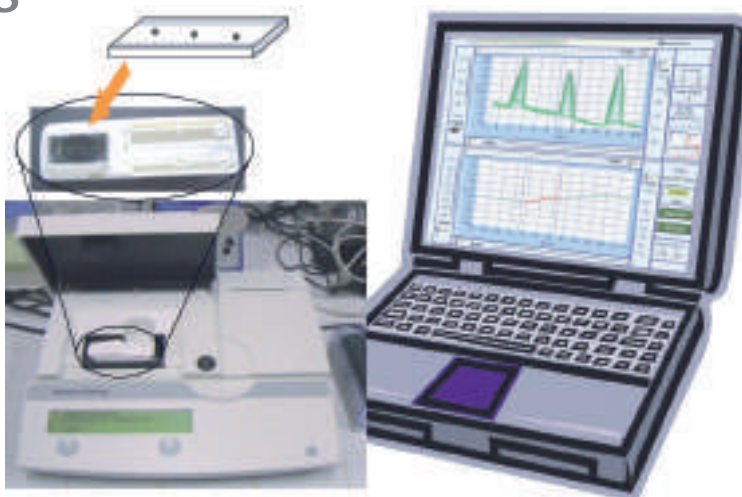


# Innovative Environmental Analysis with Antibodies

Institute of Ecological Chemistry and  
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Immunochemical analysis methods using monoclonal antibodies offer effective and cost reducing possibilities for the rapid detection of pollutants in environmental compartments like water and soils. Scientists from the GSF Institute of Ecological Chemistry and the GSF Institute of Molecular Immunology together developed different monoclonal antibodies for low molecular weight pollutants and used them in various analytical techniques. They can be employed, for example, for direct analysis of pollutants in a sample or during its preparation for further analysis. The main focus is on pollutants like the herbicides Isoproturon or Diuron that are commonly used in Europe. Using these new methods, Isoproturon has been successfully detected with high selectivity and sensitivity (ppt range) in surface water, and Diuron in effluent from a sewage plant.

A further focus is on the production of monoclonal antibodies for DDT and its isomers. These new



The optical immunosensor consists of a bench top instrument (left, shown with open cover), single-use plastic chips (details, top left), and a laptop (right). The latter is used for instrument control and registration, storage and evaluation of the results. This example shows a simultaneous measurement of three analytes (Isoproturon, Diuron, and Phenothrin). For the selective recognition of the analytes of interest, monoclonal antibodies (mAbs) – labelled with *one* fluorescent dye – are used. Analyte derivative-protein-conjugates, which are immobilised on the chip surface (spots on the chip, top left) and analyte in solution compete for the antigen binding sites of the mAbs. Laser light is used for the excitation of the fluorescent dye, and the fluorescence emission is measured in a photomultiplier. The analyte allocation is carried out through the position of the signal on the chip surface, see demonstration on the laptop screen (unpublished results, Master thesis Christina Räuber, IÖC (TUM), 2006).

antibodies were integrated into an optical immunosensor. Using this, DDT was analysed in different water samples, including from the Nairobi River in Kenya. The sensor has the additional potential of being able to analyse a number of compounds simultaneously. The first experi-

ments along these lines have been successful (see Figur).

The technologies developed in this way are not only useful in the field of environmental analysis. There are potential applications in the analysis of foodstuffs, and medical diagnosis. For the latter a new EU project (CARE-MAN) has already started. Among other activities in this project, selective monoclonal antibodies for target structures are being produced that were identified as markers for five main areas of disease (cardiovascular disease, cancer, thyroid disorders, coagulation disorder, and chronic and acute inflammation).



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## Literature:

- Krämer, P.M. et al., in: Rational Environmental Management of Agrochemicals: Risk, Assessment, Monitoring, and Remediation Action. Eds. Ivan R. Kennedy et al., Chapter 12, ACS Symposium Series 966. American Chemical Society, Washington, DC, USA, in press