insights for environmental risk assessment

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Invertebrate species are commonly used in ecotoxicity testing to investigate the impact of chemicals on the environment. A range of regulatory guidelines (OECD, ISO, EPA) are available, combining different invertebrate species and toxicological endpoints. However these guidelines and studies are mainly prescriptive and limited to relatively few species. Model and non-model invertebrate species from the three compartments of the biosphere (air, water and soil), offer a far greater range of interest for research, spanning from classical toxicological characterization to modern holistic approaches, with potential to substitute vertebrate testing. The small size, ease of maintenance and short life cycles of most invertebrate species commonly used in environmental sciences make them also very suitable for evaluating effects at different levels of organization within single and combined exposures with other chemicals or with other natural/anthropogenic stressors. Automated high throughput screening application possibilities and linkage to ecosystem functions make them good models for assessing toxic effects in the laboratory and the field using micro, mesocosms and transplant experiments. The emergence and accessibility to advanced molecular based technologies are allowing ever more complex research involving genome studies while recent tools for genome editing are greatly facilitating our understanding of the molecular cascades triggered in response to stress and its phenotypic consequences. Molecular based technologies combined with systems biology approaches offer the possibility to assess effects from the transcriptome, metabolome, organ or individual as well as the linkage to higher ecological levels up to population level. Within this session we intend to show the latest breakthroughs and new directions in toxicological research using invertebrates, focusing on novel systems, endpoints, assays and testing strategies. We invite presentations focusing on lab and field studies addressing impacts across several levels of biological organization considering molecular, life-history, demographic and/or behavioural endpoints; studies focused on a mechanistic understanding of toxic effects and/or on risk assessment of chemical pollutants alone or interacting with natural and anthropogenic stressors (temperature, food, nutrients, etc). We also invite industry to show latest high-throughput approaches using invertebrate species. Finally, we invite regulatory agencies members to discuss the latest developments and perspectives for invertebrate testing with regulatory impact.