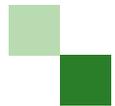UFZ-Umweltforschungszentrum
Leipzig-Halle GmbH
in der Helmholtz-Gemeinschaft

Veröffentlichungen 2004
des UFZ-Umweltforschungszentrums Leipzig-Halle

Vorbemerkung

Das vorliegende Veröffentlichungsverzeichnis umfasst die im Jahre 2004 erschienenen Publikationen, die von Mitarbeitern des Umweltforschungszentrums Leipzig-Halle GmbH verfasst, mitverfasst oder herausgegeben wurden. Zusätzlich sind alle Nachträge aus den Vorjahren enthalten.

Redaktionsschluss für diese Publikationsliste war der 20. Januar 2005. Alle bis dahin nicht erfassten Beiträge werden im Veröffentlichungsverzeichnis 2005 erscheinen.

Im Unterschied zu externen Autoren sind UFZ-Angehörige bei allen Publikationen durch **fette Schrift** hervorgehoben.

Das anschließende alphabetische Register verzeichnet alle UFZ-Autoren mit den jeweiligen laufenden Nummern ihrer Publikationen.

Bei den Publikationen aus Zeitschriften mit Impact Factor (IF) werden diese mit aufgeführt. Der IF wird berechnet durch Division der Anzahl der Zitate von Aufsätzen der Zeitschrift durch die Gesamtzahl an Aufsätzen der Zeitschrift in den letzten zwei Jahren. Um einen Impact Factor zu erhalten muss die Zeitschrift im Scientific Citation Index gelistet sein.

Zusätzlich werden bei Publikationen mit Impact Factor die abstracts aufgeführt, um den Leser besser über Inhalte der Forschung zu informieren.

Inhaltsverzeichnis

Zeitschriften mit Impact Factor

1. **Achilles, J.**, **Müller, S.**, Bley, T., **Babel, W.** (2004):
Affinity of single *S. cerevisiae* cells to 2-NBDglucose under changing substrate concentrations
Cytometry Part A **61A** (1), 88-98
Impact factor: 0; da neu im SCI
Abstract: Background: *Saccharomyces cerevisiae* is a widely employed microorganism in biotechnological processes. Since proliferation and product formation depend on the capacity of the cell to access and metabolize a carbon source, a technique was developed to enable for analyzing the *S. cerevisiae* H155 cells' affinity to extracellular glucose concentrations.
Methods: The fluorescent glucose analogue 2-NBDglucose was employed as a functional parameter to analyze the cells' affinity to glucose. Structural parameters (proliferation, neutral lipid content, granularity, and cell size) were also investigated. Cells were grown both in batches and in chemostat regimes.
Results: The 2-NBDglucose uptake in individual cells proceeds in a time- and concentration-dependent manner and is affected by respiratory and respirofermentative modes of growth. The process is inhibited by D-glucose, D-fructose, D-mannose, and sucrose, but not L-glucose, D-galactose or lactose; maltose is a weak inhibitor. The affinity of the individual cells to 2-NBDglucose was found to be high at low extracellular glucose concentrations, and weak at high concentrations. An additional, underlying pattern in the cells' affinity to glucose was detected, illustrated by the recurrent appearance of two subpopulations showing distinctly differing quantities of this substrate.
Conclusions: A multiparameter flow cytometry approach is presented that enables, for the first time, for analysis of the affinity of individual *S. cerevisiae* cells to glucose. Besides the adjustment of the yeast cell metabolism to extracellular glucose concentrations by altering their affinity to glucose, at least one further mechanism is clearly involved. Two subpopulations of cells were resolved, with different affinities not correlated with other cellular parameters measured.

2. Aguilar, R., Davila, M. M., Elizalde, M. P., **Mattusch, J.**, **Wennrich, R.** (2004):
Capability of a carbon-polyvinylchloride composite electrode for the detection of dopamine, ascorbic acid and uric acid
Electrochim.Acta **49** (6), 851-859
Impact factor: 1,996
Abstract: In this work, the composite carbon-polyvinylchloride (C-PVC) was used as an electrode for the detection of dopamine, ascorbic acid, uric acid and their mixtures by differential pulse voltammetry (DPV). The results showed that the untreated C-PVC electrode was selective and stable for the oxidation of dopamine in a mixture containing uric acid and an excess of ascorbic acid in acidic medium. The pre-treated C-PVC electrode in a neutral medium exhibited good resolution of the mixture components in the micro molar concentration range of DA. The ageing of the C-PVC electrode during longer time periods did not affect the peak potential and the detection of dopamine, uric acid and ascorbic acid in 0.1 M H_2SO_4. The practical analytical utility of the C-PVC electrode was demonstrated by the measurement of uric acid in human urine and serum samples without any preliminary pre-treatment.
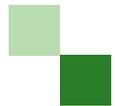
3. **Altenburger, R.**, Nendza, M., **Schüürmann, G.** (2003):
Mixture toxicity and its modeling by quantitative structure-activity relationships
Environ.Toxicol.Chem. **22** (8), 1900-1915
Impact factor: 2,013

Abstract: Environmental contaminants are frequently encountered as mixtures, and the behavior of chemicals in a mixture may not correspond to that predicted from data on the pure compounds. This paper reviews current quantitative structure-activity relationship (QSAR) methodology for the analysis of mixture toxicity. Interactions of components in a mixture can cause complex and substantial changes in the apparent properties of its constituents, resulting in synergistic or antagonistic effects as opposed to the ideal reference case of additive behavior: concentration addition (CA) and independent action (IA) are two prominent reference models for the evaluation of joint activity, and both have mechanistic support from pharmacology. After discussing graphical tools for analyzing binary mixtures and joint effect indices suitable also for multicomponent mixtures, water solubility and hydrophobicity of mixtures are analyzed with respect to the property contributions of the individual components. With the former, small but significant deviations from ideal behavior are observed even for simple organics, whereas in the case of low concentrations, mixture hydrophobicity was found to agree approximately with the fractional contributions of the components. A variety of studies suggest that mixtures of compounds exerting only one (narcotic or specific) mode of action can be modeled satisfactorily by assuming CA, whereas the interaction of differently acting compounds tends to yield a less than CA joint activity. The QSARs have been used to predict concentrations of components in mixtures from joint effects and defined mixture ratios and have been developed to predict narcotic-type mixture toxicity from molecular descriptors that are calculated as composite properties according to the fractional concentrations of the mixture components. In the case of ionogenic compounds, initial results suggest that CA may serve as a first-order approximation for the joint effect of un-ionized and ionized compound portions.

4. Alvarez, H. M., Silva, R. A., Cesari, A. C., Zamit, A. L., Peressutti, S. R., Reichelt, R., Keller, U., Malkus, U., Rasch, C., **Maskow, T.**, Mayer, F., Steinbüchel, A. (2004):
    Physiological and morphological responses of the soil bacterium *Rhodococcus opacus* strain PD630 to water stress
    FEMS Microbiol Ecol **50** (2), 75-86
    Impact factor: 2,947
    Abstract: *Rhodococcus opacus* PD630 was investigated for physiological and morphological changes under water stress challenge. Gluconate- and hexadecane-grown cells were extremely resistant to these conditions, and survival accounted for up to 300 and 400 days; respectively, when they were subjected to slow air-drying. Results of this study suggest that strain PD630 has specific mechanisms to withstand water stress. Water-stressed cells were sensitive to the application of ethanol, high temperatures and oxidative stress, whereas they exhibited cross-protection solely against osmotic stress during the first hours of application. Results indicate that the resistance programme for water stress in *R. opacus* PD630 includes the following physiological and morphological changes, among others: (1) energetic adjustments with drastic reduction of the metabolic activity (˜39% decrease during the first 24 h and about 90% after 190 days under dehydration), (2) endogenous metabolism using intracellular triacylglycerols for generating energy and precursors, (3) biosynthesis of different osmolytes such as trehalose, ectoine and hydroxyectoine, which may achieve a water balance through osmotic adjustment and may explain the overlap between water and osmotic stress, (4) adjustments of the cell-wall through the turnover of mycolic acid species, as preliminary experiments revealed no evident changes in the thickness of the cell envelope, (5) formation of short fragmenting-cells as probable resistance forms, (6) production of an extracellular slime covering the surface of colonies, which probably regulates internal and external changes in water potential, and (7) formation of compact masses of cells. This contributes to understanding the water stress resistance processes in the soil bacterium *R. opacus* PD630.

5. Arens, P., **Durka, W.**, Wernke-Lenting, J. H., Smulders, M. J. M. (2004):
    Isolation and characterization of microsatellite loci in *Geum urbanum* (Rosaceae) and their transferability within the genus *Geum*
    Mol Ecol Notes **4** (2), 209-212
    Impact factor: 1,145
    Abstract: Thirteen novel polymorphic microsatellite loci are presented for *Geum urbanum* (Rosaceae). The microsatellites will be useful tools to analyse the influence of landscape structure and land-use intensity in agricultural landscapes on genetic diversity within and among populations of *Geum urbanum*. Transferability was tested in 19 other *Geum* species and two *Waldsteinia* species. In most species polymerase chain reaction (PCR) products of the expected range were obtained, therefore the markers reported here appear to be applicable across the whole genus.

6. **Aurich, A.**, Förster, A., Mauersberger, S., Barth, G., **Stottmeister, U.** (2003):
    Critic acid production from renewable resources by *Yarrowia lipolytica*
    Biotechnol.Adv. **21** (5), 454-455
    Impact factor: 2,575
    Abstract: no abstract

7. **Baborowski, M.**, **von Tümpling jr, W.**, **Friese, K.** (2004):
    Behaviour of suspended particulate matter (SPM) and selected trace metals during the 2002 summer flood in the River Elbe (Germany) at Magdeburg monitoring station
    Hydrol Earth Syst Sc **8** (2), 135-150
    Impact factor: 0,948
   Abstract: no abstract
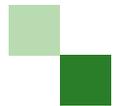
8. Backhaus, T., **Altenburger, R.**, Arrhenius, A., Blanck, H., Faust, M., Finizio, A., Gramatica, P., **Grote, M.**, **Junghans, M.**, Meyer, W., Pavan, M., Porsbring, T., Scholze, M., Todeschini, R., Vighi, M., **Walter, H.**, Grimme, L. H. (2003):
The BEAM-project: prediction and assessment of mixture toxicities in the aquatic environment
*Cont.Shelf Res* **23** (17-19), 1757-1769
Impact factor: 1,495

Abstract: Freshwater and marine ecosystems are exposed to various multi-component mixtures of pollutants. Nevertheless, most ecotoxicological research and chemicals regulation focus on hazard and exposure assessment of individual substances only, the problem of chemical mixtures in the environment is ignored to a large extent. In contrast, the assessment of combination effects has a long tradition in pharmacology, where mixtures of chemicals are specifically designed to develop new products, e.g. human and veterinary drugs or agricultural and non-agricultural pesticides. In this area, two concepts are frequently used and are thought to describe fundamental relationships between single substance and mixture effects: Independent Action (Response Addition) and Concentration Addition. The question, to what extent these concepts may also be applied in an ecotoxicological and regulatory context may be considered a research topic of major importance, as the concepts would allow to make use of already existing single substance toxicity data for the predictive assessment of mixture toxicities. Two critical knowledge gaps are identified: (a) There is a lack of environmental realism, as a huge part of our current knowledge about the applicability of the concepts is restricted to artificial situations with respect to mixture composition or biological effect assessment. (b) The knowledge on what exactly is needed for using the concepts as tools for the predictive mixture toxicity assessment is insufficient. Both gaps seriously hamper the necessary, scientifically sound consideration of mixture toxicities in a regulatory context.
In this paper, the two concepts will be briefly introduced, the necessity of considering the toxicities of chemical mixtures in the environment will be demonstrated and the applicability of Independent Action and Concentration Addition as tools for the prediction and assessment of mixture toxicities will be discussed. An overview of the specific aims and approaches of the BEAM project to fill in the identified knowledge gaps is given and first results are outlined.
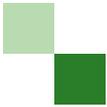
9. Baffico, G. D., Diaz, M. M., Wenzel, M. T., **Koschorreck, M.**, Schimmele, M., **Neu, T. R.**, Pedrozo, F. (2004):
Community structure and photosynthetic activity of epilithon from a highly acidic (pH <= 2) mountain stream in Patagonia, Argentina
Extremophiles **8** (6), 463-473
Impact factor: 1,955

Abstract: We explored a benthic community living on stones in an acidic (pH2) stream of active volcanic origin from Patagonia, Argentina, by combining in situ measurements (temperature, pH, conductivity, dissolved oxygen), photosynthesis of intact biofilms (measured with microsensors by the light-dark shift method), pure-culture experiments on isolated algae, and confocal laser scanning microscopy on the biofilms. The epilithon of the Agrio River was dominated (99% of total biomass) by one species: *Gloeochrysis* (Chrysophyceae). This species was observed as brown, mucilaginous, 200-m-thick films on stones, growing in clumps in a dense matrix of fungal hyphae, bacteria, and inorganic particles held together by extracellular polymeric substances. *Gloeochrysis* was isolated and cultivated. The photosynthetic rate measured at saturation irradiance was 120 mol oxygen (mg chlorophyll a)$^{-1}$h^{-1} under laboratory conditions, and the saturation rate of photosynthesis by carbon dioxide was 90 mol oxygen (mg chlorophyll a)$^{-1}$ h^{-1} for oxygen evolution. Photosynthetic activity of the biofilm was light-dependent and saturated above 200 mol photons m^{-2} s^{-1}. In the dark, the stone surface became anoxic. Our data suggest that primary production in the Agrio River was not limited by light, carbon, or phosphorus but instead, nitrogen-limited.
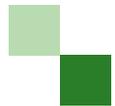
10. Balazs, D. J., Triandafillu, K., Wood, P., Chevolot, Y., van Delden, C., **Harms, H.**, Hollenstein, C., Mathieu, H. J. (2004):
Inhibition of bacteriol adhesion on PVC endotracheal tubes by RF-oxygen glow discharge, sodium hydroxide and silver nitrate treatments
Biomaterials **25** (11), 2139-2151
Impact factor: 3,008

Abstract: Medical-grade poly(vinyl chloride) (PVC) was chemically modified to study how the incorporation of monovalent silver influences *Pseudomonas aeruginosa* adhesion and colonization. The modification investigated consisted of a radio frequency-oxygen ($RF-O_2$) glow discharge pre-functionalization, followed by a two-step wet-treatment in sodium hydroxide and silver nitrate solutions. X-ray photoelectron spectroscopy (XPS) analysis and contact angle measurements were used to investigate the chemical nature and surface wettability of the films following each step of the modification. XPS analysis proved that the $RF-O_2$ plasma pre-functionalization of native PVC reproducibly increased the amount of functional groups representative of PVC additives, including ether/alcohol, esters and carboxyl groups. More specifically, we demonstrated that the groups representative of the phthalic ester and zinc carboxylate additives identified for native PVC increased by two-fold following the $RF-O_2$ plasma pre-functionalization step. Although $RF-O_2$ pre-functionalization did not have an effect on the silver content of the $NaOH/AgNO_3$ treated substrates, such a modification was necessary for biomaterial products that did not have reproducible surfaces amongst production lots. XPS analysis also demonstrated that saponification with sodium hydroxide (NaOH) of esters, like those of the phthalic ester additives of PVC is a simple, irreversible method of hydrolysis, which produced sodium carboxylate and sodium phthalate salts. Exposure of native PVC to NaOH resulted in an increased surface hydrophilicity (from ca 90° to ca 60°) due to dechlorination. XPS analysis following further incubation in silver nitrate demonstrated that silver ions can be trapped when the sodium of sodium carboxylate is replaced by silver after performing a second treatment with a monovalent silver-containing solution. The creation of silver salt on native PVC resulted in an ultra-hydrophobic (>120°) surface. The chemical modifications using NaOH and $AgNO_3$ wet treatments completely inhibited bacterial adhesion of four strains of *P. aeruginosa* to both native and oxygen-pre-functionalized PVC, and efficiently prevented colonization over longer periods (72 h). Our results suggest that surface modifications that incorporate silver ions would be extremely effective at reducing bacterial colonization to medical devices.

11. **Balcke, G.**, Turunen, L. P., **Geyer, R.**, Wenderoth, D. F., **Schlosser, D.** (2004):
Chlorobenzene biodegradation under consecutive aerobic-anaerobic conditions
FEMS Microbiol Ecol **49** (1), 109-120
Impact factor: 2,947
Abstract: The biodegradation of monochlorobenzene, the main contaminant in a quaternary aquifer at Bitterfeld, Central Germany, was studied in microcosm experiments employing either original groundwater or defined mineral media together with the indigenous microbial community from the polluted site. The impact of consecutive aerobic-anaerobic-aerobic incubations on monochlorobenzene biodegradation, microbial diversity, and pH development was examined. The related changes in microbial community composition were analyzed by 16S rRNA gene-based single-strand conformation polymorphism (SSCP) fingerprints and sequencing of dominant bands and by quantitative analysis of bacterial respiratory chain quinones as biomarkers. Under aerobic conditions, the indigenous microbial community of the groundwater degraded monochlorobenzene mainly via the modified *ortho*-pathway. Respiratory chain quinones and SSCP analysis suggested dominance of the genera *Acidovorax* and *Pseudomonas*. A shift to anoxic conditions resulted in monochlorobenzene biotransformation but no dechlorination. The ability to degrade monochlorobenzene aerobically remained preserved throughout a fortnightly anoxic period at sufficiently high buffer capacity. Acidification, caused by monochlorobenzene biodegradation, was alkalinity-controlled. At low initial alkalinity a substantial decrease in pH, monochlorobenzene degradation, and total counts of live cells, accompanied by a change of the microbial community composition, was observed.

12. Barra, R., Cisternas, M., Suarez, C., Araneda, A., Pinones, O., **Popp, P.** (2004):
PCBs and HCHs in a salt-marsh sediment record from South-Central Chile: use of tsunami signatures and ^{137}Cs fallout as temporal markers
Chemosphere **55** (7), 965-972
Impact factor: 1,904
Abstract: This paper documents the occurrence of polychlorinated biphenyl (PCB) and hexachlorocyclohexane (HCH) deposition inferred from a sedimentary record exposed in a salt-marsh trench in South-Central Chile. Sediments were carefully collected every 1 cm from the trench wall. The samples were analyzed for PCBs, HCHs, ^{137}Cs, organic carbon and grain size. The ^{137}Cs fallout and the sedimentary signature left by the 1960 Chilean tsunami were used as temporal markers to estimate the stratigraphic chronology and the sedimentation rates. PCBs were quantified by gas chromatography with electron capture detection (GC-ECD), and positive samples were confirmed by gas chromatography and mass spectrometry detection (GC-MS). Based on these results, PCBs and HCHs deposition over the last 40 years was estimated. No PCBs were detected below the tsunami signature. Total concentrations ranged from undetectable (ND) to 32 ng/g d.w. for PCBs and from undetectable (ND) to 1.29 ng/g d.w. for HCHs. The highest PCB concentrations were found in the upper 7 cm of the core. Even though PCBs were banned in 1982 as electrical fluids in Chile, total estimated PCB fluxes have increased approximately 20 times during the last 40 years: from undetectable values to 102.6 ng/cm^2/year, reflecting that PCBs are still in use and being released into the environment.
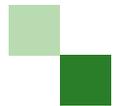
13. Barranguet, C., van Beusekom, S. A. M., Veuger, B., **Neu, T. R.**, Manders, E. M. M., Sinke, J. J., Admiraal, W. (2004):
Studying undisturbed autotrophic biofilms: still a technical challenge
Aquat.Microb.Ecol. **34** (1), 1-9
Impact factor: 2,116
Abstract: Biofilms in surface waters are characterized by their spatial structure and the heterogeneous distribution of the microorganisms that interact in a complex and dynamic way. Therefore, the assessment of phototrophic and heterotrophic biofilms' metabolic activity should be done without disturbing their structure. Several optical methods that allow the study of undisturbed living biofilms have been developed and are claimed to have high potential in the analysis of biofilms. However, natural biofilms can develop into thick packages of cells that may limit light penetration into the biofilm matrix, hindering the use of optical methods. In this paper we evaluate the use of non-destructive optical and destructive methods for the study of natural algal-bacterial biofilms. Pulse amplitude modulation (PAM) fluorimetry (with both single and multiple wavelength excitation) and confocal laser scanning microscopy (CLSM) are used as optical methods and compared to chemical extraction of plant pigments and exopolysaccharides. We demonstrate that the attenuation of the light intensity by the biofilm matrix represents a limitation to optical methods that is difficult to overcome in mature natural biofilms; but nevertheless, optical methods are very reliable for the study of thin or young biofilms. Apart from the biofilm thickness, the degree of compactness should also be taken into account. The density of some natural biofilms could be a limitation of CLSM especially if high molecular weight probes are used for specific biofilm components. In conclusion, a combination of both approaches still appears to be necessary in order to follow the complete developmental period of biofilms.

14. **Bauer, M.**, Aust, G., Schumacher, U. (2004):
Different transcriptional expression of KIAA1324 and its splicing variants in human carcinoma cell lines with different metastatic capacity
Oncol Rep **11** (3), 677-680
Impact factor: 1,256
Abstract: To identify new genes involved in metastasis, we compared the cDNA patterns of the high-metastatic MCF-7 and non-metastatic Hbl100 breast tumor cell lines by subtractive hybridization and verified the results by real-time RT-PCR in various carcinoma cell lines. One of the differentially expressed genes is KIAA1324, which is overexpressed in some highmetastatic breast and lung cancer cell lines. We have found two new splice variants of KIAA1324 mRNA in non-metastatic carcinoma cell lines and normal epithelial cells that predict the existence of truncated proteins. In summary, KIAA1324 could be involved in tumor progression and metastasis either by its expression level or through variable expression of alternative splice products.

15. Bauer, S., Wyszomirski, T., Berger, U., Hildenbrandt, H., **Grimm, V.** (2004):
Asymmetric competition as a natural outcome of neighbour interactions among plants:
results from the field-of-neighbourhood modelling approach
Plant Ecol **170** (1), 135-145
Impact factor: 1,000
Abstract: Numerous attempts have been made to infer the mode of competition from size or biomass distributions of plant cohorts. However, since the relationship between mode of competition and size distributions may be obscured by a variety of factors such as spatial configuration, density or resource level, empirical investigations often produce ambiguous results. Likewise, the findings of theoretical analyses of asymmetric competition are equivocal. In this paper, we analyse the mode of competition in an individual-based model which is based on the new field-of-neighbourhood approach. In this approach, plants have a zone of influence that determines the distance up to which neighbours are influenced. Additionally, a superimposed field within the zone of influence defines phenomenologically the strength of influence of an individual on neighbouring plants. We investigated competition at both individual and population level and characterised the influence of density and of the shape of the field-of-neighbourhood on occurrence and degree of competitive asymmetry. After finding asymmetric competition emerging in all scenarios, we argue that asymmetric competition is a natural consequence of local competition among neighbouring plants.

16. **Benndorf, D.**, Davidson, I., **Babel, W.** (2004):
Regulation of catabolic enzymes during long-term exposure of *Delftia acidovorans* MC1 to chlorophenoxy herbicides
Microbiology-SGM **150** (4), 1005-1014
Impact factor: 3,044
Abstract: *Delftia acidovorans* MC1 is able to grow on chlorophenoxy herbicides such as 2,4-dichlorophenoxypropionic acid (2,4-DCPP) and 2,4-dichlorophenoxyacetic acid as sole sources of carbon and energy. High concentrations of the potentially toxic organics inhibit the productive degradation and poison the organism. To discover the target of chlorophenoxy herbicides in *D. acidovorans* MC1 and to recognize adaptation mechanisms, the response to chlorophenoxy acids at the level of proteins was analysed. The comparison of protein patterns after chemostatic growth on pyruvate and 2,4-DCPP facilitated the discovery of several proteins induced and repressed due to the substrate shifts. Many of the induced enzymes, for example two chlorocatechol 1,2-dioxygenases, are involved in the metabolism of 2,4-DCPP. A stronger induction of some catabolic enzymes (chlorocatechol 1,2-dioxygenase $TfdC_{II}$, chloromuconate cycloisomerase TfdD) caused by an instant increase in the concentration of 2,4-DCPP resulted in increased rates of productive detoxification and finally in resistance of the cells. Nevertheless, the decrease of the (*S*)-2,4-DCPP-specific 2-oxoglutarate-dependent dioxygenase in 2D gels reveals a potential bottleneck in 2,4-DCPP degradation. Well-known heat-shock proteins and oxidative-stress proteins play a minor role in adaptation, because apart from DnaK only a weak or no induction of the proteins GroEL, AhpC and SodA was observed. Moreover, the modification of elongation factor Tu (TufA), a strong decrease of asparaginase and the induction of the hypothetical periplasmic protein YceI point to additional resistance mechanisms against chlorophenoxy herbicides.
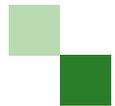
17. **Benndorf, D.**, **Loffhagen, N.**, **Härtig, C.**, **Babel, W.** (2004):
Growth on phenol at chemostress levels amplifies the expression of the phenol degradation pathway in *Acinetobacter calcoaceticus*
Eng.Life Sci. **4** (1), 38-42
Impact factor: 0, da neu im SCI
Abstract: Bacteria often use pollutants as sole carbon and energy sources. However, if they are toxic and the concentrations are high these compounds inhibit growth, and eventually poison the biocatalysts. In order to identify mechanisms contributing to stability, the protein patterns of *Acinetobacter calcoaceticus* during growth on potentially toxic phenol were analysed using two-dimensional gel electrophoresis. Enzymes involved in the catabolism or assimilation of phenol, such as phenol monooxygenase and catechol 1,2-dioxygenase, were induced at a more than twofold level in response to long-term exposure to high concentrations of the compound serving as the sole carbon and energy source. This would have clear adaptive benefits, since increased rates of consumption of phenol would reduce the susceptibility of *Acinetobacter calcoaceticus* to phenol poisoning. In contrast, transient induction of only one heat shock protein and one oxidative stress protein was detected during long-term exposure to high concentrations of phenol.

18. Berger, U., Hildenbrandt, H., **Grimm, V.** (2004):
Age-related decline in forest production: modelling the effects of growth limitation, neighbourhood competition and self-thinning
J.Ecol. **92** (5), 846-853
Impact factor: 2,833
Abstract: 1.In growing forest stands, above-ground net primary production peaks early in stand development and then declines. The causes for this decline are not yet well understood, but hypotheses include physiological and ecophysiological effects, as well as changes in stand structure due to local competition among neighbouring trees.
2. The majority of existing studies address mono-causal explanations of this decline. Here we study the combined effects of intrinsic growth limitation of individual trees, growth limitation due to neighbourhood competition, and self-thinning.
3. We use an individual-based model to analyse forest wood production of a mangrove species described by a sigmoidal growth function, and two hypothetical species with exponential or linear growth. The model reproduces a decline for all species investigated, even when individual growth rates did not become limited.
4. We conclude that individual, sigmoidal growth curves are sufficient but not necessary to explain the production decline in natural forests where neighbourhood competition is appreciably active.
5. We show that the causes for production decline change during forest development. Whereas growth reduction through neighbourhood competition is the main process at the beginning, imbalanced wood loss dominates the later stage of the decline.

19. **Bethge-Steffens, D.**, **Meißner, R.**, **Rupp, H.** (2004):
Development and practical test of a weighable groundwater lysimeter for floodplain sites
J.Plant Nutr.Soil Sc. **167** (4), 516-524
Impact factor: 0,985
Abstract: Presently, the soil water balance of flood-influenced soils in fluvial plains is insufficiently described. The new development of a weighable groundwater lysimeter is the basis for recording the water-balance components precipitation, evapotranspiration, groundwater recharge, capillary rise, and interaction with the water course. Soil-hydrologic measuring setups at two floodplain sites of the Elbe river serve for direct comparability of lysimeter measurements with data obtained on site. A groundwater control was designed for lysimeters that automatically adjusts the current groundwater level at the floodplain measuring setups and quantifies inflow into or outflow from the lysimeter. It turned out that the lysimeter developed is capable of identifying the individual water-balance quantities at high accuracy. Contrary to previous assumptions, it was possible to prove groundwater recharge for the floodplain sites.

20. Biedermann, W., Lücker, E., **Pörschmann, J.**, Lachhab, S., Truyen, U., Hensel, T. (2004):
Structural characterisation of some fatty acids from the brain as biomarkers of BSE risk material
Anal.Bioanal.Chem. **379** (7-8), 1031-1038
Impact factor: 1,715
Abstract: Identification of bovine and ovine tissue from the central nervous system (CNS: brain and spinal cord) in meat products is possible by using certain CNS fatty acids as biomarkers in GC-MS analysis. Furthermore, the relationship between the isomers of the tetracosenic acid (C24:1) is important for differentiation of the species and age of the CNS in view of the legal definition of specified risk material (SRM). This has so far been referred to as the *cis/trans* ratio of the isomers of nervonic acid; however, structural analysis was not performed. Here we present results from GC-MS structural analysis by retention time and DMDS adduct profiling of the even numbered monoenoic fatty acids from C18:1 to C26:1. Retention times and mass spectra of the FAME standards indicated that the so far designated *trans*-nervonic acid has a different isomeric structure in the tetracosenic acid from brain-sample extracts. By performing GC-MS analysis of DMDS adducts we have shown that this isomer was actually *cis*-17-tetracosenic acid in all species so far tested, not *trans*-15-tetracosenic acid (*trans*-nervonic acid). The tetracosenic acid isomer ratio proved to be species-specific in accordance with previous results. Thus, instead of the ratio of *cis/trans* isomers of nervonic acid, the ratio of 9/7-tetracosenic acid (15c-C24:1/17c-C24:1) will have to be used as a correct reference in future publications. Although *trans* isomers were not detectable in sheep and cattle brain, porcine brain contained, in addition to *cis*-17-tetracosenic acid, small amounts of the *trans* isomers of the C18:1, C20:1, C24:1, and C26:1 fatty acids, in decreasing quantities. In future, this might be useful as another means of differentiation between porcine CNS (non-SRM) and ovine or bovine CNS (SRM). Extensive follow-up studies must be performed to elucidate the extent to which this GC-MS approach will facilitate the detection of CNS according to the legal SRM definition.
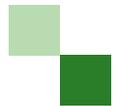
21. **Bittkau, A.**, **Geyer, R.**, **Bhatt, M.**, **Schlosser, D.** (2004):
Enhancement of the biodegradability of aromatic groundwater contaminants
Toxicology **205**, 201-210
Impact factor: 2,061
Abstract: Groundwater (GW) from the Bitterfeld industrial region, Central Germany, is contaminated mainly with monochlorobenzene (MCB). Accordingly, current research addresses the development of feasible in situ groundwater remediation technologies. Although easily degradable under aerobic conditions, MCB persists in the essentially anaerobic Bitterfeld aquifer. Therefore, we focused on primary oxidation of MCB and the subsequent anaerobic biodegradability of MCB oxidation products by the indigenous microbial community. In groundwater microcosms, most efficient MCB removal was observed upon treatment with Fenton's reagent (H_2O_2 + Fe^{2+}), which produces the highly reactive hydroxyl radical and Fe^{3+} simultaneously. Phospholipid fatty acid analysis following different treatments suggested respective shifts of the microbial community compositions, and indicated that Fenton's reagent had a rather beneficial than an adverse effect on biomass development. Potential metabolites of hydroxyl radical attack on MCB such as chlorohydroquinone, hydroquinone, catechol, resorcinol, and phenol were anaerobically degraded by the groundwater microbial community under Fe^{3+}-reducing conditions.

22. **Boehrer, B.**, **Tibke, M.**, **Suhr, U.** (2004):
Frontal progression of a juxtaposed ice cover on the Elbe river
J.Hydrol. **288** (3-4), 258-263
Impact factor: 1,354
Abstract: The passage of ice pans and the process of forming an ice cover on the Elbe river during winter 1996/1997 is described. The assumption of advecting ice pans, which assemble to a solid juxtaposed ice cover, yields a quantitative expression for the speed of the frontal progression of the ice front upriver. Observations along the Elbe river in the winter 1996/1997 over a distance of nearly 250 km, show that the progression speed indicates a consolidation by a factor of 1.27 when ice floes collide into and extend the ice front up-stream. Even in cases where nothing is known about the compaction the presented expression can be used as an upper limit for the progression of an ice front.

23. Boessmann, M., **Neu, T. R.**, Horn, H., Hempel, D. C. (2004):
Growth, structure and oxygen penetration in particle supported autotrophic biofilms
Water Sci.Technol. **49** (11-12), 371-377
Impact factor: 0,710
Abstract: Particle supported autotrophic biofilms were cultivated in external-loop airlift reactors at two different pumice concentrations. Oxygen microelectrodes were used to investigate substrate transport and conversion. A special flow cell was designed for the measurement of oxygen concentration profiles in the particle supported biofilms under defined hydrodynamic conditions. The oxygen concentration profiles inside the biofilms were found to be steeper at high flow velocities in the bulk phase of the flow cell compared to those at low flow velocities. Furthermore, the oxygen flux increased and the thickness of the concentration boundary layer decreased with increasing flow velocity. This dependence was found to be more pronounced in less dense biofilms out of airlift reactors with lower pumice concentrations. In addition confocal laser scanning microscopy (CLSM) was used to visualize the biofilm structure. The volume fractions of bacteria and extracellular polymeric substances (lectin-specific EPS-lycoconjugates) were measured in living fully hydrated biofilms. Both the microelectrode and CLSM measurement showed the influence of shear stress on particle supported biofilms. A higher particle concentration led to dense biofilms with a homogeneous surface, lower thickness of the concentration boundary layer and steeper oxygen concentration profiles. The combination of both techniques allows a detailed and quantitative characterisation of particle associated biofilm structure and function.

24. Böhme, L., **Böhme, F.**, **Langer, U.** (2004):
Spatial variability of enzyme activities in a 100-year old long-term field experiment
Biol.Fert.Soils **40** (3), 153-156
Impact factor: 1,152
Abstract: We attempted to clarify the importance of obtaining representative soil samples for microbiological purposes by comparing results from composite samples and individual cores taken at a depth of 30 cm from four different treatments at the Static Fertilisation Experiment in Bad Lauchstädt, Germany. As enzyme activities can be related to microbiological activities, we analysed alkaline phosphatase, -glucosidase and protease activities from the composite and individual samples. When comparing both kinds of samples, protease activity was found to be the most and -glucosidase activity the least variable parameter. Comparing just the individual cores, the greatest variation was found for alkaline phosphatase and the lowest variation for -glucosidase activity; however, the latter enzyme activity also showed significantly different values. Thus, care should be taken when sampling in the field for microbial purposes.

25. **Borsdorf, H.**, Nazarov, E. G., Eicemen, G. A. (2004):
Atmospheric pressure ionization and gas phase ion mobility studies of isomeric dihalogenated benzenes using different ionization techniques
Int.J.Mass Spectrom. **232** (2), 117-126
Impact factor: 2,361
Abstract: Ion mobility spectrometry (IMS) featuring different ionization techniques was used to analyze isomeric *ortho*-, *meta*- and *para*-dihalogenated benzenes in order to assess how structural features affect ion formation and drift behavior. The structure of the product ions formed was investigated by atmospheric pressure chemical ionization (APCI) mass spectrometry (MS) and IMS-MS coupling. Photoionization provided $[M]^+$ ions for chlorinated and fluorinated compounds while bromine was cleaved from isomers of dibromobenzene and bromofluorobenzene. This ionization technique does not permit the different isomers to be distinguished. Comparable ions and additional clustered ions were obtained using ^{63}Ni ionization. Depending on the chemical constitution, different clustered ions were observed in ion mobility spectra for the separate isomers of dichlorobenzene and dibromobenzene. Corona discharge ionization permits the most sensitive detection of dihalogenated compounds. Only clustered product ions were obtained. Corona discharge ionization enables the classification of different structural isomers of dichlorobenzene, dibromobenzene and bromofluorobenzene.

26. **Boßdorf, O.**, **Prati, D.**, **Auge, H.**, Schmid, B. (2004):
Reduced competitive ability in an invasive plant
Ecol Lett **7** (4), 346-353
Impact factor: 4,211
Abstract: One explanation for successful plant invaders is that they evolved to be more competitive. An intuitive prediction of this Evolution of Increased Competitive Ability (EICA) hypothesis never previously tested is that invasive populations should outcompete their native 'ancestors' in a common environment. We tested this idea in a diallel competition experiment with *Alliaria petiolata* where offspring from native and invasive populations were grown alone or in all pairwise combinations. While without competition, there were no differences between native and invasive populations, native populations outperformed invasive ones when competing against each other. Our results contradict the EICA hypothesis and we conclude that it does not not hold for *Alliaria petiolata*. Instead, we formulate a new ERCA (Evolutionary Reduced Competitive Ability) hypothesis: if there is less competition in the invasive range and competitive ability involves traits that have a fitness cost, then selection might act against it, thereby reducing intraspecific interactions too.
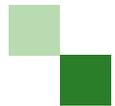
27. **Boßdorf, O.**, Schröder, S., **Prati, D.**, **Auge, H.** (2004):
Palatability and tolerance to simulated herbivory in native and introduced populations of
Alliaria petiolata (Brassicaceae)
Am.J.Bot **91** (16), 856-862
Impact factor: 2,373

Abstract: The European herb garlic mustard (*Alliaria petiolata*) is a serious invader of North American deciduous forests. One explanation for its success could be that in the absence of specialized herbivores, selection has favored less defended but more vigorous genotypes. This idea was addressed by comparing offspring from several native and introduced *Alliaria* populations with respect to their palatability to insect herbivores and their tolerance to simulated herbivory. Feeding rates of a specialist weevil from the native range were significantly greater on American plants, suggesting a loss of resistance in the introduced range. In contrast, there was significant population variation but no continent effect in the feeding rates of a generalist caterpillar. After simulated herbivory, *A. petiolata* showed a substantial regrowth capacity that involved changes in plant growth, architecture, and allocation. Removal of 75% leaf area or of all bolting stems reduced plant fitness to 81% and 58%, respectively, of the fitness of controls. There was no indication of a difference in tolerance between native and introduced *Alliaria* populations or of a trade-off between tolerance and resistance.

28. Böttcher, M. E., Khim, B. K., Suzuki, A., **Gehre, M.**, Wortmann, U., Brumsack, H. (2004):
Microbial sulfate reduction in deep sediments of the Southwest Pacific (ODP Leg 181, Sites 1119-1125): evidence from stable sulfur isotope fractionation and pore water modeling
Mar.Geol. **205** (1-4), 249-260
Impact factor: 1,497

Abstract: Interstitial water samples from seven ODP sites (Leg 181, Sites 1119-1125) of the southwestern Pacific Ocean have been analyzed for the stable sulfur isotopic composition of dissolved sulfate along with major and minor ions. Sulfate from the interstitial fluids (^{34}S values between +20.7 and +60‰ vs. the SO_2-based Vienna-Canyon Diablo troilite standard) was enriched in ^{34}S with respect to modern sea water (^{34}S~+20.6‰) indicating that microbial sulfate reduction takes place to different extents at all investigated sites. Microbial sulfate reduction (MSR) was found at all sites, the intensity depending on the availability of organic matter which is controlled by paleo-sedimentation conditions (sedimentation rate, presence of turbidites) and productivity. Microbial net sulfate reduction was additionally confirmed by modeling interstitial water sulfate profiles. Areal net sulfate reduction rates up to 14 mmol m^{-2} yr^{-1} have been calculated which were positively related to sedimentation rates. Total reduced inorganic sulfur (TRIS; essentially pyrite) as a product of microbial sulfate reduction was isotopically characterized in squeeze cake samples and gave ^{34}S values between -51 and +9‰ indicating pyrite formation both close to the sediment-water interface and later diagenetic contributions.

29. **Bozau, E.**, Leblanc, M., Seidel, J. L., **Stärk, H. J.** (2004):
Light rare earth elements enrichment in an acidic mine lake (Lusatia, Germany)
Appl.Geochem. **19** (3), 261-271
Impact factor: 1,804
Abstract: The distribution of Rare Earth Elements (REE) was investigated in the acidic waters (lake and groundwater) of a lignite mining district (Germany). The Fe- and SO_4-rich lake water (pH 2.7) displays high REE contents (e.g. La~70 g/l, Ce~160 g/l) and an enrichment of light REE (LREE) in the NASC normalised pattern. Considering the hydrodynamic model and geochemical data, the lake water composition may be calculated as a mixture of inflowing Quaternary and mining dump groundwaters. The groundwater of the dump aquifer is LREE enriched. Nevertheless, the leachates of dump sediments generally have low REE contents and display flat NASC normalised patterns. However, geochemical differences and REE pattern in undisturbed lignite (LREE enriched pattern and low water soluble REE contents) and the weathered lignite of the dumps (flat REE pattern and high water soluble REE contents) suggest that lignite is probably the main REE source rock for the lake water.

30. **Bräuer, K.**, Kämpf, H., Niedermann, S., **Strauch, G.**, **Weise, S. M.** (2004):
Evidence for a nitrogen flux directly derived from the European subcontinental mantle in the Western Eger Rift, central Europe
Geochim.Cosmochim.Ac. **68** (23), 4935-4947
Impact factor: 3,465
Abstract: In the Czech-German border region of the Vogtland and NW Bohemia (western Eger rift, Central Europe), chemical and isotopic compositions (C, N, He, Ar) of free gas from a thermal water escape (fluorite mine, Schönbrunn), two mineral springs ("Eisenquelle," Bad Brambach; "Sprudel III," Bad Elster) and a mofette (Bublak) located along an 40-km long traverse are reported. The gases of Bublak and Bad Brambach are CO_2 -rich (>99 vol.%) and have $d^{13}C$ values of -1.95 and -4.29‰, respectively. With distance from the center of CO_2 degassing (Bublak) the $d^{13}C$ values decrease, most likely due to physico-chemical fractionation of CO_2 between gaseous and aqueous phases rather than to admixture of organic/biogenic CO_2. The $d^{15}N$ values range between -3.2 and -0.6‰, compared to an upper mantle value of -4.0 ± 1.0‰. The four locations are characterized by $^3He/^4He$ ratios decreasing from 5.9 R_a in the center (Bublak) to 0.8 R_a in the periphery (Schönbrunn) and give evidence for mixing of He from a deep-seated magmatic source with a crustal source. The location with the highest $^3He/^4He$ ratio (5.9 R_a) is accompanied by the highest $^{40}Ar/^{36}Ar$ (550). We argue that the nitrogen of the Bublak mofette gas is a mixture of predominantly atmospheric and mantle-derived components, whereas at the other three locations crustal nitrogen may also be present. The Bublak $d^{15}N$ value of ~-4.5 ± 1.0‰ represents the first free gas $d^{15}N$ reference from the European subcontinental mantle (ESCM) and indicates that, in contrast to the $^3He/^4He$ ratios, the $d^{15}N$ values are equal for ESCM and MORB, respectively.

31. Breton, R., Purdy, R., **Schüürmann, G.** (2003):
Preface
QSAR Comb.Sci. **22** (1), 3-4
Impact factor: 1,558
Abstract: no abstract
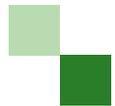
32. **Brüggemann, L.**, **Wennrich, R.** (2004):
Validation steps for traceability of linear calibrated chemical measurements
Accredit.Qual.Assur. **9** (8), 493-498
Impact factor: 0,637
Abstract: Based on the new draft of the EURACHEM/CITAC Guide Traceability in Chemical Measurement, this publication describes how traceability can be achieved for chemical measurements using a linear calibration function. Traceability can be accomplished without larger expenditure, if the measurement is calibrated on the basis of appropriate reference standards and the linear regression employed is selected and validated statistically in a suitable form. The determination of nickel in *aqua regia* eluates of sediment samples, employed for an ICP-OES measurement, is used as a practical illustration of this approach.

33. Clason, B., **Duquesne, S.**, **Liess, M.**, Schulz, R., Zauke, G.-P. (2003):
Bioaccumulation of trace metals in the Antarctic amphipod *Paramoera walkeri* (Stebbing, 1906): comparison of two-compartment and hyperbolic toxicokinetic models
Aquat.Toxicol. **65** (2), 117-140
Impact factor: 2,247
Abstract: Bioaccumulation of Cd, Pb, Cu and Zn in the Antarctic gammaridean amphipod *Paramoera walkeri* (Stebbing, 1906) was investigated at Casey station (Australian Antarctic Territory). The main goals were to provide information on accumulation strategies of the organisms tested and to verify toxicokinetic models as a predictive tool. The organisms accumulated metals upon exposure and it was possible to estimate significant model parameters of two-compartment and hyperbolic models. These models were successfully verified in a second toxicokinetic study. However, the application of hyperbolic models appears to be more promising as a predictive tool for metals in amphipods compared to compartment models, which have failed to adequately predict metal accumulation in experiments with increasing external exposures in previous studies. The following kinetic bioconcentration factors (BCFs) for the theoretical equilibrium were determined: 150-630 (Cd), 1600-7000 (Pb), 1700-3800 (Cu) and 670-2400 (Zn). We find decreasing BCFs with increasing external metal dosing but similar results for treatments with and without natural UV radiation and for the combined effect of different exposure regimes (single versus multiple metal exposure) and/or the amphipod collective involved (Beall versus Denison Island). A tentative estimation showed the following sequence of sensitivity of *P. walkeri* to an increase of soluble metal exposure: 0.2-3.0 g Cd l^{-1} , 0.12-0.25 g Pb l^{-1}, 0.9-3.0 g Cu l^{-1} and 9-26 g Zn l^{-1}. Thus, the amphipod investigated proved to be more sensitive as biomonitor compared to gammarids from German coastal waters (with the exception of Cd) and to copepods from the Weddell Sea inferred from literature data.

34. **Daus, B.**, **Wennrich, R.**, **Weiß, H.** (2004):
Sorption materials for arsenic removal from water: a comparative study
Water Res. **38** (12), 2948-2954
Impact factor: 1,812

Abstract: Five different sorption materials were tested in parallel for the removal of arsenic from water: activated carbon (AC), zirconium-loaded activated carbon (Zr-AC), a sorption medium with the trade name 'Absorptionsmittel 3' (AM3), zero-valent iron (Fe^0), and iron hydroxide granulates (GIH). Batch and column tests were carried out and the behavior of the two inorganic species (arsenite and arsenate) was investigated separately. The sorption kinetics of arsenate onto the materials followed the sequence Zr-AC>>GIH=AM3>Fe^0>AC. A different sequence was obtained for arsenite (AC>>Zr-AC=AM3=GIH=Fe^0). AC was found to enhance the oxidation reaction of arsenite in anaerobic batch experiments. The linear constants of the sorption isotherms were determined to be 377, 89 and 87 for Zr-AC, AM3 and GIH, respectively. The uptake capacities yielded from the batch experiment were about 7 g l^{-1} for Zr-Ac and 5 g l^{-1} for AM3.
Column tests indicated that arsenite was completely removed. The best results were obtained with GIH, with the arsenate not eluting before 13 100 pore volumes (inflow concentration 1 mg l^{-1} As) which corresponds to a uptake capacity of 2.3 mg g^{-1} or 3.7 g l^{-1}.

35. Dayeh, V. R., Chow, S., **Schirmer, K.**, Lynn, D. H., Bols, N. C. (2004):
Evaluating the toxicity of Triton X-100 to protozoan, fish, and mammalian cells using fluorescent dyes as indicators of cell viability
Ecotoxicol.Environ.Safety **57** (3), 375-382
Impact factor: 0,983

Abstract: Three viability assays using fluorescent dyes effectively detected a loss of viability in cultures of three mammalian cell lines (H4IIE, Caco2, and HepG-2), two fish cell lines (RTgill-W1 and RTL-W1), and a ciliated protozoan, *Tetrahymena thermophila,* after exposure to Triton X-100, used as a model toxicant. The dyes were Alamar Blue (AB), neutral red (NR), and propidium iodide, which respectively monitored energy metabolism, lysosomal activity, and membrane integrity. A fourth fluorescent dye, 5-carboxyfluorescein diacetate acetoxymethyl ester, was problematic. For 2-h Triton X-100 exposures, mammalian cell lines were as susceptible as piscine cell lines, whereas *T. thermophila* was approximately twofold less sensitive as detected with AB and NR. Despite being less sensitive, cytotoxicity tests on *T. thermophila* could be done in spring water, which means that unlike animal cells they could be directly exposed to most industrial effluents without osmolality adjustments. Therefore, *T. thermophila* could be a useful complement to animal cells as alternatives to fish in toxicity testing.
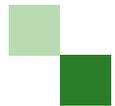
36. Dearden, J. C., **Schüürmann, G.** (2003):
Quantitative structure-property relationships for predicting Henry´s law constant from molecular structure
Environ.Toxicol.Chem. **22** (8), 1755-1770
Impact factor: 2,013
Abstract: Various models are available for the prediction of Henry's law constant (H) or the air-water partition coefficient (K_{aw}), its dimensionless counterpart. Incremental methods are based on structural features such as atom types, bond types, and local structural environments; other regression models employ physicochemical properties, structural descriptors such as connectivity indices, and descriptors reflecting the electronic structure. There are also methods to calculate H from the ratio of vapor pressure (p_v) and water solubility (S_w) that in turn can be estimated from molecular structure, and quantum chemical continuum-solvation models to predict H via the solvation-free energy ($?G_s$). This review is confined to methods that calculate H from molecular structure without experimental information and covers more than 40 methods published in the last 26 years. For a subset of eight incremental methods and four continuum-solvation models, a comparative analysis of their prediction performance is made using a test set of 700 compounds that includes a significant number of more complex and drug-like chemical structures. The results reveal substantial differences in the application range as well as in the prediction capability, a general decrease in prediction performance with decreasing H, and surprisingly large individual prediction errors, which are particularly striking for some quantum chemical schemes. The overall best-performing method appears to be the bond contribution method as implemented in the HENRYWIN software package, yielding a predictive squared correlation coefficient (q^2) of 0.87 and a standard error of 1.03 log units for the test set.

37. **Dormann, C. F.**, van der Wal, R., Woodin, S. J. (2004):
Neighbour identity modifies effects of elevated temperature on plant performance in the High Arctic
Global Change Biol **10** (9), 1587-1598
Impact factor: 4,152
Abstract: Competition among plants in extreme environments such as the High Arctic has often been described as unimportant, or even nonexistent; environmental factors are thought to overrule any negative plantplant interactions. However, few studies have actually addressed this question experimentally in the Arctic, and those that did found only little evidence for competition. Such species interactions will presumably become more important in the future, as Global Climate Change takes effect on terrestrial ecosystems. We investigated plantplant interactions in the High Arctic, following the growth of *Luzula confusa* and *Salix polaris* in pure and mixed stands, and under elevated-temperature treatment over 2 years. To understand the mechanisms of competition, a parallel experiment was undertaken in phytotrons, manipulating competition, temperature and nutrient availability. Our findings indicate that competition is acting in the natural vegetation, and that climatic warming will alter the balance of interactions in favour of the dwarf shrub *S. polaris*. The phytotron experiment suggested that the mechanism is a higher responsiveness of *Salix* to nutrient availability, which increased under warming in the field. While *Luzula* showed a positive response to higher temperature in the lab, its performance in mixed stands in the field was actually reduced by warming, indicating a competitive repression of growth by *Salix*. The growth of *Salix* was also reduced by the presence of *Luzula*, but it was still able to profit from warming. Our findings suggest that climatic warming will result in greater shrub dominance of High Arctic tundra, but we also conjecture that grazing could reverse the situation to a graminoid-dominated tundra. These two divergent scenarios would have different implications for ecosystem feedbacks to climatic change.

38. **Drechsler, M.** (2004):
Model-based conservation decision aiding in the presence of goal conflicts and uncertainty
Biodivers Conserv **13** (1), 141-164
Impact factor: 1,060
Abstract: Goal conflicts and uncertainty are two major problems in decision-making for conservation and species protection. Conflicts can often be found between ecological goals on the one hand and socio-economic goals on the other, but also among different ecological goals. They can be formally analysed by methods of multi-criteria analysis. As the solution of a multi-criteria decision problem usually depends on the weights put on the individual criteria (objectives), sensitivity and robustness analyses are necessary to understand the decision problem, concentrate on the essential aspects, and support actual decision processes fully. Uncertainty in the decision problem is often caused by scarcity of information needed to predict the consequences of management actions. The so-called outranking concept proved very useful in the consideration of such uncertainty. Based on a simple fictitious case study the paper demonstrates how multi-criteria decision analysis (in particular the PROMETHEE outranking method) in combination with population model analysis can assist in conservation biological decision-making.

39. **Drechsler, M.**, Burgman, M. A. (2004):
Combining population viability analysis with decision analysis
Biodivers Conserv **13** (1), 115-139
Impact factor: 0,781
Abstract: Management of endangered species requires methods to assess the effects of strategies, providing a basis for deciding on a best course of action. An important component of assessment is population viability analysis (PVA). The latter may be formally implemented through decision analysis (DA). These methods are most useful for conservation when used in conjunction. In this paper we outline the objectives and the potential of both frameworks and their overlaps. Both are particularly helpful when dealing with uncertainty. A major problem for conservation decision-making is the interpretation of observations and scientific measurements. This paper considers probabilistic and non-probabilistic approaches to assessment and decision-making and recommends appropriate contexts for alternative approaches.
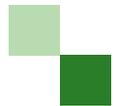
40. **Duquesne, S.**, **Liess, M.** (2003):
Increased sensitivity of the macroinvertebrate *Paramorea walkeri* to heavy-metal contamination in the presence of solar UV radiation in Antarctic shoreline waters
Mar.Ecol.-Prog.Ser. **255**, 183-191
Impact factor: 2,222
Abstract: A previous laboratory investigation showed that the Antarctic gammarid amphipod *Paramorea walkeri* is more sensitive to heavy metals when exposed to UV-B radiation. The question addressed in this study is whether this effect is also observed when the species is exposed to combined solar UV radiation and heavy-metal contamination under field conditions. *In situ* bioassays using *P. walkeri* showed that exposure to field contamination resulted in a significant decrease of survival. The effects observed were stronger than expected according to the characteristics of the contamination. The hypothesis that solar UV radiation can increase the sensitivity of organisms to metal contaminants was thus tested in an outdoor test system. This revealed that the mortality recorded under exposure to both parameters was increased compared to mortalities resulting from exposure to each single parameter. This increased sensitivity of amphipods to heavy metals in the presence of UV-radiation is discussed as an explanation for the absence of this species in contaminated shallow waters. The effects observed at the individual level would thus be reflected at a population level. This work highlights the necessity to consider environmental parameters such as UV radiation in Antarctica to improve the predictive power in ecological risk assessment.

41. **Durka, W.**, **Boßdorf, O.**, Gautschi, B. (2004):
Isolation and characterization of microsatellite loci in the invasive *Alliaria petiolata* (Brassicaceae)
Mol Ecol Notes **4** (2), 173-175
Impact factor: 1,145
Abstract: Eight novel polymorphic microsatellite loci are presented for garlic mustard (*Alliaria petiolata,* Brassicaceae) a European herb that is a serious invader of North American deciduous forests. The microsatellites will be useful tools to analyse pathways of introduction of garlic mustard, as well as its evolutionary potential in the invasive range.

42. Einax, J. W., **von Tümpling jr, W.**, Zehl, K. (2004):
Bindungsverhalten ausgewählter Elemente in Sedimenten eines sauren Tagebaurestsees
Acta Hydroch.Hydrob. **32** (1), 7-15
Impact factor: 0,460
Abstract: Zur wirtschaftlichen Nutzung saurer Tagebaurestseen sind zur Erarbeitung von Sanierungskonzepten und zu deren Anwendung detaillierte Kenntnisse hinsichtlich Wasserkörper und Sediment notwendig. Die vorliegende Arbeit hat das Bindungsverhalten und die vertikale Verteilung von ausgewählten Elementen (Aluminium, Blei, Cobalt, Eisen, Kupfer, Mangan, Nickel, Zink) im Sediment des sauren Tagebaurestsees 111 (Niederlausitz) zum Gegenstand. Ziel der Untersuchungen war eine Schätzung des vom Sediment ausgehenden Gefährdungspotentials durch die ausgewählten Metalle.

43. Farag, S., Dijst, M., **Lanzendorf, M.** (2003):
Exploring the use of e-shopping and its impact on personal travel behavior in the Netherlands
Transp.Res.Rec. **1858** (Paper No. 03-3058), 47-54
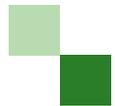Impact factor: 0,139
Abstract: no abstract

44. Fauville, A., Mayer, B., Frömmichen, R., **Friese, K.**, Veizer, J. (2004):
Chemical and isotopic evidence for accelerated bacterial sulphate reduction in acid mining lakes after addition of organic carbon: laboratory batch experiments
Chem.Geol. **204** (3-4), 325-344
Impact factor: 2,330

Abstract: Acid mine drainage is a widespread environmental problem in Lusatia in the eastern part of Germany, where extensive brown coal and lignite mining was carried out during the last century. As a result of oxidation of pyrite in strip mine dumps of this region, numerous mine drainage lakes have pH values <3 and are characterized by high concentrations of dissolved sulphate and ferrous iron. Using chemical and isotopic techniques, we tested in laboratory bottle experiments the extent to which the addition of degradable organic carbon to acid lake water and sediments could stimulate bacterial (dissimilatory) sulphate reduction. The overall goal was to evaluate whether bacterial sulphate reduction, and subsequent formation of sedimentary sulphide minerals, could generate enough alkalinity to potentially neutralize the acid lakes in Lusatia.

Pyruvate, glucose, succinic acid, lactate, ethanol, acetate, and various industrial by-products were added in various concentrations to original lake water and sediments in glass bottles and incubated between 4 and 12 weeks in darkness. The extent of bacterial sulphate reduction was determined by analyzing the concentrations and the isotopic compositions of sulphate in the water column, and the contents and ^{34}S values of various sedimentary sulphur compounds at the beginning and the end of the experiments. Bacterial sulphate reduction was significantly enhanced after addition of pure substances (lactate, pyruvate, acetate, and ethanol) resulting in elevated pH values (4.5 to 6.0) in the bottle water at the end of the experiments. Cheap industrial by-products (whey, molasses, Pfezi-granules, and Carbokalk) as organic carbon source were also shown to be effective in enhancing bacterial sulphate reduction, thereby increasing the pH value of the bottle water. In general, the addition of selected organic carbon compounds enhanced sufficiently bacterial sulphate reduction and the formation of sedimentary sulphur minerals, generating enough alkalinity for raising the pH of the bottle water to near-neutral values. Further research in enclosures and under field conditions is needed to determine whether this technique constitutes a feasible remediation strategy for the acid lakes in Lusatia.

45. Fedotov, P. S., **Bauer, C.**, **Popp, P.**, **Wennrich, R.** (2004):
Dynamic extraction in rotating coiled columns, a new approach to direct recovery of polycyclic aromatic hydrocarbons from soils
J.Chromatogr.A **1023** (2), 305-309
Impact factor: 2,922

Abstract: A new approach to the direct recovery of polycyclic aromatic hydrocarbons (PAHs) from environmental solid samples has been proposed. It has been shown that rotating coiled columns (RCCs) earlier used mainly in countercurrent chromatography can be successfully applied to the fast continuous-flow extraction of PAHs from soils. A particulate solid sample was retained in the rotating column as the stationary phase under the action of centrifugal forces while a mixture of organic solvents (acetone-cyclohexane, 1:1, v/v) was continuously pumped through. The separation procedure requires less than half an hour, complete automation being possible. No clean-up step is needed before the subsequent HPLC- analysis of extracts. Besides, the dynamic multistage extraction performed in the rotating column at room temperature and normal pressure may have nearly the same efficiency as accelerated batch solvent extraction repeated three times at 150 °C and 14 MPa. Contents of PAHs in extracts obtained by using both methods are in good agreement with the certified data on the PAHs concentrations in the soil samples. The use of appropriate "mild" solvents for the dynamic extraction in rotating columns may be very perspective for the simulation of naturally occurring processes and determination of environmentally-relevant forms of PAHs and other pollutants in environmental solids. A particular emphasis could be placed on time-resolved (kinetic) studies of the mobilization of toxicants in soil systems.

46. Fennell, D. E., **Nijenhuis, I.**, Wilson, S. F., Zinder, S. H., Häggblom, M. H. (2004):
Dehalococcoides ethenogenes strain 195 reductively dechlorinates diverse chlorinated aromatic pollutants
Environ.Sci.Technol. **38** (7), 2075-2081
Impact factor: 3,592

Abstract: *Dehalococcoides ethenogenes* strain 195 dechlorinates tetrachloroethene to vinyl chloride and ethene, and its genome has been found to contain up to 17 putative dehalogenase gene homologues, suggesting diverse dehalogenation ability. We amended pure or mixed cultures containing *D. ethenogenes* strain 195 with 1,2,3,4-tetrachlorodibenzo-*p*-dioxin, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin, 2,3-dichlorodibenzo-*p*-dioxin, 1,2,3,4-tetrachloro-dibenzofuran, 2,3,4,5,6-pentachlorobiphenyl, 1,2,3,4-tetrachloronaphthalene, various chlorobenzenes, or a mixture of 2-, 3-, and 4-chlorophenol to determine the dehalogenation ability. *D. ethenogenes* strain 195 dechlorinated 1,2,3,4-tetrachlorodibenzo-*p*-dioxin to a mixture of 1,2,4-trichlorodibenzo-*p*-dioxin and 1,3-dichlorodibenzo-*p*-dioxin. 2,3,4,5,6- Pentachlorobiphenyl was dechlorinated to 2,3,4,6- and/or 2,3,5,6-tetrachlorobiphenyl and 2,4,6-trichlorobiphenyl. 1,2,3,4-Tetrachloronaphthalene was dechlorinated primarily to an unidentified dichloro-naphthalene congener. The predominant end products from hexachlorobenzene dechlorination were 1,2,3,5-tetrachloro-benzene and 1,3,5-trichlorobenzene. We did not detect dechlorination daughter products from monochlorophenols, 2,3-dichlorodibenzo-*p*-dioxin or 2,3,7,8- tetrachlorodibenzo-*p*-dioxin. *D. ethenogenes* strain 195 has the ability to dechlorinate many different types of chlorinated aromatic compounds, in addition to its known chloroethene respiratory electron acceptors. Remediation of sediments contaminated with aromatic halogenated organic pollutants such as polychlorinated biphenyls and polychlorinated dibenzo-*p*-dioxins could require billions of dollars in the coming years. Harnessing microorganisms such as *Dehalococcoides* spp. that detoxify these compounds via removal of halogens may lead to cost-effective biotechnological approaches for remediation.

47. **Fischäder, G.**, **Wichmann, G.**, **Mühlenberg, J.**, Kulla, C., **Rehwagen, M.**, Nieber, K., **Lehmann, I.** (2004):
An in vitro experimental model for the determination of immunomodulating effects by volatile compounds
Immunobiology **209** (4-6), 468-469
Impact factor: 1,773
Abstract: no abstract

48. Fischer, R., **Seidel, H.**, Rahner, D., **Morgenstern, P.**, **Löser, C.** (2004):
Elimination of heavy metals from leachates by membrane electrolysis
Eng.Life Sci. **4** (5), 438-444
Impact factor: 0; da neu im SCI
Abstract: The elimination of heavy metals from bioleaching process waters (leachates) by electrolysis was studied in the anode and cathode region of a membrane electrolysis cell at current densities of 5-20 mA/cm^2 using various electrode materials. The leaching waters containing a wide range of dissolved heavy metals, were high in sulfate, and had pH values of approx. 3. In preliminary tests using a rotating disc electrode the current density-potential curve (CPK) was recorded at a rotation velocity of 0, 1000 and 2000 rpm and a scan rate of 10 mV/s in order to collect information on the influence of transport processes on the electrochemical processes taking place at the electrodes. The electrochemical deposition-dissolution processes at the cathode are strongly dependent on the hydrodynamics. Detailed examination of the anodic oxidation of dissolved Mn(II) indicated that the manganese dioxide which formed adhered well to the electrode surface but in the cathodic return run it was again reduced. Electrode pairs of high-grade steel, lead and coal as well as material combinations were used to investigate heavy metal elimination in a membrane electrolysis cell. Using high-grade steel, lead and carbon electrode pairs, the reduction and deposition of Cu, Zn, Cr, Ni and some Cd in metallic or hydroxide form were observed in an order of 10-40 % in the cathode chamber. The dominant process in the anode chamber was the precipitation of manganese dioxide owing to the oxidation of dissolved Mn(II). Large amounts of heavy metals were co-precipitated by adsorption onto the insoluble MnO$_2$. High-grade steel and to some extent lead anodes were dissolved and hence were proven unsuitable as an anode material. These findings were largely confirmed by experiments using combination electrodes of coal and platinized titanium as an anode material and steel as a cathode material. With both electrode combinations and current densities of 5 or 10 mA/cm^2, in the cathode region low depositions of 10-20 % Cd, 2-10% Mn, 5-20 % Zn, 1-20 % Co and 5-15 % Ni were measured. By contrast, the elimination of other metals was substantially larger: Fe 40 - 60 %, Cu 20-40 %, and Cr 40-60 %. In the anode region the removal of heavy metals was in the order of 30-50%, with Mn being as high as 80 %. The anode materials exhibit good resistance at the current densities tested. The precipitates deposited in both electrode regions contained as main components Al with 10-20 %, Mg with approximately 10 %, and SO$_4$ with 5-20 %. The solid material in the cathode chamber consisted of relatively high proportions of Zn and Mn. Calcium in the solids indicated the co-precipitation of calcium sulfate. The main components in the solids of the anode chamber were Mn in the form of pyrolusite, Al as basic sulfate, and Mg. The results indicate that electrochemical metal separation in the membrane electrolysis cell can represent a practical alternative to the metal separation by alkalization. Regarding the main heavy metals Zn, Mn and Ni in the process water, combination electrodes using steel as a cathode material and coal or platinized titanium as an anode material proved to be suitable for eliminating the heavy metals from the aqueous phase. However, for practical application, further work is necessary to improve the efficiency, applicability and costs of the process.

49. **Franck, U.**, **Tuch, T.**, **Manjarrez, M.**, Wiedensohler, A., **Herbarth, O.** (2004):
Submicrometer and ultrafine airborne particles in a residential home in a street canyon with dense traffic
J.Aerosol Sci. **35** (Suppl. 2), 859-860
Impact factor: 1,738
Abstract: no abstract

50. **Frank, K.** (2004):
Ecologically differentiated rules of thumb for habitat network design - lessons from a formula
Biodivers Conserv **13** (1), 189-206
Impact factor: 1,060
Abstract: The present paper addresses the following typical question of metapopulation management: What habitat distribution is optimal for metapopulation persistence if a habitat network with a given number and configuration of patches is considered?. By utilizing a generic metapopulation model and performing a special model analysis, rules of thumb for optimum habitat distribution and a general Principle of Optimality are derived. The whole study is based on the application of a formula for the mean lifetime of metapopulations derived in a previous study. Finally, some general conclusions are drawn concerning the potential of using PVA techniques for deriving tools for decision support for conservation management.

51. **Friese, K.**, Frömmichen, R., Witter, B., Müller, H. (2004):
Determination of trace metals in the freshwater leech *Erpobdella octoculata* of the Elbe River - evaluation of the analytical protocol
Acta Hydroch.Hydrob. **31** (4-5), 346-355
Impact factor: 0,460
Abstract: A composite procedure to determine heavy metals in the freshwater leech *Erpobdella octoculata* (L.) (Annelidae: Hirudinea) of the Elbe river has been developed. All stages of the analytical process were checked, including the sampling procedure, sample preparation, and validation of the analysis by inductively coupled plasma mass spectrometry (ICP-MS) and atomic absorption spectrometry (AAS). The elements chromium, manganese, copper, zinc, cadmium, mercury, arsenic, and lead were determined. To ensure the quality of the results, the CRM NRC Dorm-1 (dogfish muscle) and Nist 1643c (river water) were analyzed on a parallel basis. A first overview on recent contamination of leeches in the river Elbe (Germany) was gained with the newly developed procedure.

52. **Fritz, G. J.**, **Herbarth, O.** (2004):
Asthmatic disease among urban preschoolers: an observational study
Int.J.Hyg.Environ.Health **207** (1), 23-30
Impact factor: 1,085

Abstract: Asthma is of increasing concern especially in industrialized countries. This cross-sectional study was to assess the influence of spatial and temporal variations in the urban air pollution profile on asthmatic disease. The prevalences presented are based on physician-diagnosed asthmatic and allergic disease data, collected between 1993 and 1995. Seven hundred and thirty-six preschool children (age 2 to 7, mean 5.7 years) of 37 daycare centres in the City of Leipzig participated in the study. Variations were observed in the lifetime prevalences of asthma and allergy with differences in a residential area's ambient pollution profile. Depending on the level of traffic (high or low), children residing in areas with a dominant coal-heating emission profile had more frequently a diagnosis of asthma, 17.5% and 8.8% (95% confidence intervals [CI]: 10.8…23.5 and 5.8…11.6, respectively), as compared to those, living in centrally heated areas 13.4% and 5.8% (CI: 6.6…19.3 and 1.2…9.6, respectively). Allergic disorders occurred more often in areas with a predominantly traffic-associated pollution profile, 14.3% and 9.6% vs. 5.8% and 3.7% (CI: 7.4…20.3 and 6.4…12.5; 1.2…9.6 and 0.2…6.5, respectively). Interestingly, asthmatic disease was not necessarily associated with a clinical history of allergies. Of the children with physician-diagnosed asthma, 83.7% were not reported to have a concurrent diagnosis of allergies nor to show clinical symptoms. This suggests that environmental exposures (i.e., complex pollution mixtures associated with residential coal-heating and/or traffic) may have differentially influenced the phenotypic expression of asthma. A qualitative discussion is presented on the occurrence of "asthma without reported allergies" in Leipzig.

53. Frömmichen, R., **Wendt-Potthoff, K.**, **Friese, K.**, Fischer, R. (2004):
Microcosm studies for neutralization of hypolimnic acid mine pit lake water (ph 2.6)
Environ.Sci.Technol. **38** (6), 1877-1887
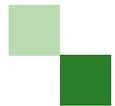Impact factor: 3,592

Abstract: Ten microcosms of 0.088 m^3 water volume (0.3 m i.d. and 1.20 m height) were designed for neutralization studies representing hypolimnic ecosystem models for acid mine pit lakes. Sediment and water were collected from an acid lignite mine pit lake (Brandenburg, Germany) and filled into the microcosms. To determine the efficacy of controlled in situ organic carbon amendments as a possible neutralization method, sediment and water were treated with ethanol and Carbokalk with and without wheat straw. The water chemistry was monitored for 1 yr. At start-up and end of the experiments, the sediment was characterized. Iron and sulfate were removed with varying intensity from the water phase as a result of microbial iron and sulfate reduction together with a subsequent precipitation of unsoluble sulfide minerals to the sediment. The pH rose, and alkalinity generation and bacterial growth were observed. Neutralization rates were calculated using equivalents of accumulated total reduced inorganic sulfur together with the nonsulfidic reactive ferrous iron in the sediment. In the treated microcosms, the neutralization rates were between 6 and 15 equiv m^{-2} a^{-1}. Carbokalk was most effective in stimulating growth of sulfate-reducing bacteria and probably also served as inoculum. With Carbokalk together with wheat straw, the pH increased from 2.6 to around 6.5 within the whole microcosm. The critical revision of the results indicates that the application of Carbokalk (approximately 3.9 kg m^{-2}) together with the application of wheat straw (approximately 9.3 kg m^{-2}) is most suitable for further experiments in outdoor enclosures (mesocosms). For that case, the prediction of the water quality for a lake water column after multiple lake turnover events is presented based on batch reaction simulation using the geochemical model PHREEQC.
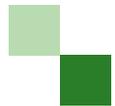
54. **Gehre, M.**, Geilmann, H., Richter, J., Werner, R. A., Brand, W. A. (2004):
Continuous flow ^{2}H/^{1}H and ^{18}O/^{16}O analysis of water samples with dual inlet precision
Rapid.Comm.Mass.Spectrom. **18** (22), 2650-2660
Impact factor: 2,789
Abstract: A method for isotope ratio analysis of water samples is described comprising an on-line high-temperature reduction technique in a helium carrier gas. Using a gas-tight syringe, injection of 0.5 to 1 L sample is made through a heated septum into a glassy carbon reactor at temperatures in excess of 1300°C. More than 150 injections can be made per day and both isotope ratios of interest, ^{2}H and ^{18}O, can be measured with the same setup. The technique has the capability to transfer high-precision stable isotope ratio analysis of water samples from a specialized to a routine laboratory task compatible with other common techniques (automated injection for GC, LC, etc.). Experiments with an emphasis on the reactor design were made in two different laboratories using two different commercially available high-temperature elemental analyser (EA) systems. In the Jena TC/EA unit, sample-to-sample memory (single injection) has been reduced to 1% and high precision of about 0.1 for ^{18}O and < 1 for ^{2}H has been achieved by a redesign of the glassy carbon reactor and by redirecting the gas flow of the commercial TC/EA unit. With the modified reactor, the contact of water vapour with surfaces other than glassy carbon is avoided completely. The carrier gas is introduced at the bottom of the reactor thereby flushing the outer tube compartment of the tube-in-tube assembly before entering the active heart of the reactor. With the Leipzig high-temperature reactor (HTP) similar precision was obtained with a minor modification (electropolishing) of the injector metal sleeve. With this system, the temperature dependence of the reaction has been studied between 1100 and 1450°C. Complete yield and constant isotope ratio information has been observed only for temperatures above 1325°C. For temperatures above 1300°C the reactor produces an increasing amount of CO background from reaction of glass carbon with the ceramic tube. This limits the usable temperature to a maximum of 1450°C. Relevant gas permeation through the Al_2O_3 walls has not been detected up to 1600°C.

55. Gehring, U., Bischof, W., Borte, M., **Herbarth, O.**, Wichmann, H. E., Heinrich, J. (2004):
Levels and predictors of endotoxin in mattress dust samples from East and West German homes
Indoor Air **14** (4), 284-292
Impact factor: 2,035
Abstract: EastWest differences in prevalence of asthma and allergies were suggested to be associated with lifestyle factors. To describe endotoxin levels in mattress dust samples from East and West German homes collected approximately 10 years after reunification. To identify factors that may account for an EastWest difference. Dust was collected from mattresses of 2157 infants and 2108 mothers living in Leipzig (former East Germany) and Munich (West Germany). Endotoxin was measured using a chromogenic kinetic Limulus amoebocyte lysate test. Data on bedding, dwelling, and housing characteristics, and occupants' behavior were collected using a self-administered questionnaire. Endotoxin levels were significantly higher in Leipzig compared with Munich for the infants' mattresses but not for the mothers' mattresses. Apart from this, predictors for the mothers' and the infants' mattresses were very similar. Pet-ownership and contact with animals outside the home were most influential. Endotoxin levels in mattress dust were highest in summer and increased with the number of persons living in the household. The overall percentage of variability in endotoxin levels explained by these factors was low. Endotoxin levels were associated with lifestyle factors discussed within the framework of the hygiene hypothesis. None of these factors explains the difference in infant's mattress dust endotoxin between Leipzig and Munich or could be used as a surrogate for endotoxin.

56. **Geyer, R.**, Peacock, A. D., White, D. C., Lytle, C., van Berkel, G. J. (2004):
Atmospheric pressure chemical ionization and atmospheric pressure photoionization for simultaneous mass spectrometric analysis of microbial respiratory ubiquinones and menaquinones
Journal of Mass Spectrometry **39** (8), 922-929
Impact factor: 2,875

Abstract: An atmospheric pressure photoionization (APPI) source and an atmospheric pressure chemical ionization (APCI) source were compared for the selective detection of microbial respiratory ubiquinone and menaquinone isoprenologues using tandem mass spectrometry. Ionization source- and compound mass-dependent parameters were optimized individually for both sources, using the available quinone standards. Detection levels for the two ion sources were determined with ubiquinone-6 (UQ_6) and menaquinone-4 (MK_4, vitamin K_2) standards using flow injection analysis and selected reaction monitoring (SRM). With APPI the calculated lower limit of detection (LLOD) was 1.7 fmol μl^{-1} for UQ_6 and 2.2 fmol μl^{-1} for MK_4 at a signal-to-noise ratio of 3. These LLODs were at least three times lower than with APCI. The selectivity of detection afforded by SRM detection reduced complex mixture analysis to 3 min per sample by eliminating the need for chromatographic separations. The detection method was successfully applied to quinone quantification in a variety of environmental samples and cell cultures. Adequate amounts of respiratory quinones can be extracted and quantified from samples containing as low as 2×10^7 cells.

57. Giupponi, C., **Mysiak, J.**, Fassio, A., Cogan, V. (2004):
MULINO-DSS: a computer tool for sustainable use of water resources at the catchment scale
Math.Comput.Simul. **64** (1), 13-24
Impact factor: 0,558

Abstract: MULINO, an ongoing project financed by the European Commission, has released the prototype of a Decision Support System software (mDSS) for the sustainable management of water resources at the catchment scale. The software integrates socio-economic and environmental modelling, with geo-spatial information and multi-criteria analysis. The policy background refers to the EU Water Framework Directive. The challenging multi-disciplinary context was approached by developing an innovative and dynamic implementation of the DPSIR framework, originally proposed by the European Environmental Agency. In mDSS integrated assessment modelling provides the values of quantitative indicators to be used for transparent and participated decisions, through the application of value functions, weights and decision rules chosen by the end user. Simple routines for the sensitivity analysis and comparison of alternative weight vectors also provides effective decision support by exploring and finding compromises between conflicting interests/perspectives in a multi-stakeholder context.

58. Godlinski, F., Leinweber, P., **Meißner, R.**, **Seeger, J.** (2004):
Phosphorus status of soil and leaching losses: results from operating and dismantled lysimeters after 15 experimental years
Nutr.Cycl.Agroecosys. **68** (1), 47-57
Impact factor: 0,671

Abstract: The objectives of the present study were: (1) to evaluate the predicting value of the most important European soil P tests for P leaching losses; and (2) to investigate how these soil P tests reflect the development of P depth profiles in original homogeneous soils of lysimeters. The study included more than 100 lysimeters, located at the Lysimeter Station Falkenberg/Saxony-Anhalt, UFZ-Centre for Environmental Research Leipzig-Halle GmbH, Germany. Soil textures were sand, sandy loam, loam and silt. The management forms were arable land, grassland and fallow with various variation in fertilisation, crop rotation and irrigation. Samples were collected from the A-horizons and from the whole profiles of eight set-aside and dismantled lysimeters at 10-cm sections. The concentrations of total P were determined monthly in the leachates and evaluated for a three-year period. The concentrations of P extracted by ammonium acetate lactate (AL-P), double lactate (DL-P), sodium bicarbonate (Olsen-P) and ammonium oxalate (OX-P) as well as P_t were significantly correlated with each other (*P*<0.05-*P*<0.001) for arable soils. The relevant regression coefficients were strongly influenced by soil texture, soil use and management. The mean annual P concentrations of the leachates were in the range 0.4-1.2 mg l^{-1} for sands and <0.001-0.1 mg l^{-1} for the textures sandy loam, loam and silt. These corresponded to P leaching losses of 0.001-2846 g ha^{-1} yr^{-1}. Mean annual and maximum P concentrations and leaching losses were significantly (*r*>0.954, *P*<0.001) predicted by the OX-P concentrations of arable topsoils in lysimeters filled with sand. For sandy loam under grass the agronomic soil P tests (AL-P, DL-P and Olsen-P) enabled reasonable predictions of P in leachate. Under arable use, factors such as fertilisation, management intensity, depth of tillage and irrigation resulted in weak correlations between soil P concentrations and P in leachate. It was shown for the first time that all P extractants reflected P enrichments in topsoils and subsoils and the development of distinct depth profiles. Influence of soil use on the depth distribution of P was more pronounced in the 0-20 cm layer than in the subsoils. Here, the original homogeneous substrate had oscillating P concentrations at 10-cm increments under all soil uses. These could not be explained by Al_{ox} and Fe_{ox} but were significantly correlated with the C_t contents and bulk density. This indicates that vertical movement of P containing organic matter along with differences in porosity contributed to the heterogeneous P distribution in the lysimeter subsoils. This new evidence must be considered if data sets from long-term lysimeter experiments are used to calibrate and validate P leaching models.

59.　Gremion, F., Chatzinotas, A., Kaufmann, K., Von Sigler, W., **Harms, H.** (2004):
Impacts of heavy metal contamination and photoremediation on a microbial community during a twelve-month microcosm experiment
FEMS Microbiol Ecol **48** (2), 273-283
Impact factor: 2,947

Abstract: The effects of heavy metals and phytoextraction practices on a soil microbial community were studied during 12 months using a hyperaccumulating plant (*Thlaspi caerulescens*) grown in an artificially contaminated soil. The 16S ribosomal RNA genes of the *Bacteria* and the -*Proteobacteria* and the *amoA* gene (encoding the -subunit of ammonia monooxygenase) were PCR-amplified and analysed by denaturing gradient gel electrophoresis (DGGE). Principal component analysis (PCA) of the DGGE data revealed that: (i) the heavy metals had the most drastic effects on the bacterial groups targeted, (ii) the plant induced changes which could be observed in the *amoA* and in the *Bacteria* 16S rRNA gene patterns, (iii) the changes observed during 12 months in the DGGE-patterns of the planted contaminated soil did not indicate recovery of the initial bacterial community present in the non-contaminated soil. The potential function of the microbial community was assessed recording community level physiological profiles (CLPP) and analysing them by PCA. The lower capability of the bacterial community to degrade the substrates provided in the BIOLOG plates, in particular the amino acids, amides and amines, as well as a delay in the average well colour development (AWCD) differentiated the bacterial community of the contaminated samples from that of the non-contaminated ones. However, the plant had a positive effect on substrate utilization as shown by the greater number of substrates used in all planted samples compared to unplanted ones. Finally, the measurement of the potential ammonia oxidation indicated that ammonia oxidising bacteria were completely inhibited in the contaminated soil. The stimulation of ammonia oxidation by the plant observed in the non-contaminated samples was surpassed by the inhibitory effect of the heavy metals in the contaminated soil. This study emphasises the combined use of culture-independent techniques with conventional methods to investigate the ecology of bacteria in their natural habitats.

60.　Griebler, C., Adrian, L., Meckenstock, R. U., **Richnow, H. H.** (2004):
Stable carbon isotope fractionation during aerobic and anaerobic transformation of trichlorobenzene
FEMS Microbiol Ecol **48** (3), 313-321
Impact factor: 2,947

Abstract: Fractionation of stable carbon isotopes upon degradation of trichlorobenzenes was studied under aerobic and anaerobic conditions. Mineralization of 1,2,4-trichlorobenzene by the aerobic strain *Pseudomonas* sp. P51 which uses a dioxygenase for the initial enzymatic reaction was not accompanied by a significant isotope fractionation. In contrast, reductive dehalogenation by the anaerobic strain *Dehalococcoides* sp. strain CBDB1 revealed average isotope enrichment factors () between -3.1 and -3.7 for 1,2,3- and 1,2,4-trichlorobenzene, respectively. The significant isotope fractionation during reductive dehalogenation would allow tracing the in situ biodegradation of halogenated benzenes in contaminated anoxic aquifers, whereas the lack of isotope fractionation during aerobic transformation limits the use of this approach in oxic environments.
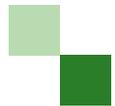
61. Griebler, C., Safinowski, M., **Vieth, A.**, **Richnow, H. H.**, Meckenstock, R. U. (2004):
Combined application of stable carbon isotope analysis and specific metabolites
determination for assessing *In situ* degradation of aromatic hydrocarbons in a tar oil-
contaminated aquifer
Environ.Sci.Technol. **38** (2), 617-631
Impact factor: 3,592

Abstract: To evaluate the intrinsic bioremediation potential in an anoxic tar oil-
contaminated aquifer at a former gasworks site, groundwater samples were
qualitatively and quantitatively analyzed by compound-specific isotope analysis (CSIA)
and signature metabolites analysis (SMA). $^{13}C/^{12}C$ fractionation data revealed
conclusive evidence for in situ biodegradation of benzene, toluene, *o*-xylene, *m/p*-
xylene, naphthalene, and 1-methylnaphthalene. In laboratory growth studies, $^{13}C/^{12}C$
isotope enrichment factors for anaerobic degradation of naphthalene (= -1.1 ± 0.4) and
2-methylnaphthalene (= -0.9 ± 0.1) were determined with the sulfate-reducing
enrichment culture N47, which was isolated from the investigated test site. On the
basis of these and other laboratory-derived enrichment factors from the literature, in
situ biodegradation could be quantified for toluene, *o*-xylene, *m/p*-xylene, and
naphthalene. Stable carbon isotope fractionation in the field was also observed for
ethylbenzene, 2-methylnaphthalene, and benzothiophene but without providing
conclusive results. Further evidence for the in situ turnover of individual BTEX
compounds was provided by the presence of acetophenone, *o*-toluic acid, and *p*-toluic
acid, three intermediates in the anaerobic degradation of ethylbenzene, *o*-xylene, and
p-xylene, respectively. A number of groundwater samples also contained naphthyl-2-
methylsuc cinic acid, a metabolite that is highly specific for the anaerobic degradation
of 2-methylnaphthalene. Additional metabolites that provided evidence on the
anaerobic in situ degradation of naphthalenes were 1-naphthoic acid, 2-naphthoic acid,
1,2,3,4-tetrahydronaphthoic acid, and 5,6,7,8-tetrahydronaphthoic acid. 2-
Carboxybenzothiophene, 5-carboxybenzothiophene, a putative further
carboxybenzothiophene isomer, and the reduced derivative
dihydrocarboxybenzothiophene indicated the anaerobic conversion of the heterocyclic
aromatic hydrocarbon benzothiophene. The combined application of CSIA and SMA,
as two reliable and independent tools to collect direct evidence on intrinsic
bioremediation, leads to a substantially improved evaluation of natural attenuation in
situ.

62. **Grimm, V.**, Lorek, H., Finke, J., Köster, F., Malachinski, M., Sonnenschein, M., Moilanen, A., Storch, I., Singer, A., **Wissel, C.**, **Frank, K.** (2004):
META-X: generic software for metapopulation viability analysis
Biodivers Conserv **13** (1), 165-188
Impact factor: 1,060
Abstract: The major tools used to make population viability analyses (PVA) quantitative are stochastic models of population dynamics. Since a specially tailored model cannot be developed for every threatened population, generic models have been designed which can be parameterised and analysed by non-modellers. These generic models compromise on detail so that they can be used for a wide range of species. However, generic models have been criticised because they can be employed without the user being fully aware of the concepts, methods, potentials, and limitations of PVA. Here, we present the conception of a new generic software package for metapopulation viability analysis, META-X. This conception is based on three elements, which take into account the criticism of earlier generic PVA models: (1) comparative simulation experiments; (2) an occupancy-type model structure which ignores details of local population dynamics (these details are integrated in external submodels); and (3) a unifying currency to quantify persistence and viability, the intrinsic mean time to extinction. The rationale behind these three elements is explained and demonstrated by exemplary applications of META-X in the three fields for which META-X has been designed: teaching, risk assessment in the field, and planning. The conception of META-X is based on the notion that PVA is a tool to deal with rather than to overcome uncertainty. The purpose of PVA is to produce relative, not absolute, assessments of extinction risk which support, but do not supplant, management decisions.

63. **Grimm, V.**, **Wissel, C.** (2004):
The intrinsic mean time to extinction: a unifying approach to analysing persistence and viability of populations
Oikos **105** (3), 501-511
Impact factor: 2,142
Abstract: Analysing the persistence and viability of small populations is a key issue in extinction theory and population viability analysis. However, there is still no consensus on how to quantify persistence and viability. We present an approach to evaluate any simulation model concerned with extinction. The approach is devised from general Markov models of stochastic population dynamics. From these models, we distil insights into the general mathematical structure of the risk of extinction by time t, $P_0(t)$. From this mathematical structure, we devise a simple but effective protocol the $\ln(1P_0)$-plot which is applicable for situations including environmental noise or catastrophes. This plot delivers two quantities which are fundamental to the assessment of persistence and viability: the intrinsic mean time to extinction, T_m, and the probability c_1 of the population reaching the established phase. The established phase is characterized by typical fluctuations of the population's state variable which can be described by quasi-stationary probability distributions. The risk of extinction in the established phase is constant and given by $1/T_m$. We show that T_m is the basic currency for the assessment of persistence and viability because T_m is independent of initial conditions and allows the risk of extinction to be calculated for any time horizon. For situations where initial conditions are important, additionally c_1 has to be considered.
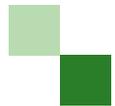
64. Grosse, S., Müller, C., **Rogge, G.**, **Wendlandt, K. D.**, Miguez, C. B., Kleber, H.-P. (2003):
Screening for soluble methane monooxygenase in methanotrophic bacteria using combined molecular and biochemical methods for hydroxylase detection
J.Basic Microbiol. **43** (1), 8-17
Impact factor: 0,512
Abstract: Three well known methanotrophic bacteria (*Methylosinus trichosporium* OB3b, *Methylocystis* sp. WI 14, and *Methylocystis* sp. GB 25) and three newly isolated methanotrophic bacteria (*Methylocystis* sp. WI 11, *Methylocystis* sp. X, and FI-9) were screened for sMMO considering the existence of hydroxylase (component A) genes as well as its gene expression. For these purposes monoclonal antibodies that specifically recognize each subunit of the hydroxylase of *Methylocystis* sp. WI 14 (-subunit [9E5/F2], -subunit [4E2/G11], -subunit [10G3/D7]) were produced. PCR amplification using well known primers showed that the hydroxylase encoding genes appear to be only present in *M. trichosporium* OB3b, *Methylocystis* sp. WI 11 and WI 14, and in the isolate FI-9. Western and ELISA analysis using the monoclonal antibodies revealed that all subunits of hydroxylase were present. However, in FI-9, only the -subunit of the hydroxylase might be expressed. Surprisingly, in *Methylocystis* sp. GB 25, where no sMMO activity and no amplification with sMMO specific primers was obtained, the antibody 4E2/G11 recognized a protein band with exactly the same molecular mass as the -subunit of the hydroxylase. *Methylocystis* sp. X showed no positive reaction in any of the tests. In combination with the detection methods currently used, the described antibodies provide a powerful tool for detecting even partially expressed hydroxylase genes.

65. **Guhr, H.**, **Spott, D.**, **Bormki, G.**, **Baborowski, M.**, **Karrasch, B.** (2003):
The effects of nutrient concentrations in the river Elbe
Acta Hydroch.Hydrob. **31** (4-5), 282-296
Impact factor: 0,700
Abstract: The nutrient turnover and the resulting development of phytoplankton biomass were investigated during four river surveys in the free-flowing reach of the river Elbe under almost constant hydrological and meteorological conditions taking into account the transport time and the time of day. The chlorophyll-a concentration was found to increase by a factor of between 3 and 6 depending on the season, while the biomass load increased by a factor of up to 18. The concentrations of dissolved silicate and dissolved total phosphate behaved oppositely to this development, while the levels of particulate bound nutrients rose accordingly. Depending on the season, 623% of the total bound nitrogen was found to be removed from the river by denitrification. The river Saale contains the highest load of nutrients of all the tributaries. At the end of the investigated reach, algae biomass accounts for as much as 75% of the POC.

66. Hansen, F., Jeltsch, F., Tackmann, K., Staubach, C., **Thulke, H.-H.** (2004):
Processes leading to a spatial aggregation of *Echinococcus multilocularis* in its natural intermediate host *Microtus arvalis*
Int.J.Parasitol. **34** (1), 37-44
Impact factor: 2,881
Abstract: The small fox tapeworm (*Echinococcus multilocularis*) shows a heterogeneous spatial distribution in the intermediate host (*Microtus arvalis*). To identify the ecological processes responsible for this heterogeneity, we developed a spatially explicit simulation model. The model combines individual-based (foxes, *Vulpes vulpes*) and grid-based (voles) techniques to simulate the infections in both intermediate and definite host. If host populations are homogeneously mixed, the model reproduces field data for parasite prevalence only for a limited number of parameter combinations. As ecological parameters inevitably vary to a certain degree, we discarded the homogeneous mixing model as insufficient to gain insight into the ecology of the fox tapeworm cycle. We analysed five different model scenarios, each focussing on an ecological process that might be responsible for the heterogeneous spatial distribution of *E. mulitlocularis* in the intermediate host. Field studies revealed that the prevalence ratio between intermediate and definite host remains stable over a wide range of ecological conditions. Thus, by varying the parameters in simulation experiments, we used the robustness of the agreement between field data and model output as quality criterion for the five scenarios. Only one of the five scenarios was found to reproduce the prevalence ratio over a sufficient range of parameter combinations. In the accentuated scenario most tapeworm eggs die due to bad environmental conditions before they cause infections in the intermediate host. This scenario is supported by the known sensitivity of tapeworm eggs to high temperatures and dry conditions. The identified process is likely to lead to a heterogeneous availability of infective eggs and thus to a clumped distribution of infected intermediate hosts. In conclusion, areas with humid conditions and low temperatures must be pointed out as high risk areas for human exposure to *E. multilocularis* eggs as well.

67. **Hansjürgens, B.** (2004):
Economic valuation through cost-benefit analysis - possibilities and limitations
Toxicology **205** (3), 241-252
Impact factor: 2,061
Abstract: The economic approach used to evaluate effects on human health and the environment centres around cost-benefit analysis (CBA). Thus, for most economists, economic valuation and CBA are one and the same. However, the question of the possibilities and limitations of cost-benefit analysis is one of the most controversial aspects of environmental research. In this paper, the possibilities and limitations of CBA are analysed. This is done not only by explaining the central elements of CBA, but also by commenting on criticism of it. What becomes clear is that CBA is not only a mere mechanism of monetarisation, but a heuristic model for the whole process of valuation. It can serve as a guideline for collecting the necessary data in a systematic way. The limits of CBA can be mainly seen in the non-substitutability of essential goods, irreversibility, long-term effects and inter-generational fairness.

68. Hauser, B., **Schellin, M.**, **Popp, P.** (2004):
Membrane-assisted solvent extraction of triazines, organochlorine, and organophosphorus compounds in complex samples combined with large-volume injection-gas chromatography/mass spectrometric detection
Anal.Chem. **76** (20), 6029-6038
Impact factor: 5,250

Abstract: The performance of the fully automated membrane-assisted solvent extraction was investigated for 47 environmental contaminants (among them 30 organochlorine compounds, 9 organophosphorus compounds, and 7 triazines). The extraction took place in a 20-mL headspace vial filled with the aqueous sample and containing a polypropylene membrane bag with 1 mL of cyclohexane as extractant. This device was handled by a multipurpose sampler, which enabled the sample to be mixed at a defined temperature with subsequent large-volume injection of the organic extract taken out of the membrane bag. After optimization of extraction parameters, the method was validated for the three compound classes, triazines and organochlorine and organophosphorus compounds, using spiked distilled water. Then, the extraction yield of these analytes from several complex samples such as a natural and a synthetic wastewater, a bacterial culture, and orange juice was determined and compared to a conventional liquid-liquid extraction. Furthermore, the possibility of reducing matrix interference by adding salt, methanol, or detergent during membrane-assisted solvent extraction was investigated.

69. Heidrich, S., **Weiß, H.**, **Kaschl, A.** (2004):
Attenuation reactions in a multiple contaminated aquifer in Bitterfeld (Germany)
Environ.Pollut. **129** (2), 277-288
Impact factor: 2,002

Abstract: Large-scale contaminated sites with multiple contaminants in the groundwater present a challenge to risk assessment and remediation. Attenuation reactions take place in the subsurface and act to contain contaminants, but must be thoroughly investigated on a site-specific basis. Field data from monitoring wells at a contaminated industrial site in Bitterfeld, Germany, are presented and analyzed for evidence of the prevalent biodegradation reactions. The groundwater in the Tertiary aquifer is contaminated with large quantities of chlorinated aliphatic compounds, in addition to chlorobenzenes and BTEX. In this strictly anaerobic environment, geochemical indications for several microbial processes were found, including methanogenesis, sulfate and iron reduction as well as reductive dechlorination of the chlorinated hydrocarbons. Direct evidence for the latter degradation reaction was observed along the flowpath due to the appearance of intermediates and an increase in the degree of dechlorination.

70. Heintzenberg, J., Birmili, W., Wiedensohler, A., Nowak, A., **Tuch, T.** (2004):
Structure, variability and persistence of the submicrometre marine aerosol
Tellus B **56** (4), 357-367
Impact factor: 2,586

Abstract: Submicrometre dry number size distributions from four marine and one continental aerosol experiment were evaluated jointly in the present study. In the marine experiments only data with back trajectories of at least 120 h without land contact were used to minimize continental contamination. Log-normal functions were fitted to the size distributions. Basic statistics of the marine aerosol indicate a closed character of the size distribution at the lower size limit as opposed to an open character for corresponding continental data. Together with the infrequent occurrences of marine particles below 20 nm this finding supports hypotheses and model results suggesting low probabilities of homogeneous nucleation in the marine boundary layer. The variability of submicrometre marine number concentrations was parametrized with a bimodal log-normal function that quantifies the probability of finding different number concentrations about a given median value. Together with a four-modal log-normal approximation of the submicrometre marine size distribution itself, this model allows a statistical representation of the marine aerosol that facilitates comparison of experiments and validation of aerosol models. Autocorrelation at the one fixed marine site with a minimum of interruptions in times-series revealed a strong size dependency of persistence in particle number concentration with the shortest persistence at the smallest sizes. Interestingly, in the marine aerosol (at Cape Grim) persistence exhibits a size dependency that largely matches the modes in d_{g0}, i.e. near the most frequent geometric mean diameters number concentrations are most persistent. Over the continent, persistence of particle numbers is strongly constrained by diurnal meteorological processes and aerosol dynamics. Thus, no strong modal structure appears in the size-dependent persistence at Melpitz. As with the aerosol variability, marine aerosol processes in models of aerosol dynamics can be tested with these findings.

71. **Heipieper, H. J.**, **Neumann, G.**, **Kabelitz, N.**, **Kästner, M.**, **Richnow, H. H.** (2004):
Carbon isotope fractionation during *cis-trans* isomerization of unsaturated fatty acids in
Pseudomonas putida
Appl.Microbiol.Biotechnol. **66** (3), 285-290
Impact factor: 2,034

Abstract: The molecular mechanism of the unique *cis* to *trans* isomerization of unsaturated fatty acids in the solvent-tolerant bacterium *Pseudomonas putida* S12 was studied. For this purpose, the carbon isotope fractionation of the *cis-trans* isomerase was estimated. In resting cell experiments, addition of 3-nitrotoluene for activation of the *cis-trans* isomerase resulted in the conversion of the *cis*-unsaturated fatty acids into the corresponding *trans* isomers. For the conversion of C16:1 *cis* to its corresponding *trans* isomer, a significant fractionation was measured. The intensity of this fractionation strongly depended on the rate of *cis-trans* isomerization and the added concentration of 3-nitrotoluene, respectively. The presence of a significant fractionation provides additional indication for a transition from the sp^2 carbon linkage of the *cis*-double bond to an intermediate sp^3 within an enzyme-substrate complex. The sp^2 linkage is reconstituted after rotation to the *trans* configuration has occurred. As cytochrome *c* plays a major role in the catabolism of Cti polypeptide, these findings favour a mechanism for the enzyme in which electrophilic iron (Fe^{3+}), provided by a heme domain, removes an electron of the *cis* double bond thereby transferring the sp^2 linkage into sp^3.
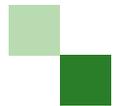
72. **Henle, K.**, Davies, K. F., Kleyer, M., Margules, C., **Settele, J.** (2004):
Predictors of species sensitivity to fragmentation
Biodivers Conserv **13** (1), 207-251
Impact factor: 1,060
Abstract: We reviewed empirical data and hypotheses derived from demographic, optimal foraging, life-history, community, and biogeographic theory for predicting the sensitivity of species to habitat fragmentation. We found 12 traits or trait groups that have been suggested as predictors of species sensitivity: population size; population fluctuation and storage effect; dispersal power; reproductive potential; annual survival; sociality; body size; trophic position; ecological specialisation, microhabitat and matrix use; disturbance and competition sensitive traits; rarity; and biogeographic position. For each trait we discuss the theoretical justification for its sensitivity to fragmentation and empirical evidence for and against the suitability of the trait as a predictor of fragmentation sensitivity. Where relevant, we also discuss experimental design problems for testing the underlying hypotheses. There is good empirical support for 6 of the 12 traits as sensitivity predictors: population size; population fluctuation and storage effects; traits associated with competitive ability and disturbance sensitivity in plants; microhabitat specialisation and matrix use; rarity in the form of low abundance within a habitat; and relative biogeographic position. Few clear patterns emerge for the remaining traits from empirical studies if examined in isolation. Consequently, interactions of species traits and environmental conditions must be considered if we want to be able to predict species sensitivity to fragmentation. We develop a classification of fragmentation sensitivity based on specific trait combinations and discuss the implications of the results for ecological theory.

73. **Henle, K.**, Lindenmayer, D. B., Margules, C., Saunders, D. A., **Wissel, C.** (2004):
Species survival in fragmented landscapes: where are we now?
Biodivers Conserv **13** (1), 1-8
Impact factor: 1,060
Abstract: We present a brief introduction to current attempts to understand and mitigate the effects of fragmentation on species survival. We provide a short overview of the contributions of empiricists, modellers, and practitioners in this issue of *Biodiversity and Conservation*, which were initiated during a workshop held in Australia in February 2002 on the topic Species Survival in Fragmented Landscapes: Where are we now?. These contributions address the themes uncertainty in research and management, tools for quantifying risk and predicting species sensitivity to fragmentation, and tools for reassembling fragmented landscapes. A final contribution provides a synthesis across the contributions and highlights the most important areas for future research on species survival in fragmented landscapes.

74. **Henle, K.**, Sarre, S., Wiegand, K. (2004):
The role of density regulation in extinction processes and population viability analysis
Biodivers Conserv **13** (1), 9-52
Impact factor: 1,060
Abstract: We review the role of density dependence in the stochastic extinction of populations and the role density dependence has played in population viability analysis (PVA) case studies. In total, 32 approaches have been used to model density regulation in theoretical or applied extinction models, 29 of them are mathematical functions of density dependence, and one approach uses empirical relationships between density and survival, reproduction, or growth rates. In addition, quasi-extinction levels are sometimes applied as a substitute for density dependence at low population size. Density dependence further has been modelled *via* explicit individual spacing behaviour and/or dispersal. We briefly summarise the features of density dependence available in standard PVA software, provide summary statistics about the use of density dependence in PVA case studies, and discuss the effects of density dependence on extinction probability. The introduction of an upper limit for population size has the effect that the probability of ultimate extinction becomes 1. Mean time to extinction increases with carrying capacity if populations start at high density, but carrying capacity often does not have any effect if populations start at low numbers. In contrast, the Allee effect is usually strong when populations start at low densities but has only a limited influence on persistence when populations start at high numbers. Contrary to previous opinions, other forms of density dependence may lead to increased or decreased persistence, depending on the type and strength of density dependence, the degree of environmental variability, and the growth rate. Furthermore, effects may be reversed for different quasi-extinction levels, making the use of arbitrary quasi-extinction levels problematic. Few systematic comparisons of the effects on persistence between different models of density dependence are available. These effects can be strikingly different among models. Our understanding of the effects of density dependence on extinction of metapopulations is rudimentary, but even opposite effects of density dependence can occur when metapopulations and single populations are contrasted. We argue that spatially explicit models hold particular promise for analysing the effects of density dependence on population viability provided a good knowledge of the biology of the species under consideration exists. Since the results of PVAs may critically depend on the way density dependence is modelled, combined efforts to advance statistical methods, field sampling, and modelling are urgently needed to elucidate the relationships between density, vital rates, and extinction probability.

75. Hennebrüder, K., **Wennrich, R.**, **Mattusch, J.**, **Stärk, H. J.**, Engewald, W. (2004):
Determination of gadolinium in river water by SPE preconcentration and ICP-MS
Talanta **63** (2), 309-316
Impact factor: 2,091
Abstract: An analytical scheme was developed for the determination of Gd-diethylenetriaminepentaacetate (Gd-DTPA), Gd and the other rare earth elements (REE) in river water by inductively coupled plasma (quadrupole) mass spectrometry (ICP-Q-MS). The preconcentration step was essential, since the limits of detection of this multielemental analytical technique are higher than the trace concentrations of the interesting elements in river water.
Solid phase extraction (SPE) with different commercially available complexing agents (Chelex 100, Toyopearl and ethylhexylphosphates) was employed for the preconcentration of REE. The investigations revealed that complex stability (varying in dependence of the pH value) has a strong influence on the degree of the enrichment of Gd-DTPA. Based on acidified water samples (pH<3) a procedure using ethylhexylphosphates was proposed for the preconcentration of Gd and REE from surface water samples. For this purpose C_{18}-cartridges loaded with ethylhexylphosphates were used, resulting in an enrichment factor of 40.
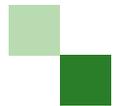
76. **Hennrich, K.**, Crozier, M. J. (2004):
A hillslope hydrology approach for catchment-scale slope stability analysis
Earth Surf.Process.Landf. **29** (5), 599-610
Impact factor: 1,246

Abstract: Regional analysis of slope stability is often constrained by availability of data. Model requirements for input data cannot be met at the desired spatial resolution because data are either site-specific or non-existent. Faced with these difficulties it has often been the practice to assume that certain parameters are uniform throughout the area of interest. An alternative approach proposed here allows a more detailed discrimination of slope stability conditions. Based on the principles of hillslope hydrology, hydrologic information can be generated at sufficient resolution to allow higher resolution slope stability analysis. Measurements from an instrumented network in a small area have been used to establish index-based models for topographic and climate-related controls of piezometric response. The ability to relate groundwater levels to rainfall and topographic parameters provides a means of up-scaling to larger catchments and ultimately the opportunity to generate a catchment-wide prediction of the distribution, magnitude and frequency of rainstorm-generated groundwater levels. The example provided in this study uses the topography index of TOPMODEL in GIS to predict the spatial patterns of groundwater elevation for seasonal soil moisture conditions and given rainfall inputs. This allows modelling of catchment-wide response of soil water to rainstorms with different return periods (representing different magnitudes), and is an essential prerequisite for a probabilistic regional slope stability analysis.

77. **Herbarth, O.**, **Franck, U.**, **Krumbiegel, P.**, **Rehwagen, M.**, **Rolle-Kampczyk, U.**, **Weiß, H.** (2004):
Noninvasive assessment of liver detoxification capacity of children, observed in children from heavily polluted industrial and clean control areas, together with assessments of air pollution and chloro-organic body burden
Environ.Toxicol. **19** (2), 103-108
Impact factor: 1,271

Abstract: The liver is an important target organ in exposure to foreign substances or their metabolites. Early changes in the metabolic capacity of the liver may be a first sign of the effect of an exposure and an indication of an early (pre)pathological process. For the noninvasive testing of this metabolic capacity, a special diagnostic tool has been developed and demonstrated under real exposure conditions. The main questions investigated were (1) whether the liver detoxification capacity of children is affected by long-term low exposure in a highly polluted area and (2) to what extent redevelopment in once heavily polluted industrial areas contributes to improvement in the health measured in the children from the changed detoxification capacity. Kindergarten children from a heavily polluted industrial area and a control area were observed over a prolonged period during redevelopment of the industrial area. The liver's detoxification capacity was assessed with a stable-isotope-based diagnostic test, the [^{15}N]methacetin test. In addition, the region-specific external exposure (indicator components were chlorinated compounds) and internal load were measured. The difference in the children's internal load between the exposed and control groups reflected the differences in exposure (exposed children had an internal load 2.3 times greater than that of the control children). The exposed children showed a 6% lower liver detoxification capacity. A reduction in pollution by about 70% as a result of remediation was reflected in improved liver detoxification capacity, and the difference between the polluted and control areas was no longer significant. Prolonged exposure to low concentrations of xenobiotics can disturb hepatic functioning. The proposed test can be used as a tool to determine the effects of multicomponent exposure and is well suited for bioeffect monitoring.

78. **Herbarth, O.**, **Rolle-Kampczyk, U.**, **Franck, U.**, **Rehwagen, M.**, **Weiß, H.**, **Krumbiegel, P.** (2004):
Detecting exposure-dependent changes of liver detoxification capacity of children in a formerly high-loaded industrial area with a ^{15}N-labelled diagnostic tool
Isot.Environ.Health Stud. **40** (1), 69-74
Impact factor: 0,490
Abstract: The effect of remediation activities in formerly high-loaded industrial areas is measured conventionally in terms of decreased toxic loads. It is more difficult to investigate the effect on physiological parameters of the people living there. A non-invasive ^{15}N-based organ function test, the [^{15}N]methacetin urine test, was adapted to environmental-medical purposes for the detection of small deviations from the norm-range hepatic detoxification capacity. Parallel to the measurement of region-specific external exposure (especially by tri- and tetrachloro ethylene) and of the corresponding internal load (urinary trichloro acetic acid), the hepatic mono oxygenation capacity was determined. The study cohort consisted of 35 kindergarten children who were 3.3 + - 0.5 years old at the beginning of the study. They lived in a high-polluted industrial village ($n = 23$) and in a non-polluted control village close by ($n = 12$), respectively. Children living in the polluted area were exposed a 2.3 times higher load and showed detoxification capacities 6% lower than the children in the control area. Improvement of the environmental situation led to exposure data decreasing by 70%, which is also reflected in smaller internal load and improved liver detoxification of the children in the polluted area. Then, between loaded and control area the mean hepatic detoxification was no longer significantly different (0.6%). The study shows that chronic low-dose exposure can disturb a hepatic function and that thereafter the capacity is recovered quickly in children. The stable isotope-based test is suited to characterize a health effect of multicomponent exposure by bioeffect monitoring within the framework of screening and testing the remediation efficiency.
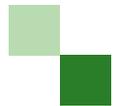
79. **Herbarth, O.**, **Schlink, U.**, **Müller, A.**, **Richter, M.** (2003):
Spatiotemporal distribution of airborne mould spores in apartments
Mycol.Res. **107** (11), 1361-1371
Impact factor: 1,306

Abstract: Indoor air contamination with mould spores currently experiences an increasing interest with respect to their relevance to health. To assess adverse health effects, epidemiological studies combine the health outcome of individuals with their concomitant exposure to airborne spores, which is observed, for example, during the current month. While the latter is representative for the studied period, health effects might also be the result of long term-exposure or emerge in consequence of a peak of pollution throughout the year. To consider such questions, additional information about the spatiotemporal distribution of airborne spores is necessary.

This paper aims at elucidating the spatial and temporal variation of spore concentrations in Leipzig, Germany. The analysis is based on 1165 matched pairs of indoor and outdoor measurements taken in the period 1998-2002. All data were collected in the frame of previous epidemiological studies and refer to apartments. The analysis comprised spore concentrations (as CFU m^{-3} in air) of the most important genera, such as *Penicillium*, *Aspergillus*, *Alternaria*, *Mucorales*, *Cladosporium*, and also for yeasts.

We found two groups of fungi differing in their spatiotemporal distribution. As this behaviour can be explained by the predominant origin and growing conditions, we call them indoor-relevant and outdoor-relevant genera. *Penicillium* species are a representative of the former group, while the latter is well represented by *Cladosporium*. In the studied period we did not observe a clear trend in the spore concentration. Outdoors there is a year-to-year variation of *Cladosporium* spore concentrations, which follow the prevalent climatic conditions.

For the spore concentration of the outdoor-relevant group a significant annual cycle was observed. Highest concentrations occurred during the summer months and were about 100× the winter burden. That means, for a direct comparison of measurements of spore concentrations taken during different months the season has to be considered. We summarise the findings in a seasonal model, which is fitted to our measurements. Based on the model we developed a procedure for seasonal adjustment, which enabled us to estimate the annual peak spore concentration utilising one monthly observation.

80. Horn, H., Staudt, C., **Neu, T. R.**, Leon-Ohl, A., Bößman, M., Hempel, D. C. (2004):
Untersuchungsmethoden für Biofilmsysteme
Chem.Ing.Tech. **76** (3), 333-337
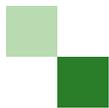Impact factor: 0,306
Abstract: no abstract
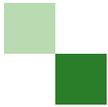
81. **Huth, A.**, **Drechsler, M.**, Köhler, P. (2004):
Multicriteria evaluation of simulated logging scenarios in a tropical rain forest
J.Environ.Mgmt **71** (4), 321-333
Impact factor: 0,624
Abstract: Forest growth models are useful tools for investigating the long-term impacts of logging. In this paper, the results of the rain forest growth model FORMIND were assessed by a multicriteria decision analysis. The main processes covered by FORMIND include tree growth, mortality, regeneration and competition. Tree growth is calculated based on a carbon balance approach. Trees compete for light and space; dying large trees fall down and create gaps in the forest.
Sixty-four different logging scenarios for an initially undisturbed forest stand at Deramakot (Malaysia) were simulated. The scenarios differ regarding the logging cycle, logging method, cutting limit and logging intensity. We characterise the impacts with four criteria describing the yield, canopy opening and changes in species composition. Multicriteria decision analysis was used for the first time to evaluate the scenarios and identify the efficient ones.
Our results plainly show that reduced-impact logging scenarios are more 'efficient' than the others, since in these scenarios forest damage is minimised without significantly reducing yield. Nevertheless, there is a trade-off between yield and achieving a desired ecological state of logged forest; the ecological state of the logged forests can only be improved by reducing yields and enlarging the logging cycles. Our study also demonstrates that high cutting limits or low logging intensities cannot compensate for the high level of damage caused by conventional logging techniques.

82. Jarvis, A. J., Stauch, V. J., **Schulz, K.**, Young, P. C. (2004):
The seasonal temperature dependency of photosynthesis and respiration in two deciduous forests
Global Change Biol **10**, 939-950
Impact factor: 4,152
Abstract: no abstract
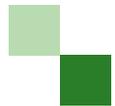
83. **Jax, K.**, Rozzi, R. (2004):
Ecological theory and values in the determination of conservation goals: examples from temperate regions of Germany, United States of America, and Chile
Revista Chilena de Historia Natural **77**, 349-366
Impact factor: 0,504

Abstract: The definition of conservation goals is a complex task, which involves both ecological sciences and social values. A brief history of conservation strategies in Germany (protection of cultural landscapes), United States (wilderness ideal), and southern Chile (preservation paradigm and the more recent interest in ecotourism) illustrates a broad range of conservation goals. To encompass such an array of conservation dimensions and goals, the ecosystem approach adopted by the Conference of the Parties of the Convention on Biological Diversity represents a good approach. However, to become effective, this kind of approach requires clarifying and agreeing upon basic concepts, such as ecosystem. To serve that purpose, we present a scheme that considers the selected phenomena, internal relationship, and the component resolution to define an ecosystem. We conclude that: (1) conservation traditions encompass interests in the preservation of both natural and cultural heritages, which also appear as mutually dependent dimensions. Hence, nature and humans are brought together as much in the goals as in the processes of conservation. (2) In the context of current global change, it is impossible to completely "isolate" protected areas from direct or indirect human influences. In addition, the current view of nature points out that biotas and ecosystems will change over time, even in protected areas. Hence, in order to preserve species or habitats it is not enough to isolate protected areas, but it often requires active management and conservation actions. The two former conclusions suggest the need to revise the conservation approach that has been undertaken in the southern region of Chile, because (a) local people have been systematically excluded from protected areas, and (b) these areas lack personnel and facilities to conduct appropriate conservation and/or management programs. (3) Our analyses of the views of nature and conservation goals in different regions and/or historical moments demonstrate that these involve not only scientific criteria, but also philosophical, political and broader cultural, social and economic dimensions. Hence, effective conservation requires a greater degree of interdisciplinary and interagency cooperation

84. Johnson, W. E., Godoy, J. A., Palomares, F., Delibes, M., Fernandes, M., **Revilla, E.**, O´Brien, S. J. (2004):
Phylogenetic and phylogeographic analysis of Iberian lynx populations
J.Hered. **95** (1), 19-28
Impact factor: 1,707
Abstract: The Iberian lynx (*Lynx pardinus*), one of the world's most endangered cat species, is vulnerable due to habitat loss, increased fragmentation of populations, and precipitous demographic reductions. An understanding of Iberian lynx evolutionary history is necessary to develop rational management plans for the species. Our objectives were to assess Iberian lynx genetic diversity at three evolutionary timescales. First we analyzed mitochondrial DNA (mtDNA) sequence variation to position the Iberian lynx relative to other species of the genus *Lynx*. We then assessed the pattern of mtDNA variation of isolated populations across the Iberian Peninsula. Finally we estimated levels of gene flow between two of the most important remaining lynx populations (Doñana National Park and the Sierra Morena Mountains) and characterized the extent of microsatellite locus variation in these populations. Phylogenetic analyses of 1613 bp of mtDNA sequence variation supports the hypothesis that the Iberian lynx, Eurasian lynx, and Canadian lynx diverged within a short time period around 1.53-1.68 million years ago, and that the Iberian lynx and Eurasian lynx are sister taxa. Relative to most other felid species, genetic variation in mtDNA genes and nuclear microsatellites were reduced in Iberian lynx, suggesting that they experienced a fairly severe demographic bottleneck. In addition, the effects of more recent reductions in gene flow and population size are being manifested in local patterns of molecular genetic variation. These data, combined with recent studies modeling the viability of Iberian lynx populations, should provide greater urgency for the development and implementation of rational in situ and ex situ conservation plans.

85. Kaib, M., Jmhasly, P., Wilfert, L., **Durka, W.**, Franke, S., Francke, W., Leuthold, R. H., **Brandl, R.** (2004):
Cuticular hydrocarbons and aggression in the termite *Macrotermes subhyalinus*
J.Chem.Ecol. **30** (2), 365-385
Impact factor: 1,673
Abstract: Cuticular hydrocarbons are among the prime candidates for nestmate recognition in social insects. We analyzed the variation of cuticular hydrocarbons in the termite species *M. subhyalinus* in West Africa (Comoë National Park) on a small spatial scale (<1 km). We found considerable variation in the composition of cuticular hydrocarbons among colonies, with four distinct chemical phenotypes. Different phenotypes occurred within each of the four habitats. The difference between these phenotypes is primarily due to unsaturated compounds. A clear correlation between the difference of the hydrocarbon composition and the aggression between colonies was found. This correlation also holds in a multivariate analysis of genetic similarity (measured by AFLPs), morphometric distances (measured by Mahalanobis-distances), as well as geographic distances between colonies. In a more detailed analysis of the correlation between the composition of cuticular hydrocarbons and aggression, we found that no single compound is sufficient to explain variation in aggression between pairings of colonies. Thus, termites seem to use a bouquet of compounds. Multiple regression analysis suggested that many of these compounds are unsaturated hydrocarbons and, thus, may play a key role in colony recognition.
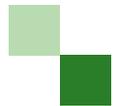
86. Kamjunke, N., Gaedke, U., **Tittel, J.**, Weithoff, G., Bell, E. M. (2004):
Strong vertical differences in the plankton composition of an extremely acidic lake
Arch.Hydrobiol. **161** (3), 289-306
Impact factor: 1,261

Abstract: Vertical differences in food web structure were examined in an extremely acidic, iron-rich mining lake in Germany (Lake 111; pH 2.6, total Fe 150 mg L^{-1}) during the period of stratification. We tested whether or not the seasonal variation of the plankton composition is less pronounced than the differences observed over depth. The lake was strongly stratified in summer, and concentrations of dissolved organic carbon and inorganic carbon were consistently low in the epilimnion but high in the hypolimnion. Oxygen concentrations declined in the hypolimnion but were always above 2 mg L^{-1}. Light attenuation did not change over depth and time and was governed by dissolved ferric iron. The plankton consisted mainly of single-celled and filamentous bacteria, the two mixotrophic flagellates *Chlamydomonas* sp. and *Ochromonas* sp., the two rotifer species *Elosa worallii* and *Cephalodella hoodi*, and Heliozoa as top predators. We observed very few ciliates and rhizopods, and no heterotrophic flagellates, crustaceans or fish. *Ochromonas* sp., bacterial filaments, *Elosa* and Heliozoa dominated in the epilimnion whereas *Chlamydomonas* sp., single-celled bacteria and *Cephalodella* dominated in the hypolimnion. Single-celled bacteria were controlled by *Ochromonas* sp. whereas the lack of large consumers favoured a high proportion of bacterial filaments. The primarily phototrophic *Chlamydomas* sp. was limited by light and CO_2 and may have been reduced due to grazing by *Ochromonas* sp. in the epilimnion. The distribution of the primarily phagotrophic *Ochromonas* sp. and of the animals seemed to be controlled by prey availability. Differences in the plankton composition were much higher between the epilimnion and hypolimnion than within a particular stratum over time. The food web in Lake 111 was extremely species-poor enabling no functional redundancy. This was attributed to the direct exclusion of species by the harsh environmental conditions and presumably enforced by competitive exclusion. The latter was promoted by the low diversity at the first trophic level which, in turn, was attributed to relatively stable growth conditions and the independence of resource availability (inorganic carbon and light) from algal density. Ecological theory suggests that low functional redundancy promotes low stability in ecosystem processes which was not supported by our data.

87. **Karrasch, B.**, **Bormki, G.**, **Herzsprung, P.**, **Winkler, M.**, **Baborowski, M.** (2003):
Extracellular enzyme activity in the river Elbe during a spring flood event
Acta Hydroch.Hydrob. **31** (4-5), 307-318
Impact factor: 0,700

Abstract: The ecological balance of rivers can be significantly disturbed by floods, increasing the supply of allochthonous material and energy to the fluvial planktonic food web. During spring flooding in the Elbe in 1999, various physicochemical (pH, conductivity, suspended particulate matter (SPM), particulate and dissolved organic carbon (DOC, POC), inorganic nutrients) and biological parameters (concentration of chlorophyll-a, abundance and biomass of bacteria) were studied in connection with the microbial self-cleaning capacity (dissolved and particle-associated extracellular enzyme activity of ten different enzymes). The pattern of dissolved and particulate material was found to differ greatly (regarding dilution and allochthonous input dynamics), with biological parameters displaying partly differing patterns owing to their bioactivity. Hydrolytic activity was detected for all the enzyme categories investigated, with especially high breakdown rates being determined for proteins containing leucine, arginine, and tyrosine. The overall activities of all the microbial extracellular enzymes studied proved to be dominated by the ectoenzymes ((62.8 ± 13.6)%) associated with particulate (particles, aggregates, and bacterial cell walls). The resulting ecological implications for microbial self-cleaning processes in rivers are discussed.

88. **Karrasch, B.**, Ullrich, S., **Mehrens, M.**, Zimmermann-Timm, H. (2003):
Free and particle-associated extracellular enzyme activity and bacterial production in the Lower Elbe Estuary, Germany
Acta Hydroch.Hydrob. **31** (4-5), 297-306
Impact factor: 0,700

Abstract: A high abundance of particles and aggregates is a characteristic of estuaries and may represent important loci of increased bioproductivity and microbial activity. From a survey performed in the Elbe estuary, particle concentration (using a particle counter), bacterial biomass and abundance (AODC method), bacterial production rates ($[^3H]$ thymidine method) and the microbial extracellular enzyme activity of 11 enzymes (MUF and MCA method) were determined with particular respect to their relationship to particles and aggregates (sizefractionated). Although higher particle abundance was found compared to other sections of the river Elbe, neither relative nor absolute bacterial activity associated with particles and aggregates was enhanced. The activity of free dissolved microbial enzymes was found to dominate the breakdown of organic material. The productivity of free dispersed bacteria 0.2<2 m (269%) and bacteria attached to small particles 2<10 m (2793%) considerably surpassed that of bacteria associated with particles >10 m (040%). This indicates that the larger particles and aggregates do not always contribute substantially to the overall microbial activity in rivers and estuaries.

89. Kaufmann, K., Christophersen, M., Buttler, A., **Harms, H.**, Höhener, P. (2004):
Microbial community response to petroleum hydrocarbon contamination in the unsaturated zone at the experimental field site Værløse, Denmark
FEMS Microbiol Ecol **48** (3), 387-399
Impact factor: 2,947

Abstract: This study investigates the influence of petroleum hydrocarbons on a microbial community in the vadose zone under field conditions. An artificial hydrocarbon mixture consisting of volatile and semi-volatile compounds similar to jet-fuel was emplaced in a previously uncontaminated vadose zone in nutrient-poor glacial melt water sand. The experiment included monitoring of microbial parameters and CO_2 concentrations in soil gas over 3 months in and outside the hydrocarbon vapor plume that formed around the buried petroleum. Microbial and chemical analyses of soil and vadose zone samples were performed on samples from cores drilled to 3.3 m depth on three dates and three lateral distances from the buried petroleum mass. Significantly elevated CO_2 concentrations were observed after contamination. Total cell numbers as determined by fluorescence microscopy were strongly correlated with soil organic carbon and nitrogen content but varied little with contamination. Redundancy analysis (RDA) allowed direct analysis of effects of selected environmental variables or the artificial contamination on microbiological parameters. Variation in biomass and CO_2 production was explained by soil parameters, to 46%, and by the duration of contamination, to 39.8%. The microbial community structure was assessed by community level physiological profiles (CLPP) analysis using Biolog[TM] Eco-Plates. In the CLPP data only 35.9% of the variation could be linked to soil parameters and contamination, however, the samples with greatest exposure to hydrocarbons grouped together on RDA plots. It is concluded that, at this nutrient-poor site, the microbial community was dominated by natural heterogeneity and that the influence of petroleum hydrocarbon vapors was weak.
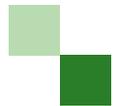
90. Knappe, S., Haferkorn, U., **Mattusch, J.**, **Meißner, R.**, **Rupp, H.**, **Wennrich, R.** (2004):
Water and solute balances in recultivated lignite mining dump soils-field data and lysimeter experiments
Water Air Soil Poll. **157** (1-4), 85-105
Impact factor: 0,883

Abstract: Specific problems of water and solute balancing in the central German post-lignite-mining district are caused by the almost unknown interactions between surface water, seepage and groundwater in the unsaturated zone of mining dumps. This paper presents the findings of studies using lysimeter and seepage groundwater measuring systems designed to investigate the water balance and the migration of inorganic components in the vadose zone of recultivated dumps. Despite the heterogeneous tertiary layers of the three lysimeter monoliths studied, the quantity of seepage occurring at a depth of 3 m as well as the evapotranspiration and the soil water regime were almost the same in the 4 years of the investigation. The high variability of the ion balances in seepage reflects inhomogeneities in tertiary dump material and can be explained by substrate properties interacting with the soil's pH. Very high seepage conductivities are caused by coal containing high levels of pyrite with a low pH and high acid potential. These conductivities are caused by comparatively high concentrations of ions of sulphate, iron, aluminium, calcium, magnesium and heavy metals. The results confirm the impact of ventilated and pyrite-containing dump substrates for groundwater quality.

91. **Knöller, K.**, Fauville, A., Mayer, B., **Strauch, G.**, **Friese, K.**, Veizer, J. (2004):
Sulfur cycling in an acid mining lake and its vicinity in Lusatia, Germany
Chem.Geol. **204** (3-4), 303-323
Impact factor: 2,330

Abstract: The sulfur cycle plays a key role in the hydrochemical development of lignite and coal mining districts, which are often characterized by acid mine drainage. Identification of sulfur sources and transformations is essential if we are to understand the current status of acid lakes and propose successful remediation strategies. We utilized stable isotope ($^{34}S_{sulfate}$, $^{18}O_{sulfate}$, $^{34}S_{dissolved\ sulfide}$, $^{18}O_{water}$) and hydrochemical data of lake and groundwater samples as well as the concentrations and isotope ratios of various sedimentary sulfur compounds (acid-soluble sulfate [ASS], acid-volatile sulfur [AVS], chromium-reducible sulfur [CRS]) in aquifer and lake sediments for assessing the biogeochemical sulfur cycle in a Lusatian acidic mining lake (ML111) and the surrounding area.

Pyrite oxidation is the dominant source of sulfate and iron in the two aquifers west and east of mining lake ML111. Concentration and isotope data for dissolved sulfate suggest that bacterial (dissimilatory) sulfate reduction became an increasingly important process in the flow direction of the western aquifer, thereby improving water quality. In contrast, bacterial sulfate reduction was only of local importance in the dump aquifer on the eastern side of the lake. Oxygen isotope ratios of the lake water sulfate, and mass and isotope balances demonstrate that ~80% of the sulfate in mining lake ML111 is derived via groundwater influx from the dump aquifer, with the remainder contributed by the western aquifer. In-lake pyrite oxidation or bacterial sulfate reduction in the water column are insignificant. The latter process is restricted to the monimolimnion, which represents less than 1% of the lake volume. Hence, the potential for natural generation of alkalinity by bacterial (dissimilatory) sulfate reduction is presently low. For successful remediation of ML111, it is essential to reduce significantly the continuous input of sulfate and acidity from inflowing dump groundwater.

92. **Köller, G.**, **Rolle-Kampczyk, U.**, **Lehmann, I.**, **Popp, P.**, **Herbarth, O.** (2004):
Determination of Ochratoxin A in small volumes of human blood serum
J.Chromatogr.B **804** (2), 313-317
Impact factor: 2,085
Abstract: A new simple and rapid method for analysing Ochratoxin A (OTA) in small volumes of human blood serum using capillary zone electrophoresis coupled to laser-induced fluorescence is described. The clean-up procedure solely consists of a double extraction step. To improve the reproducibility of migration times and quantification, two internal standards were used. The limit of detection was 0.55 ng/ml, with a linear range of 1-100 ng/ml of OTA in spiked human blood serum. The method is used to rapidly screen suspected patients.

93. **Kopinke, F. D.**, **Georgi, A.**, **Weiß, H.** (2004):
Letter to the editor
J Nanopart Res **6** (1), -123
Impact factor: 1,333
Abstract: no abstract

94. **Kopinke, F. D.**, **Mackenzie, K.**, **Köhler, R.**, **Georgi, A.** (2004):
Alternative sources of hydrogen for hydrodechlorination of chlorinated organic compounds in water on Pd catalysts
Appl Catal A **271** (1-2), 119-128
Impact factor: 2,825
Abstract: Formic acid, isopropanol and hydrazine were investigated as reductants for the Pd-catalyzed hydrodechlorination of chlorobenzene in water at ambient temperature. The intention was to find alternatives to molecular hydrogen with high water solubilities. Formic acid was found to be as reactive as H_2 under acidic and neutral conditions, but less reactive under alkaline conditions. The observed kinetics imply two pH-controlled reaction mechanisms (possibly H-atom and hydride transfer). H-consumers, such as chlorinated compounds, strongly stimulate the decomposition of formic acid. The half-life of 5 mg L^{-1} chlorobenzene in the presence of 1 mg L^{-1} Pd is about 2 min under optimal reaction conditions. Rh was found to be inactive in the formic acid driven hydrodechlorination. Isopropanol is less reactive by about five orders of magnitude than H_2. Hydrazine is effective as a H-donor for the hydrodechlorination under alkaline conditions. However, the reaction is slower than with H_2 by a factor of 30. From the technical and economic point of view, formic acid is a promising substitute for H_2.

95. Kosolapow, D. B., **Kuschk, P.**, Vainshtein, M., Vatsourina, A., **Wießner, A.**, **Kästner, M.**, **Müller, R. A.** (2004):
Microbial processes of heavy metal removal from carbon-deficient effluents in constructed wetlands
Eng.Life Sci. **4** (5), 403-411
Impact factor: 0; da neu im SCI
Abstract: This paper reviews the main microbial processes involved when toxic metals are removed from wastewater in constructed wetlands. Microbial activity is thought to play a key role in the detoxification of these metals. The paper concentrates on the microbial processes which affect the mobility, the toxicity and bioavailability of metals, namely biosorption, metal sulfide precipitation by sulfate reducers, redox transformations, and methylation, as well as microbe-plant interactions. These reactions result in either the precipitation and accumulation of metals in wetland soils, or their volatilization and emission into the atmosphere. The possibilities of optimizing the microbially mediated reactions for the development of wetland technology are discussed as a long-term metal retention strategy.
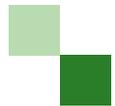
96. Kramer, C., Kreisel, G., Fahr, K., Käßbohrer, J., **Schlosser, D.** (2004):
Degradation of 2-fluorophenol by brown-rot fungus *Gloeophyllum striatum*: evidence for the involvement of extracellular Fenton chemistry
Appl.Microbiol.Biotechnol. **64** (3), 387-395
Impact factor: 2,034
Abstract: Iron-containing liquid cultures of the brown-rot basidiomycete *Gloeophyllum striatum* degraded 2-fluorophenol. Two simultaneously appearing degradation products, 3-fluorocatechol and catechol, were identified by gas chromatography and mass spectrometry (GC-MS). Concomitantly, fluoride was produced at approximately 50% of the amount that theoretically could be achieved upon complete dehalogenation. Defluorination was strongly inhibited in the presence of either the hydroxyl radical scavenger mannitol or superoxide dismutase, as well as in the absence of iron. The addition of the natural iron chelator oxalate caused a clear but less extensive inhibition, whereas supplementation with the artificial iron chelator nitrilotriacetic acid increased fluoride production. Extracellular 2-fluorophenol degradation was evidenced by defluorination, observed upon addition of 2-fluorophenol to cell-free culture supernatants derived from iron-containing fungal cultures. Ultrafiltered culture supernatants oxidized methanol to formaldehyde, known as a product of the reaction of methanol with hydroxyl radical. In addition, *G. striatum* was found to produce metabolites extractable with ethyl acetate that are capable of reducing Fe^{3+}. GC-MS analysis of such extracts revealed the presence of several compounds. The mass spectrum of a prominent peak matched those previously reported for 2,5-dimethoxyhydroquinone and 4,5-dimethoxycatechol, fungal metabolites implicated to drive hydroxyl radical production in *Gloeophyllum*. Taken together, these findings further support an extracellular Fenton-type mechanism operative during halophenol degradation by *G. striatum*.

97. **Kramer-Schadt, S.**, **Revilla, E.**, **Wiegand, T.**, Breitenmoser, U. (2004):
Fragmented landscapes, road mortality and patch connectivity: modelling influences on the dispersal of Eurasian lynx
J.Appl.Ecol. **41** (4), 711-723
Impact factor: 3,205
Abstract: 1. Although many reintroduction schemes for the Eurasian lynx *Lynx lynx* in Germany have been discussed, the implications of connectivity between suitable patches have not been assessed.
2. We introduce an individual-based, spatially explicit dispersal model to assess the probability of a dispersing animal reaching another suitable patch in the complex heterogeneous German landscape, with its dense transport system. The dispersal model was calibrated using telemetric data from the Swiss Jura and based on a map of potential lynx dispersal habitat.
3. Most suitable patches could be interconnected by movements of dispersing lynx within 10 years of reintroduction. However, when realistic levels of mortality risks on roads were applied, most patches become isolated except along the GermanCzech border. Consequently, patch connectivity is limited not so much by the distribution of dispersal habitat but by the high mortality of dispersing lynx. Accordingly, rather than solely investing in habitat restoration, management efforts should try to reduce road mortality.
4. *Synthesis and applications*. Our approach illustrates how spatially explicit dispersal models can guide conservation efforts and reintroduction programmes even where data are scarce. Clear limits imposed by substantial road mortality will affect dispersing lynx as well as other large carnivores, unless offset by careful road-crossing management or by the careful selection of release points in reintroduction programmes.

98. Kremenetski, K. V., **Böttger, T.**, MacDonald, G. M., Vaschalova, T., Sulerzhitsky, L., Hiller, A. (2004):
Medieval climate warming and aridity as indicated by multiproxy evidence from the Kola Peninsula, Russia
Paleogeogr.Paleoclimatol.Paleoecol. **209**, 113-125
Impact factor: 1,766

Abstract: Data obtained from the low-elevation Khibiny Mountains (ca. 67-68°N; 33-34°E) on the Kola Peninsula, northwest Russia, indicate a period of exceptionally warm and dry conditions commenced at ca. AD 600 and was most pronounced between ca. AD 1000 and 1200. Warmer summer temperatures during this period (coeval with the 'Medieval Warm Period' observed in other parts of Europe) are evident in a 100-140 m upward shift in the pine (*Pinus sylvestris* L.) limit in the Khibiny Mountains. On average, the cellulose of pine trees that grew between ca. AD 1000 and 1300 is enriched by ^{13}C values of around 1‰ compared to the modern trees from the region, further suggesting warmer summer climate than at present. The Medieval Warm Period was also accompanied by a steady decline in avalanche activity and the resulting formation of soils on the current avalanche cones in the Khibiny Mountains, suggesting lower winter precipitation and thinner snow cover. Lower precipitation is also evident by currently submerged tree stumps dating to the medieval period that indicate lower lake levels on the Kola Peninsula. In the middle of the peninsula at about AD 1000, the level of small closed-basin lakes was ~1 m lower than the modern time at some sites. Drier conditions may be attributable to decreased cyclonic activity. The medieval warm and dry episode was followed at ca. AD 1300 by the development of a colder climate with increased precipitation resulting in a decline in the alpine pine limits, increased avalanche activity, and higher lake levels. That phase corresponds to the modern aeolian episode reconstructed in subarctic Finland. Our results indicate that the Medieval Warm Period on the Kola Peninsula experienced notably warm and dry conditions. Hence, this period of warming extends to northwestern Russia as well as other parts of Europe.
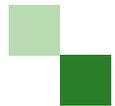
99. **Krumbiegel, P.**, **Lehmann, I.**, **Alfreider, A.**, **Fritz, G. J.**, Boeckler, D., **Rolle-Kampczyk, U.**, **Richter, M.**, **Jorks, S.**, Müller, L., Richter, M. W., **Herbarth, O.** (2004):
Heliobacter pylori determination in non-municipal drinking water and epidemiological findings
Isot.Environ.Health Stud. **40** (1), 75-80
Impact factor: 0,490
Abstract: Background: Studies conducted in Europe as well as in North and South America have tried to link *Helicobacter pylori* colonization with the drinking water supply, especially since *H. pylori* is known to survive quite well in water.
Methods: In 2000, a cohort of 1884 grade-two children from two rural counties surrounding the city of Leipzig, Germany (77.4% of the 1991/1992 birth cohort) were tested for *H. pylori* colonization using the [^{13}C]urea breath test. A parent-completed questionnaire elicited details on living conditions and lifestyle habits including questions on the children's drinking water from sources other than public water supplies, swimming in natural waters, etc.
In a second independent study, samples of well water, taken from 157 private wells still used in the two counties, were being tested for the presence of *H. pylori*, using polymerase chain reaction (PCR) method to determine relevant target DNA fragments of *H. pylori*.
Results: In county I, 5.7% of the children and in county II 6.6% tested *H. pylori*-positive. Cluster analyses of the questionnaire data in both counties pointed to 'drinking water from other than municipal sources', as the closest *H. pylori*-associated cluster variable. The cluster estimations were supported by odds ratio (OR) calculations with an OR = 16.4 (95% confidence interval (CI) 3.1,…,88.5) for county I and OR = 4.0 (95% CI 1.3,…,12.4) for county II.
The PCR analyses showed *H. pylori* DNA fragments in 10.8% of the wells in county I and 9.2% in county II. The detection limit was set at 10 DNA copies corresponding to 125?bacteria/L, the average infestation of these wells was 931?bacteria/L.
Conclusion: Despite the fact that the microbiological and epidemiological data do not correspond except that both studies were conducted in the same geographical areas, the independent findings of *H. pylori* in well water in the same general areas where children do seem to drink water other than from the public water supply suggests that water may be an important source of *H. pylori* infection.

100. **Kühn, I.**, **Brandl, R.**, **Klotz, S.** (2004):
The flora of German cities is naturally species rich
Evol.Ecol.Res. **6** (5), 749-764
Impact factor: 1,587
Abstract: no abstract

101. **Küster, E.**, **Dorusch, F.**, **Vogt, C.**, **Weiß, H.**, **Altenburger, R.** (2004):
On line biomonitors used as a tool for toxicity reduction evaluation of in situ groundwater remediation techniques
Biosens.Bioelectron. **19** (12), 1711-1722
Impact factor: 2,947
Abstract: Success of groundwater remediation is typically controlled via snapshot analysis of selected chemical substances or physical parameters. Biological parameters, i.e. ecotoxicological assays, are rarely employed. Hence the aim of the study was to develop a bioassay tool, which allows an on line monitoring of contaminated groundwater, as well as a toxicity reduction evaluation (TRE) of different remediation techniques in parallel and may furthermore be used as an additional tool for process control to supervise remediation techniques in a real time mode. Parallel testing of groundwater remediation techniques was accomplished for short and long time periods, by using the energy dependent luminescence of the bacterium *Vibrio fischeri* as biological monitoring parameter. One data point every hour for each remediation technique was generated by an automated biomonitor. The bacteria proved to be highly sensitive to the contaminated groundwater and the biomonitor showed a long standing time despite the highly corrosive groundwater present in Bitterfeld, Germany. The bacterial biomonitor is demonstrated to be a valuable tool for remediation success evaluation. Dose response relationships were generated for the six quantitatively dominant groundwater contaminants (2-chlortoluene, 1,2- and 1,4-dichlorobenzene, monochlorobenzene, ethylenbenzene and benzene). The concentrations of individual volatile organic chemicals (VOCs) could not explain the observed effects in the bacteria. An expected mixture toxicity was calculated for the six components using the concept of concentration addition. The calculated EC_{50} for the mixture was still one order of magnitude lower than the observed EC_{50} of the actual groundwater. The results pointed out that chemical analysis of the six most quantitative substances alone was not able to explain the effects observed with the bacteria. Thus chemical analysis alone may not be an adequate tool for remediation success evaluation in terms of toxicity reduction.

102. **Langer, U.**, Böhme, L., **Böhme, F.** (2004):
Short communication: Classification of soil microorganisms based on growth properties: a critical view of some commonly used terms
J.Plant Nutr.Soil Sc. **167** (3), 267-269
Impact factor: 0,985
Abstract: no abstract
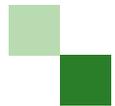
103. Lawrence, J. R., Chenier, M. R., Roy, R., Beaumier, D., Fortin, N., Swerhone, G. D. W., **Neu, T. R.**, Greer, C. W. (2004):
Microscale and molecular assessment of impacts of nickel, nutrients, and oxygen level on structure and function of river biofilm communities
Appl.Environ.Microb. **70** (7), 4326-4339
Impact factor: 3,820

Abstract: Studies were carried out to assess the influence of nutrients, dissolved oxygen (DO) concentration, and nickel (Ni) on river biofilm development, structure, function, and community composition. Biofilms were cultivated in rotating annular reactors with river water at a DO concentration of 0.5 or 7.5 mg liter^{-1}, with or without a combination of carbon, nitrogen, and phosphorus (CNP) and with or without Ni at 0.5 mg liter^{-1}. The effects of Ni were apparent in the elimination of cyanobacterial populations and reduced photosynthetic biomass in the biofilm. Application of lectin-binding analyses indicated changes in exopolymer abundance and a shift in the glycoconjugate makeup of the biofilms, as well as in the response to all treatments. Application of the fluorescent live-dead staining (BacLight Live-Dead staining kit; Molecular Probes, Eugene, Oreg.) indicated an increase in the ratio of live to dead cells under low-oxygen conditions. Nickel treatments had 50 to 75% fewer 'live' cells than their corresponding controls. Nickel at 0.5 mg liter^{-1} corresponding to the industrial release rate concentration for nickel resulted in reductions in carbon utilization spectra relative to control and CNP treatments without nickel. In these cases, the presence of nickel eliminated the positive influence of nutrients on the biofilm. Other culture-dependent analyses (plate counts and most probable number) revealed no significant treatment effect on the biofilm communities. In the presence of CNP and at both DO levels, Ni negatively affected denitrification but had no effect on hexadecane mineralization or sulfate reduction. Analysis of total community DNA indicated abundant eubacterial 16S ribosomal DNA (rDNA), whereas *Archaea* were not detected. Amplification of the *alkB* gene indicated a positive effect of CNP and a negative effect of Ni. The *nirS* gene was not detected in samples treated with Ni at 0.5 mg liter^{-1}, indicating a negative effect on specific populations of bacteria, such as denitrifiers, resulting in a reduction in diversity. Denaturing gradient gel electrophoresis revealed that CNP had a beneficial impact on biofilm bacterial diversity at high DO concentrations, but none at low DO concentrations, and that the negative effect of Ni on diversity was similar at both DO concentrations. Notably, Ni resulted in the appearance of unique bands in 16S rDNA from Ni, DO, and CNP treatments. Sequencing results confirmed that the bands belonged to bacteria originating from freshwater and marine environments or from agricultural soils and industrial effluents. The observations indicate that significant interactions occur between Ni, oxygen, and nutrients and that Ni at 0.5 mg liter^{-1} may have significant impacts on river microbial community diversity and function.

104. **Lazik, D.**, **Geistlinger, H.** (2004):
A new method for membrane-based gas measurements
Sensor Actuat A-Phys **117** (2), 241-251
Impact factor: 1,422

Abstract: A method for gas measurement based on selective diffusion of gases through membrane tubes has been developed. Combining the element-specific diffusion rates through a membrane set and Dalton's principle of partial pressures, the gas concentration is determined through measured physical quantities: pressure, time, and temperature. Since the procedure is based on the evaluation of an intensive thermodynamic state variable, miniaturization of the sensor is possible. The gas sensor consists of several measuring chambers closed by membranes, where each chamber has its own pressure sensor. One additional sensor is used for temperature measurement. The measurement is carried out after the conditioning of the measuring chambers with a purge gas, which is used as internal standard. In order to determine the m partial pressures of the components by n pressure measurements, a system of linear equations has to be solved. The measuring method is demonstrated for a two-component-gas phase (oxygen, nitrogen) for a partial pressure range from 0.1 to 100 kPa. The mean absolute error of about 5% related to the measurement value is acceptable and can be reduced further, if the technical deficiencies of the experimental set-up are improved.

105. Levy, G., Lutz, I., Krüger, A., **von Tümpling, W.**, Kloas, W. (2004):
Retinol-binding protein as a biomarker to assess endocrine-disrupting compounds in the environment
Anal.Bioanal.Chem. **378** (3), 676-683
Impact factor: 1,715

Abstract: Endocrine-disrupting compounds (EDC) are predominantly investigated with respect to their ability to mimic or block estrogenic actions. However, it is well-known that EDC can act as agonists or antagonists of androgen- and estrogen-response systems. For that reason, there is an obvious need for bioassays providing the possibility of detecting (anti-)estrogenic and (anti-)androgenic effects. The retinol-binding protein (RBP) seems to be a useful molecular biomarker for assessing all modes of action of EDC, because it is regulated by sex steroid hormones. This study was conducted to establish RBP as a biomarker for determination of (anti-)estrogenic and (anti-)androgenic effects of EDC using a *Xenopus laevis* primary hepatocyte culture system. It could be shown that RBP mRNA expression in *X. laevis* hepatocytes was stimulated by estrogens in a dose-dependant manner whereas a combination of estrogen and androgen or estrogen and anti-estrogen treatment suppressed estrogenic stimulating effects. Androgens testosterone and dihydrotestosterone were able to reduce RBP mRNA expression and the anti-androgen vinclozolin could abolish the mRNA synthesis-suppressing activity of the androgen dihydrotestosterone. These results clearly demonstrated that RBP mRNA expression patterns in *Xenopus laevis* hepatocytes have different modes of (anti-)estrogenic and (anti-)androgenic action and can be used for examination of suspected EDC. Moreover, water samples from sewage-treatment plant effluents were applied to liver cells and expression levels of RBP and estrogen receptor mRNA (a known estrogenic biomarker) were detected. These samples had high estrogenicity but caused low to moderate induction of RBP mRNA synthesis, leading to the conclusion that RBP levels represent the sum of all possible effects (estrogenic and other effects) of EDC in environmental samples.
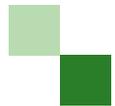
106. **Lindenschmidt, K. E.**, **Ollesch, G.**, Kerzhentsev, A., Hecky, R. E. (2004):
A comparative study of substances transport behavior in two Ugandan and one Russian catchment areas
J.Great Lakes Res. **29** (Supplement 2), 159-168
Impact factor: 1,172
Abstract: Owing to the marginal success in abating pollution sources in water systems, integrated catchment management plans are being increasingly implemented in hopes of improving water quality. Transferring data and concepts between subbasins in the catchment is often used to fill knowledge and data gaps. Conducted here is a comparative study of three catchment areas of similar size, two neighboring stream basins in Uganda and one in central Russia, to investigate important prerequisites for transferability of data between basins. Compared were ions (Ca, Cl, Fe, K, Mg, Mn, Na), nutrients (NH_4-N, NO_3-N, dissolved and particulate P, SO_4), discharge, suspended sediment, pH, and alkalinity with attention given also to the climatic, soil, and land-use characteristics of each catchment. Significant statistical differences were found in the parameters, even of the adjacent lying catchment areas in Uganda. The substance regime in the Russian stream is dominated by the snowmelt events whereas that in Uganda by the rainy season pattern. The phosphorus dynamics were markedly different between the two adjacent catchments in Uganda. Although the climates and the chemical composition of the soils of the two basins are quite similar, slight shifts in land-use distribution can alter the processes dominating in the transport of phosphorus. This is indicative of the sensitivity that parameters of individual basin characteristics (even small neighboring basins) can have on the outcome of the substance regimes and fluxes. These sensitivities highlight the precision required in defining the processes to make transferability of data and models across subbasins in a catchment management system as successful as possible. Keeping such systems flexible and modular (object-oriented approach) can alleviate these difficulties.

107. **Lindenschmidt, K. E.**, **Ollesch, G.**, **Rode, M.** (2004):
Physically-based hydrological modelling for non-point phosphorus transport in small and medium-sized river basins
Hydrolog Sci J **49** (3), 495-510
Impact factor: 0,885
Abstract: Current research suggests that strategies to control sediment and phosphorus loss from non-point sources should focus on different runoff components and their spatial and temporal variations within the river basin. This is a prerequisite for determining effective management measures for reducing diffuse source pollution. Therefore, non-point source models, especially in humid climatic regions, should consider variable hydrologically active source areas. These models should be able to consider runoff generation by saturated overland flow, as well as Hortonian overland flow. A combination of the hydrological model WaSiM-ETH and the erosion and P-transport model AGNPS was chosen for this study. The models were run in the WaSiM runoff generation mode (Green & Ampt/TOPMODEL or Richards equation approach) and the SCS curve number mode to assess the effect of these different runoff calculation procedures on the dissolved phosphorus yield. A small and a medium-sized river basin, of the area of 1.44 and 128.9 km^2, respectively, in central Germany were selected for the investigation. The results show that the WaSiM-AGNPS coupling produces more accurate results than the SCS curve number method. For the spatial distribution, the more physically-based model approach computed a much more realistic distribution of water and phosphorus yield-producing areas.

108. **Loffhagen, N.**, **Härtig, C.**, **Babel, W.** (2004):
Pseudomonas putida NCTC 10936 balances membrane fluidity in response to physical and chemical stress by changing the saturation degree and the *trans / cis* ratio of fatty acids
Biosci.Biotechnol.Biochem. **68** (2), 317-323
Impact factor: 1,025

Abstract: This study explored the capability of *Pseudomonas putida* NCTC 10936 to maintain homeoviscosity after changing the growth temperature, incubating resting cells at different temperatures or at a constant temperature in the presence of 4-chlorophenol (4-CP). After raising the growth temperature from 20 to either 30 or 35°C, the degree of saturation of the organism's fatty acids increased and the ratio of *trans* to *cis* unsaturated fatty acids decreased somewhat. In contrast, after the incubation temperature of resting cells was raised (grown at 30°C) from 20 to 30 or 35°C the degree of saturation of the fatty acids remained nearly constant, while the ratio of *trans* to *cis* unsaturated fatty acids increased. Incubating resting cells (grown at 30°C) at 20°C in the presence of 4-CP again caused no major changes in the degree of saturation, but *cis* to *trans* conversion of unsaturated fatty acids was induced, with a corresponding increase in the *trans*/*cis* ratios. Increases in both the saturation degree of the fatty acids and the *trans*/*cis* ratio of the unsaturated fatty acids correlated with increases in the fluorescence anisotropy of 1,6-diphenyl-1,3,5-hexatriene intercalated in the bilayers of liposomes prepared from the cells of *P. putida* NCTC 10936. Electron transport phosphorylation (ETP) could be stabilized by adaptive adjustments in the fluidity of the cytoplasmic membrane mediated by changes in fatty acid composition such as those observed. Whether changes in the degree of saturation or in the *trans*/*cis* ratio are more effective can be decided by studying *P. putida* NCTC 10936.

109. Lord, H. L., **Möder, M.**, **Popp, P.**, Pawliszyn, J. B. (2004):
In vivo study of triazine herbicides in plants by SPME
Analyst **129** (2), 107-109
Impact factor: 2,251

Abstract: The use of SPME for *in vivo* monitoring of herbicide levels in plant tissues is evaluated. Fibers are exposed to the plant tissue with the aid of buffer located at the fiber/tissue interface region. Following this extraction period the extracted amount is estimated by solvent desorption and LC-MS-MS.

110. **Löser, C.**, **Ulbricht, H.**, **Seidel, H.** (2004):
Degradation of polycyclic aromatic hydrocarbons (PAHs) in waste wood
Compost Sci.Util. **12** (4), 335-341
Impact factor: 0,500
Abstract: no abstract
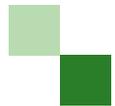
111. **Löser, C.**, **Zehnsdorf, A.**, **Voigt, K.**, **Seidel, H.** (2004):
Physicochemical conditioning of dredged heavy metal-polluted sediment in suspension
Eng.Life Sci. **4** (3), 258-265
Impact factor: 0; da neu im SCI
Abstract: The remediation of heavy metal-polluted aquatic sediment by solid-bed bioleaching requires a material well permeable to air and water. Freshly dredged sediment is nearly impermeable and needs previous conditioning to make it suitable for solid-bed leaching. This conditioning - in practice carried out by planting sediment packages with helophytes - comprises water removal by evapotranspiration, abiotic and microbial oxidation of sediment-borne reduced compounds, acidification, as well as structural changes improving the sediment permeability. The rate of this process seems to be limited by the transport of oxygen into the sediment bed. For a better understanding of the physicochemical processes occurring during conditioning, sediment oxidation was studied in a stirred suspension to minimize transport limitations. Freshly dredged, silty, anoxic, heavy metal-polluted sediment from the Weisse Elster River (Germany) was suspended in water and then continuously stirred and aerated at 20 °C. Aerobic conditions appeared within a few hours. The redox potential increased from - 400 to + 220 mV, at first very quickly and later more slowly. Sediment-borne inorganic sulfur compounds were oxidized to sulfate (S^0 mainly within two days and sulfide within ten days), which reduced the pH from 7.2 to 5.9. A successive oxidation of FeS to Fe(II) sulfate, the oxidation of Fe(II) to Fe(III) followed by Fe(III) oxyhydrate formation caused the dissolved Fe to sharply increase and thereafter rapidly decrease. Ammonium was completely oxidized in a nitrification process to form nitrate, further decreasing the pH to 5.5. The acidification increased the solubility of Mn, Zn, Mg, Ca, and K. The increase in dissolved Mn rules out any oxidation of Mn(II) to Mn(IV) since Mn(IV) would have been insoluble under the prevailing pH and redox conditions. Sediment oxidation did not proceed in a well-defined, redox-potential-directed order, but individual (partly microbially) oxidation processes superimposed each other. Physicochemical conditioning of suspended sediment was completed after 20 days while conditioning in a solid bed would require months or even years. These different rates result from transport limitations in the solid bed. Sediment conditioning in a solid bed could therefore possibly be accelerated by prior sediment aeration.

112. **Mages, M.**, **Ovari, M.**, **von Tümpling jr, W.**, Kröpfl, K. (2004):
Biofilms as bio-indicator for polluted waters? Total reflection X-ray fluorescence analysis of biofilms of the Tisza river (Hungary)
Anal.Bioanal.Chem. **378** (4), 1095-1101
Impact factor: 1,715
Abstract: The aim of this work was to investigate the heavy metal accumulation by natural biofilms living in the catchment area of the Tisza river in Hungary, as well as in biofilms cultivated in vitro. Laboratory tests have demonstrated that metals can be adsorbed on biofilms, depending on their concentration and on the availability of free sorptive places. Biofilms were cultivated in vitro in natural freshwater from the Saale river, Germany. After reaching the plateau phase, Cu was added to reach a concentration of 100 µg/L. An increase of its mass fraction in the biofilm was observed, which caused the decrease of the concentration in the water phase. Unfortunately, the reactor wall was also found to act as adsorbent for Cu. More detailed results of our in vitro experiments will be published in a forthcoming paper. Naturally grown biofilm samples from exposed as well as background places at the Hungarian rivers Szamos and Tisza were collected in 2000 and 2002 after the cyanide spill, and analysed using total reflection X-ray fluorescence analysis (TXRF). Metal mass fraction differences as high as two orders of magnitude were found between polluted and unpolluted (background) sampling points. Extremely high concentration values, e.g. 5600 µg/g Zn in biofilm, were found at highly polluted sampling points. This means an enrichment factor of ca. 10,000 compared to the water phase.

113. **Mages, M.**, Woelfl, S., **Ovari, M.**, **von Tümpling jr, W.**, Encina, F. (2004):
The use of a portable total reflection X-ray fluorescene spectrometer for trace element determination in freshwater microcrustaceans *(Daphnia)*
Spectrochim.Acta B **59** (8), 1265-1272
Impact factor: 2,361

Abstract: The suitability of a newly developed, portable total reflection X-ray fluorescence (TXRF) spectrometer (PicoTAX, Roentec, Berlin, Germany) to analyze trace elements in biological material was tested and compared with a stationary instrument (Spectrometer 8030 C, FEI, Munich, Germany). For that, single freshwater microcrustacean specimens (Daphnia spec.) with dry weights ranging between 1.6 and 18.8 g individual^{-1} were prepared according to the *dry method* and analyzed with both instruments. Additionally, for orientation purposes, freshly collected *Daphnia* were prepared in field according to the *wet method* directly on the glass carrier and analyzed using the portable PicoTAX. For method validation, certified reference material (CRM 414, plankton) was analyzed.
The results of the in-field measurements demonstrate that the PicoTAX yields very fast and sufficiently sensitive in-field measurements on the element content of minute biological samples. For As, Cu, K, Mn, Ni and Sr, a good correlation was found between the two spectrometers. Only for Ca, Fe, Pb and Zn the comparison with the results of the stationary equipment has shown significant differences.

114. **Maskow, T.**, **Kleinsteuber, S.** (2004):
Carbon and energy fluxes during haloadaptation of *Halomonas* sp. EF11 growing on phenol
Extremophiles **8** (2), 133-141
Impact factor: 1,955

Abstract: The haloalkaliphile *Halomonas* sp. EF11 can grow on phenol as sole source for carbon and energy, while maintaining an osmotic equilibrium predominantly by adjusting levels of a certain compatible solute. To determine the energy costs of haloadaptation and the fate of substrate-carbon, the strain was grown continuously in an isothermal compensation calorimeter, keeping all conditions constant except salinity. As salinity increased, slight linear reductions in exothermic heat flow and biomass formation occurred, and 1,4,5,6-tetrahydro-2-methyl-4-pyrimidinecarboxylic acid (ectoine) synthesis increased linearly. However, beyond a certain salinity threshold the stationary phenol concentration increased exponentially, while heat flow fell sharply, indicating intoxication or wash-out. The clear transition point between the phases, where ectoine formation peaked, suggests that calorimetric measurements could be used to control the conversion of growth-inhibiting substrates (like phenol) into ectoine and to optimize the process. Enthalpy balance and chemical determinations revealed acetate and formate were formed as side products when the C/N ratio in the feed was low, while 2-muconic acid semialdehyde and formate were produced when the ratio was high. These findings indicate that phenol assimilation occurs via the *meta* pathway. However, enzyme assays implied that assimilation occurs via the *ortho* and *meta* pathways at a low C/N ratio and exclusively via the *meta* pathway at a high C/N ratio.
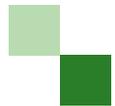
115. **Maskow, T.**, Olomolaiye, D., **Breuer, U.**, Kemp, R. (2004):
Flow calorimetry and dielectric spectroscopy to control the bacterial conversion of toxic substrates into polyhydroxyalcanoates
Biotechnol.Bioeng. **85** (5), 547-552
Impact factor: 2,173
Abstract: The microbial conversion of toxic substrates into valuable products in continuous culture requires the equivalent of a tight rope walk between formation of the desired product and intoxication of the microbial catalyst. The condition of the latter is reflected immediately by changes in heat flow rate and -dispersion in an electrical RF field. Therefore, these were applied to the example of the continuous growth-associated synthesis of polyhydroxyalcanoates (PHA) from phenol by the bacterial strain *Variovorax paradoxus* DSM 4065. By controlling the supply of phenol to the chemostat, the rates of degradation, biomass formation, and synthesis of target product, respectively, were increasingly elevated until the onset of poisoning the organisms. The boundary between the maximum rates and the initiation of intoxication coincided with a sudden change in the heat flux. Using this occurrence, it was possible to develop a control strategy and test it successfully for a time period of 80 h. After 40 h the process stabilized at mean values, i.e., at rates of 92% phenol degradation, 100% biomass formation, and 70 - 75% of PHA formation compared with the situation shortly before poisoning the organisms. Using a moving-average technique to filter the raw dielectric spectroscope data, changes were followed in biomass concentration of approximately 100 mg/L. However, this technique was not sensitive or rapid enough to control the process.

116. Matthies, D., **Bräuer, I.**, Maibom, W., Tscharntke, T. (2004):
Population size and the risk of local extinction: empirical evidence from rare plants
Oikos **105** (3), 481-488
Impact factor: 2,142
Abstract: Due to habitat fragmentation many plant species today occur mainly in small and isolated populations. Modeling studies predict that small populations will be threatened more strongly by stochastic processes than large populations, but there is little empirical evidence to support this prediction for plants. We studied the relationship between size of local populations (number of flowering plants) and survival over ten years for 359 populations of eight short-lived, threatened plants in northern Germany (*Lepidiumcampestre*, *Thlaspiperfoliatum*, *Rhinanthusminor*, *R. serotinus*, *Melampyrumarvense*, *M. nemorosum*, *Gentianellaciliata* and *G. germanica*). Overall, 27% of the populations became extinct during the study period. Probability of survival of a local population increased significantly with its size in all but one species (*R. minor*). However, estimated population sizes required for 90% probability of survival over 10 years varied widely among species. Survival probability increased with decreasing distance to the nearest conspecific population in *R. serotinus*, but not in the other species. The mean annual growth rate of surviving populations differed greatly between species, but was only for *G. germanica* significantly lower than 1, suggesting that there was no general deterministic decline in the number of plants due to deteriorating habitat conditions. We conclude that the extinction of populations was at least partly due to stochastic processes. This is supported by the fact that in all species a considerable proportion of small populations survived and developed into large populations.

117. **Meier, J.**, Babenzien, H. D., **Wendt-Potthoff, K.** (2004):
Microbial cycling of iron and sulfur in sediments of acidic and pH-neutral mining lakes in Lusatia (Brandenburg, Germany)
Biogeochemistry **67** (2), 135-156
Impact factor: 2,580

Abstract: A vast number of lakes developed in the abandoned opencast lignite mines of Lusatia (East Germany) contain acidic waters ($mmolSm^{-2}a^{-}$). Potential Fe(III) reduction measured by the accumulation of Fe(II) during anoxic incubation yielded similar rates in both types of sediments, however, the responses towards the supplementation of Fe(III) and organic carbon were different. Sulfate reduction rates estimated with ^{35}S-radiotracer were much lower in the slightly acidic sediment than in the pH-neutral sediment (156 v.s. $738 mmolSO_4^{2-}m^{-2}a^{-1}$). However, sulfate reduction rates were increased by the addition of organic carbon. Severe limitation of sulfate-reducing bacteria under acidic conditions was also reflected by low most probable numbers (MPN). High MPN of acidophilic iron- and sulfur-oxidizing bacteria in acidic sediments indicated a high reoxidation potential. The results show that potentials for reductive processes are present in acidic sediments and that these are determined mainly by the availability of oxidants and organic matter.

118. Melbourne, B. A., Davies, K. F., Margules, C., Lindenmayer, D. B., Saunders, D. A., **Wissel, C.**, **Henle, K.** (2004):
Species survival in fragmented landscapes: where to from here?
Biodivers Conserv **13** (1), 275-284
Impact factor: 1,060

Abstract: We summarise the contributions of empiricists, modellers, and practitioners in this issue of *Biodiversity and Conservation*, and highlight the most important areas for future research on species survival in fragmented landscapes. Under the theme uncertainty in research and management, we highlight five areas for future research. First, we know little about the effects of density dependence on the viability of metapopulations, a requirement for fragmented landscapes. Second, successful early attempts suggest that it is worth developing more rigorous calibration methods for population viability analysis with spatially explicit, individual-based models. In particular, the balance between model complexity, ease of calibration, and precision, needs to be addressed. Third, we need to improve methods to discriminate between models, including alternatives to time-series approaches. Fourth, when our ability to reduce model uncertainty is weak, we need to incorporate this uncertainty in population viability analysis. Fifth, population viability analysis and decision analysis can be integrated to make uncertainty an explicit part of the decision process. An important future direction is extending the decision framework to adaptive management. Under the theme tools for quantifying risk and predicting species sensitivity to fragmentation, we highlight three areas for future research. First, we need to develop tools to support comparative approaches to population viability analysis. Second, population modelling can be used to find rules of thumb to support conservation decisions when very little is known about a species. Rules of thumb need to be extended to the problem of managing for multiple species. Third, species traits might be useful for predicting sensitivity but predictions could be further refined by considering the relative importance of population processes at different scales. Under the theme tools for reassembling fragmented landscapes, we consider the focal species approach, and highlight aspects of the approach that require more rigorous testing. Finally, we highlight two important areas for future research not presented in the previous themes or papers in this volume. First, we need to incorporate the deterministic effects of habitat modification into the modelling framework of population viability analysis. Second, an avenue of research that remains largely unexplored is the combination of landscape-scale experiments and population modelling, especially using data from existing fragmentation experiments and from experiments designed to test the effects of defragmenting landscapes.
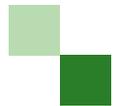
119. Metz, N., Resch, G., Wiedensohler, A., Hermann, H., **Tuch, T.**, **Wehner, B.**, Rose, D., Engler, C., Gnauk, T., Brüggemann, E., **Franck, U.** (2004):
Physical and chemical characteristics of aerosol particles from diesel exhaust and urban environment
J.Aerosol Sci. **35** (Suppl. 1), 391-392
Impact factor: 1,738
Abstract: no abstract

120. **Miltner, A.**, **Richnow, H. H.**, **Kopinke, F. D.**, **Kästner, M.** (2004):
Assimilation of CO_2 by soil microorganisms and transformation into soil organic matter
Org.Geochem. **35** (9), 1015-1024
Impact factor: 1,712
Abstract: Soil microorganisms have been shown to fix CO_2. Although this process plays only a minor quantitative role on a bulk soil basis, it is important in certain microenvironments of the soil and may change the assessment of data on soil organic matter turnover as determined by stable isotope techniques and on the formation of bound residues from radioactively labelled pollutants. To study this process, we incubated soil in the dark under a $^{13}CO_2$-enriched atmosphere and found a significant transfer of the label into soil organic matter (1.3 mol C g^{-1} soil after 61 days). Enrichment of the label in fatty acids (^{13}C up to 1200‰) and amino acids (^{13}C up to 200‰) showed that microbial biomass mediates the process. The data indicate that a wide range of autotrophic and heterotrophic microorganisms are involved and that anaplerotic reactions make a significant contribution. Part of the label appeared to have been already transformed to non-living soil organic matter, after lysis of the microbial cells.

121. **Möder, M.**, **Martin, C.**, **Köller, G.** (2004):
Degradation of hydroxylated compounds using laccase and horseradish peroxidase immobilized on microporous polypropylene hollow fiber membranes
J.Membr.Sci. **245** (1-2), 183-190
Impact factor: 2,081
Abstract: Microporous polypropylene hollow fiber membranes (HF) impregnated with horseradish peroxidase (HRP) and laccase were used to study the degradation of selected hydroxylated aromatic compounds (3,4-dimethylphenols, 4-ethylphenol, 2-hydroxy-1,2,3,4-tetrahydronaphthalene, 2-hydroxy-decahydronaphthalene and 4-hydroxy-biphenyl). It was found that, with the exception of 2-hydroxy-decahydronaphthalene, all substrates were efficiently degraded (50-100% within 48 h). In preliminary investigations, the transport behavior of the analytes through the membranes before and after enzyme immobilization was studied in batch experiments. In addition, a continuous-flow hollow fiber membrane device was used to examine the degradation performance of the immobilized enzymes on the substrates. It was successfully demonstrated that freshly prepared radish juice can be used to replace the commercially available horseradish peroxidase. The method of overall monitoring used was a combination of solid-phase microextraction/gas chromatography/mass spectrometry (SPME-GC-MS).

122. **Möder, M.**, **Schrader, S.** (2004):
Enhanced extraction capacity and chemical noise reduction in solid-phase microextraction
J.Sep.Sci. **27** (17-18), 1517-1523
Impact factor: 2,108

Abstract: Solid-phase microextraction fibres with different lengths, coatings (polydimethylsiloxane, polyacrylate, Carbowax/divinylbenzene), film thicknesses, and mounting techniques were examined in combination with GC-MS with regard to their enhanced extraction capacities and fibre bleeding. A series of phenols and halogenated aromatics with diverse physicochemical properties were investigated to characterize the effects of the enhanced extraction capacities of solid-phase microextraction fibres. Fibre extension was found to be effective for the microextraction of compounds with high log K_{ow} values, whereas increasing both coating thickness and fibre length is most effective for the microextraction of more polar compounds such as phenols. Almost no bisphenol A was released when custom-made polydimethylsiloxane fibres were used, finally eliminating a drawback of endocrine disrupter analysis by solid-phase microextraction.

123. **Montero, L.**, **Popp, P.**, **Paschke, A.**, Pawliszyn, J. B. (2004):
Polydimethylsiloxane rod extraction, a novel technique for the determination of organic micropollutants in water samples by thermal desorption-capillary gas chromatography-mass spectrometry
J.Chromatogr.A **1025** (1), 17-26
Impact factor: 2,922

Abstract: A novel, simple and inexpensive approach to absorptive extraction of organic compounds from environmental samples is presented. It consists of a polydimethylsiloxane rod used as an extraction media, enriched with analytes during shaking, then thermally desorbed and analyzed by GC-MS. Its performance was illustrated and evaluated for the enrichment of sub- to ng/l of selected chlorinated compounds (chlorobenzenes and polychlorinated biphenyls) in water samples. The new approach was compared to the stir bar sorptive extraction performance. A natural ground water sample from Bitterfeld, Germany, was also extracted using both methods, showing good agreement. The proposed approach presented good linearity, high sensitivity, good blank levels and recoveries comparable to stir bars, together with advantages such as simplicity, lower cost and higher feasibility.

124. Morasch, B., **Richnow, H. H.**, **Vieth, A.**, Schink, B., Meckenstock, R. U. (2004):
Stable isotope fractionation caused by glycyl radical enzymes during bacterial degradation of aromatic compounds
Appl.Environ.Microb. **70** (5), 2935-2940
Impact factor: 3,820
Abstract: Stable isotope fractionation was studied during the degradation of *m*-xylene, *o*-xylene, *m*-cresol, and *p*-cresol with two pure cultures of sulfate-reducing bacteria. Degradation of all four compounds is initiated by a fumarate addition reaction by a glycyl radical enzyme, analogous to the well-studied benzylsuccinate synthase reaction in toluene degradation. The extent of stable carbon isotope fractionation caused by these radical-type reactions was between enrichment factors () of -1.5 and -3.9, which is in the same order of magnitude as data provided before for anaerobic toluene degradation. Based on our results, an analysis of isotope fractionation should be applicable for the evaluation of in situ bioremediation of all contaminants degraded by glycyl radical enzyme mechanisms that are smaller than 14 carbon atoms. In order to compare carbon isotope fractionations upon the degradation of various substrates whose numbers of carbon atoms differ, intrinsic ($_{intrinsic}$) were calculated. A comparison of $_{intrinsic}$ at the single carbon atoms of the molecule where the benzylsuccinate synthase reaction took place with compound-specific elucidated that both varied on average to the same extent. Despite variations during the degradation of different substrates, the range of found for glycyl radical reactions was reasonably narrow to propose that rough estimates of biodegradation in situ might be given by using an average if no fractionation factor is available for single compounds.

125. **Morgenstern, P.**, **Brüggemann, L.**, **Wennrich, R.** (2004):
Validation of an X-ray methodology with environmental concern
Spectrochim.Acta B **59** (2), 185-197
Impact factor: 2,361
Abstract: The capabilities of test procedures toward the validation of X-ray fluorescence analysis with environmental concern were investigated. The applied analytical scheme was based on the combination of fusion and pelletizing technique for sample preparation, while matrix correction was performed by means of the fundamental parameter and the scattered radiation method. Validation was carried out in terms of precision, trueness, measurement uncertainty, limit of detection and test for homogeneity of the sample material. To confirm trueness for the examined calibration strategy, the bias of the recovery functions for each analyte under study was evaluated by means of orthogonal regression analysis. The investigations were focused on single laboratory validation. Consequently, the presented validation procedures were based nearly exclusively on certified reference material.

126. **Müller, S.**, **Babel, W.** (2003):
Analysis of bacterial DNA patterns - an approach for controlling biotechnological processes
J.Microbiol.Meth. **55** (3), 851-858
Impact factor: 1,749

Abstract: Optimisation of biotechnological processes catalysed by microbial cells requires detailed information about operational limits of the single cells. Their performance is correlated with distinct physiological states. We related these states to cell cycle events, which were found to proceed extremely diversely in different bacterial strains. Characteristic DNA patterns were found flow cytometrically, depending on the type of strain, substrates and growth conditions involved; this information can be used for the development of control strategies of bioprocesses, although some skill is required.
Four bacterial strains (the Gram-negative strains *Acinetobacter calcoaceticus* 69-V, *Ralstonia eutropha* JMP 134, *Ochrobactrum anthropi* K2-14 and the Gram-positive strain *Rhodococcus erythropolis* K2-3) were grown in mono- and mixed cultures on different substrates, and analysed regarding their proliferation behaviour. The resulting DNA distribution patterns provided three types of valuable information. First, correlation of proliferation activity with the appearance of a major part of cells within the C_2 stage of the cell cycle is a strain-specific feature. Second, bacteria usually maintain more than one chromosome under limiting growth conditions: DNA replication is completed in such cases, but cell division fails. Third, high growth rates are associated with uncoupled DNA synthesis. Its general initiation might be genetically determined in the first place, but it is promoted by optimal growth conditions and the presence of substrates that can be metabolised at high rates, thereby allowing substantial amounts of carbon, other nutrients and energy to be used exclusively for DNA synthesis.

127. **Müller, S.**, **Lösche, A.** (2004):
Population profiles of a commercial yeast strain in the course of brewing
J.Food Eng. **63** (4), 375-381
Impact factor: 1,213

Abstract: The performance of microbial populations is a function of the summed performance of their individuals, i.e. each cell contributes to the performance of the whole population. However, abiotic factors affect the physiological state and consequently the performance of each individual in a distinct manner. Thus, the efficiency of industrial microbial processes is boosted by cultivation strategies that improve the capacity of the living fraction within the bioreactor. Beer brewing processes are bounded to bioreactor scales up to more than 200 m^3. Subpopulations, indicating different physiological activities, should be considered as quickly and detailed as possible to avoid spoiling or diminishing the amount of the product. In this paper various subpopulations of a commercial yeast strain of *Saccharomyces cerevisiae* were characterised on three successive runs of brewing. Typical changes in structural and functional parameters of the cells were quantitatively analysed by multiparametric flow cytometry and visualised by cell sorting and image analysis.
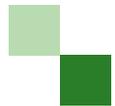
128. Negele, K., Heinrich, J., Borte, M., von Berg, A., Schaaf, B., **Lehmann, I.**, Wichmann, H. E., Bolte, G. (2004):
Mode of delivery and development of atopic disease during the first 2 years of life
Pediatr Allergy Immunol **15** (1), 48-54
Impact factor: 1,573
Abstract: It has been hypothesized that cesarean delivery might have an impact on the development of atopic diseases because of its gut flora modulating properties. In the present study, we analysed the association between cesarean delivery and atopic diseases using data of 2500 infants enrolled in the LISA-Study, a German prospective multicenter birth cohort study. Data on symptoms and physician-diagnosed atopic diseases were gathered by questionnaires shortly after birth and at infant's age 6, 12, 18, and 24 months. In addition, sensitization to common food and inhalant allergens was assessed by measuring specific immunoglobulin E (IgE) using the CAP-RAST FEIA method at the age of 2 yr. Confounder-adjusted odds ratios (aOR) with 95% confidence intervals (CI) were calculated by multiple logistic regression. We found a positive association between cesarean delivery and occurrence of at least one episode of wheezing [aOR 1.31 (95% CI 1.021.68)] and of recurrent wheezing [1.41 (1.021.96)] during the first 2 yr of life. Furthermore, effect estimates for allergic sensitization defined as at least one specific IgE ="
src="/na102/home/ACS/publisher/synergy/journals/entities/2265.gif" align=absBottom
border=00.70 kU/l against any allergen [1.48 (0.982.24)], against food allergens [1.64 (1.032.63)], and against inhalant allergens [1.75 (0.983.12)] were increased. Symptoms of atopic dermatitis [1.21 (0.921.59)], physician-diagnosed atopic dermatitis [1.04 (0.791.39)], and symptoms of allergic rhinoconjunctivitis [1.40 (0.802.44)] were only marginally increased in children delivered by cesarean section. In conclusion, our results suggest that cesarean delivery may be an additional risk factor for wheezing and allergic sensitization at least to food allergens up to the age of 2 yr. This should be considered when cesarean section is done for other than medical reasons.

129. Netzeva, T. I., **Aptula, A. O.**, Chaudary, S. H., Duffy, J. C., Schultz, T. W., **Schüürmann, G.**, Cronin, M. T. D. (2003):
Structure-activity relationships for the toxicity of substituted poly-hydroxylated benzenes to *Tetrahymena pyriformis*: influence of free radical formation
QSAR Comb.Sci. **22** (6), 575-582
Impact factor: 1,558
Abstract: The aim of this study was to develop quantitative structure-activity relationships for the toxicity to *Tetrahymena pyriformis* of 30 substituted poly-hydroxylated benzenes. Physico-chemical descriptors for the expression of free radical formation, associated with the OH moiety on the aromatic ring, were calculated. These included one-electron equilibrium constants that did and did not account for the oxidation of an OH-group, homolytic bond dissociation energy (BDE), electronegativity (EN) and absolute hardness (AH), in addition to the distribution coefficient (log D) as a measure of hydrophobicity. The reactivity descriptors were calculated using the semi-empirical AM1 Hamiltonian in the MOPAC molecular orbital software. Statistically significant two-parameter QSARs for toxicity were obtained by combination of log D with either BDE or AH. The QSARs suggested that toxicity is associated with hydrophobicity and the probability of radical formation.

130. **Neu, T. R.**, Lawrence, G. (2004):
One-photon versus two-photon laser scanning microscopy and digital image analysis of microbial biofilms
Method Microbiol **34**, 89-136
Impact factor: 0,578
Abstract: no abstract

131. **Neu, T. R.**, Woelfl, S., Lawrence, J. R. (2004):
Three-dimensional differentiation of photo-autotrophic biofilm constituents by multi-channel laser scanning microscopy (single-photon and two-photon excitation)
J.Microbiol.Meth. **56** (2), 161-172
Impact factor: 2,015
Abstract: A simple microscopic method to three-dimensionally differentiate between various members in photo-autotrophic biofilm systems is described. By dual-channel single-photon (confocal) and two-photon laser scanning microscopy, the signals in the red and far red channels as well as their combination can be simultaneously recorded. The method takes advantage of the autofluorescent signal of cyanobacteria-recorded in the red and far red channel and the autofluorescent signal of the green algae-recorded in the far red channel only. The differentiation is based on the specific pigment composition of cyanobacteria and green algae in combination with the appropriate filter settings for detection of the autofluorescent emission signals. The method allows the non-destructive, three-dimensional examination of fully hydrated interfacial microbial communities at high resolution as well as the clear separation between autofluorescent signals of cyanobacteria and green algae. Furthermore, there is a third option to record additional signals simultaneously such as nucleic acid stained bacteria, bacteria labeled with phylogenetic probes or glycoconjugates stained by using lectins. With state of the art laser scanning microscopes, even a fourth channel is available for recording yet another parameter, e.g. in the reflection (single-photon only) or fluorescence (single- and two-photon) mode. Thus the approach represents a convenient tool to study multiple parameters of complex photo-autotrophic biofilm systems.

132. **Neumann, G.**, Teras, R., Monson, L., Kivisaar, M., Schauer, F., **Heipieper, H. J.** (2004):
Simultaneous degradation of atrazine and phenol by *Pseudomonas* sp. strain ADP: effects of toxicity and adaptation
Appl.Environ.Microb. **70** (4), 1907-1912
Impact factor: 3,820
Abstract: The strain *Pseudomonas* sp. strain ADP is able to degrade atrazine as a sole nitrogen source and therefore needs a single source for both carbon and energy for growth. In addition to the typical C source for *Pseudomonas*, Na_2-succinate, the strain can also grow with phenol as a carbon source. Phenol is oxidized to catechol by a multicomponent phenol hydroxylase. Catechol is degraded via the *ortho* pathway using catechol 1,2-dioxygenase. It was possible to stimulate the strain in order to degrade very high concentrations of phenol (1,000 mg/liter) and atrazine (150 mg/liter) simultaneously. With cyanuric acid, the major intermediate of atrazine degradation, as an N source, both the growth rate and the phenol degradation rate were similar to those measured with ammonia as an N source. With atrazine as an N source, the growth rate and the phenol degradation rate were reduced to 35% of those obtained for cyanuric acid. This presents clear evidence that although the first three enzymes of the atrazine degradation pathway are constitutively present, either these enzymes or the uptake of atrazine is the bottleneck that diminishes the growth rate of *Pseudomonas* sp. strain ADP with atrazine as an N source. Whereas atrazine and cyanuric acid showed no significant toxic effect on the cells, phenol reduces growth and activates or induces typical membrane-adaptive responses known for the genus *Pseudomonas*. Therefore *Pseudomonas* sp. strain ADP is an ideal bacterium for the investigation of the regulatory interactions among several catabolic genes and stress response mechanisms during the simultaneous degradation of toxic phenolic compounds and a xenobiotic N source such as atrazine.
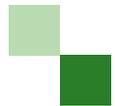
133. Nunnari, G., Dorling, S., **Schlink, U.**, Cawley, G., Foxall, R., Chatterton, T. (2004):
Modelling SO_2 concentration at a point with statistical approaches
Environ Modell Softw **19** (10), 887-905
Impact factor: 0,780

Abstract: In this paper, the results obtained by inter-comparing several statistical techniques for modelling SO_2 concentration at a point such as neural networks, fuzzy logic, generalised additive techniques and other recently proposed statistical approaches are reported. The results of the inter-comparison are the fruits of collaboration between some of the partners of the APPETISE project funded under the Framework V Information Societies and Technologies (IST) programme. Two different cases for study were selected: the Siracusa industrial area, in Italy, where the pollution is dominated by industrial emissions and the Belfast urban area, in the UK, where domestic heating makes an important contribution. The different kinds of pollution (industrial/urban) and different locations of the areas considered make the results more general and interesting. In order to make the inter-comparison more objective, all the modellers considered the same datasets. Missing data in the original time series was filled by using appropriate techniques. The inter-comparison work was carried out on a rigorous basis according to the performance indices recommended by the European Topic Centre on Air and Climate Change (ETC/ACC). The targets for the implemented prediction models were defined according to the EC normative relating to limit values for sulphur dioxide. According to this normative, three different kinds of targets were considered namely daily mean values, daily maximum values and hourly mean values. The inter-compared models were tested on real cases of poor air quality. In the paper, the inter-compared techniques are ranked in terms of their capability to predict critical episodes. A ranking in terms of their predictability of the three different targets considered is also proposed. Several key issues are illustrated and discussed such as the role of input variable selection, the use of meteorological data, and the use of interpolated time series. Moreover, a novel approach referred to as the technique of balancing the training pattern set, which was successfully applied to improve the capability of ANN models to predict exceedences is introduced. The results show that there is no single modelling approach, which generates optimum results in terms of the full range of performance indices considered. In view of the implementation of a warning system for air quality control, approaches that are able to work better in the prediction of critical episodes must be preferred. Therefore, the artificial neural network prediction models can be recommended for this purpose. The best forecasts were achieved for daily averages of SO_2 while daily maximum and hourly mean values are difficult to predict with acceptable accuracy.

134. **Ockenfeld, K.**, **Guhr, H.** (2003):
Groyne fields - sink and source functions of "flow-reduced zones" for water contents in the River Elbe (Germany)
Water Sci.Technol. **48** (7), 17-24
Impact factor: 0,710

Abstract: The role of man-made "flow-reduced zones" as a sink or a source of water content is unknown for the River Elbe, Germany. We measured and compared: a) the concentration of suspended matter at the inflow and the outflow of one special groyne field ("UFZ groyne field") weekly for a period of two years; and b) the intensity of oxygen metabolism within several groyne fields and the main stream during a Lagrangian survey. Under discharge conditions near or below mean water, we found a significant reduction of
suspended particulate matter and particle bound nutrients in the "UFZ groyne field". In contrast, concentrations of most soluble water contents and chlorophyll *a* did not significantly change between in- and outflow. During the Lagrangian survey, pelagic production and respiration rates developed nearly identically in both the main stream and the adjacent groyne fields but oxygen time curves showed higher amplitudes for the groyne fields compared to the river. This higher net-oxygen production in the groyne fields is due to reduced water depth and reduced stream velocity. It enhances the concentration of oxygen in the main stream. The contrary results show the coexistence of both sink and source functions of "flow-reduced zones" in rivers.

135. Otabbong, E., Leinweber, P., Schlichting, A., **Meißner, R.**, Shenker, M., Litaor, I., Sapek, A., Robinson, S., Nidermeier, A., Hacin, H., Otabbong, J. R. (2004):
Comparison of ammonium lactate, sodium bicarbonate and double calcium lactate methods for extraction of phosphorus from wetland peat soils
Acta Agr Scand B-S P **54** (1), 9-13
Impact factor: 0,125

Abstract: Procedures for routine analysis of soil phosphorus (P) have been used for assessment of P status, distribution and P losses from cultivated mineral soils. No similar studies have been carried out on wetland peat soils. The objective was to compare extraction efficiency of ammonium lactate (P-AL), sodium bicarbonate (P-Olsen), and double calcium lactate (P-DCaL) and P distribution in the soil profile of wetland peat soils. For this purpose, 34 samples of the 0-30, 30-60 and 60-90 cm layers were collected from peat soils in Germany, Israel, Poland, Slovenia, Sweden and the United Kingdom and analysed for P. Mean soil pH ($CaCl_2$, 0.01 M) was 5.84, 5.51 and 5.47 in the 0-30, 30-60 and 60-90 cm layers, respectively. The P-DCaL was consistently about half the magnitude of either P-AL or P-Olsen. The efficiency of P extraction increased in the order P-DCaL<P-AL=P-Olsen, with corresponding means ($mg\ kg^{-1}$) for all soils (34 samples) of 15.32, 33.49 and 34.27 in 0-30 cm; 8.87, 17.30 and 21.46 in 30-60 cm; and 5.69, 14.00 and 21.40 in 60-90 cm. The means decreased with depth. When examining soils for each country separately, P-Olsen was relatively evenly distributed in the German, UK and Slovenian soils. P-Olsen was linearly correlated (r=0.594, P=0.0002) with pH, whereas the three P tests (except P-Olsen vs P-DCaL) significantly correlated with each other *(P=0.0178=0.0001)*. The strongest correlation (r=0.617, P=0.0001) was recorded for P-AL vs P-DCaL) and the two methods were inter-convertible using a regression equation: *P-AL=-22.593+5.353 pH+1.423 P-DCaL, R^2 =0.550.*

136. **Ovari, M.**, **Mages, M.**, Woelfl, S., **von Tümpling, W.**, Kröpfl, K., Zaray, G. (2004):
Total reflection X-ray fluorescence spectrometric determination of element inlets from mining activities at the upper Tisza catchment area, Hungary
Spectrochim.Acta B **59** (8), 1173-1181
Impact factor: 2,361

Abstract: Natural freshwater and biofilm samples collected at seven sites at the upper catchment area of the Tisza river system in Hungary were analyzed by total reflection X-ray fluorescence (TXRF) spectrometry. On the basis of the results, it could be established that there are elevated trace element concentrations in the river Szamos compared to the upper course of the river Tisza. A portable TXRF spectrometer was also used for in-field water analysis. Using the portable TXRF spectrometer, a rapid screening of trace elements was possible just before the confluence of both rivers. The in-field analysis confirmed the statement above. Since biofilms are very good trace element scavengers, the elevated trace element concentrations were also found in the naturally grown biofilms.

137. **Paschke, A.**, Neitzel, P. L., Walther, W., **Schüürmann, G.** (2004):
Octanol/water partition coefficient of selected herbicides: determination using shake-flask method and reversed-phase high-performance liquid chromatography
J.Chem.Eng.Data **49** (6), 1639-1642
Impact factor: 0,950

Abstract: For some triazines and phenylurea derivatives no reliable K_{OW} values were available from literature. The log K_{OW} values were determined directly with the shake-flask procedure and also indirectly using the reversed-phase high-performance liquid chromatography (RP-HPLC) method in the isocratic and gradient elution mode, respectively. Atrazine, as a well-investigated substance, and two herbicides of different chemical structures (acid amides) were included in this study. Both RP-HPLC methods yield log K_{OW} values comparable among themselves and identical with the shake-flask results for methabenzthiazuron (2.5), chloroxuron (3.8), sebutylazine (3.2), and atrazine (2.6). For the atrazine metabolites investigated, the RP-HPLC-derived log K_{OW} values are significantly less than those directly measured (1.0 for desethylatrazine and 1.5 for desisopropylatrazine). In contrast to these findings, considerably higher log K_{OW} values were obtained for the two acid amides propachlor and metazachlor with both RP-HPLC methods compared to the shake-flask values (2.2 for both compounds). Because of the still complicated choice of reliable reference compounds/data for the RP-HPLC methods, the shake-flask technique should be preferred for determination of octanol/water partition coefficients with high accuracy in the range of log $K_{OW} < 4$. Finally, the directly measured K_{OW} values were compared with estimates obtained with two widely applied group-contribution methods (CLOGP and LOGKOW).

138. **Paschke, A.**, **Popp, P.** (2004):
Diffusion-based calibration for solid-phase microextraction of benzene, toluene,
ethylbenzene, *p*-xylene and chlorobenzenes from aqueous samples
J.Chromatogr.A **1025** (1), 11-16
Impact factor: 2,922
Abstract: Short-term solid-phase microextraction (SPME) was performed to test a
recently proposed semi-empirical model for the prediction of concentrations of analyte
in water samples from the fibre-extracted mass without further calibration. The mass
uptake rates obtained for benzene, toluene, ethylbenzene and *p*-xylene (BTEX) differ
considerably from the before published, showing that interfibre comparability is a
serious issue. The relative prediction errors are between -55% for benzene and +82%
for *p*-dichlorobenzene under optimal conditions, i.e. they are by an order of magnitude
higher than originally published. A sensitivity analysis shows the dominant influence of
the estimated thickness of the diffusional boundary layer around the fibre on the
concentration predicted. Empirical modification of the model equation for this
parameter yields satisfactory results under the conditions tested for both BTEX and the
selected chlorobenzenes.

139. Peacock, A. D., Chang, Y. J., Istok, J. D., Krumholz, L., **Geyer, R.**, Kinsall, B.,
Watson, D., Sublette, K. L., White, D. C. (2004):
Utilization of microbial biofilms as monitors of bioremediation
Microbial Ecol. **47** (3), 284-292
Impact factor: 2,310
Abstract: A down-well aquifer microbial sampling system was developed using glass
wool or Bio-Sep beads as a solid-phase support matrix. Here we describe the use of
these devices to monitor the groundwater microbial community dynamics during field
bioremediation experiments at the U.S. Department of Energy Natural and Accelerated
Bioremediation Research Programs Field Research Center at the Oak Ridge National
Laboratory. During the 6-week deployment, microbial biofilms colonized glass wool and
bead internal surfaces. Changes in viable biomass, community composition, metabolic
status, and respiratory state were reflected in sampler composition, type of donor, and
groundwater pH. Biofilms that formed on Bio-Sep beads had 2-13 times greater viable
biomass; however, the bead communities were less metabolically active [higher
cyclopropane/monoenoic phospholipid fatty acid (PLFA) ratios] and had a lower
aerobic respiratory state (lower total respiratory quinone/PLFA ratio and
ubiquinone/menaquinone ratio) than the biofilms formed on glass wool. Anaerobic
growth in these systems was characterized by plasmalogen phospholipids and was
greater in the wells that received electron donor additions. Partial 16S rDNA sequences
indicated that Geobacter and nitrate-reducing organisms were induced by the acetate,
ethanol, or glucose additions. DNA and lipid biomarkers were extracted and recovered
without the complications that commonly plague sediment samples due to the
presence of clay or dissolved organic matter. Although microbial community
composition in the groundwater or adjacent sediments may differ from those formed on
down-well biofilm samplers, the metabolic activity responses of the biofilms to
modifications in groundwater geochemistry record the responses of the microbial
community to biostimulation while providing integrative sampling and ease of recovery
for biomarker analysis.
Dedication: The authors dedicate this paper to Professor Peter Hirsch, whose
infectious enthusiasm for beautiful mushrooms, Antarctica, and most of all weird
microbes he has isolated and characterized has greatly enriched our lives as
microbiologists with the wonder of what lies beyond our lab-rat cultures. Once Peter
visits your lab, looking through your microscope will be a different experience. Happy
birthday and thanks for so enriching our lives and profession.

140. **Pe'er, G.**, Saltz, D., **Thulke, H.-H.**, Motro, U. (2004):
Response to topography in a hilltopping butterfly and implications for modelling nonrandom dispersal
Animal Behaviour **68** (4), 825-839
Impact factor: 2,557

Abstract: Animal movement between habitat patches is often considered a random process. However, responses to landscape heterogeneity can direct the movement of animals and affect connectivity patterns. Topographical heterogeneity is a major source of habitat heterogeneity, which often directs animal movements and yet is scarcely studied in the context of dispersal. We investigated the mechanisms of response to topography and movement rules, using hilltopping as a behavioural case study. Hilltopping is a mate-searching strategy where males and virgin or multiple-mating females seek a topographical summit on which to mate. Mated females descend from the summits thereafter to search for host plants. We investigated the behavioural rules of hilltopping in males and virgin females of the butterfly *Melitaea trivia*, and female postmating movements. We released butterflies in different topographical formations, in a landscape that contained no larval host plants. We followed them individually, mapped the flight routes, and analysed them with respect to the surrounding landscape, using a Digital Elevation Model. Males and virgin females initiated hilltopping behaviour only in the absence of other individuals. After an initial orientation phase, butterflies flew towards the maximal inclination available. However, some downward movements interrupted the upward flight. When arriving at or released on a summit, males strongly adhered to it. After copulating, females showed little response to topography. Males and virgin females responded to topographical cues within about 50 m of their location. Our results show that nonrandom movements, such as hilltopping, are based on simple and predictable decision rules. We discuss the relation between hilltopping and dispersal, and the implications for modelling dispersal.

141. **Popp, P.**, **Bauer, C.**, **Paschke, A.**, **Montero, L.** (2004):
Application of a polysiloxane-based extraction method combined with column liquid chromatography to determine polycyclic aromatic hydrocarbons in environmental samples
Anal.Chim.Acta **504** (2), 307-312
Impact factor: 2,210

Abstract: Silicone rods with a diameter of 1 mm and 10 mm long were used to extract polycyclic aromatic hydrocarbons (PAHs) from water samples and for the rapid screening of highly contaminated waste material. The rods were placed in a 15 ml glass vial for the extraction of the analytes, which involved shaking (300 min^{-1}) the sample for 3 h. After extraction the rods were placed into 250 l inserts of 2 ml vials filled with 100 l of an acetonitrile-water mixture (4:1) and desorption was performed with sonication for 10 min. Then the PAHs were determined using LC and fluorescence detection. Recoveries of the rod extraction ranged between 62 and 97% and the detection limits were between 0.1 and 1.2 ng l^{-1}. These results are comparable with those of stir bar sorptive extraction (SBSE). Although the rods are reusable, their low price means they can be discarded if contaminated, eliminating the need for expensive cleaning. One disadvantage compared to SBSE is the longer extraction time needed to reach equilibrium.

142. **Pörschmann, J.**, **Spijkerman, E.**, **Langer, U.** (2004):
Fatty acid patterns in *Chlamydomonas* sp. as a marker for nutritional regimes and temperature under extremely acidic conditions
Microbial Ecol. **48**, 78-89
Impact factor: 2,310

Abstract: Fatty acid profiles were used to characterize nutritional pathways in *Chlamydomonas* sp. isolated from an acidic mining lake (pH 2.7). Surprisingly, profiles of *Chlamydomonas* sp. grown in the lab under photoautotrophic, mixotrophic, and heterotrophic conditions at *in situ* deep strata lake water temperatures (8°C) were very similar, polyunsaturated fatty acids including -linolenic acid (18:33) and 16:43 along with palmitic acid (16:0) being most abundant. Therefore, heterotrophic growth of *Chlamydomonas* sp. at low temperatures can result in high concentrations of polyunsaturated fatty acids, as previously only described for some psychrophilic bacteria. By contrast, the cultivation of isolated *Chlamydomonas* sp. at 20°C, reflecting surface water temperatures, provided fatty acid patterns characteristic of the nutrition strategy applied: the concentration of polyunsaturated fatty acids decreased when the growth pathway changed from photoautotrophic via mixotrophic to heterotrophic. Total fatty acid concentration also diminished in this order. Principal component analysis confirmed the significance of FA profiling to mirror nutritional pathways. Lake-water analysis revealed low concentrations of dissolved organic carbon, mainly consisting of polymeric fulvic acids that are unable to support heterotrophic growth of *Chlamydomonas* sp. Polymeric fulvic acids present in the deeper strata of the lake turned out to be formed *in situ* on the basis of organic monomers including reduced sulfur-containing ones, as revealed by thermochemolysis and pyrolysis. Growth of *Chlamydomonas* sp. in the deep chlorophyll maximum is therefore assumed to mainly result from photosynthesis, despite very low photon densities. Phytol-including metabolites proved to be significant biomarkers to indicate the nutritional pathway of *Chlamydomonas* sp. , -Dicarboxylic acids-light-induced degradation products of unsaturated fatty acids-appeared to be good indicators of photooxidative alterations to the algal species under study.

143. **Prati, D.**, **Boßdorf, O.** (2004):
Allelopathic inhibition of germination by *Alliaria petiolata* (Brassicaceae)
Am.J.Bot **91** (2), 285-288
Impact factor: 2,373

Abstract: Garlic mustard (*Alliaria petiolata*, Brassicaceae) is an invasive, nonindigenous species currently invading the understory of North American woodlands where it is a serious threat to the native flora. Part of this success might be due to allelopathic interference by garlic mustard. Two congeneric species, the European *Geum urbanum* and the North American *Geum laciniatum*, were tested for allelopathic inhibition of germination by garlic mustard. Seeds were germinated either on substrate contaminated by garlic mustard or on substrate with contamination neutralized by activated carbon. Allelopathic effects of native European and invasive North American garlic mustard populations were also compared. Activated carbon increased germination by 14%, indicating that garlic mustard contaminated the substrate through root exudates. Activated carbon in turn counteracted this effect. The two test species differed in their sensitivity to allelopathic interference. North American *G. laciniatum* had a much stronger increase in germination when activated carbon was added to the substrate, independent of the origin of garlic mustard. In contrast, the European *G. urbanum* germinated better in substrate precultivated with North American garlic mustard, whereas activated carbon increased its germination only in substrate precultivated with European garlic mustard.
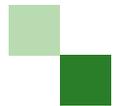
144. Prinzing, A., Ozinga, W. A., **Durka, W.** (2004):
The relationship between global and regional distribution diminishes among phylogenetically basal species
Evolution **58** (12), 2622-2633
Impact factor: 3,833

Abstract: Phylogenetic legacy and phylogenetic trends affect the ecology of species-except, apparently, for the width of their distribution. As a result, "macroecological" patterns of species distributions emerge constantly in phylogenetically very distinct species assemblages. The width of the global distribution of species, for instance, constantly correlates positively to the width of their regional distribution. However, such patterns primarily reflect the phylogenetically derived species that dominate most assemblages. Basal species, in contrast, might show different macroecological patterns. We tested the hypothesis that the correlation between global and regional distributions of species diminishes among the phylogenetically basal species. We considered central European higher plants and defined global distribution as the occupancy of global floristic zones, regional distribution as the grid occupancy in Eastern Germany, and phylogenetic position as the rank distance to tree base. We also took into account a number of confounding variables. We found that, across all lineages, the global/regional correlation diminished among basal species. We then reanalyzed 19 lineages separately and always found the same pattern. The pattern reflected both increases in global distributions and decreases in regional distributions among basal species. The results indicate that many basal species face a risk of global or at least regional extinction, but have escaped the downward spiral of mutually reinforcing extinction risks at multiple scales. We suggest that many basal species had much time to expand their global ranges but are presently displaced locally by more derived species. Overall, the study shows that macroecological patterns may not be static and universal, but may undergo macroevolutionary trends. Analyses of macroecological patterns across a phylogeny may thus provide insights into macroevolutionary processes.

145. Rademacher, C., Neuert, C., Grundmann, V., **Wissel, C.**, **Grimm, V.** (2004):
Reconstructing spatiotemporal dynamics of Central European natural beech forests:
the rule-based forest model BEFORE
Forest Ecol.Manag. **194** (1-3), 349-368
Impact factor: 1,207

Abstract: Without humans, large areas of central Europe would be covered by forests dominated by beech (*Fagus silvatica*). The spatiotemporal dynamics of natural beech forests are hence a subject of interest for both forest management and conservation. However, since in most regions there are no longer any natural beech forests, their structure and dynamics cannot routinely be analysed and compared to managed forests. The forest model BEech FOREst (BEFORE) is therefore, designed to reconstruct the spatiotemporal dynamics of natural beech forests. BEFORE is a grid-based and partly individual-based model which divides beeches into four different height classes. Changes to the forest structure due to growth, mortality and storm disturbances are entirely described by empirical 'if-then' rules. BEFORE is capable of reproducing two patterns which have been observed in remnants of natural beech forests: beech forests consist of a mosaic pattern of small areas (on average 0.3 ha) which are at different developmental stages; at the scale of these small areas, a cyclic succession of three developmental stages occurs, which are characterised by different vertical structures. One typical feature of natural beech forests is hence their very high structural diversity. Gaps in the canopy induce a local pulse of vitality and growth for younger beech trees. These pulses are spread into the vicinity by two mechanisms. Firstly, windfalls affect not only the site of the tree knocked over itself but also neighbouring sites due to the damage caused by the tree falling over. Moreover, since the light is diffuse and oblique, canopy gaps affect also vitality and growth in the neighbourhood of a gap. The results obtained with BEFORE show that natural beech forests achieve quasi-stationary dynamics, demonstrating considerable fluctuations in the forest structure. For example, the percentage of forest area at the optimal stage, which is characterised by a closed canopy and almost no understorey, varies between 10 and 40%, and after extreme storm events even between 0 and 60%. Beech forests with an inner area larger than 40 ha (corresponding to a total area of 70 ha) develop spatiotemporal dynamics which do not differ qualitatively or quantitatively from larger forests, but even very small natural beech forests would exhibit very high temporal and structural diversity. Thus, even small 'islands' of unmanaged stands within larger, managed forests would contribute significantly to providing structures typical of natural beech forests.
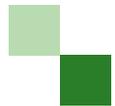
146. Reichardt, P., Müller, D., Posselt, U., Vorberg, B., **Diez, U.**, **Schlink, U.**, Reuter, W., Borte, M. (2004):
Fatty acids in colostrum from mothers of children at high risk of atopy in relation to clinical and laboratory signs of allergy in the first year of life
Allergy **59** (4), 394-400
Impact factor: 3,161

Abstract: Background: It remains controversial whether fatty acid (FA) composition of breast milk relates to development of atopy in the infant. This study evaluates FA in colostrum from mothers of children at high risk of atopy in association with atopy at the age of 1 year.
Methods: The FA of colostrum were analyzed for 218 children (60 with low birth weight between 1500 and 2500 g, 84 with a history of maternal atopy, and 74 with an elevated cord blood immunoglobulin (Ig)E of >0.9 IU/ml). Total lipids were extracted, methylated and separated by gasliquid chromatography. Laboratory screening for allergic sensitization and clinical examination took place within the Leipzig Allergy Risk Children's Study (LARS).
Results: Low birth weight was correlated with low percentage levels of 20:2n-6, 22:2n-6, and 22:3n-3 ($r = 0.14$, $P < 0.05$; $r = 0.14$, $P < 0.05$ and $r = 0.20$, $P < 0.01$, respectively) and low gestational age at birth was correlated with low 22:3n-3 ($r = 0.15$, $P < 0.05$). There was no association between FA and atopic eczema at the age of 1 year. However, high linoleic acid (LA, 18:2n-6) was linked to high specific IgE against cow's milk protein ($P < 0.05$), and low docosapentaenoic acid (DPA, 22:5n-3) was associated with elevated total serum IgE ($P < 0.05$) at the age of 1 year, respectively.
Conclusions: The polyunsaturated fatty acid composition of colostrum in a high risk newborn population shows associations with atopic sensitization at the age of 1 year and may be predictive for later atopic disease.
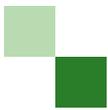
147. **Revilla, E.**, **Wiegand, T.**, Palomares, F., Ferreras, P., Delibes, M. (2004):
Effects of matrix heterogeneity on animal dispersal: from individual behavior to
metapopulation-level parameters
American Naturalist **164**, E153 S.
Online Journal
Impact factor: 4,059
Abstract: Mounting theoretical and empirical evidence shows that matrix heterogeneity
may have contrasting effects on metapopulation dynamics by contributing to patch
isolation in nontrivial ways. We analyze the movement properties during interpatch
dispersal in a metapopulation of Iberian lynx (Lynx pardinus). On a daily temporal
scale, lynx habitat selection defines two types of matrix habitats where individuals may
move: open and dispersal habitats (avoided and used as available, respectively). There
was a strong and complex impact of matrix heterogeneity on movement properties at
several temporal scales (hourly and daily radiolocations and the entire dispersal event).
We use the movement properties on the hourly temporal scale to build a simulation
model to reconstruct individual dispersal events. The two most important parameters
affecting model predictions at both the individual (daily) and metapopulation scales
were related to the movement capacity (number of movement steps per day and
autocorrelation in dispersal habitat) followed by the parameters representing the habitat
selection in the matrix. The model adequately reproduced field estimates of population-
level parameters (e.g., interpatch connectivity, maximum and final dispersal distances),
and its performance was clearly improved when including the effect of matrix
heterogeneity on movement properties. To assume there is a homogeneous matrix
results in large errors in the estimate of interpatch connectivity, especially for close
patches separated by open habitat or corridors of dispersal habitat, showing how
important it is to consider matrix heterogeneity when it is present. Movement properties
affect the interaction of dispersing individuals with the landscape and can be used as a
mechanistic representation of dispersal at the metapopulation level. This is so when the
effect of matrix heterogeneity on movement properties is evaluated under biologically
meaningful spatial and temporal scales.

148. Richter, O., **Seppelt, R.** (2004):
Flow of genetic information through agricultural ecosystems: a generic modelling
framework with application to pesticide-resistance weeds and genetically modified
crops
Ecol.Model. **174** (1-2), 55-66
Impact factor: 1,561
Abstract: Unintended spatial spread of genetic information is one of the major problems
in modern agriculture. The vertical distribution of transgenic properties and the spatial
spread of resistant weeds and pests are likely to develop under long-term pesticide
use. These are complex systems that require an integrated view of population
dynamics, genetics, and physical transport processes. Mathematical models may be
utilised to support of risk assessment and to derive appropriate risk management
strategies. In this contribution we propose a generic modelling framework that provides
an explicit simulation of the spatial patterns of gene flow through agro-ecosystems.
Pollen dispersal is modelled with traditional transport equations from atmospheric
physics that are applied to outcrossing studies of genetically modified maize. Transport
equations were coupled to models of population dynamics and genetics with partial
differential equations that combine dispersal, growth and genetics. The overall model
consists of a set of coupled partial differential equations for pollen dispersal, and the
spatial and temporal dynamics of each biotype involved. Initial boundary value
problems are set up for the dispersal of resistance in dependence on spatial spread
patterns, which are solved by finite element methods.
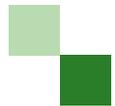
149. Riis, V., **Kleinsteuber, S.**, **Babel, W.** (2003):
Influence of high salinities on the degradation of diesel fuel by bacterial consortia
Can.J.Microbiol. **49** (11), 713-721
Impact factor: 1,080
Abstract: Microbial communities from three Argentinean saline soils were extracted and tested for their ability to degrade diesel fuel in liquid culture at salinities between 0% and 25%. In each case, the degradation process was continuously monitored by measuring oxygen consumption. Two communities (CR1 and CR2) showed nearly equal degrees of degradation across a salinity range of 0%-10% (the former degrading about 63% of the diesel fuel and the latter about 70% after 53 and 80 d, respectively). Furthermore, the degree of degradation was not significantly lower in the presence of 17.5% salt (58% and 65% degraded, respectively). A third community (El Zorro) showed a maximum turnover at 5% salt (79% diesel fuel degraded) and significant degradation (66%) at a salinity of 10%. However, the degree of degradation by this community clearly dropped at 0% and 15% salt. None of the communities were able to degrade diesel fuel in the presence of 25% salt, but the living cell counts showed that components of the microbial population survived the long-term exposure. The surviving portion is obviously sufficient to allow substantial restoration of the original community, as verified by the BIOLOG method. Isolates of the CR1 community were identified as members of the genera *Cellulomonas*, *Bacillus*, *Dietzia*, and *Halomonas*. In light of our investigations, the bioremediation of contaminated saline soils should be quite possible if the salinity of the soil water is lower than 15% or if it is reduced below this limit by the addition of water.

150. **Rolle-Kampczyk, U.**, **Fritz, G. J.**, **Diez, U.**, **Lehmann, I.**, **Richter, M.**, **Herbarth, O.** (2004):
Well water - one source of *Heliobacter pylori* colonization
Int.J.Hyg.Environ.Health **207** (4), 363-368
Impact factor: 1,085
Abstract: *Helicobacter pylori* (*H. pylori*) is one of the world's most widespread microorganisms. Its acquisition in humans remains poorly understood, however, epidemiological studies have identified drinking water as reservoir for the bacterium. The aim of this study was to investigate the prevalence of *H. pylori* infection among individuals using or drinking previously *H. pylori* tested well water.
Applying household cluster sampling, a total of 91 subjects, all using or drinking well water (13 of either *H. pylori* positive or negative wells), were screened for their H. *pylori* status. The group was comprised of 73 adults and 19 children under the age of 18.*H. pylori* infection was determined using the [^{13}C]urea breath test. A self-administered or parent-completed questionnaire provided information on living conditions and lifestyle habits including the use or drinking of well water.
Logistic regression analyses associated the drinking of *H. pylori* positive well water with a positive colonization status [Odds Ratio (OR) 8.3; 95% confidence interval (95% CI) 2.4 - 29]. In summary, the use or drinking of *H. pylori* contaminated well water appears associated with the acquisition of a *H. pylori* infection. This study is based on a relatively small and inhomogeneous population sample and should be repeated to confirm the results.

151. **Rückauf, U.**, Augustin, J., **Russow, R.**, Merbach, W. (2004):
Nitrate removal from drained and reflooded fen soils affected by soil N transformation processes and plant uptake
Soil Biol.Biochem. **36** (1), 77-90
Impact factor: 1,915

Abstract: Knowledge about nitrate transformation processes and how they are affected by different plants is essential in order to reduce the loss of valuable N fertiliser as well as to prevent environmental pollution due to nitrate leaching or N_2O emission after fertilisation or the reflooding of degraded fens with nitrate-containing municipal sewage. Therefore four microcosm ^{15}N tracer experiments were performed to evaluate the effect of common wetland plants (*Phalaris arundinacea, Phragmites australis*) combined with different soil moisture conditions (from dry to reflooded) on nitrate turnover processes. At the end of experiment, the total formation of gaseous N compounds was calculated using the ^{15}N balance method. In two experiments (wet and reflooded soil conditions) the N_2O and N_2 emissions were also directly determined.
Our results show that in degraded fen soils, which process mainly takes place-denitrification or transformation into organic N compounds-is determined by the soil moisture conditions. Under dry soil moisture conditions (water filled pore space: 31%) up to 80% of the ^{15}N nitrate added was transformed into organic N compounds. This transformation process is not affected by plant growth. Under reflooded conditions (water filled pore space: 100%), the total gaseous N losses were highest (77-95% of the ^{15}N-nitrate added) and the transformation into organic N compounds was very low (1.8% of ^{15}N nitrate added). Under almost all soil conditions plant growth reduced the N losses by 20-25% of the ^{15}N nitrate added due to plant uptake. The N_2 emissions exceeded the N_2O emissions by a factor of 10-20 in planted soil, and as much as 30 in unplanted soil. In the treatments planted with *Phragmites australis*, N_2O emission was about two times higher than in the corresponding unplanted treatment. 15% of the N_2O and N_2 formed was transported via the *Phragmites* shoots from the soil into the atmosphere. By contrast, *Phalaris arundinacea* did not affect N_2O emissions and no emission via the shoots was observed.

152. **Rupp, H.**, **Meißner, R.**, Leinweber, P. (2004):
Effects of extensive land use and re-wetting on diffuse phosphorus pollution in fen areas - results from a case study in the Drömling catchment, Germany
J.Plant Nutr.Soil Sc. **167** (4), 408-416
Impact factor: 0,985

Abstract: Fen-soil cultivation in NE Germany resulted in severe peat degradation; therefore present and future management is aimed to restore degraded sites by re-wetting. Evidence in the literature indicates that decreasing redox potentials in re-wetted fens may result in an increased risk of diffuse water pollution with P. However, little is known about the impact of different fen-preserving land-management schemes on the redox potential in soil and on the P dynamics in adjacent surface water. We investigated effects of peat degradation and re-wetting on redox potential and P mobilization on extensive grassland, re-wetted intensive grassland, and alder swamp forest in the Drömling (Saxony-Anhalt, Germany). The results showed that the redox potentials of peat lands were almost below the theoretical stability fields of Fe(III)-containing minerals. The re-wetted site was characterized by the highest concentrations of soluble reactive P (SRP) in surface water. Average SRP concentrations up to 0.36 mg l^{-1} indicated an increased P load. The concentration of SRP in the Ohre river, which is the central drainage channel of the Drömling catchment, significantly increased since 1996. The P concentrations of surface water were found to be indirectly correlated with the redox potentials.
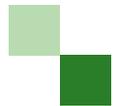
153. **Russow, R.**, Veste, M., Littmann, T. (2004):
Using the natural ^{15}N abundance to assess the main nitrogen inputs into the sand dune area of the North-Western Negev Desert (Israel)
Isot.Environ.Health Stud. **40** (1), 57-67
Impact factor: 0,490

Abstract: The variation of the natural ^{15}N abundance is often used to evaluate the origin of nitrogen or the pathways of N input into ecosystems. We tried to use this approach to assess the main input pathways of nitrogen into the sand dune area of the north-western Negev Desert (Israel). The following two pathways are the main sources for nitrogen input into the system:
Biological fixation of atmospheric nitrogen by cyanobacteria present in biological crusts and by N_2-fixing vascular plants (*e.g.* the shrub *Retama raetam*);
Atmospheric input of nitrogen by wet deposition with rainfall, dry deposition of dust containing N compounds, and gaseous deposition.
Samples were taken from selected environmental compartments such as biological crusts, sand underneath these crusts (down to a depth of 90 cm), N_2-fixing and non-N_2-fixing plants, atmospheric bulk deposition as well as soil from arable land north of the sandy area in three field campaigns in March 1998, 1999 and 2000. The d^{15}N values measured were in the following ranges: grass -2.5‰ to +1.5‰; *R. reatam*: +0.5‰ to +4.5‰; non-N_2-fixing shrubs +1‰ to +7‰; sand beneath the biological crusts +4‰ to +20‰ (soil depth 2-90 cm); and arable land to the north up to 10‰. Thus, the natural ^{15}N abundance of the different N pools varies significantly. Accordingly, it should be feasible to assess different input pathways from the various ^{15}N abundances of nitrogen. For example, the biological N fixation rates of the Fabaceae shrub *R. reatam* from the ^{15}N abundances measured were calculated to be 46-86% of biomass N derived from the atmosphere. The biological crusts themselves generally show slight negative ^{15}N values (-3‰ to -0.5‰), which can be explained by biological N fixation. However, areas with a high share of lichens, which are unable to fix atmospheric nitrogen, show very negative values down to -10‰. The atmospheric N bulk deposition, which amounts to 1.9-3.8 kg N/ha yr, has a ^{15}N abundance between 4.4‰ and 11.6‰ and is likely to be caused by dust from the arable land to the north. Thus, it cannot be responsible for the very negative values of lichens measured either. There must be an additional N input from the atmosphere with negative d^{15}N values, *e.g.* gaseous N forms (NO_x, NH_3). To explain these conflicting findings, detailed information is still needed on the wet, particulate and gaseous atmospheric deposition of nitrogen.

154. Ruszczynska, A., **Wennrich, R.**, **Stärk, H. J.**, Bulska, E. (2004):
Fractionation of aluminium in acidic lake water by solid extraction followed by atomic or mass spectrometry detection
Pol.J.Environ.Stud. **13** (Supplement IV), 30-35
Impact factor: 0,461
Abstract: no abstract

155. Santos, P. M., **Benndorf, D.**, Sá-Correia, I. (2004):
Insights into *Pseudomonas putida* KT2440 response to phenol-induced stress by quantitative proteomics
Proteomics **4** (9), 2640-2652
Impact factor: 5,766

Abstract: To gain insight into the global mechanism underlying phenol toxicity and tolerance in bacteria, we have generated a two-dimensional protein reference map and used it to identify variations in protein expression levels in *Pseudomonas putida* KT2440 following exposure to sub-lethal inhibitory concentrations of this solvent. Inspection of the two-dimensional gel electrophoresis gels revealed that 1 h following sudden cell exposure to two different concentrations of phenol, leading to the inhibition of exponential growth (600 mg/L) or to growth arrest for, at least, 4 h before inhibited growth resumption (800 mg/L), the amount of 68 proteins was increased while the amount of 13 proteins was reduced. The up-regulated proteins include proteins involved in the: (i) oxidative stress response (AhpC, SodB,Tpx and Dsb); (ii) general stress reponse (UspA, HtpG, GrpE and Tig); (iii) energetic metabolism (AcnB, AtpH, Fpr, AceA, NuoE, and MmsA-1); (iv) fatty acid biosynthesis (FabB, AccC-1 and FabBx1); (v) inhibition of cell division (MinD); (vi) cell envelope biosynthesis (LpxC, VacJ, and MurA); (vii) transcription regulation (OmpR and Fur); and (viii) transport of small molecules (TolC, BraC, AotJ, AapJ, FbpA and OprQ). Among the down-regulated proteins are those involved in nucleotide biosynthesis (PurM, PurL, PyrH and Dcd) and cell motility (FliC). The information emerging from this genome expression profiling and the detailed investigation of the biological role of candidate genes, as targets of phenol toxicity or as determinants of phenol resistance in *P. putida* KT2440, will allow more rationale strategies for developing bacteria with greater solvent tolerance with impact in bioremediation and whole-cell biotransformations in media with organic solvents.

156. Schädler, M., Alphei, J., Scheu, S., **Brandl, R.**, **Auge, H.** (2004):
Resource dynamics in an early-successional plant community are influenced by insect exclusion
Soil Biol.Biochem. **36** (11), 1817-1826
Impact factor: 1,915

Abstract: The exclusion of insects from terrestrial ecosystems may change productivity, diversity and composition of plant communities and thereby nutrient dynamics. In an early-successional plant community we reduced densities of above- and below-ground insects in a factorial design using insecticides. Beside measuring vegetation dynamics we investigated the effects of insect exclusion on above- and below-ground plant biomass, below-ground C and N storage by plants, litter quality, decomposition rate, soil water content, soil C:N ratio, nutrient availability and soil microbial activity and biomass.
The application of soil insecticide had only minor effects on above- and below-ground biomass of the plant community but increased carbon content in root biomass and total carbon and nitrogen storage in roots. In one of the three investigated plant species (*Cirsium arvense*), application of soil insecticide decreased nitrogen concentration of leaves (-12%). Since *C. arvense* responded positively to soil insecticide application, this effect may be due to drought stress caused by root herbivory. Decomposition rate was slightly increased by the application of above-ground insecticide, possibly due to an impact on epigeic predators. The application of soil insecticide caused a slightly increased availability of soil water and an increased availability of mineralised nitrogen (+30%) in the second season. We explain these effects by phenological differences between the plant communities, which developed on the experimental plots. Microbial biomass and activity were not influenced by insecticide application, but were correlated to above-ground plant biomass of the previous year. Overall, we conclude that the particular traits of the involved plant species, e.g. their phenology, are the key to understand the resource dynamics in the soil.
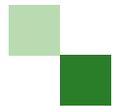
157. Schädler, M., Jung, G., **Brandl, R.**, **Auge, H.** (2004):
Secondary succession is influenced by belowground insect herbivory on a productive site
Oecologia **138** (2), 242-252
Impact factor: 3,128

Abstract: We investigated the effects of insect herbivory on a plant community of a productive old-field community by applying foliar and soil insecticides in a full factorial design. During the first 3 years of succession, insecticide treatments had only minor effects on total cover abundance and species richness. However, species ranking within the plant community was strongly affected by soil insecticide but not by foliar insecticide. Creeping thistle, *Cirsium arvense*, dominated the experimental plots with reduced root herbivory, while square-stemmed willow-herb, *Epilobium adnatum*, dominated the control and the plots with foliar insecticide. When soil insecticide was applied, cover abundance of monocarpic forbs increased and cover abundance of polycarpic herbs decreased compared to the control. However, this effect was due to a few abundant plant species and is not based on a consistent difference between life history groups. Instead, application of soil insecticide promoted persistence of species that established at the start of succession, and suppressed species that established in the following years. We conclude that below-ground herbivory reduces competitive ability of resident species and, thus, facilitates colonization by late-successional species. Hence, soil insects can exert strong top-down effects on the vegetation of productive sites by affecting dominant plant species and altering competitive balances.

158. **Schellin, M.**, Hauser, B., **Popp, P.** (2004):
Determination of organophosphorus pesticides using membrane-assisted solvent extraction combined with large volume injection-gas chromatography-mass spectrometric detection
J.Chromatogr.A **1040** (2), 251-258
Impact factor: 2,922

Abstract: Eight organophosphorus pesticides (parathion-methyl, fenitrothion, malathion, fenthion, bromophos, bromophos-ethyl, fenamiphos and ethion) in aqueous samples were analysed by means of membrane-assisted solvent extraction. First a 20 ml extraction vial was filled with 15 ml of aqueous sample. Then the membrane bag consisting of nonporous polypropylene was put into the vial and filled with 800 l of organic solvent. The analytes were separated from the aqueous layer by transporting them through the membrane material into the small amount of solvent. The technique was fully automated and successfully combinable with large volume extraction and GC-MS. To achieve an optimum performance several extraction conditions were investigated. Cyclohexane was chosen as acceptor phase. Then the impact of salt, methanol, pH value, as well as working parameters like stirring rate of the agitator and extraction time, were studied. Moreover, the influence of matrix effects was examined by adding different concentrations of humic acid sodium salt. Detection limits in the ng/l level were achieved using large volume injection with the injecting volume of 100 l. The recovery values ranged from 47 to 100% and the relative standard deviation for three standard measurements was between 4 and 12% (except for bromophos-ethyl: 22%). The linear dynamic range was between 0.001 and 70 g/l. The applicability of the method to real samples was tested by spiking the eight organophosphorus pesticides to red wine, white wine and apple juice samples.

159. **Schirmer, K.**, Dayeh, V. R., **Bopp, S.**, **Russold, S.**, Bols, N. C. (2004):
Applying whole water samples to cell bioassays for detecting dioxin-like compounds at contaminated sites
Toxicology **205** (3), 211-221
Impact factor: 2,061
Abstract: Methodology was developed in order to rapidly and cost-efficiently screen whole water samples without extraction for the presence of dioxin-like compounds using a cell bioassay approach. Presence of dioxin-like compounds was indicated by the induction in the rainbow trout (*Oncorhynchus mykiss*) liver cell line, RTL-W1, of cytochrome CYP1A, which was measured as 7-ethoxyresorufin-*O*-deethylase (EROD) activity. Two simple culture media, L-15/ex and Earle's-G, prepared in tissue culture water and supplemented with 5% serum, proved suitable for supporting RTL-W1 cell viability and induction of EROD activity by the model inducers, 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD) and benzo[a]pyrene (BaP). Preparation of the same simplified media using whole surface and ground water instead of tissue culture water again allowed EROD induction by spiked TCDD and BaP to be detected but higher concentrations of inducers were necessary. Despite this reduced sensitivity, RTL-W1 cells responded to 4 out of 40 ground water samples from a former oil and lignite processing site with significant EROD induction. In the future, the value of the bioassay is as an inexpensive means of quickly screening ground and surface water samples to identify high contaminant levels particularly at industrial sites, where detailed site-investigations and long-term monitoring programs are required.

160. **Schirmer, M.**, Butler, B. J. (2004):
Transport behaviour and natural attenuation of organic contaminants at spill sites
Toxicology **205** (3), 173-179
Impact factor: 2,061
Abstract: Organic contaminants pose a significant threat to groundwater resources. These contaminants are often released as non-aqueous phase liquids (NAPLs) during spills of, for example, gasoline, crude oil, creosote, coal tar or chlorinated solvents. Once released, the liquids seep downward and dissolve into the groundwater. In many cases, the impacted groundwater contains a mixture of contaminants, either due to the complexity of the NAPL (e.g., gasoline) or due to co-disposal/co-spillage (e.g., landfill leachates). Many organic contaminants are hazardous to human health and the environment and therefore threaten our potable water resources and natural ecosystems. Active remediation of contaminated groundwater is often very expensive so that cost-effective alternatives have to be found. If natural attenuation is intended to be used as a means of achieving specific remedial objectives at a contaminated site, it will require a sound understanding of the ongoing processes as well as careful control and monitoring ("monitored natural attenuation" (MNA)). Therefore, a major goal of remediation research today is to develop methods to predict the mass fate of multiple organic compounds in heterogeneous aquifers under natural conditions.
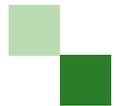
161. **Schleinitz, K. M.**, **Kleinsteuber, S.**, Vallaeys, T., **Babel, W.** (2004):
Localization and characterization of two novel genes encoding stereospecific
dioxygenases catalyzing 2(2,4-dichlorophenoxy)propionate cleavage in *Delftia
acidovorans* MC1
Appl.Environ.Microb. **70** (9), 5357-5365
Impact factor: 3,820
Abstract: Two novel genes, *rdpA* and *sdpA*, encoding the enantiospecific -ketoglutarate
dependent dioxygenases catalyzing *R*, *S*-dichlorprop cleavage in *Delftia acidovorans*
MC1 were identified. Significant similarities to other known genes were not detected,
but their deduced amino acid sequences were similar to those of other -ketoglutarate
dioxygenases. RdpA showed 35% identity with TauD of *Pseudomonas aeruginosa*, and
SdpA showed 37% identity with TfdA of *Ralstonia eutropha* JMP134. The functionally
important amino acid sequence motif $HX(D/E)X_{23-26}(T/S)X_{114-183}HX_{10-13}R/K$, which is
highly conserved in group II -ketoglutarate-dependent dioxygenases, was present in
both dichlorprop-cleaving enzymes. Transposon mutagenesis of *rdpA* inactivated *R*-
dichlorprop cleavage, indicating that it was a single-copy gene. Both *rdpA* and *sdpA*
were located on the plasmid pMC1 that also carries the lower pathway genes.
Sequencing of a 25.8-kb fragment showed that the dioxygenase genes were separated
by a 13.6-kb region mainly comprising a Tn*501*-like transposon. Furthermore, two
copies of a sequence similar to IS*91*-like elements were identified. Hybridization studies
comparing the wild-type plasmid and that of the mutant unable to cleave dichlorprop
showed that *rdpA* and *sdpA* were deleted, whereas the lower pathway genes were
unaffected, and that deletion may be caused by genetic rearrangements of the IS*91*-
like elements. Two other dichlorprop-degrading bacterial strains, *Rhodoferax* sp. strain
P230 and *Sphingobium herbicidovorans* MH, were shown to carry *rdpA* genes of high
similarity to *rdpA* from strain MC1, but *sdpA* was not detected. This suggested that *rdpA*
gene products are involved in the degradation of *R*-dichlorprop in these strains.

162. **Schlink, U.**, **Rehwagen, M.**, Damm, M., **Richter, M.**, Borte, M., **Herbarth, O.** (2004):
Seasonal cycle of indoor-VOCs: comparison of apartments and cities
Atmos.Environ. **38** (8), 1181-1190
Impact factor: 2,338
Abstract: On the basis of 2103 measurements of volatile organic compounds (VOCs) in
indoor air we study the intensity of a seasonal pattern. The data are representative for
the German population and were gathered in different cities (Leipzig, München, Köln),
in rooms of different type (children's, living, sleeping rooms, and other rooms), and in
households of smokers and non-smokers. In addition to the randomly selected different
apartments that were sampled each month, we repeatedly measured in a fixed set of
10 apartments. The analysis comprised concentrations of 30 VOCs belonging to the
groups of alkanes, cycloalkanes, aromatics, volatile halogenated hydrocarbons, and
terpenes.
The annual cycle for total VOC concentrations was observed at every site. Seasonality
proved to be the most dominant pattern, but it may be modified by further factors, such
as the city, the considered VOC component, and the type of the considered room.
Highest concentrations occurred during the winter months and amount to
approximately three to four times the summer burden. As seasonality may bias the
results of health effect studies we fit a seasonal model to our measurements and
develop a procedure for seasonal adjustment, which enables to roughly estimate the
annual peak concentration utilizing one monthly observation. The seasonal pattern
proved to be a general feature of indoor VOC concentrations and, therefore, this
adjustment procedure may be generally applicable. For Leipzig, München, and Köln we
present site-specific adjustment factors for indoor concentrations of aromatics,
terpenes, and alkanes.

163. Schmidt, A. C., **Mattusch, J.**, Reisser, W., **Wennrich, R.** (2004):
Uptake and accumulation behaviour of angiosperms irrigated with solutions of different arsenic species
Chemosphere **56** (3), 305-313
Impact factor: 1,904

Abstract: Uptake and metabolisation of arsenic as a function of both the plant type and the chemical form of arsenic were examined. For this purpose two different plant species (*Silene vulgaris* and *Plantago major*) were selected that differed in their vitality and accumulation behaviour on arsenic-loaded substrates. The plants were cultivated on soil and irrigated with aqueous solutions of an inorganic arsenic compound (arsenious acid) and an organic compound (dimethylarsinate). The arsenic species accumulated in the parts of the plants above ground were extracted by PLE and determined using IC-ICP-MS. The concentrations and metabolisation products of arsenic found in the extracts indicate different mechanisms of arsenic uptake and transformation in both angiosperms. The arsenic species pattern showed that *S. vulgaris* was more arsenic--tolerable than *P. major* which is attributed to a low arsenate to arsenite concentration ratio in the plant compartments. *S. vulgaris* was also able to demethylate and reduce dimethylarsinate to form arsenite in a high extent. *P. major* accumulated only eight times lower concentration of arsenic, and the arsenate to arsenite concentration ratio shifted to higher values. Metabolisation products of dimethylarsinate did not occur under the present experimental conditions. The vitality of the angiosperms seems to be very dependent on the ability of the plant to reduce arsenate to arsenite.

164. Schmidt, A. C., Reisser, W., **Mattusch, J.**, **Wennrich, R.**, **Jung, K.** (2004):
Analysis of arsenic species accumulation by plants and the influence on their nitrogen uptake
J Anal At Spectrom **19** (1), 172-177
Impact factor: 3,200

Abstract: Terrestrial plants are able to accumulate arsenic to a substantial extent but survive the stress to differing degrees of vitality. The influence of arsenic on important energy and metabolic cycles does not yet have sufficient explanation. Parallel to the uptake and processing of arsenic species such as As(III) and As(V) by *Silene vulgaris*, the nitrogen uptake using a ^{15}N tracer method was investigated. The results showed that the nitrogen uptake decreases with increasing arsenate concentrations applied to the plants. The reaction of the plants treated with arsenite changed from a depression at low arsenite concentrations to a strong increase with the largest quantity applied, exceeding the ^{15}N-incorporation of the control plants. This behaviour underlines the divergent behaviour of the N-metabolism caused by both arsenic species. As(III) can be detoxified by complexation with peptides rich in SH-groups. As(V) acts as a phosphate analogue and interrupts diverse phosphorylation reactions.
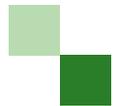
165. **Schmidt, T.**, **Schirmer, M.**, **Weiß, H.**, Haderlein, S. B. (2004):
Microbial degradation of methyl *tert*-butyl ether and *tert*-butyl alcohol in the subsurface
J.Contam.Hydrol. **70** (3-4), 173-203
Impact factor: 1,438
Abstract: The fate of fuel oxygenates such as methyl *tert*-butyl ether (MTBE) in the subsurface is governed by their degradability under various redox conditions. The key intermediate in degradation of MTBE and ethyl *tert*-butyl ether (ETBE) is *tert*-butyl alcohol (TBA) which was often found as accumulating intermediate or dead-end product in lab studies using microcosms or isolated cell suspensions. This review discusses in detail the thermodynamics of the degradation processes utilizing various terminal electron acceptors, and the aerobic degradation pathways of MTBE and TBA. It summarizes the present knowledge on MTBE and TBA degradation gained from either microcosm or pure culture studies and emphasizes the potential of compound-specific isotope analysis (CSIA) for identification and quantification of degradation processes of slowly biodegradable pollutants such as MTBE and TBA.
Microcosm studies demonstrated that MTBE and TBA may be biodegradable under oxic and nearly all anoxic conditions, although results of various studies are often contradictory, which suggests that site-specific conditions are important parameters. So far, TBA degradation has not been shown under methanogenic conditions and it is currently widely accepted that TBA is a recalcitrant dead-end product of MTBE under these conditions. Reliable in situ degradation rates for MTBE and TBA under various geochemical conditions are not yet available. Furthermore, degradation pathways under anoxic conditions have not yet been elucidated. All pure cultures capable of MTBE or TBA degradation isolated so far use oxygen as terminal electron acceptor. In general, compared with hydrocarbons present in gasoline, fuel oxygenates biodegrade much slower, if at all. The presence of MTBE and related compounds in groundwater therefore frequently limits the use of in situ biodegradation as remediation option at gasoline-contaminated sites. Though degradation of MTBE and TBA in field studies has been reported under oxic conditions, there is hardly any evidence of substantial degradation in the absence of oxygen. The increasing availability of field data from CSIA will foster our understanding and may even allow the quantification of degradation of these recalcitrant compounds. Such information will help to elucidate the crucial factors of site-specific biogeochemical conditions that govern the capability of intrinsic oxygenate degradation.

166. **Scholz, S.**, Domaschke, H., Kanamori, A., Ostermann, K., Rödel, G., Gutzeit, H. O. (2004):
Germ cell-less expression in Medaka (*Oryzias latipes*)
Mol.Reprod.Dev. **67** (1), 15-18
Impact factor: 2,543
Abstract: The gene germ cell-less (*gcl*) plays an important role in the early differentiation of germ cells in *Drosophila*. We isolated the *gcl* homolog of the model teleost medaka (*Oryzias latipes*) using degenerated primers and an ovary cDNA bank. The predicted amino acid sequence of medaka gcl showed 92, 68 and 31% overall identity to mouse, human and *Drosophila gcl* respectively. RT-PCR revealed stronger expression in the ovary and weaker expression in testis, brain, heart, liver and muscle tissue. Expression in early embryos indicates the presence of maternal mRNA. By in situ hybridisation (ISH), *gcl* could not be detected in embryos. In contrast to vasa, ISH revealed expression of *gcl* in the ovary but not in the testis.

167. **Scholz, S.**, Kordes, C., Hamann, J., Gutzeit, H. O. (2004):
Induction of vitellogenin in vivo and in vitro in the model teleost medaka (*Oryzias latipes*): comparison of gene expression and protein levels
Mar.Environ.Res. **57** (3), 235-244
Impact factor: 1,487
Abstract: Quantification of the egg yolk precursor vitellogenin (VTG) in fish has become a standard technique to detect estrogenic effects of known chemicals and environmental samples. In the present study, we have analysed VTG induction by estradiol, ethynylestradiol and genistein exposure in the model teleost medaka (*Oryzias latipes*) and demonstrate that the medaka is a suitable model system to analyse estrogenic effects. By comparing VTG gene expression and protein levels we show that in principal both techniques can be used to study VTG induction in vivo (juvenile and adult males) and in vitro (primary cultures of male liver cells). If a short term in vivo or in vitro exposure is performed, detection of mRNA might be sufficient. For long term studies with the need to detect weak estrogenic chemicals and a precise quantification, immuno-chemical detection may be favoured.

168. **Schulz, H.**, Giesemann, A., **Gehre, M.** (2004):
Influence of reduced S inputs on the sulfate pool in the humus layer and sulfate uptake in *Pinus sylvestris* L. as indicated by natural isotope variations of sulfur and oxygen
Journal of Applied Botany and Food Quality - Angewandte Botanik **78** (1), 18-24
Impact factor: 0,600
Abstract: no abstract

169. **Schulz, K.**, Jarvis, A. J. (2004):
Environmental and biological controls on the seasonal variations in latent heat fluxes derived from flux data for three forest sites
Water Resources Research, 10 S.
Online Journal
Impact factor: 1,549
Abstract: One difficulty that arises when predicting canopy-scale energy fluxes is that the parameterization of complex (bio)physical soil vegetation atmosphere transfer schemes is often only partially conditioned by the information content of the eddy covariance data commonly used for calibration, rendering subsequent predictions and extrapolations somewhat uncertain. Here we derive a functional description for daily evaporative fluxes directly from observations at the canopy scale using a nonstationary regression framework. This method is applied to 3 year blocks of eddy covariance and micrometeorological data from three different FLUXNET forest sites: Harvard Forest, USA, University of Michigan Biological Station, USA, and Hyytiälä, Finland, covering a variety of climate and vegetation conditions. The approach yields a simple three-parameter model which is based on partitioning latent heat between equilibrium latent heat fluxes and fluxes that are under strong stomatal control and hence are related to CO_2 fluxes. Despite being well defined and able to account for much of the observed variations in latent heat, predictive validation of the model emphasizes the need to account for surface and subsurface water balance in such descriptions.

170. **Schurr, F.**, **Boßdorf, O.**, Milton, S. J., Schumacher, J. (2004):
Spatial pattern formation in semi-arid shrubland: a priori predicted versus observed pattern characteristics
Plant Ecol **173** (2), 271-282
Impact factor: 1,000

Abstract: Ecologists increasingly use spatial statistics to study vegetation patterns. Mostly, however, these techniques are applied in a purely descriptive fashion without a priori statements on the pattern characteristics expected. We formulated such a priori predictions in a study of spatial pattern in a semi-arid Karoo shrubland, South Africa. Both seed dispersal and root competition have been discussed as processes shaping the spatial structure of this community. If either of the two processes dominates pattern formation, patterns within and between shrub functional groups are expected to show distinct deviations from null models. We predicted the type and scale of these deviations and compared predicted to observed pattern characteristics. As predicted by the seed dispersal hypothesis, small-scale co-occurrence within and between groups of colonisers and successors was increased as compared to complete spatially random arrangement of shrubs. The root competition predictions, however, were not met as shrubs of similar rooting depth co-occurred more frequently than expected under random shrub arrangement. Since the distribution of rooting groups to the given shrub locations also failed to match the root competition predictions, there was little evidence for dominance of root competition in pattern formation. Although other processes may contribute to small-scale plant co-occurrence, the sufficient and most parsimonious explanation for the observed pattern is that its formation was dominated by seed dispersal. To characterise point patterns we applied both cumulative (uni- and bivariate K-function) and local (pair- and mark-correlation function) techniques. Based on our results we recommend that future studies of vegetation patterns include local characteristics as they independently describe a pattern at different scales and can be easily related to processes changing with interplant distance in a predictable fashion.

171. **Schüürmann, G.**, Funar-Timofei, S. (2003):
Multilinear regression and comparative molecular field analysis (CoMFA) of azo dye-fiber affinities. 2. Inclusion of solution-phase molecular orbital descriptors
J.Chem.Inf.Comp.Sci. **43** (5), 1502-1512
Impact factor: 2,902

Abstract: For a data set with 30 direct azo dyes taken from literature, quantitative structure-activity relationship (QSAR) analyses have been performed to model the affinity of the dye molecules for the cellulose fiber. The electronic structure of the compounds was characterized using quantum chemical gas-phase (AM1) and continuum-solvation molecular orbital parameters. As regards the solution phase, COSMO appears to be better suited than SM2 in quantifying relative trends of the aqueous solvation energy. For the dye-fiber affinity, the leave-one-out prediction capability of multilinear regression equations is superior to CoMFA, with predictive squared correlation coefficients ranging from 0.63 (pure CoMFA) to 0.89. At the same time, solution-phase CoMFA is superior to previously derived AM1-based CoMFA models. As a general trend, the dye-fiber affinity increases with increasing electron donor capacity that corresponds to an increasing hydrogen bond acceptor strength of the azo dyes. The discussion includes the consideration of structural features that are likely to be involved in dye-fiber and dye-dye hydrogen bonding interactions, and possible links between CoMFA electrostatic results and the atomic charge distribution of the compounds.

172. **Schweiger, O.**, **Frenzel, M.**, **Durka, W.** (2004):
Spatial genetic structure in a metapopulation of the land snail *Cepaea nemoralis* (Gastropoda: Helicidae)
Mol.Ecol. **13** (12), 3645-3655
Impact factor: 3,870
Abstract: Habitat fragmentation is a major force affecting demography and genetic structure of wild populations, especially in agricultural landscapes. The land snail *Cepaea nemoralis* (L.) was selected to investigate the impact of habitat fragmentation on the spatial genetic structure of an organism with limited dispersal ability. Genetic and morphological patterns were investigated at a local scale of a 500 m transect and a mesoscale of 4 4 km in a fragmented agricultural landscape while accounting for variation in the landscape using least-cost models. Analysis of microsatellite loci using expected heterozygosity (H_E), pairwise genetic distance ($F_{ST}/1\ F_{ST}$) and spatial autocorrelograms (Moran's *I*) as well as shell characteristics revealed spatial structuring at both scales and provided evidence for a metapopulation structure. Genetic diversity was related to morphological diversity regardless of landscape properties. This pointed to bottlenecks caused by founder effects after (re)colonization. Our study suggests that metapopulation structure depended on both landscape features and the shape of the dispersal function. A range of genetic spatial autocorrelation up to 80 m at the local scale and up to 800 m at the mesoscale indicated leptokurtic dispersal patterns. The metapopulation dynamics of *C. nemoralis* resulted in a patchwork of interconnected, spatially structured subpopulations. They were shaped by gene flow which was affected by landscape features, the dispersal function and an increasing role of genetic drift with distance.

173. **Seidel, H.**, **Löser, C.**, **Zehnsdorf, A.**, **Hoffmann, P.**, Schmerold, R. (2004):
Bioremediation process for sediments contaminated by heavy metals: feasibility study on a pilot scale
Environ.Sci.Technol. **38** (5), 1582-1588
Impact factor: 3,592
Abstract: The core stages of a sediment remediation process-the conditioning of dredged sludge by plants and the solid-bed leaching of heavy metals using microbially produced sulfuric acid-were tested on a pilot scale using a highly polluted river sediment. Conditioning was performed in 50 m^3 basins at sludge depths of 1.8 m. During one vegetation period the anoxic sludge turned into a soil-like oxic material and became very permeable to water. Reed canary grass (*Phalaris arundinacea*) was found to be best suited for conditioning. Bioleaching was carried out in an aerated solid-bed reactor of 2000 L working volume using oxic soil-like sediment supplemented with 2% sulfur. When applying conditioned sediment, the oxidation of easily degradable organic matter by heterotrophic microbes increased the temperature up to 50C in the early leaching phase, which in turn temporarily inhibited the sulfur-oxidizing bacteria. Nevertheless, most of the metal contaminants were leached within 21 days. Zn, Cd, Mn, Co, and Ni were removed by 61-81%, Cu was reduced by 21%, while Cr and Pb were nearly immobile. A cost-effectiveness assessment of the remediation process indicates it to be a suitable treatment for restoring polluted sediments for beneficial use.

174. Semple, K. T., Doick, K. J., Jones, K. C., Burauel, P., Craven, A., **Harms, H.** (2004):
Defining bioavailability and bioaccessibility of contaminated soil and sediment is complicated
Environ.Sci.Technol. **38** (12), 229A-231A
Impact factor: 3,592
Abstract: no abstract
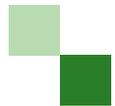
175. **Solé, M.**, **Durka, W.**, **Eber, S.**, **Brandl, R.** (2004):
Genotypic and genetic diversity of the common weed *Cirsium arvense* (Asteraceae)
Int.J.Plant Sci. **165** (3), 437-444
Impact factor: 1,619
Abstract: In many clonal species, seedling establishment is restricted to early successional stages when recruitment is still possible. Then, one expects that adapted genotypes become dominant and genotypic and genetic diversity should decrease with time. We investigated genotypic and genetic diversity within recently founded and established populations of the common weed *Cirsium arvense.* We used highly polymorphic amplified fragments length polymorphism (AFLP) markers. All populations were multiclonal and highly diverse (the proportion of distinguishable genotypes was 0.73 ± 0.25 [mean ± SD]). Clonal evenness was variable and ranged from 0.2 to 1. Independent of successional stage, we found on the small geographic scale of our study (<5 km) a considerable differentiation between populations ($_{SC} = 0.63$). This amount of differentiation was similar between founder and established populations and could result from selection in the early stage of succession as well as founder effects. Contrary to the general expectation, genotypic and genetic diversity were maintained through time, and molecular variance did not differ between successional stages (1.9 ± 0.89 vs. 2.5 ± 1.41). We suggest that this pattern is a consequence of the particular reproductive system of *C. arvense* that combines clonality with dioecy. The combination of clonal reproduction with the recruitment of sexually outcrossed seedlings in the first years allows the species to perform efficient colonizations even with founder effects, to undergo selection without loss of diversity, and to persist locally. This strategy appears to be very efficient in *C. arvense* and may have contributed to the worldwide success of this species.

176. Speybroeck, N., Madder, M., **Thulke, H.-H.**, Mtambo, J., Tirry, L., Chaka, G., Marcotty, T., Berkvens, D. (2004):
Variation in body size in the tick complex *Rhipicephalus appendiculatus/Rhipicephalus zambeziensis*
J Vector Ecol **29** (2), 347-354
Impact factor: 1,231
Abstract: no abstract

177. Staudt, C., Horn, H., Hempel, D. C., **Neu, T. R.** (2004):
Volumetric measurements of bacterial cells and extracellular polymeric substance glycoconjugates in biofilms
Biotechnol.Bioeng. **88** (5), 585-592
Impact factor: 2,173
Abstract: In this study an enrichment culture developed from activated sludge was used to investigate the architecture of fully hydrated multispecies biofilms. The assessment of biofilm structure and volume was carried out using confocal laser scanning microscopy (CLSM). Bacterial cell distribution was determined with the nucleic acid-specific stain SYTO 60, whereas glycoconjugates of extracellular polymeric substances (EPS) were stained with the Alexa-488-labeled lectin of *Aleuria aurantia*. Digital image analysis was employed for visualization and quantification of three-dimensional CLSM data sets. The specific volumes of the polymeric and cellular biofilm constituents were quantified. In addition, gravimetric measurements were done to determine dry mass and thickness of the biofilms. The data recorded by the CLSM technique and the gravimetric data were then compared. It was shown that the biofilm thicknesses determined with both methods agree well for slow-growing hetorotrophic and chemoautotrophic biofilms. In addition, for slow-growing biofilms, the volumes and masses calculated from CLSM and the biomass calculated from gravimetric measurements were also comparable. For fast-growing heterotrophic biofilms cultivated with high glucose concentrations the data sets fit to a lesser degree, but still showed the same common trend. Compared with traditional gravimetric measurements, CLSM allowed differential recording of multiple biofilm parameters with subsequent three-dimensional visualization and quantification. The quantitative three-dimensional results recorded by CLSM are an important basis for understanding, controlling, exploiting, and modeling of biofilms.

178. **Stottmeister, U.**, **Wießner, A.**, **Kuschk, P.**, **Kappelmeyer, U.**, **Kästner, M.**, **Bederski, O.**, **Müller, R. A.**, **Moormann, H.** (2003):
Effects of plants and microorganisms in constructed wetlands for wastewater treatment
Biotechnol.Adv. **22** (1-2), 93-117
Impact factor: 2,875
Abstract: Constructed wetlands are a natural alternative to technical methods of wastewater treatment. However, our understanding of the complex processes caused by the plants, microorganisms, soil matrix and substances in the wastewater, and how they all interact with each other, is still rather incomplete.
In this article, a closer look will be taken at the mechanisms of both plants in constructed wetlands and the microorganisms in the root zone which come into play when they remove contaminants from wastewater. The supply of oxygen plays a crucial role in the activity and type of metabolism performed by microorganisms in the root zone. Plants' involvement in the input of oxygen into the root zone, in the uptake of nutrients and in the direct degradation of pollutants as well as the role of microorganisms are all examined in more detail.
The ways in which these processes act to treat wastewater are dealt with in the following order:
• Technological aspects;
• The effect of root growth on the soil matrix;
• Gas transport in helophytes and the release of oxygen into the rhizosphere;
• The uptake of inorganic compounds by plants;
• The uptake of organic pollutants by plants and their metabolism;
• The release of carbon compounds by plants;
• Factors affecting the elimination of pathogenic germs.

179. Suzuki, A., Yoshida, K., Onizuka, H., Iwai, Y., Arai, Y., **Aptula, A. O.**, **Kühne, R.**, **Ebert, R. U.**, **Schüürmann, G.** (2004):
Categorical modeling of the flow pattern of liquid organic compounds between blade electrodes using semiempirical and *ab initio* quantum chemical descriptors
Croat.Chem.Acta **77** (1-2), 377-389
Impact factor: 0,729

Abstract: For a data set of 30 organic fluids, categorical modeling has been employed to predict the flow pattern under an external electric field. To this end, a previously generated data set was augmented by 10 compounds with new experimental results, and quantum chemical methods have been used to characterize the geometric and electronic structure of the molecules on both the semiempirical and ab initio levels of theory. Both linear discriminant analysis (LDA) and binary logistic regression (BLR) have been employed to model the flow rate (high vs. low) and flow direction (left vs. right). For the flow rate, good LDA and BLR calibration statistics using the dipole moment, hydrophobicity and some charged partial surface area (CPSA) descriptors is accompanied with moderate prediction statistics, as evaluated through simulated external validation, and activity scrambling shows that chance correlation is not relevant. Additional neural network analyses yielded no stable models due to constraints imposed by the data set size. For the flow direction, LDA and BLR calibration and prediction statistics show more variation among the different models generated, with an overall performance inferior to the one for the flow rate. Here, besides CPSA descriptors, two parameters characterizing the softness of the electronic structure are involved. In general, BLR is slightly superior to LDA for both properties. The results are discussed in terms of contingency table statistics and with respect to the mechanistic meaning of molecular descriptors.

180. Tamburro, A., Robuffo, I., **Heipieper, H. J.**, Allocati, N., Rotilio, D., Di Ilio, C., Favaloro, B. (2004):
Expression of glutathione *S*-transferase and peptide methionine sulphoxide reductase in *Ochrobactrum anthropi* is correlated to the production of reactive oxygen species caused by aromatic substrates
FEMS Microbiol.Lett. **241** (2), 151-156
Impact factor: 1,932

Abstract: Peptide methionine sulphoxide reductase (MsrA) and glutathione S-transferases (GSTs) are considered as detoxification enzymes. In the xenobiotics-degrading bacterium Ochrobactrum anthropi the two enzymes are co-induced by toxic concentrations of aromatic substrates such as phenol and 4-chlorophenol. In aerobic organisms, degradation of aromatic substrates by mono- and dioxygenases leads to a generation of oxidative stress that causes the occurrence of reactive oxygen species (ROS). A capillary electrophoretic method, using the intracellular conversion of dihydrorhodamine- 123 into rhodamine-123, was developed to measure the content of ROS in the bacteria. The presence of toxic concentrations of the aromatic substrate 4-chlorophenol, an inducer of GST and MsrA, leads to a significant increase in the production of ROS. These results strongly suggest that GST and MsrA enzymes are part of the bacterial defence mechanism against particular oxidative stress conditions. As oxidative stress is known to be present predominantly close to the cytoplasmic membrane, we investigated the subcellular distribution of both MsrA and GST enzymes in this bacterium grown in the presence of 4-chlorophenol. By Western blotting, MsrA and GST was assayed in the cytoplasm as well as in the periplasm. Moreover, immunolocalisation by colloidal gold immunoelectron microscopy identified the two proteins associated with the cell envelope.

181. Terentiev, Y., **Breuer, U.**, **Babel, W.**, Kunze, G. (2004):
      Non-conventional yeasts as producers of polyhydroxyalkanoates - genetic engineering
      of *Arxula adeninivorans*
      Appl.Microbiol.Biotechnol. **64** (3), 376-381
      Impact factor: 2,034
      Abstract: The non-conventional yeast *Arxula adeninivorans* was equipped with the
      genes *phbA*, *phbB* and *phbC* of the polyhydroxyalkanoate (PHA) biosynthetic pathway
      of *Ralstonia eutropha*, which encode -ketothiolase, NADPH-linked acetoacetyl-CoA
      reductase and PHA synthase, respectively. *Arxula* strains transformed solely with the
      PHA synthase gene (*phbC*) were able to produce PHA. However, the maximum
      content of the polymer detected in these strains was just 0.003% poly-3-
      hydroxybutyrate (PHB) and 0.112% poly-3-hydroxyvalerate (PHV). The expression of
      all three genes (*phbA*, *phbB*, *phbC*) resulted in small increases in the PHA content of
      the transgenic *Arxula* cells. However, under controlled cultivation conditions with
      minimal medium and ethanol as the carbon source, the recombinant yeast was able to
      accumulate up to 2.2% PHV and 0.019% PHB. Possible reasons for these differences
      are discussed.

182. Terentiev, Y., Pico, A. H., Böer, E., Wartmann, T., Klabunde, J., **Breuer, U.**, **Babel, W.**,
      Suckow, M., Gellissen, G., Kunze, G. (2004):
      A wide-range integrative yeast expression vector system based on *Arxula
      adeninivorans*-derived elements
      J Ind Microbiol Biotechnol **31** (5), 223-228
      Impact factor: 1,195
      Abstract: An *Arxula adeninivorans* integration vector was applied to a range of
      alternative yeast species including *Saccharomyces cerevisiae*, *Debaryomyces
      hansenii*, *Debaryomyces polymorphus*, *Hansenula polymorpha* and *Pichia pastoris*.
      The vector harbours a conserved *A. adeninivorans*-derived 25S rDNA sequence for
      targeting, the *A. adeninivorans*-derived *TEF1* promoter for expression control of the
      reporter sequence, and the *Escherichia coli*-derived *hph* gene conferring resistance
      against hygromycin B for selection of recombinants. Heterologous gene expression
      was assessed using a green fluorescent protein (GFP) reporter gene. The plasmid was
      found to be integrated into the genome of the various hosts tested; recombinant strains
      of all species exhibited heterologous gene expressions of a similar high level.
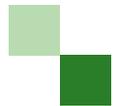
183. Tews, J., Brose, U., **Grimm, V.**, Tielbörger, K., Wichmann, M. C., Schwager, M., Jeltsch, F. (2004):
Animal species diversity driven by habitat heterogeneity/diversity: the importance of keystone structures
J.Biogeogr. **31** (1), 79-92
Impact factor: 2,097

Abstract: Aim: In a selected literature survey we reviewed studies on the habitat heterogeneityanimal species diversity relationship and evaluated whether there are uncertainties and biases in its empirical support.
Location World-wide.
Methods: We reviewed 85 publications for the period 19602003. We screened each publication for terms that were used to define habitat heterogeneity, the animal species group and ecosystem studied, the definition of the structural variable, the measurement of vegetation structure and the temporal and spatial scale of the study.
Main conclusions: The majority of studies found a positive correlation between habitat heterogeneity/diversity and animal species diversity. However, empirical support for this relationship is drastically biased towards studies of vertebrates and habitats under anthropogenic influence. In this paper, we show that ecological effects of habitat heterogeneity may vary considerably between species groups depending on whether structural attributes are perceived as heterogeneity or fragmentation. Possible effects may also vary relative to the structural variable measured. Based upon this, we introduce a classification framework that may be used for across-studies comparisons. Moreover, the effect of habitat heterogeneity for one species group may differ in relation to the spatial scale. In several studies, however, different species groups are closely linked to 'keystone structures' that determine animal species diversity by their presence. Detecting crucial keystone structures of the vegetation has profound implications for nature conservation and biodiversity management.

184. Tews, J., **Schurr, F.**, Jeltsch, F. (2004):
Seed dispersal by cattle may cause shrub encroachment of *Grewia flava* on southern Kalahari rangelands
Appl.Veg.Sci. **7** (1), 89-102
Impact factor: 0,877

Abstract: Shrub encroachment, i.e. the increase in woody plant cover, is a major concern for livestock farming in southern Kalahari savannas. We developed a grid-based computer model simulating the population dynamics of Grewia flava, a common, fleshy-fruited encroaching shrub. In the absence of large herbivores, seeds of Grewia are largely deposited in the sub-canopy of Acacia erioloba. Cattle negate this dispersal limitation by browsing on the foliage of Grewia and dispersing seeds into the grassland matrix. In this study we first show that model predictions of Grewia cover dynamics are realistic by comparing model output with shrub cover estimates obtained from a time series of aerial photographs. Subsequently, we apply a realistic range of intensity of cattle-induced seed dispersal combined with potential precipitation and fire scenarios. Based on the simulation results we suggest that cattle may facilitate shrub encroachment of Grewia. The results show that the severity of shrub encroachment is governed by the intensity of seed dispersal. For a high seed dispersal intensity without fire (equivalent to a high stocking rate) the model predicts 56% shrub cover and 85% cell cover after 100 yr. With fire both recruitment and shrub cover are reduced, which may, under moderate intensities, prevent shrub encroachment. Climate change scenarios with two-fold higher frequencies of drought and wet years intensified shrub encroachment rates, although long-term mean of precipitation remained constant. As a management recommendation we suggest that shrub encroachment on rangelands may be counteracted by frequent fires and controlling cattle movements to areas with a high proportion of fruiting Grewia shrubs.
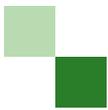
185. Thomas, J. A., **Settele, J.** (2004):
Evolutionary biology: Butterfly mimics of ants
Nature **432** (7015), 283-284
Impact factor: 30,979
Abstract: no abstract

186. **Thulke, H.-H.**, Selhorst, T., Müller, T., Wyszomirski, T., Müller, U., Breitenmoser, U. (2004):
Assessing anti-rabies baiting - what happens on the ground?
BMC Infectious Diseases **4:9**, 11 S.
Online Journal
Impact factor: 1,255
Abstract: Background: Rabies is one of the most hazardous zoonoses in the world. Oral mass vaccination has developed into the most effective management method to control fox rabies. The future need to control the disease in large countries (i.e. Eastern Europe and the Americas) forces cost-benefit discussions. The 'Increase bait density' option refers to the usual management assumption that more baits per km^2 could compensate for high fox abundance and override the imperfect supply of bait pieces to the individual fox.
Methods: We use a spatial simulation, which combines explicitly fox space use (tessellation polygons) and aeroplane flight lines (straight lines). The number of baits actually falling into each polygon is measured. The manager's strategic options are converted into changes of the resulting bait distribution on the ground. The comparison enables the rating of the options with respect to the management aim (i.e. accessibility of baits).
Results: Above 5% (approx. 10%) of all fox groups without any bait (at most 5 baits) relate to the baiting strategy applied in the field (1 km spaced parallel flight lines, 20 baits per km^2 distributed) under habitat conditions comparable to middle and western Europe (fox group home-range 1 km^2 , 2.5 adults; reference strategy).
Increasing the bait density on the same flight-line pattern neither reduces the number of under-baited fox group home-ranges, nor improves the management outcome and hence wastes resources. However, reducing the flight line distance provides a more even bait distribution and thus compensates for missed fox groups or extra high fox density. The reference strategy's bait density can be reduced when accounting for the missed fox groups. The management result with the proper strategy is likely the same but with reduced costs.
Conclusion: There is no overall optimal strategy for the bait distribution in large areas. For major parts of the landscape, the reference strategy will be more competitive. In situations where set backs are attributed to non-homogeneous bait accessibility the distribution scheme has to be refined zone-based (i.e. increase of the flight line length per unit area). However, increase in bait density above the reference strategy appears inappropriate at least for non-urban abundance conditions of the red fox.
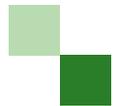
187. **Tittel, J.**, Kamjunke, N. (2004):
Metabolism of dissolved organic carbon by planktonic bacteria and mixotrophic algae in lake neutralisation experiments
Freshwat.Biol. **49** (8), 1062-1071
Impact factor: 1,936

Abstract: 1. Lakes formed in mining pits often contain high concentrations of dissolved ferric iron and sulphate (e.g. 2 and 16 mmol L^1, respectively) and the pH is buffered between 2.5 and 3.5. Efforts to neutralise their water are based on the stimulation of lake internal, bacterial iron- and sulphate reduction. Electron donors may be supplied by organic carbon compounds or indirectly by enhancement of primary production. Here, we investigated the function of mixotrophic algae, which can potentially supplement or deplete the organic carbon pool, in the carbon metabolism and alkalinity budget of an acidic mining lake.
2. Two weeks after organic substrates had been added in a large *in situ* mesocosm of 30 m diameter, a bloom of *Chlamydomonas* occurred, reaching a biovolume of 80 mm^3 L^1. Growth experiments using filtered lake water showed that the alga reduced the overall dissolved organic carbon (DOC) concentration despite significant photosynthetic activity. However, when *Chlamydomonas* were grown together with natural bacterioplankton, net DOC consumption did not increase.
3. Uptake experiments using [^{14}C]-glucose indicated that bacteria dominated glucose uptake and remineralisation. Therefore, the DOC leached in the water column was processed mainly by planktonic bacteria. Leached DOC must be regarded as loss, not transferred by larger organisms to the sediment, where reduction processes take place.
4. From phytoplankton biomass and production 2 years after fertilisation we estimated that pelagic photosynthesis does not supply an electron donor capacity capable of reducing more than 2% of actual stock of acidity per year. We estimated that only the benthic primary production was in a range to compensate for ongoing inputs of iron and sulphate.

188. Trefzer, U., **Herberth, G.**, Wohlan, K., Milling, A., Thiemann, M., Sherev, T., Sparbier, K., Sterry, W., Walden, P. (2004):
Vaccination with hybrids of tumor and dendritic cells induces tumor-specific T-cell and clinical responses in melanoma stage III and IV patients
Int.J.Cancer **110** (5), 730-740
Impact factor: 4,375

Abstract: Hybrid cell vaccination was developed as therapeutic approach that aims at stimulating tumor-specific cytotoxic T-cell responses in cancer patients using hybrids of autologous tumor and allogeneic dendritic cells. We tested this concept and the efficacy of the vaccines in inducing clinical and immunologic responses in a clinical trial with melanoma stage III and IV patients. Of the 17 patients evaluated, 1 experienced a complete response, 1 a partial response and 6 stable disease with remarkably long survival times. In 11 of 14 patients analyzed, high-frequency T-cell responses to various tumor-associated T-cell epitope were induced and detectable in the peripheral blood. These immune responses were detected in clinical response patients as well as nonresponders. Failures of clinical responses in all the cases investigated correlated with loss of antigen expression and presentation. Hybrid cell vaccination thus proves effective in inducing tumor-specific T-cell responses in cancer patients.

189. **Tuch, T.**, **Franck, U.**, Voigtländer, K., Wiedensohler, A. (2004):
Changes of the aerosol in a street canyon induced by traffic reduction
J.Aerosol Sci. **35** (Suppl. 1), 385-386
Impact factor: 1,738
Abstract: no abstract
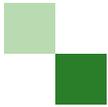
190. **Vetterlein, D.**, Jahn, R. (2004):
Combination of micro suction cups and time-domain reflectometry to measure osmotic potential gradients between bulk soil and rhizosphere at high resolution in time and space
Eur.J.Soil Sci. **55** (3), 497-504
Impact factor: 1,623

Abstract: A prerequisite to investigate the importance of osmotic potential ($_o$) in relation to matric potential ($_m$) in the soil for water uptake is the existence of a method that measures the temporal and spatial dynamics of $_o$ in the vicinity of roots. One method for measuring $_o$ *in situ* is the collection of soil solution with micro suction cups, the spatial resolution of which is suitable for rhizosphere studies. A major drawback of soil solution sampling is the disturbance of soil solution equilibrium, which makes frequent measurements impossible, so another method is required to provide information on the temporal dynamics of $_o$. The time-domain reflectometry (TDR) technique might be suitable as the signal attenuation () shows a close linear correlation with the salt concentration for a known soil water content. The temporal resolution of the TDR technique is high and the measurement has no impact on soil solution equilibrium. However, the spatial resolution of the TDR technique is too coarse to be used on its own in rhizosphere studies.
We used a combination of TDR (fine temporal resolution) and micro suction cups (fine spatial resolution) to measure $_o$ in a model system with *Zea mays* grown in quartz substrates. Osmotic potential changed continuously with time, and a steep gradient between bulk soil and the root compartment developed during the 39-day growing period. The steepest gradient measured over a distance of 6 mm across the nylon net, separating the bulk soil from the root compartment, was 365 kPa. The combination of both methods made it possible to extend the time interval between micro suction cup samplings and thus minimize the impact of sampling on soil solution equilibrium. Problems of separate calibration were avoided by calibrating the TDR measurements against the results obtained with the micro suction cups within the same experiment.
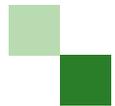
191. **Vetterlein, D.**, Jahn, R. (2004):
Gradients in soil solution composition between bulk soil and rhizosphere - *In situ* measurement with changing soil water content
Plant and Soil **258** (1), 307-317
Impact factor: 1,594

Abstract: Soil solution composition changes with time and distance from the root surface as a result of mass flow, diffusion, plant nutrient uptake and root exudation. A model system was designed, consisting of a root compartment separated from the bulk soil compartment by a nylon net (30 m mesh size), which enabled independent measurements of the change of soil solution composition and soil water content with increasing distance from the root surface (nylon net). K^+ concentration in the rhizosphere soil solution decreased during the initial growth stage (12 days after planting, DAP). Thereafter K^+ accumulated with time, due to mass flow as the dominating process. The extend of K^+ accumulation depended on the initial fertiliser application. As K^+ concentrations in soil solution increase, not only as a result of transport exceeding uptake, but also as a result of decreasing soil water content, it is hypothesised that K concentration in soil solution is not the only trigger for the activity of K transporters in membranes, but ABA accumulation in roots induced by decreasing soil matric potentials may add to the regulation. A strong decrease of rhizosphere pH with time is observed as a result of H^+ efflux from the roots in order to maintain cation-anion balance. In addition the K^+ to Ca^{2+} ratio was altered continuously during the growing period, which has an impact on Ca^{2+} uptake and thus firmness of cell walls, apoplast pH, membrane integrity and activity of membrane transporters. The value of osmotic potential in the rhizosphere soil solution increased with time indicating decreasing soil water availability. Modelling approaches based on the data obtained with the system might help to fill in the time gaps caused by the low temporal resolution of soil solution sampling method.

192. **Vetterlein, D.**, Kuhn, K., Schubert, S., Jahn, R. (2004):
Consequences of sodium exclusion for the osmotic potential in the rhizosphere - comparison of two maize cultivars differing in Na+ uptake
J.Plant Nutr.Soil Sc. **167** (3), 337-344
Impact factor: 0,985

Abstract: According to the biphasic model of growth response to salinity, growth is first reduced by a decrease in the soil osmotic potential ($_o$), *i.e.*, growth reduction is an effect of salt outside rather than inside the plant, and genotypes differing in salt resistance respond identically in this first phase. However, if genotypes differ in Na^+ uptake as it has been described for the two maize cultivars Pioneer 3906 and Across 8023, this should result in differences in Na^+ concentrations in the rhizosphere soil solution and thus in the concentration of salt outside the plant. It was the aim of the present investigation to test this hypothesis and to investigate the effect of such potential differences in soil $_o$ caused by Na^+ exclusion on plant water relations. Sodium exclusion at the root surface of intact plants growing in soil was investigated by sampling soil solution from the rhizosphere of two maize cultivars (Across 8023, Pioneer 3906). Plants were grown in a model system, consisting of a root compartment separated from the bulk soil compartment by a nylon net (30 m mesh size), which enabled independent measurements of the change of soil solution composition and soil water content with increasing distance from the root surface (nylon net). Across 8023 accumulated higher amounts of sodium in the shoot compared to the excluder (Pioneer 3906). The lower Na^+ uptake in the excluder was partly compensated by higher K^+ uptake. Pioneer 3906 not only excluded sodium from the shoot but also restricted sodium uptake more efficiently from roots relative to Across 8023. This was reflected by higher Na^+ concentrations in the rhizosphere soil solution of the excluder 34 days after planting (DAP). The difference in Na^+ concentration in rhizosphere soil solution between cultivars was neither due to differences in transpiration and thus in mass flow, nor due to differences in actual soil water content. As the lower Na^+ uptake of the excluder (Pioneer 3906) was only partly compensated by increased uptake of K^+, soil $_o$ in the rhizosphere of the excluder was more negative compared to Across 8023. However, no significant negative effect of decreased soil $_o$ on plant water relations (transpiration rate, leaf $_o$, leaf water potential, leaf area) could be detected. This may be explained by the fact that significant differences in soil $_o$ between the two cultivars occurred only towards the end of the experiment (27 DAP, 34 DAP).
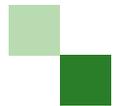
193. Vighi, M., **Altenburger, R.**, Arrhenius, A., Backhaus, T., Bödeker, W., Blanck, H., Consolaro, F., Faust, M., Finizio, A., Froehner, K., Gramatica, P., Grimme, L. H., Grönvall, F., Hamer, V., Scholze, M., **Walter, H.** (2003):
Water quality objectives for mixtures of toxic chemicals: problems and perspectives
Ecotoxicol.Environ.Safety **54** (2), 139-150
Impact factor: 1,189
Abstract: The need to develop water quality objectives not only for single substances but also for mixtures of chemicals seems evident. For that purpose, the conceptual basis could be the use of the two existing biometric models: concentration addition (CA) and independent action (IA), which is also called response addition. Both may allow calculation of the toxicity of mixtures of chemicals with similar modes of action (CA) or dissimilar modes of action (IA), respectively. The joint research project Prediction and Assessment of the Aquatic Toxicity of Mixtures of Chemicals (PREDICT) within the framework of the IVth Environment and Climate Programme of the European Commission, provided the opportunity to address (a) chemometric and QSAR criteria to classify substances as supposedly similarly or dissimilarly acting; (b) the predictive values of both models for the toxicity of mixtures at low, statistically nonsignificant effect concentrations of the individual components; and (c) the predictability of mixture toxicity at higher levels of biological complexity. In this article, the general outline, methodological approach, and some preliminary findings of PREDICT are presented. A procedure for classifying chemicals in relation to their structural and toxicological similarities has been developed. The predictive capabilities of CA and IA models have been demonstrated for single species and, to some extent, for multispecies testing. The role of very low effect concentrations in multiple mixtures has been evaluated. Problems and perspectives concerning the development of water quality objectives for mixtures are discussed.

194. Visser, E.-J., **Lanzendorf, M.** (2004):
Mobility and accessibility effects of B2C e-commerce: a literature review
Tijdschrift voor Economische en Sociale Geografie **95** (2), 189-205
Impact factor: 0,778
Abstract: no abstract

195. **Vogt, C.**, **Alfreider, A.**, Lorbeer, H., Hoffmann, D., Wünsche, L., **Babel, W.** (2004):
Bioremediation of chlorobenzene-contaminated ground water in an in situ reactor mediated by hydrogen peroxide
J.Contam.Hydrol. **68** (1), 121-141
Impact factor: 1,438
Abstract: New in situ reactive barrier technologies were tested nearby a local aquifer in Bitterfeld, Saxonia-Anhalt, Germany, which is polluted mainly by chlorobenzene (CB), in concentrations up to 450 M. A reactor filled with original aquifer sediment was designed for the microbiological remediation of the ground water by indigenous bacterial communities. Two remediation variants were examined: (a) the degradation of CB under anoxic conditions in the presence of nitrate; (b) the degradation of CB under mixed electron acceptor conditions (oxygen+nitrate) using hydrogen peroxide as the oxygen-releasing compound. Under anoxic conditions, no definite degradation of CB was observed. Adding hydrogen peroxide (2.94 mM) and nitrate (2 mM) led to the disappearance of CB (ca. 150 M) in the lower part of the reactor, accompanied by a strong increase of the number of cultivable aerobic CB degrading bacteria in reactor water and sediment samples, indicating that CB was degraded mainly by productive bacterial metabolism. Several aerobic CB degrading bacteria, mostly belonging to the genera *Pseudomonas* and *Rhodococcus*, were isolated from reactor water and sediments. In laboratory experiments with reactor water, oxygen was rapidly released by hydrogen peroxide, whereas biotic-induced decomposition reactions of hydrogen peroxide were almost four times faster than abiotic-induced decomposition reactions. A clear chemical degradation of CB mediated by hydrogen peroxide was not observed. CB was also completely degraded in the reactor after reducing the hydrogen peroxide concentration to 880 M. The CB degradation completely collapsed after reducing the hydrogen peroxide concentration to 440 M. In the following, the hydrogen peroxide concentrations were increased again (to 880 M, 2.94 mM, and 880 M, respectively), but the oxygen demand for CB degradation was higher than observed before, indicating a shift in the bacterial population. During the whole experiment, nitrate was uniformly reduced during the flow path in the reactor.

196. **Vogt, C.**, Simon, D., **Alfreider, A.**, **Babel, W.** (2004):
Microbial degradation of chlorobenzene under oxygen-limited conditions leads to accumulation of 3-chlorocatechol
Environ.Toxicol.Chem. **23** (2), 265-270
Impact factor: 2,429
Abstract: Five bacterial strains (Acidovorax facilis B517, Cellulomonas turbata B529, Pseudomonas veronii B547, Pseudomonas veronii B549, and Paenibacillus polymyxa B550) isolated on chlorobenzene as the sole source of carbon and energy were screened for the accumulation of the putative metabolic intermediate 3-chlorocatechol during growth on chlorobenzene under oxygen-limited conditions in the presence and absence of nitrate (1 mM). 3-Chlorocatechol accumulated in the growth media of all five strains, but accumulation was significantly less in cultures of A. facilis B517 compared to the other four strains. The presence of nitrate did not influence the biological conversion pattern. However, biologically produced nitrite reacted with 3-chlorocatechol chemically, a reaction that masked the accumulation of 3-chlorocatechol. For P. veronii B549, a clear relationship between the presence of 3-chlorocatechol in the medium and low oxygen concentrations was demonstrated. The assumption is made that accumulation of 3-chlorocatechol is due to the low enzymatic turnover of the 3-chlorocatechol cleaving enzyme, catechol-1,2-dioxygenase, at low oxygen concentrations.
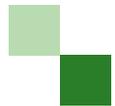
197.   Voigtländer, K., **Tuch, T.**, **Franck, U.**, Birmili, W., Wiedensohler, A. (2004):
Influence of traffic on particle size distribution in a street canyon and depence on
meteorological parameters
J.Aerosol Sci. **35** (Suppl. 1), 585-586
Impact factor: 1,738
Abstract: no abstract

198.   von der Kammer, F., **Baborowski, M.**, Tadjiki, S., **von Tümpling jr, W.** (2003):
Colloidal particles in sediment pore waters: particle size distributions and associated
element size distribution in anoxic and re-oxidized samples, obtained by FFF-ICP-MS
coupling
Acta Hydroch.Hydrob. **31** (4-5), 400-410
Impact factor: 0,700
Abstract: The aim of the paper is the reconstruction of daily algae concentrations
(chlorophyll-a) in the middle stretches of the Elbe River (Schnackenburg station) during
the years 1985 - 2001. These data are required to verify changes in biogeochemical
processes before and after the reunification of Germany. Both linear regression and
multiple input single output (MISO) stochastic transfer function (STF) approaches are
used in data reconstruction. An analysis of available data sets is followed by the
development of STF models based on different types of input data (pH, DO and
temperature). The choice of model for reconstruction is based on the comparison of the
results with monthly observations of algae concentrations at Schnackenburg during the
years 1985 - 2001 and daily observations at Cumlosen in the years 1997 - 1999. The
stochastic transfer function model based on DO concentrations and temperature gives
the best fit to the data, followed closely by the model additionally using pH values as an
input.

199.   **von der Ohe, P. C.**, **Liess, M.** (2004):
Relative sensitivity distribution of aquatic invertebrates to organic and metal
compounds
 Environ.Toxicol.Chem. **23** (1), 150-156
Impact factor: 2,429
Abstract: In the field, a multitude of species can be exposed to numerous toxicants;
thus, the sensitivity of individual species to particular toxicants must be known to
predict effects and to analyze changes in species composition. For most species, no
information about their toxicant sensitivity is available. To address this limitation, we
have grouped the available information to assign sensitivities to aquatic invertebrate
taxa relative to Daphnia magna. With respect to organic compounds, most taxa of the
orders Anisoptera, Basommatophora, Coleoptera, Decapoda, Diptera, Ephemeroptera,
Eulamellibranchiata, Heteroptera, Hirudinea, Isopoda, Oligochaeta, Prosobranchia,
Trichoptera, Tricladida, and Zygoptera are less sensitive than D. magna. Some taxa of
the Amphipoda, Plecoptera, and Cladocera (other than D. magna) are significantly
more sensitive. For organic compounds, approximately 22% of the investigated taxa
were more sensitive than D. magna. Most taxa of the orders Amphipoda,
Basommatophora, Diptera, Ephemeroptera, Eulamellibranchiata, Heteroptera, Isopoda,
Oligochaeta, and Tricladida are significantly less sensitive than D. magna to metal
compounds. The taxa belonging to the Crustacea, with the exception of the order
Isopoda, are much more sensitive. For metal compounds, approximately 30% of the
investigated taxa were more sensitive than D. magna. Hence, D. magna is among the
most sensitive taxa regarding both groups of toxicants. The sensitivities for several
taxa are listed, and use of the relative sensitivity distribution to link toxicant effects in
mesocosm studies and field investigations is discussed.

200. Weber, M., Harada, E., **Veß, C.**, von Roepenack-Lahaye, E., Clemens, S. (2004):
Comparative microarray analysis of *Arabidopsis thaliana* and *Arabidopsis halleri* roots
identifies nicotianamine synthase, a ZIP transporter and other genes as potential metal
hyperaccumulation factors
The Plant Journal **37** (2), 269-281
Impact factor: 5,914

Abstract: The hyperaccumulation of zinc (Zn) and cadmium (Cd) is a constitutive
property of the metallophyte *Arabidopsis halleri*. We therefore used *Arabidopsis*
GeneChips to identify genes more active in roots of *A. halleri* as compared to *A.
thaliana* under control conditions. The two genes showing highest expression in *A.
halleri* roots relative to *A. thaliana* roots out of more than 8000 genes present on the
chip encode a nicotianamine (NA) synthase and a putative Zn^{2+} uptake system. The
significantly higher activity of these and other genes involved in metal homeostasis
under various growth conditions was confirmed by Northern and RT-PCR analyses. *A.
halleri* roots also show higher NA synthase protein levels. Furthermore, we developed
a capillary liquid chromatography electrospray ionization quadrupole time-of-flight mass
spectrometry (CapLC-ESI-QTOF-MS)-based NA analysis procedure and consistently
found higher NA levels in roots of *A. halleri*. Expression of a NA synthase in Zn^{2+}-
hypersensitive *Schizosaccharomyces pombe* cells demonstrated that formation of NA
can confer Zn^{2+} tolerance. Taken together, these observations implicate NA in plant Zn
homeostasis and NA synthase in the hyperaccumulation of Zn by *A. halleri*.
Furthermore, the results show that comparative microarray analysis of closely related
species can be a valuable tool for the elucidation of phenotypic differences between
such species.

201. **Wehner, B.**, Massling, A., **Tuch, T.**, Wu, Z. J., Hu, M., Wiedensohler, A. (2004):
Aerosol number size distribution measurements in Beijing, China
J.Aerosol Sci. **35** (Suppl. 1), 387-388
Impact factor: 1,738
Abstract: no abstract

202. **Wehner, B.**, Wiedensohler, A., **Tuch, T.**, Wu, Z. J., Hu, M., Slanina, J., Kiang, C. S.
(2004):
Variability of the aerosol number size distribution in Beijing, China: new particle
formation, dust storms, and high continental background
Geophys.Res.Lett. **31** (22), L22108
Impact factor: 2,422

Abstract: Continuous measurements of aerosol number size distributions from 3 nm to
10 µm have been first performed within the city area of Beijing since March 2004. Size
distributions of the first 45 measurement days (March 05 to April 18, 2004) were
investigated in terms of their high variability. Two dust storm events were observed
indicated by high number concentrations greater than 1 µm and mass concentrations
around 1 mg m^{-3}. Continental highly polluted air was observed during 12 days indicated
by a number peak in the accumulation mode range, and submicrometer volume
concentrations above 150 µm^3 cm^{-3} were observed. Newly formed particles with more
than 100,000 cm^{-3} were observed on 25 days when the particle surface area
concentration drops below a critical value (100-2000 µm^2 cm^{-3}) because of clean air
from the north. Measurements show only a slight growth (~1 nm h^{-1}) of the particles
indicating that they are produced within the city area of Beijing.

203. **Weiß, M.**, **Geyer, R.**, **Günther, T.**, **Kästner, M.** (2004):
Fate and stability of ^{14}C-labeled 2,4,6-trinitrotoluene in contaminated soil following microbial bioremediation processes
Environ.Toxicol.Chem. **23** (9), 2049-2060
Impact factor: 2,429
Abstract: Biological treatment of 2,4,6-trinitrotoluene (TNT) in soil rarely results in complete mineralization of the parent compound. More often, the largest proportion of the TNT carbon is incorporated into the soil organic matrix. Therefore, we evaluated the stability of nonextractable residues from various bioremediation processes of ^{14}C-TNT in soils. The extractable amounts of the residual radioactivity varied between 7 and 33% and thus the nonextractable amount between 93 and 67% (3-15% in fulvic acids, 26-46% in humic acids, and 27-44% in the humin fraction). The residue-containing soils were analyzed for the release of radioactivity after treatment by physical (freeze and thaw, grinding of soil, and steam extraction), chemical (acid rain and addition of metal complexing agent), and biological methods (addition of compost, white rot fungi, radical-generating enzymes, and germination of plants). Freeze and thaw treatment and grinding of the soil did not alter the partitioning of the label significantly. Steam extraction and acid rain extraction increased the water extractability to 11 to 29% and to 51.6% in the native TNT-contaminated soil. The addition of ethylenediamine-tetraacetate (EDTA) increased the extractability from 7 to 12%. After biological treatment, only slightly increased extractability (10%) was observed. No increase of extractable TNT or known metabolites was observed with any of the treatments. Thus, under the treatment conditions applied in this study, the residues formed during microbial transformation of TNT may be biogenic residues with low mobilization potential and low hazardous impact.

204. **Weiß, M.**, **Geyer, R.**, **Russow, R.**, **Richnow, H. H.**, **Kästner, M.** (2004):
Fate and metabolism of [^{15}N]2,4,6-Trinitrotoluene in soil
Environ.Toxicol.Chem. **23** (8), 1852-1860
Impact factor: 2,013
Abstract: The fates of the labels from [^{14}C] and [^{15}N] trinitrotoluene were analyzed in bioreactors under aerobic conditions in soil treated by a fungal bioremediation process with Stropharia rugosoannulata and in control soil. Up to 17.5% of the ^{15}N label had a different fate than the ^{14}C label. Three N-mineralization processes were identified in detailed experiments with [^{15}N]TNT. About 2% of the ^{15}N label was found as NO_3^- and NH_4^+, showing simultaneous processes of direct TNT denitration (I) and reduction with cleavage of the amino groups (II). The enrichment of NO_2^-/NO_3^- (up to 7.5 atom% [15]N abundance) indicates the formation of Meisenheimer complexes with a denitration of [^{15}N]TNT. A 1.4% of the label was found distributed between N_2O and N_2. However, the ^{15}N enrichment of the N_2O (up to 38 atom%) demonstrated that both N atoms were generated from the labeled TNT and clearly indicates a novel formation process (III). We propose, as an explanation, the generation of N_2O by cleavage from condensed azoxy metabolites. In addition, 1.7% of the ^{15}N label was detected as biogenic amino acids in the wheat straw containing the fungus. Overall, 60 to 85% of the applied [^{15}N]TNT was degraded and 52 to 64% was found as nonextractable residues in the soil matrix. Three percent was detected as 2-amino-4,6-dinitrotoluene and 4-amino-2,6-dinitrotoluene.

205. **Weißflog, L.**, Elansky, N. F., Putz, E., Krueger, G., Lange, C. A., Lisitzina, L.,
Pfennigsdorff, A. (2004):
Trichloroacetic acid in the vegetation of polluted and remote areas of both hemisphere
- Part II: salt lakes as novel sources of natural chlorohydrocarbons
Atmos.Environ. **38** (25), 4197-4204
Impact factor: 2,338

Abstract: One of the issues provided for by the 1993 existing substances regulation (793/93/EEC) is the assessment of the environmental risk emanating from waste materials. One such material is the highly volatile substance perchloroethene (PER; TECE). PER is produced in large quantities all over the world by the chemical industry. There are many industrial processes in which PER escapes into the environment, especially the atmosphere. It has since been proven that after entering plants via the air/leaf pathway, airborne PER can be metabolised into the phytotoxic substance trichloroacetic acid. However our own studies detected relatively high levels of TCA in environmental compartments in regions far away from industry which cannot be explained by the anthropogenic input of airborne substances into the relevant ecosystems. This indicates that natural PER emittents also exist and must be identified, in order to find out more about the global spread of PER.
This paper reports on the findings of related fieldwork in the Kalmykian Steppe. This area of steppe in southern Russia spans an area extending west-to-east from the Black Sea and the Caspian Sea and north-to-south between the Greater Caucasus and Volgograd. The main aim of the experiments in the Kalmykian Steppe was to study water from lakes, rivers and springs with differing levels of salinity. The concentrations of the chlorinated hydrocarbons (VCHCs) chloroform ($CHCl_3$), tetrachloromethane (CCl_4), 1,1,1-trichloroethane (1,1,1-$C_2H_3Cl_3$), trichloroethene (TRI; C_2HCl_3), tetrachloroethene (PER; C_2Cl_4) and TCA in these waters were measured, along with the levels of cations and anions and the pH-value of the waters. The measurements indicate that in particular water from salt lakes located in semiarid/arid areas of the study region must be considered as new types of natural emittents of PER and other chlorinated hydrocarbons as well as trichloroacetic acid. Furthermore, attention is drawn to ecological impacts resulting from the occurrence of these substances in connection with the desertification observed in this area since the mid-20th century. Possible global associations between TCA phytotoxicity, the consumption of water by contaminated plants and the resulting impact on the regional water cycle are discussed.
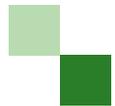
206. Wells, M., Wick, L. Y., **Harms, H.** (2004):
Perspectives on modeling the release of hydrophobic organic contaminants drawn from model polymer release systems
J.Mater.Chem. **14** (15), 2461-2472
Impact factor: 2,659
Abstract: This work critically evaluates current practices in modeling the release of hydrophobic organic contaminants (HOCs) from complex matrices. Using well-constrained model polymer release systems (MPRS), we evaluate several empirical kinetic release models and one class of semi-empirical diffusion model; generally these models either do not describe release well, and are thus not useful, or they describe release well but are overparameterized, thus decreasing confidence in the fitting parameters. Results indicate that the *n*-phasic release often attributed to soil and sediment matrices is a non-mechanistic operational definition, arising from bias in the choice of empirical fitting expression. Further analysis illustrates pitfalls in common approaches to characterizing desorption from complex environmental matrices with respect to parameter interpretation, particularly effective diffusion coefficients. We also consider MPRS release in the context of other models and find that, though release occurs from these materials *via* a mechanism of anomalous (non-Fickian) diffusion, Fickian diffusion models nonetheless describe release well. This finding reconciles previous reports about anomalous release from environmental matrices with the hitherto success of Fickian diffusion models of desorption.

207. **Wennrich, R.**, **Mattusch, J.**, **Morgenstern, P.**, **Freyer, K.**, **Treutler, H. C.**, **Stärk, H. J.**, **Brüggemann, L.**, **Paschke, A.**, **Daus, B.**, **Weiß, H.** (2004):
Characterization of sediments in an abandoned mining area; a case study of Mansfeld region, Germany
Environ.Geol. **45** (6), 818-833
Impact factor: 0,605
Abstract: The distribution of selected heavy metals, including some radionuclides, metalloids and non-metals was determined in stream sediments in a region influenced by abandoned copper mining and ore processing activities. A considerable amount of the ore processing waste with a very complex composition and highly elevated concentrations of zinc, sulfur, lead, copper, arsenic, and a lot of other elements in the range between 100 and 1,000 mg/kg (Sb, Mn, Ni, Cr, Cd, Hg, and Ag) was piled up on mine dumps. The dispersion of the pollutants originating from this source and their environmental impact were investigated. Both, sediments and original waste material were studied to indicate the pathways and the mobilization behavior of different pollutants. For this purpose, the process of the elution of pollutants by application of different fractionation schemes was studied. The capabilities of different analytical techniques are shown for the analysis of solid samples (X-ray fluorescence spectrometry, Gamma-spectrometry) and liquid ones (ICP-atomic emission spectrometry, ICP-mass spectrometry and different techniques of atomic absorption). Additionally, the coupling of ion chromatography and ICP-MS detection was used to study the distribution of arsenic species in the sediment cores of a lake which acts as a natural sink for the region.

208. **Wenzel, K. D.**, **Vrana, B.**, **Hubert, A.**, **Schüürmann, G.** (2004):
Dialysis of persistent organic pollutants and polycyclic aromatic hydrocarbons from semipermeable membranes. A procedure using an accelerated solvent extraction device
Anal.Chem. **76** (18), 5503-5509
Impact factor: 5,250
Abstract: Accelerated solvent extraction (ASE) is one of the most recent solid-phase extraction methods and has caught on all over the world in numerous laboratories. Until now it was not known that this device is also very suitable for performing dialysis. In this study, development of a rapid dialysis procedure (RDP) was described that is based on the dialysis of persistent organic xenobiotics from triolein-containing semipermeable membrane devices (SPMDs) using ASE. All the operating parameters were optimized within the framework of usage. The RDP procedure was compared with the conventional dialytic recovery of target analytes under atmospheric pressure using spiked analytes and real field samples of SPMDs exposed to urban air. The main advantages of the RDP in comparison to the conventional dialysis are the speed, with up to 70 times faster taking only 40 min, and the considerable reduction in solvent consumption (by two-thirds) when SPMDs with standard configuration are used. Moreover, the RDP is also suitable as an analytical cleanup procedure for the same analytes from various types of lipid samples and other difficult matrixes using semipermeable membranes.

209. **Wichmann, G.**, **Dägelmann, C.**, **Herbarth, O.**, **Strauch, G.**, **Schirmer, K.**,
Wöstemeyer, J., **Lehmann, I.** (2004):
Inflammatory activity in river-water samples
Environ.Toxicol. **19** (6), 594-602
Impact factor: 1,271
Abstract: Contamination of the urban aquatic environment with chemical and biological substances could have a long-term impact on human health because these substances threaten the integrity of the urban ecosystem and the availability of high-quality water for recreation and consumption. In light of this, the aim of the present study was to assess the potential immunological effects of water sampled at various sites along the River Saale near the city of Halle (in the state of Sachsen-Anhalt, Germany). For the control, Ficoll-separated peripheral blood mononuclear cells (PBMC) of healthy donors were cultured for 24 h in either filter-sterilized river water or drinking-water samples. Cell vitality was assessed using the MTT bioassay. Cytokines in culture supernatants were measured by ELISA. Endotoxin concentrations in the water samples were assessed by the limulus amoebocyte lysate (LAL) test. River water and drinking water showed comparably weak cytotoxic effects on PBMC. Drinking water did not exert any effect on cytokine secretion. In contrast, all river-water samples triggered secretion of proinflammatory cytokines, as shown for TNF-, IL-1, and IL-6. Free endotoxin was detected in all river-water samples. However, the highest inflammatory activity regarding induction of all three cytokines, as well as the highest endotoxin content as determined by LAL, was found in a water sample taken immediately downstream of a wastewater treatment plant. Inhibition studies using the monoclonal anti-CD14 antibody biG14, which is known to suppress binding of lipopolysaccharide (LPS) to CD14 via binding CD14 itself, revealed that free endotoxin was indeed the major inducer of proinflammatory cytokines in the river-water samples. Taken together, the results suggest that the microorganism-derived endotoxin is a widely distributed contaminant in the urban aquatic environment that should be considered in routine monitoring and in assessing ecosystem and human health.
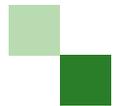
210. Wick, L. Y., Mattle, P. A., Wattiau, P., **Harms, H.** (2004):
Electrokinetic transport of PAH-degrading bacteria in model aquifers and soil
Environ.Sci.Technol. **38** (17), 4596-4602
Impact factor: 3,592
Abstract: An investigation of the mobility, viability, and activity of polycyclic aromatic hydrocarbon (PAH) degrading bacteria in an electric field is presented. Bench-scale model aquifers were used to test electrophoresis and electroosmosis as potential mechanisms for bacterial dispersion in contaminated sites. Glass beads, alluvial sand from Lake Geneva, and historically polluted clayey soil were used as packing materials. The green-fluorescent protein labeled PAH-degrading bacteria *Sphingomonas sp.* L138 and *Mycobacterium frederiksbergense* LB501TG were used as test organisms because of the known differing physico chemical surface and adhesion properties of the corresponding wild-type strains. No adverse effects of the electric current on bacterial viability and PAH-degradation were observed in the system chosen. Up to 90% of the weakly negatively charged and moderately adhesive cells of strain L138 were transported by electroosmosis, whereas 0-20% were transported by electrophoresis. By contrast, poor electrokinetic transport of strongly charged and highly adhesive cells of *M. frederiksbergense* LB501TG occurred in the different model aquifers. Treatment of bacteria with the nonionic surfactant Brij35 resulted in up to 80% enhanced electrokinetic dispersion of both strains. Our findings demonstrate that electroosmosis may be a valuable mechanism to transport bacteria in the subsurface with transport efficiencies heavily depending on the retention of the bacteria by the solid phase.

211. **Wiegand, T.**, Knauer, F., Kaczensky, P., Naves, J. (2004):
Expansion of brown bears (*Ursus arctos*) into the eastern Alps: a spatially explicit population model
Biodivers Conserv **13** (1), 79-114
Impact factor: 1,060
Abstract: We present a spatially explicit population model for analysing the expansion of brown bears (*Ursus arctos*) after the reintroduction program in central Austria. The model is based on field investigations into brown bears in Austria and Slovenia and on current knowledge of brown bears. The landscape of the eastern Alps is represented by a GIS-derived raster map defining local habitat suitability and five major spatial barriers to dispersal. The population model follows the fate of individual bears and simulates reproduction, dispersal, home range establishment, and mortality in annual time steps. We indirectly adjust unknown or uncertain model parameters with 10-year data on the number of females with cubs in central Austria and determine key variables of population dynamics, such as population sizes and growth rates within different population nuclei, dispersal distances, or mortality rates, for model parameterisations that reproduce the data on females with cubs. We estimated a current (1996-2000) growth rate of the population in Austria and adjacent parts of Italy of some 14%; a high proportion of this growth was due toimmigration from Slovenia. Consequently, the growth rate of the subpopulation in central Austria, which probably is isolated functionally (i.e., no exchange of females) from the nuclei along the Austrian-Slovenian border, yielded some 7%. This subpopulation may comprise seven residents, and we estimated for females a 33% risk of extinction during the 1992-2000 period. Validation and confirmation of our model results with data on bear densities that were not used for model construction and parameterisation supported our findings. The high female mortality rates, together with the vulnerability of the small population to chance events (i.e., demographic stochasticity), are the most pressing threat for the population in the eastern Alps. Our approach could be widely applied for analysing dynamics of rare and endangered species in which the paucity of data precludes an appraisal of the state of the population using standard methods.
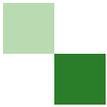
212. **Wiegand, T.**, Moloney, K. A. (2004):
Rings, circles, and null-models for point pattern analysis in ecology
Oikos **104** (2), 209-229
Impact factor: 2,142
Abstract: A large number of methods for the analysis of point pattern data have been developed in a wide range of scientific fields. First-order statistics describe large-scale variation in the intensity of points in a study region, whereas second-order characteristics are summary statistics of all point-to-point distances in a mapped area and offer the potential for detecting both different types and scales of patterns. Second-order analysis based on Ripley's K-function is increasingly used in ecology to characterize spatial patterns and to develop hypothesis on underlying processes; however, the full range of available methods has seldomly been applied by ecologists. The aim of this paper is to provide guidance to ecologists with limited experience in second-order analysis to help in the choice of appropriate methods and to point to practical difficulties and pitfalls. We review (1) methods for analytical and numerical implementation of two complementary second-order statistics, Ripley's K and the O-ring statistic, (2) methods for edge correction, (3) methods to account for first-order effects (i.e. heterogeneity) of univariate patterns, and (4) a variety of useful standard and non-standard null models for univariate and bivariate patterns. For illustrative purpose, we analyze examples that deal with non-homogeneous univariate point patterns. We demonstrate that large-scale heterogeneity of a point-pattern biases Ripley's K-function at smaller scales. This bias is difficult to detect without explicitly testing for homogeneity, but we show that it can be removed when applying methods that account for first-order effects. We synthesize our review in a number of step-by-step recommendations that guide the reader through the selection of appropriate methods and we provide a software program that implements most of the methods reviewed and developed here.

213. **Wiegand, T.**, **Revilla, E.**, Knauer, F. (2004):
Dealing with uncertainty in spatially explicit population models
Biodivers Conserv **13** (1), 53-78
Impact factor: 1,060
Abstract: It has been argued that spatially explicit population models (SEPMs) cannot provide reliable guidance for conservation biology because of the difficulty of obtaining direct estimates for their demographic and dispersal parameters and because of error propagation. We argue that appropriate model calibration procedures can access additional sources of information, compensating the lack of direct parameter estimates. Our objective is to show how model calibration using population-level data can facilitate the construction of SEPMs that produce reliable predictions for conservation even when direct parameter estimates are inadequate. We constructed a spatially explicit and individual-based population model for the dynamics of brown bears (*Ursus arctos*) after a reintroduction program in Austria. To calibrate the model we developed a procedure that compared the simulated population dynamics with distinct features of the known population dynamics (=patterns). This procedure detected model parameterizations that did not reproduce the known dynamics. Global sensitivity analysis of the uncalibrated model revealed high uncertainty in most model predictions due to large parameter uncertainties (coefficients of variation CV 0.8). However, the calibrated model yielded predictions with considerably reduced uncertainty (CV 0.2). A pattern or a combination of various patterns that embed information on the entire model dynamics can reduce the uncertainty in model predictions, and the application of different patterns with high information content yields the same model predictions. In contrast, a pattern that does not embed information on the entire population dynamics (e.g., bear observations taken from sub-areas of the study area) does not reduce uncertainty in model predictions. Because population-level data for defining (multiple) patterns are often available, our approach could be applied widely.
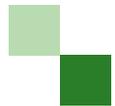
214. **Wiegand, T.**, Snyman, H. A., Kellner, K., Paruelo, J. M. (2004):
Do grasslands have a memory: modeling phytomass production of a semiarid South African grassland
Ecosystems **7** (3), 243-258
Impact factor: 3,239

Abstract: We analyzed data sets on phytomass production, basal cover, and monthly precipitation of a semiarid grassland in South Africa for good, medium, and poor rangeland condition (a) to investigate whether phytomass production per unit of basal cover differed among rangeland conditions, (b) to quantify the time scales of a carryover effect from production in previous months, and (c) to construct predictive models for monthly phytomass. Finally, we applied the best models to a 73-year data set of monthly precipitation data to study the long-term variability of grassland production. Our results showed that mean phytomass production per unit of basal cover did not vary significantly among the rangeland conditions-that is, vegetated patches in degraded grassland have approximately the same production as vegetated patches in grassland in good condition. Consequently, the stark decline in production with increasing degradation is a first-order effect of reduced basal area. Current-year precipitation accounted for 64%, 62%, and 36% of the interannual variation in phytomass production for good, medium, and poor condition, respectively. We found that 61%, 68%, and 33%, respectively, of the unexplained variation is related to a memory index that combines mean monthly temperature and a memory of past precipitations. We found a carryover effect in production from the previous 4 years for grassland in good condition and from the previous 1 or 3S month for grassland in medium and poor condition. The memory effect amplified the response of production to changes in precipitation due to alternation of prolonged periods of dry or wet years/months at the time scale of the memory. The interannual variability in phytomass production per unit basal cover (coefficient of variation [CV] = 0.42-0.50 for our 73-year prediction, CV = 0.57-0.71 for the 19-year data) was greater than the corresponding temporal variability in seasonal rainfall (CV = 0.29).

215. Wiegel, S., Aulinger, A., Brockmeyer, R., **Harms, H.**, Löffler, J., Reincke, H.,
Schmidt, R., Stachel, B., **von Tümpling, W.**, Wanke, A. (2004):
Pharmaceuticals in the river Elbe and its tributaries
Chemosphere **57** (2), 107-126
Impact factor: 1,904

Abstract: Medicinal drugs were found to be ubiquitous in the river Elbe, its tributary the river Saale and in other tributaries at their points of entry into the Elbe. The distribution of concentration peaks along the investigated river stretches provides an indication that they are mainly due to the emission of treated waste water from municipal sewage treatment works. This leads to the conclusion that medicinal substances can be regarded as faecal indicators for water pollution caused by human activity. The main substances found in the Elbe in 1998 were diclofenac, ibuprofen and carbamazepine as well as various antibiotics and lipid regulators in the concentration range of <20-140 ng/l. The more thorough investigations carried out in 1999 and 2000 show that in addition to the drugs (phenazone, isopropyl-phenazone and paracetamol) metabolite concentrations contributed significantly to the total concentration of pharmaceuticals in the Elbe. The metamizole metabolites *N*-acetyl-4-aminoantipyrine (AAA) and *N*-formyl-4-aminoantipyrine (FAA) were found in concentrations from <20 to 939 ng/l. A multivariate statistical analysis revealed a high correlation in respect of the distribution of persistent substances. The metoprolol distribution throughout the Saale demonstrated that the tributaries cause either an increase (Weiße Elster, Unstrut, Ilm) or a reduction (Wipper, Bode) in the concentration, depending on the respective load of waste water. Wide scale sampling in Saxony during 2002 showed the ubiquitous occurrence of carbamazepine in surface waters. The ecotoxicological effects of this contamination cannot be assessed at present. This is due to the fact that no legal framework in respect of these medicinal drugs for human consumption has been established and therefore little research and no risk assessment has been carried out. Therefore it is urgently necessary to include at least the quantitatively most significant substances in the new assessment concept of the EC White Paper.
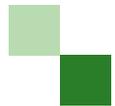
216. Wieneke, S., **Prati, D.**, **Brandl, R.**, Stöcklin, J., **Auge, H.** (2004):
Genetic variation in *Sanguisorba minor* after 6 years *in situ* selection under elevated CO_2
Global Change Biol **10** (8), 1389-1401
Impact factor: 4,152

Abstract: Genetic variation within plant species in their response to elevated CO_2 could be important for long-term changes in plant community composition because it allows for selection of responsive genotypes. Six years of *in situ* CO_2 enrichment in a temperate grassland offered a unique opportunity to investigate such microevolutionary changes in a common herb of that plant community, *Sanguisorba minor*. Plants were grown from seeds collected at the end of a 6-year treatment in either ambient or elevated CO_2. The resulting seedlings were grown under ambient or elevated CO_2 and with or without interspecific competition by *Bromus erectus* in the greenhouse for two seasons. The effect of competition was included because we expected selection under elevated CO_2 to favour increased competitive ability. Elevated CO_2 in the greenhouse and competition both caused a significant reduction of the total dry mass in *S. minor*, by 12% and 40%, respectively, with no interaction between CO_2 and competition. Genetic variation in all traits was substantial. Seed families responded differently to competition, but the family greenhouse CO_2 interaction was rather weak. There was no main effect of the field CO_2 treatment on any parameter analysed in the greenhouse. However, the field CO_2 treatment did significantly interact with the greenhouse CO_2 treatment for the cumulative number of leaves, suggesting microevolutionary change in this plant trait. Families from ambient field CO_2 produced fewer leaves under elevated greenhouse CO_2, whereas families from elevated field CO_2 retained constant number of leaves in either greenhouse CO_2 treatment. Since this resulted in increased litter production of the families from elevated field CO_2 under elevated greenhouse CO_2, the microevolutionary response should, in turn, affect ecosystem functions through dry matter recycling.

217. Witter, B., **Winkler, M.**, **Friese, K.** (2004):
Depth distribution of chlorinated and polycyclic aromatic hydrocarbons in floodplain soils of the river Elbe
Acta Hydroch.Hydrob. **31** (4-5), 411-422
Impact factor: 0,460

Abstract: Depth profiles of various organic micropollutants were measured in floodplain soils of the river Elbe, Germany. The study area lies in the former East Germany (GDR) and displays elevated concentrations of pesticides and polycyclic aromatic hydrocarbons. Depth distributions were found to vary at different sampling points and among the individual compounds, which could only partly be explained by comparing normalized concentrations (organic carbon). Metabolization, mobilization, and effects of sedimentation and erosion also need to be taken into account to understand the contaminant patterns found in the different profiles.

218. Woelfl, S., **Mages, M.**, Mercado, S., Villalobos, L., **Ovari, M.**, Encina, F. (2004):
Determination of trace elements in planktonic microcrustaceans using total reflection X-ray fluorescence (TXRF): first results from two Chilean lakes
Anal.Bioanal.Chem. **378** (4), 1088-1094
Impact factor: 1,715
Abstract: First results are described from the application of a recently developed dry method for determination of elements in single specimens of freshwater microcrustaceans, using total reflection X-ray fluorescence spectrometry (TXRF). This method is a powerful, non-destructive technique for quantifying the trace element content of minute biological samples with a dry weight of 3-50 g. Three different freshwater microcrustaceans were sampled, from the natural, uncontaminated Lake Laja and from the artificial Rapel reservoir which is slightly contaminated by drainage water from a copper mine. Single specimens of *Daphnia pulex*, *Bosmina chilensis*, and *Ceriodaphnia dubia* were prepared using a modification of the dry method and measured by TXRF. The results showed that both As, Mn, Fe, Ni, Zn, and Cu content and the bioaccumulation of these metals were usually significantly different between the microcrustaceans from the two lakes. The largest difference was found for Cu which was eight times more concentrated in the two microcrustaceans from Rapel reservoir than it was in *D. pulex* from Lake Laja.

219. Zenkevich, I. G., **Möder, M.**, **Köller, G.**, **Schrader, S.** (2004):
Using new structurally related additive schemes in the precalculation of gas chromatographic retention indices of polychlorinated hydroxybiphenyls on HP-5 stationary phase
J.Chromatogr.A **1025** (2), 227-236
Impact factor: 2,922
Abstract: A new additive scheme is proposed for the precalculation of gas chromatographic retention indices of complex organic compounds. The principal feature of this approach is the absence of previously calculated *I* increments for any structural fragments or functional groups in the molecule. Instead, arithmetical operations involving *I* values of simpler structural analogues of target compounds are used directly. *I* precalculation for polychlorinated hydroxybiphenyls (839 congeners) on the HP-5 stationary phase was chosen as one of the most important applications of the method under discussion. Such a large number of congeners cannot be obtained as reference samples and their gas chromatographic (GC)-mass spectrometric (MS) identification should therefore be based currently on precalculated *I* values.
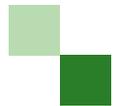
220. Zuber, A., **Weise, S. M.**, Motyka, J., **Osenbrück, K.**, Rózanski, K. (2004):
Age and flow pattern of groundwater in a Jurassic limestone aquifer and related Tertiary sands derived from combined isotope, noble gas and chemical data
J.Hydrol. **286** (1-4), 87-112
Impact factor: 1,354

Abstract: Multi-tracer study of the Malm (Upper Jurassic) limestone aquifer in north-western part of Cracow, Poland, revealed the existence of much older waters than those estimated from Darcy's law. The following environmental tracers were used: ^{3}H, ^{14}C, ^{13}C, ^{18}O, ^{2}H, ^{4}He, Ne, Ar, Kr, Xe, ^{3}He/^{4}He and ^{40}Ar/^{36}Ar in combination with water chemistry. The natural drainage of unconfined parts of the aquifer is by springs and streams, with a dominant presence of modern and pre-bomb era Holocene waters, whereas the confined part is drained only by upward leakage through thick Miocene clays in river valleys, mainly in the Vistula (Wisa) river valley. As a consequence, the confined part contains much older waters. Their glacial ages are indicated by ^{18}O and ^{2}H values significantly more negative than those found for modern recharge and by noble gas temperatures reduced by ca. 4.5 °C when compared to the present-day mean annual air temperatures. Quantitative age interpretation of ^{14}C is regarded unreliable due to isotope exchange between dissolved and solid carbonates as suggested by ^{13}C values of DIC in the range of -0.6 to -6.1‰ for the confined part of the aquifer. Similarly, quantitative ^{4}He dating turned out to be unreliable, though ^{4}He excess values (0.93-5.45×10^{-6} cm^3 STP/g) and very low ^{14}C contents (0.0-5.5 pmc) suggest glacial ages. Changes in hydrochemistry also indicate a long-lasting water-rock interaction probably dominated by diffusion-controlled exchange with overlying and underlying formations. Admixture of older water ascending from underlying formations is observed at two sites. That older water is also supposed to be of Quaternary age as the ^{40}Ar/^{36}Ar of the mixture remains equal to the atmospheric ratio. Great tracer ages are shown to result mainly from the delay of solute velocity with respect to the velocity of mobile water, caused by diffusive exchange between mobile water in the fissures (porosity of 0.0001-0.001) and stagnant water in the matrix (porosity of ~0.06). This stagnant water in the porous matrix is the main water reservoir in the Malm aquifer. In the erosion structures of the Malm limestones, close to the Cracow centre on the southern side of the Vistula river, Tertiary sands are deposited under clay cover. Prior to this study, the origin and age of mineral water exploited from these sands was controversial. However, tracer data indicated meteoric water recharged at the end of the last glacial, and excluded an admixture of connate marine water from adjacent formations. In one well a 10% admixture of modern water was observed with the mean age of about 30 years as determined from the lumped-parameter modelling of the tritium data. The recharge is supposed to take place indirectly through nearby Malm horsts and/or by seepage through Miocene clays in unidentified areas, with dissolution of evaporites as the main source of chemical components. The glacial ages of waters in the confined parts of the Malm aquifer and in Tertiary sands indicate their low vulnerability to anthropogenic pollution.

Zeitschriften ohne Impact Factor

221. **Baeder-Bederski, O.**, **Kuschk, P.**, **Mosig, P.**, **Müller, R. A.**, Borneff-Lipp, M., Dürr, M. (2004):
Reducing faecal germs in municipal sewage using planted soil filters. Initial results of a pilot plant system
Acta Hortic. **643**, 257-263

222. Berenzen, N., Hümmer, S., **Liess, M.**, Schulz, R. (2003):
Pesticide peak discharge from wastewater treatment plants into streams during the main period of insecticide application: ecotoxicological evaluation in comparison to runoff
Bull.Environm.Contam.Toxicol. **70** (5), 891-897

223. **Bernt, M.** (2004):
Declining city, big ambitions: Leipzig's olympic wish
Progressive Planning **161** (3), 11-12

224. Birner, R., **Wittmer, H.** (2004):
On the 'efficient boundaries of the state': the contribution of transaction-costs economics to the analysis of decentralization and devolution in natural resource management
Environment and Planning C: Government and Policy **22** (5), 667-685

225. **Bopp, S.**, **Weiß, H.**, **Schirmer, M.**, Grathwohl, P., **Schirmer, K.** (2004):
Passive Probennahme in Grund- und Oberflächenwasser - Ein Überblick
Grundwasser **9** (2), 109-118

226. Deichner, O., Foeckler, F., Groh, K., **Henle, K.** (2003):
Anwendung und Überprüfung einer Rüttelmaschine zur Schlämmung und Siebung von Mollusken-Bodenproben
Mitteilungen der Deutschen Malakozoologischen Gesellschaft **69/70**, 71-77

227. **Dermietzel, J.**, **Strenge, G.**, **Strauch, G.**, **Schlosser, D.**, **Bittkau, A.** (2004):
Die Grundwassermessstelle als Mikrokosmos - ein Ansatz zur *In-situ*-Abschätzung des NA-Potenzials
Grundwasser **9** (2), 89-97

228. **Fischer, A.**, **Vieth, A.**, **Knöller, K.**, Wachter, T., Dahmke, A., **Richnow, H. H.** (2004):
Charakterisierung des mikrobiellen Schadstoffabbaus mithilfe von isotopenchemischen Methoden
Grundwasser **9** (3), 159-172

229. Fuentes, N., Ugarte, E. A., **Klotz, S.** (2004):
Flora asociada a bordes de camino en un transecto este-oeste en la VIII región, Chile
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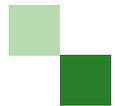
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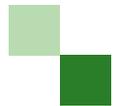
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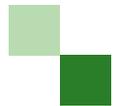
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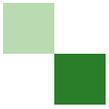
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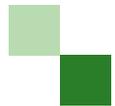
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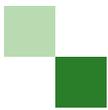
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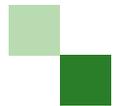
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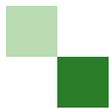
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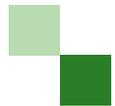
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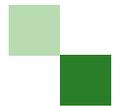
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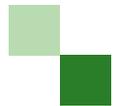
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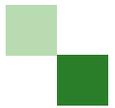
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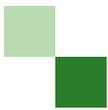
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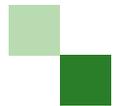
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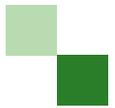
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