

PCBs and DDTs in Bluefin tuna from the Adriatic Sea

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Polychlorinated biphenyls (PCBs) and *p,p'*- DDT

- belong to the group of *Persistent Organic Pollutants* (objective of the Stockholm Convention)
- highly persistent and lipophilic → accumulate in the adipose tissue of animals and humans
- toxic to wildlife and humans

AIM: to investigate the concentration levels and pattern distribution of 20 PCB congeners and *p,p'*- DDT and its main metabolites (*p,p'*- DDE and *p,p'*- DDD) in the muscle tissue of 9 wild Bluefin tuna (*Thunnus thynnus*) fish caught in the Adriatic Sea (the northernmost branch of the Mediterranean Sea)



Bluefin tuna

- fast-growing, long-lived, wide-ranging fish and a top marine predator → accumulates lipophilic contaminants
- good bioindicator of marine ecosystem contamination
- foodstuff → important for human health risk assessment

Analysis

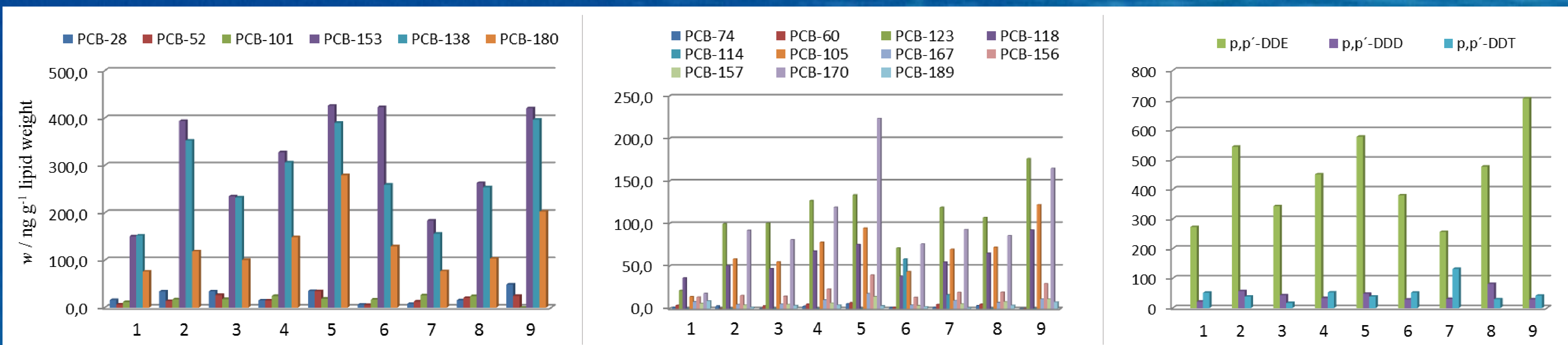
extraction: 2 g of lyophilisate with *n*-hexane:acetone=50:50 (20 mL) in a Microwave Accelerated Reaction System (CEM, USA) at 1200 W and temperature programme: heating 10 min until 115 °C, 20 min isothermally, cooling 60 min

cleaning: 96% sulphuric acid, followed by adsorption chromatography on multilayer silica column and commercial SPE tubes pre-packed with carbon (ENVI-Carb, 3 mL, 0.25 g, Supelco, USA)

instrumental analysis: two-column HRGC-ECD (Clarus 500, PerkinElmer)

(details on cleaning and HRGC-ECD conditions reported in: Klinčić, D.; Herceg Romanić, S.; Matek Sarić, M.; Grzunov, J.; Dukić, B. *Environ. Toxicol. Pharmacol.* **2014**, *37*, 543-552)

Results and discussion



- the sum of six indicator PCB congeners accounted for between 54% and 75% of total PCB levels
- predominance of higher chlorinated indicator PCBs (PCB-153, PCB-138, PCB-180)
- 3 most toxic PCB congeners (PCB-77, PCB-126 and PCB-169) in all the samples were below the limits of determination

predominance of *p,p'*-DDE – a major metabolite of *p,p'*- DDT (contributed with between 61% and 91% to total DDTs levels)

- positive correlations of PCB-138, -153, -180 and *p,p'*-DDE with tuna age and/or body weight – confirms bioaccumulation and biomagnification of organochlorine contaminants in tuna that can potentially cause harmful effects
- Toxic Equivalent, TEQ between 0.7 and 2.6 pg g⁻¹ wet weight → indicates no risk for human health (according to the Croatian and European legislation the maximum permitted TEQ value in the muscle tissue of fish for PCDDs/PCDFs is 4.0 pg g⁻¹, and for PCDDs/PCDFs/PCBs is 8.0 pg g⁻¹ wet weight)
- POPs need to be monitored continuously, especially in species such as tuna, which is an important food and export product