

# Effects of polystyrene microplastics and two organic pollutants in different life stages of brown trout (*Salmo trutta f. fario*)

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The aim of our study is to investigate effects of **polystyrene (PS)** (cryogenically milled granules, fractionated to <50 µm, up to 1.000.000 particles/L), in different live stages of brown trout (*Salmo trutta f. fario*). The animals were exposed to microplastics either alone or in combination with the **pesticide methiocarb (MC)** or the **antidepressant amitriptyline (AM)**.

## Experiments



### Tests with juvenile brown trout

Per treatment: 3 replicates, 10 fish per replicate

Experiment I: Exposure of 11 month-old fish to **PS** and **MC** (1 mg/L) for 96 hrs

Experiment II: Exposure of 9 month-old fish to **PS** and **AM** (100 µg/L) for 3 weeks

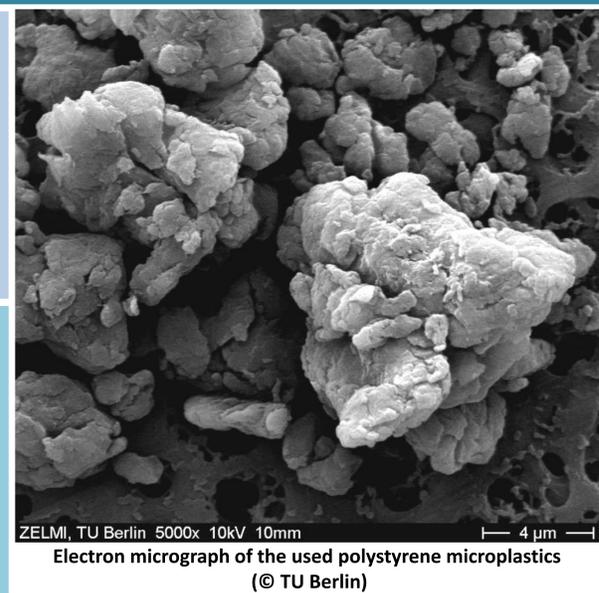


### Brown trout early life stage tests (OECD 212)

Per treatment: 3 replicates, 30 eggs per replicate

Experiment III: Exposure of green eggs (1 day post fertilization [dpf]) to **PS** for six month

Experiment IV: Exposure of eyed-eggs (~ 30 dpf) to **PS** and **AM** (300 µg/L) for two months



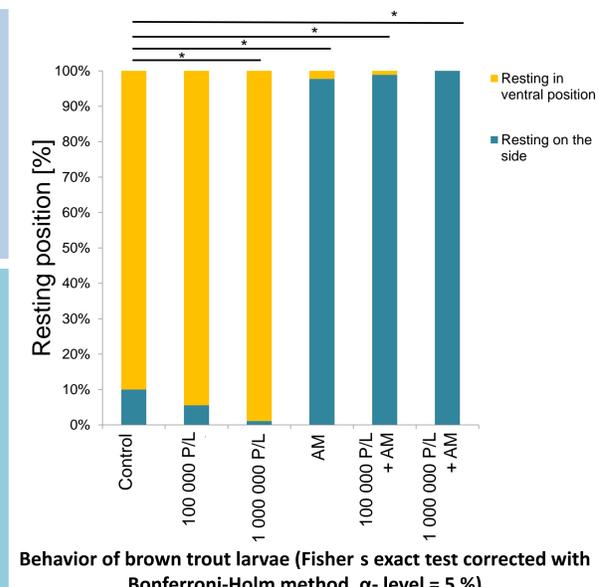
## Results – polystyrene microplastics alone



	10 000 p/L	100 000 p/L
<b>Oxidative Stress</b>	No effect	No effect
<b>AChE activity</b>	No effect	No effect
<b>Histopathology</b>	No effect	No effect
<b>Proteotoxicity</b>	No effect	Not examined



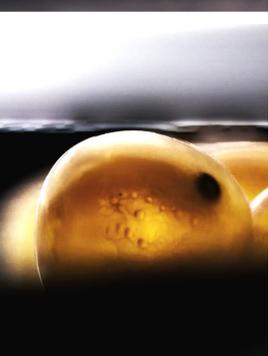
	100 p/L	10 000 p/L	100 000 p/L	1 000 000 p/L
<b>Eyed-egg stage</b>	No effect	No effect	No effect	Not determined
<b>Hatching</b>	No effect	No effect	No effect	No effect
<b>Heart rate</b>	No effect	No effect	No effect	No effect
<b>Behaviour</b>	No effect	No effect	No effect	<b>Less fish resting on their side</b>
<b>Oxidative stress</b>	No effect	No effect	No effect	No effect
<b>AChE activity</b>	No effect	No effect	No effect	No effect



## Results – combination of polystyrene microplastics with amitriptyline and methiocarb



	Amitriptyline (AM)	Combination of PS and AM	Methiocarb (MC)	Combination of PS and MC
<b>Mortality</b>	No effect	No modulation	No effect	No modulation
<b>Oxidative stress</b>	No effect	No modulation	No effect	No modulation
<b>AChE-activity</b>	Investigations in progress	Investigations in progress	Decreased	No modulation
<b>CbE activity</b>	Investigations in progress	Investigations in progress	Decreased	No modulation
<b>Histopathology</b>	No effect	No modulation	Effects in liver and gills	No modulation



	Amitriptyline (AM)	Combination of PS and AM
<b>Hatching</b>	Earlier hatch	No modulation
<b>Heart rate</b>	No effect	No modulation
<b>Behaviour</b>	More fish resting on their side	No modulation
<b>Biometric values</b>	Decreased	No modulation
<b>Oxidative stress</b>	No effect	No modulation
<b>AChE activity</b>	Increased activity	No modulation

## Conclusions

### Polystyrene microplastics:

- **Effect on behaviour** at a concentration of 1 000 000 particle/L
  - **No effect on any other parameter** in both life stages
- ### Combination with organic pollutants:
- **No modulation** of any effect resulting from amitriptyline or methiocarb exposure

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