

SUN

Nanomaterials in a perspective of effects on ecosystem services and ecological risk

Presented by: Janeck J Scott-Fordsmand (AU)

Work by: JJ Scott-Fordsmand (AU) , E Simensin (UNIVIE) , T Fernandes (HWU) , JM Navas,(INIA), R Handy (UoP), TFM Roelofs (VUA), Hund-Rinke (IME), MJB Amorim (UAVR).



ECOSYSTEM SERVICES

Clean water – Sewage sludge function

Food production – Soil-, water-function, trophic transfer

Biodiversity – Species sensitivity, loss

Gene Pool – Epigenetic etc

ECOLOGICAL RISK

Ecology beyond directly serving to human mankind

TARGETS IN SUN

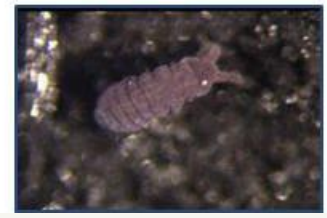
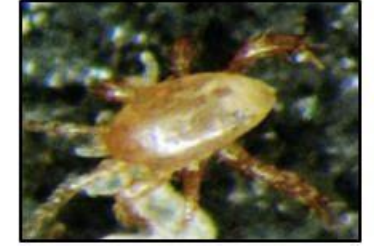
Develop tools to estimate long-term effects including repeated exposures, focusing on bio-accumulation, secondary poisoning and trophic transfer

Develop long-term predictive tools based on short-term experiments using gene expression HTP/-content tests tools

Develop risk evaluation tools for long-term scenarios (and suggest risk mitigation approaches), including scenarios with multiple stressors



EXAMPLES



INITIAL SCREENING

INITIAL SCREENING

Protocol optimization for dispersion.

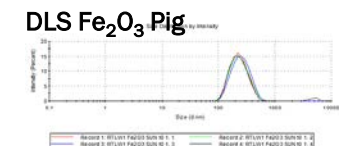
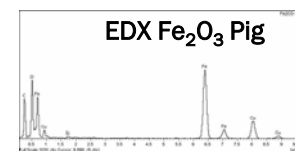
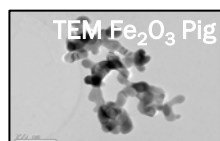
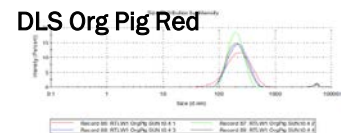
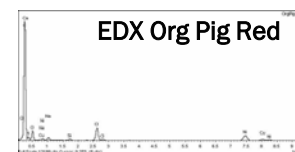
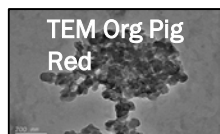
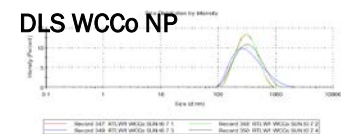
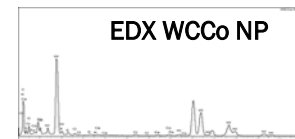
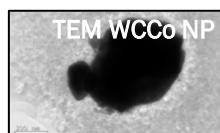
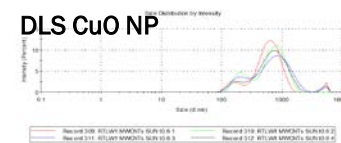
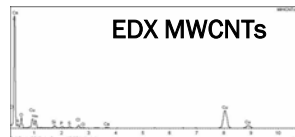
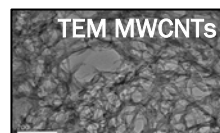
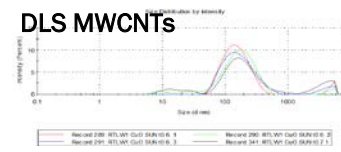
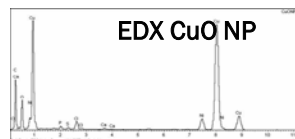
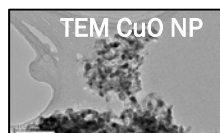
Characterization of dispersed NMs in test medium

Interference of NMs with measurements e.g.
cytotoxicity assays.

In vivo and In vitro cytotoxicity tests

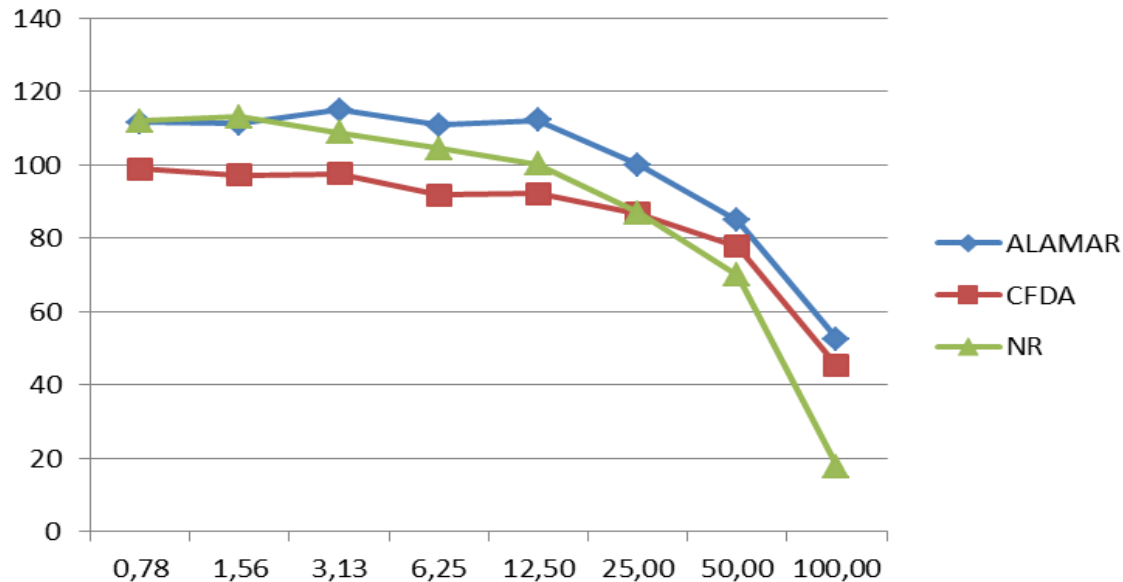
INITIAL SCREENING

NM characterisation in test medium



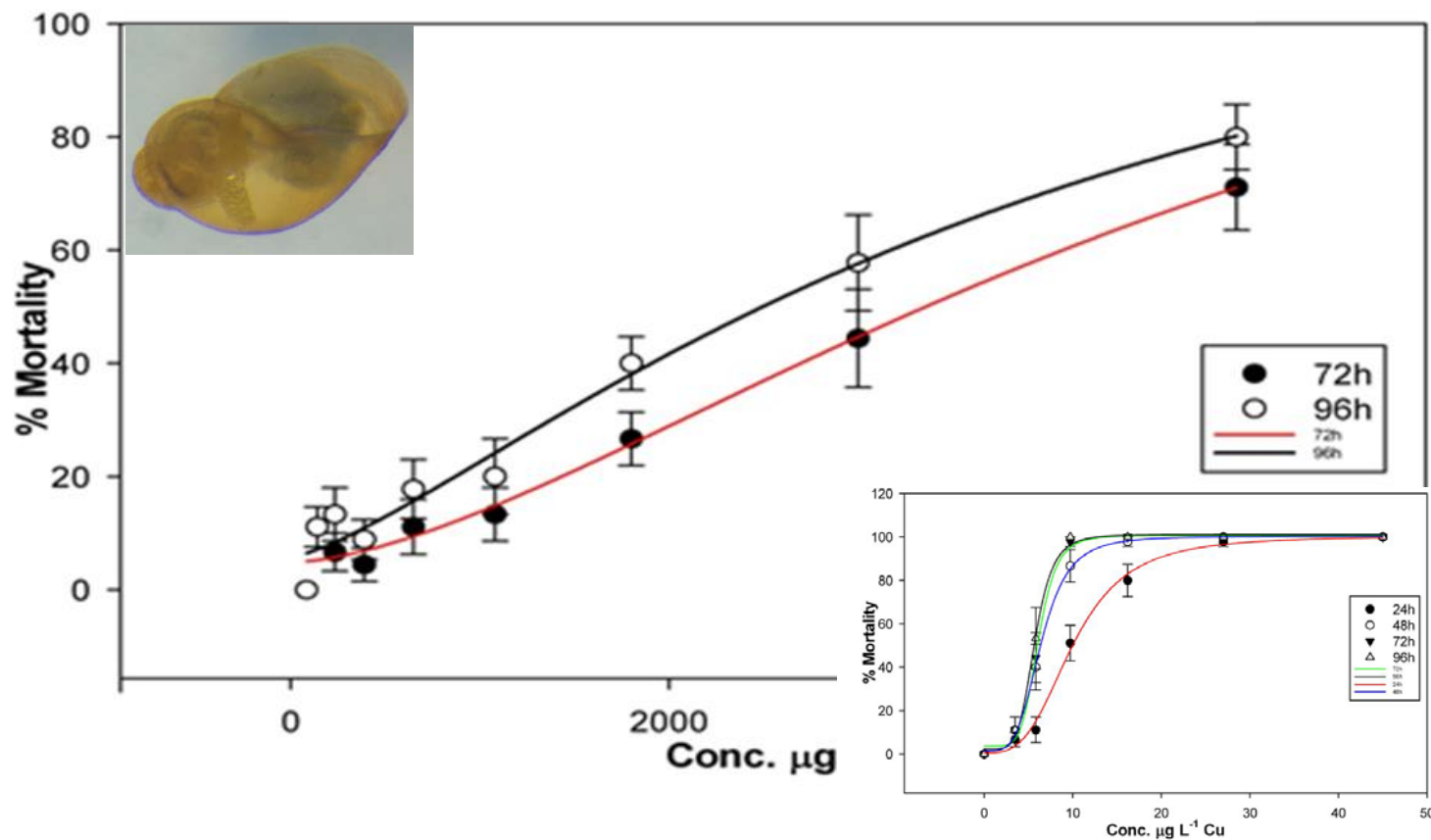
TESTs *IN VITRO* AND *IN VIVO*

CuO NM Toxicity in Cell line Assay RTL-W1



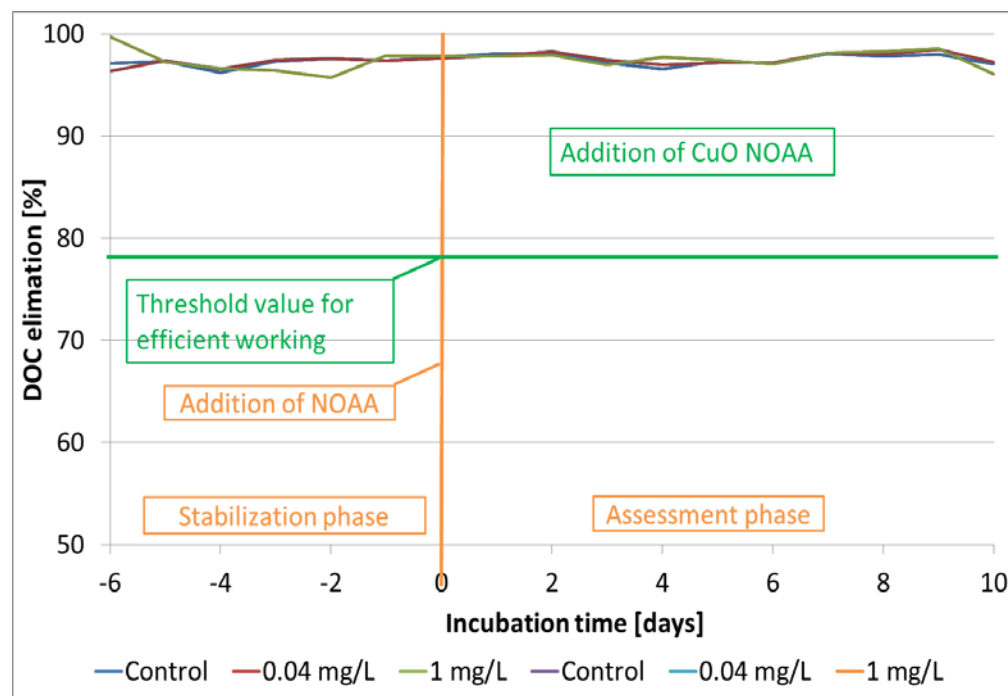
TESTs *IN VITRO* AND *IN VIVO*

CuO NM Toxicity in single species test



TESTs ON SLUDGE ACTIVITY

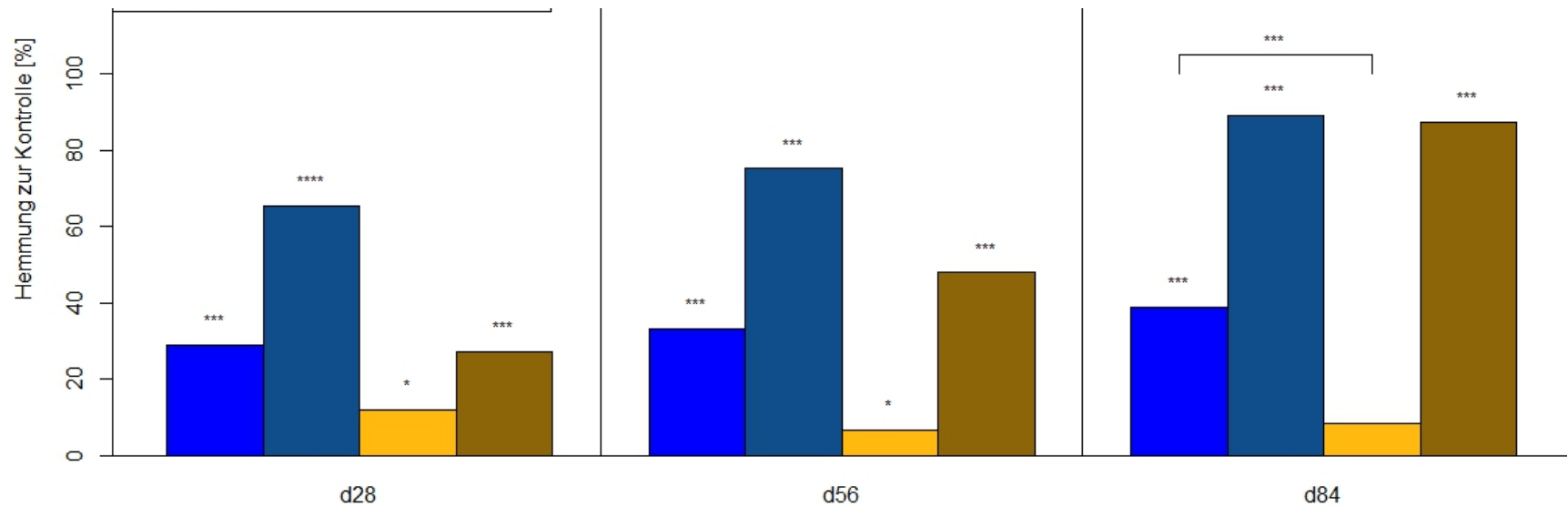
Simulation in model wastewater treatment plants



LONG TERM AND REPEATED EXPOSURE TOOLS

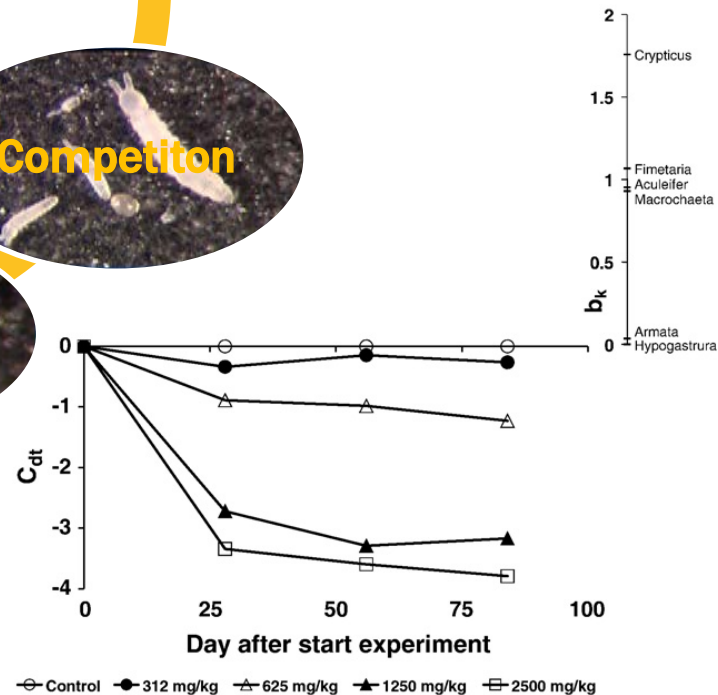
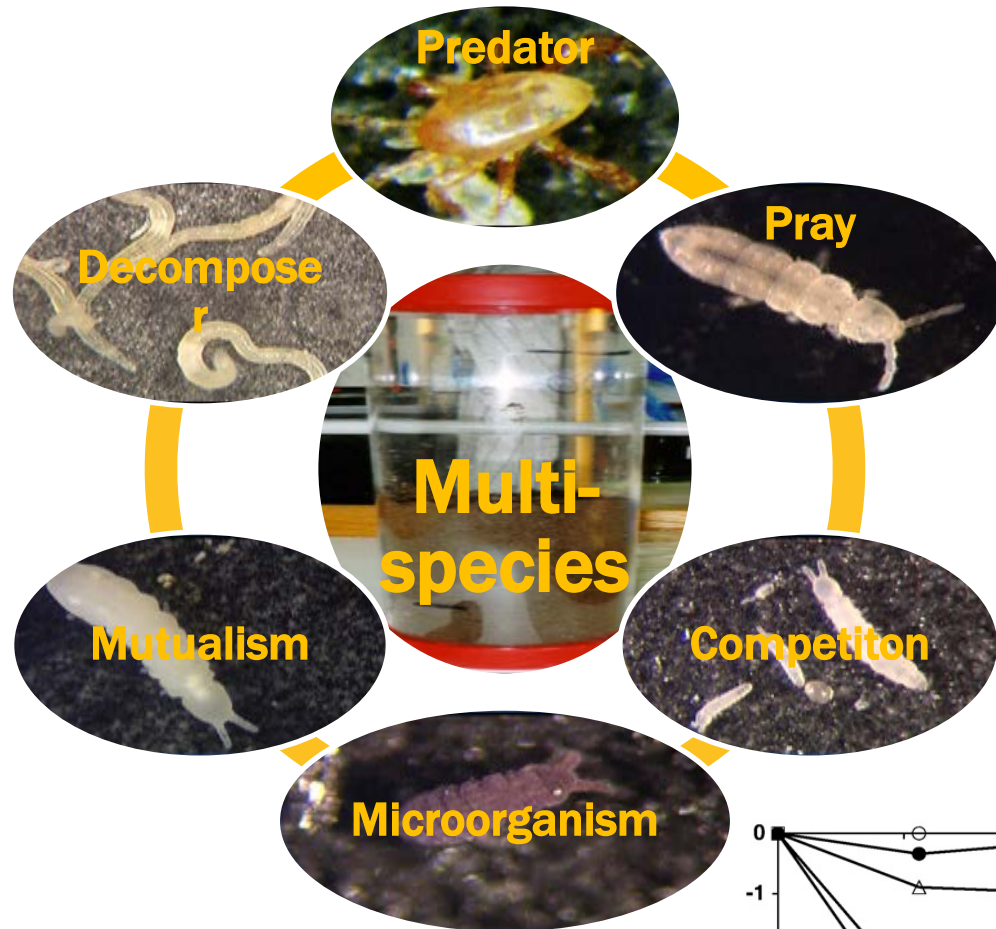
LONG TERM VS REPEATED

CuO inhibition of microbial respiration



Blue single exposure /Yellow repeated exposure

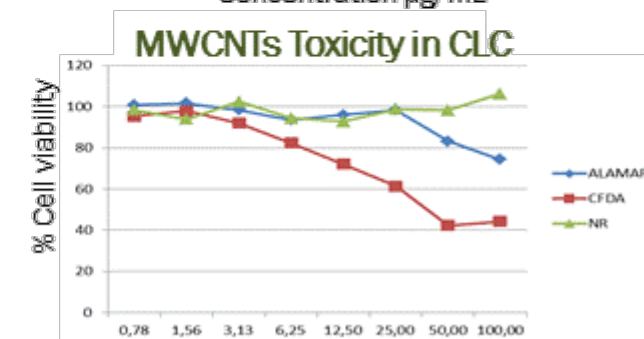
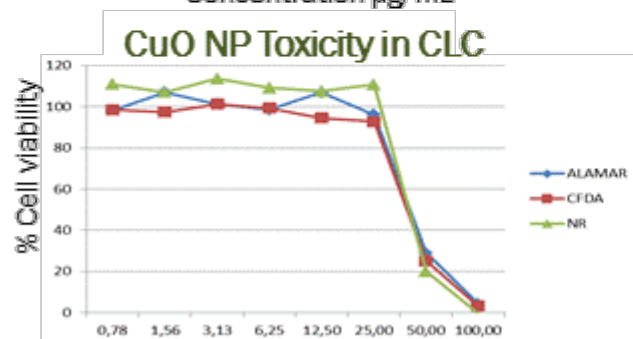
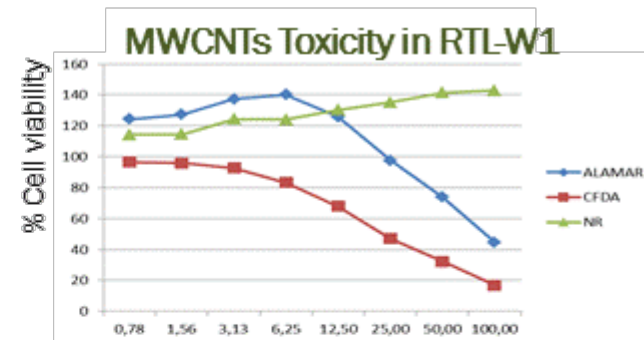
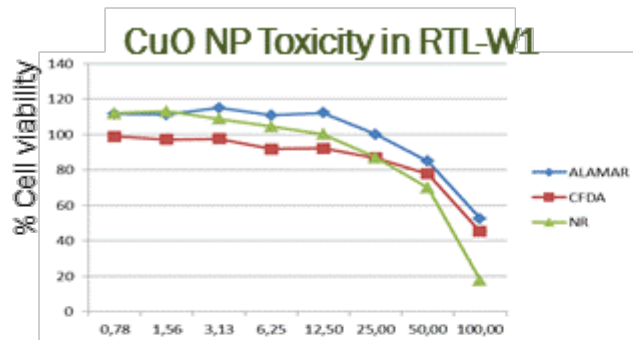
FOOD CHAIN - TROPHIC TRANSFER



LONG-TERM PREDICTIONS BASED ON SHORT-TERM EXPERIMENTS

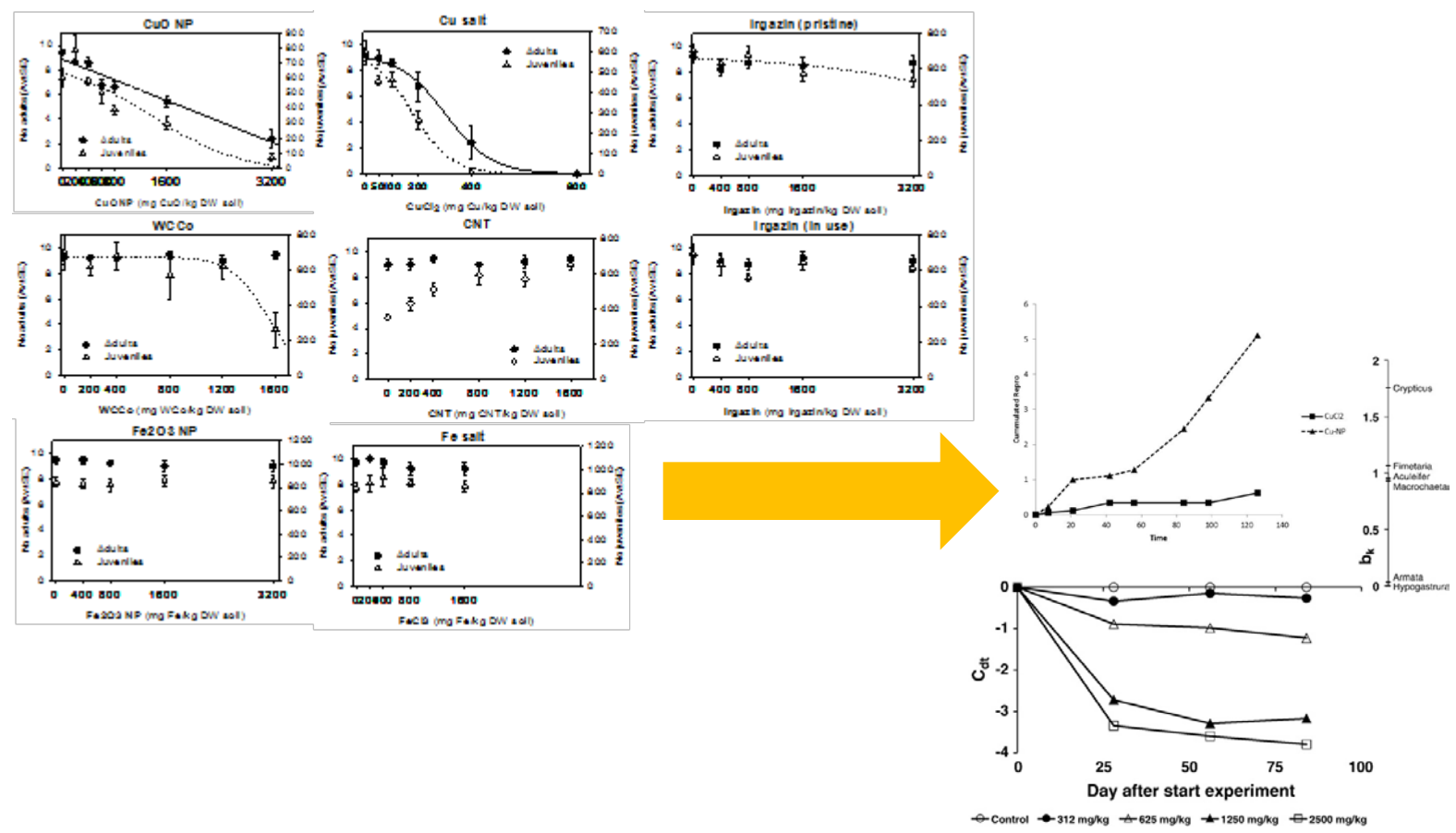
IN VITRO BASE FOR PREDICTION

CuO and MWCNTs inhibition in in vitro assays



IN VIVO BASE FOR PREDICTION

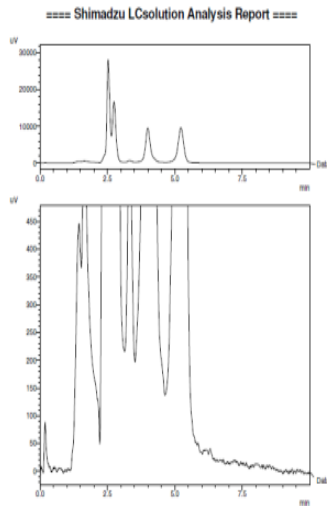
NMs inhibition in in vivo enchytraeid tests



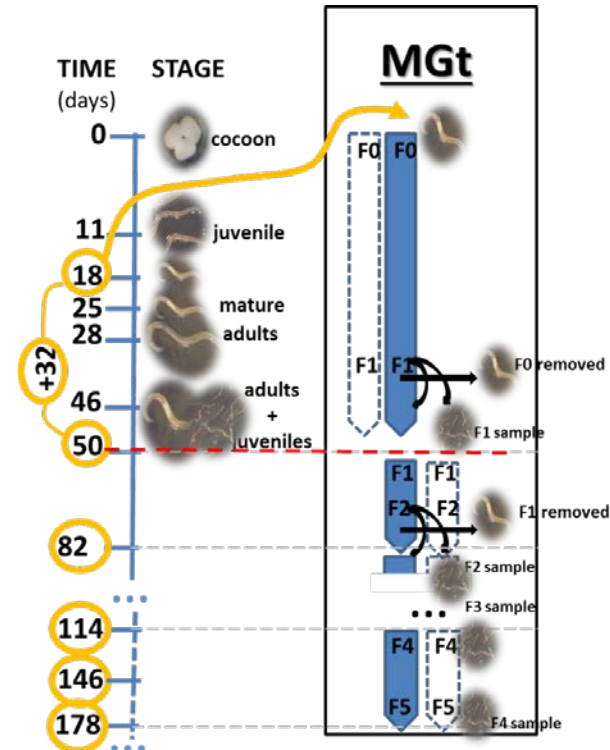
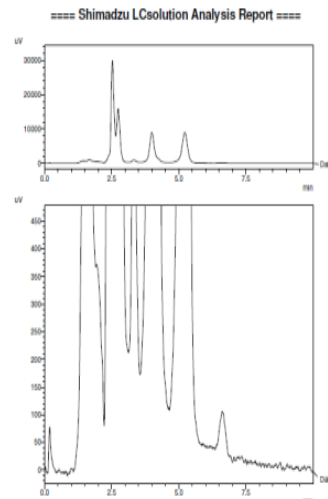
EPIGENETIC PREDICTION

E. crypticus & *F. candida* multigeneration
Survival, Reproduction, Epigenetics, Gene expression

F. candida



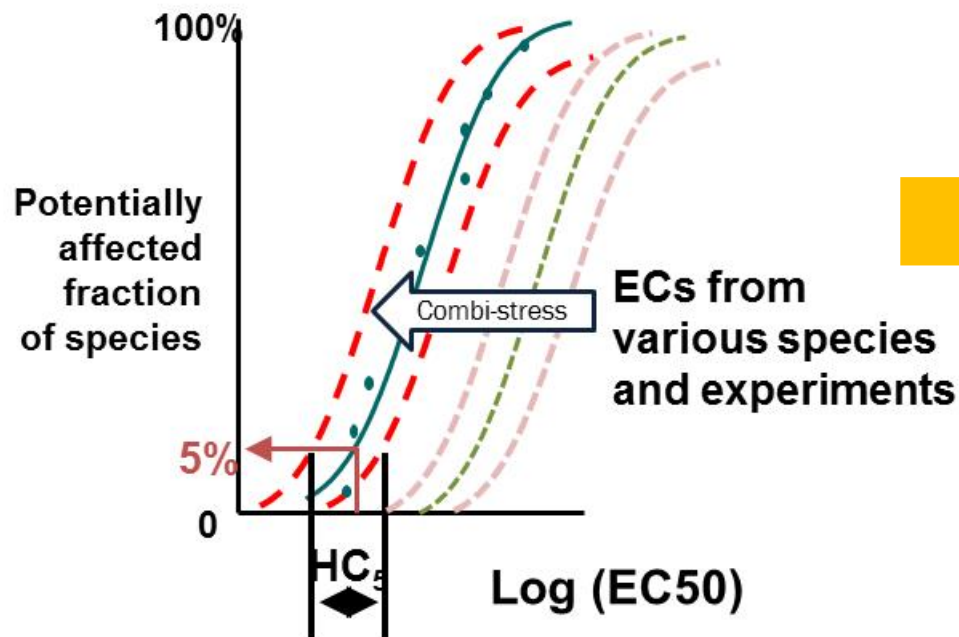
E. crypticus



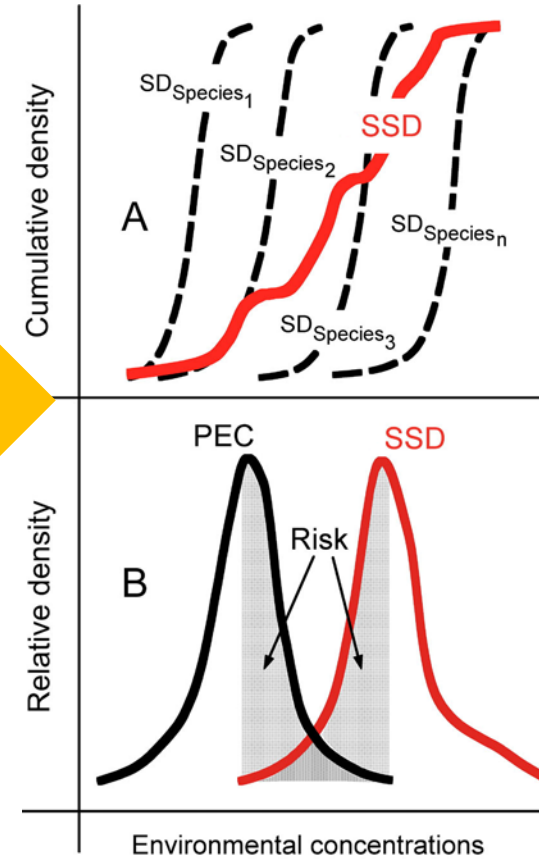
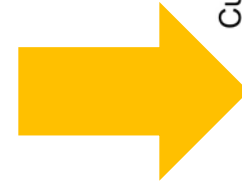
RISK EVALUATION TOOLS FOR LONG-TERM SCENARIOS

HAZARD PREDICTION

Species sensitivity distributions



ECs from various species and experiments



WHAT SUN IS DELIVERING

TOOLS

In vivo tools estimating long-term risks of
nanomaterials

in vitro and rapid high-throughput content tools to
estimate long-term consequences

Integrated probabilistic based risk evaluation

**Tools and data targeted scenarios relevant
and important ecosystem services**