

# Biological Activity of Pentachlorophenol on the Digestive Gland Cells of the Freshwater Mussel *Unio tumidus*

Katarzyna Milowska<sup>a</sup>, Teresa Gabryelak<sup>a\*</sup>, Joanna Dudala<sup>a</sup>, Magdalena Labieniec<sup>a</sup>, and Ekaterina Slobozhanina<sup>b</sup>

<sup>a</sup> Department of General Biophysics, University of Lodz, Bamacha 12/16, 90–237 Lodz, Poland. Fax: (4842) 6354474. E-mail: tgabryl@biol.uni.lodz.pl

<sup>b</sup> Institute of Photobiology, National Academy of Sciences of Belarus, 220072 Minsk, Belarus

\* Author for correspondence and reprint requests

Z. Naturforsch. **58c**, 867–872 (2003); received March 27/May 22, 2003

Many chlorinated phenols and their derivatives are used extensively as insecticides, fungicides and herbicides by industrial and agricultural users throughout the world. Among these substances, pentachlorophenol (PCP) is a broad-spectrum biocide, which is still used as a wood preservative. In this paper, the digestive gland cells were used to assess the effect of PCP in the range of concentrations 3.75–75  $\mu\text{M}$  (0.01–0.2 ppm) on oxidative DNA damage, fluidity changes and peroxidation activity in the plasma membrane. The toxic property of PCP on DNA strand breakage was studied using the comet assay. The results showed that pentachlorophenol in the range of 37.5–75  $\mu\text{M}$  contributed to these lesions. To demonstrate the changes in the fluidity of plasma membrane we used the spectrofluorimetric method using two fluorescence probes: 1-[4-(trimethylamino)phenyl]-6-phenyl-1,3,5-hexatriene (TMA-DPH) and 12-(9-anthroyloxy) stearic acid (12-AS). It was shown that PCP did not influence the surface of plasma membrane but contributed to the increase in the fluidity of the internal region of the lipid bilayer in the range of concentrations 18.75–75  $\mu\text{M}$  (0.05–0.2 ppm). We also examined the effect of PCP on the lipid peroxidation. To imply its peroxidation properties the spectrophotometry method was used to measure the level of malondialdehyde (MDA), one of the endpoints of the peroxidation of polyunsaturated fatty acids. The obtained results showed that PCP in the used doses did not initiate the formation of lipid peroxides. Thus, our investigation indicates that PCP can behave as a prooxidant agent but its action depends on the used doses and parameters chosen for the research.

**Key words:** Pentachlorophenol, *Unio tumidus*, Genotoxicity, Peroxidation