

June 15, 2005

ENVIRONMENTAL Science & Technology

<http://pubs.acs.org/est>

Ridding Ships' **BALLAST Water of** **Microorganisms**

Lessons from Endocrine Disruption
Applied to Other Trace Organics

Contemporary Anthropogenic
Silver Cycle: A Multilevel Analysis



PUBLISHED BY
THE AMERICAN
CHEMICAL SOCIETY

Critical Reviews

4321

Lessons from Endocrine Disruption and Their Application to Other Issues Concerning Trace Organics in the Aquatic Environment

John P. Sumpter and Andrew C. Johnson

Opinions are given on what has been learned from all the research on endocrine disruption and how these lessons can be applied to other issues.

4333

Conservation of Coral Reefs through Active Restoration Measures: Recent Approaches and Last Decade Progress

Baruch Rinkevich

Recent approaches are reviewed in reef restoration, with emphasis on the achievements of active restoration, including gardening measures and novel technological approaches.

Characterization of Natural and Affected Environments

4343

Why Do Organochlorine Differences between Arctic Regions Vary among Trophic Levels?

Katrine Borga, Geir Wing Gabrielsen, Janneche Utne Skaare, Lars Kleivane, Ross J. Norstrom, and Aaron T. Fisk

On the basis of similar levels of legacy organochlorines in zooplankton and fish between Arctic regions, earlier regional differences seem to have evened out.

■ 4353

Nitrous Oxide Fluxes in Three Experimental Boreal Forest Reservoirs

L. L. Hendzel, C. J. D. Matthews, J. J. Venkiteswaran, V. L. St. Louis, D. Burton, E. M. Joyce, and R. A. Bodaly

Diffusive surface N_2O fluxes are examined in three newly created experimental reservoirs located in Canada's boreal ecozone, which has flooded soils that contain different amounts of organic carbon.

■ 4361

Historical Trends in Mercury Sedimentation and Mixing in the Strait of Georgia, Canada

Sophia C. Johannessen, Robie W. Macdonald, and K. Magnus Eek

Mercury profiles in dated sediment cores reveal a history of contamination and sediment mixing.

■ 4369

Analysis of Reduced Phosphorus in Samples of Environmental Interest

Siyuan C. Morton, Dietmar Glindemann, Xiaorong Wang, Xiaojun Niu, and Marc Edwards

Reduced phosphorus is present in many environmental samples, but microbially mediated phosphate reduction is not occurring to a significant extent.

■ 4377

Variations in Maize Pollen Emission and Deposition in Relation to Microclimate

Nathalie Jarosz, Benjamin Loubet, Brigitte Durand, Xavier Foueillassar, and Laurent Huber

Measurements are given of airborne concentration and deposition rates of maize pollen downwind from and within three different-sized crops.

Notices to ES&T authors

1. We are pleased to inaugurate a new subject heading, **Ecotoxicology and Human Environmental Health**, in recognition of the emerging importance of this field and the increasing number of *ES&T* papers being submitted. Look for it soon.
2. Submitted manuscripts must now include email addresses for all coauthors, in addition to full contact information for the corresponding author. Please also provide a list of at least four suggested reviewers and their contact information (email addresses are preferred).

■ 4385

Contribution of Dicofol to the Current DDT Pollution in China

Xinghua Qiu, Tong Zhu, Bo Yao, Jianxin Hu, and Shaowen Hu

Samples of formulated dicofol are collected in China to measure DDT contents, and the contribution of dicofol use in China to DDTs in the environment is estimated.

4391

Sterols and Anionic Surfactants in Urban Aerosol: Emissions from Wastewater Treatment Plants in Relation to Background Concentrations

Michael Radke

The emission of sterols and anionic surfactants from aerated wastewater treatment tanks leads to significantly increased concentrations of these compounds in aerosol.

4398

Homologue and Isomer Patterns of Polychlorinated Dibenzo-*p*-dioxins and Dibenzofurans from Phenol Precursors: Comparison with Municipal Waste Incinerator Data

Jae-Yong Ryu, James A. Mulholland, Do Hyong Kim, and Masao Takeuchi

The role of phenol precursors in polychlorinated dibenzo-*p*-dioxin and dibenzofuran formation in municipal waste incinerators is assessed on the basis of homologue and isomer patterns.

4407

Spatial and Temporal Variability in Air Concentrations of Short-Chain (C_{10} – C_{13}) and Medium-Chain (C_{14} – C_{17}) Chlorinated *n*-Alkanes Measured in the U.K. Atmosphere

Jonathan L. Barber, Andy J. Sweetman, Gareth O. Thomas, Eric Braekevelt, Gary A. Stern, and Kevin C. Jones

Short- and medium-chain chlorinated *n*-alkanes are present in the U.K. atmosphere at higher concentrations than other chemicals of concern.

4416

Removal of Headspace CO_2 Increases Biological Hydrogen Production

Wooshin Park, Seung H. Hyun, Sang-Eun Oh, Bruce E. Logan, and In S. Kim

Chemically scavenging CO_2 to suppress acetogenesis is a simple method to increase hydrogen production during anaerobic fermentation with a mixed culture.

■ Supporting information is available free at <http://pubs.acs.org/est>.

■ 4421

Bioaccumulation of Organochlorines in Crows from an Indian Open Waste Dumping Site: Evidence for Direct Transfer of Dioxin-Like Congeners from the Contaminated Soil

Michio X. Watanabe, Hisato Iwata, Mafumi Watanabe, Shinsuke Tanabe, Annamalai Subramanian, Kumiko Yoneda, and Takuma Hashimoto

This study suggests that dioxin-like congeners in the soil of dumping sites are transferred to crows that ingest garbage contaminated with soil.

4431

Isotopic Signature and Impact of Car Catalysts on the Anthropogenic Osmium Budget

André Poirier and Clément Gariépy

Car catalysts may be responsible for the deposition of up to 120 pg Os/m²/yr in urban areas; part of this amount may be exported to sedimentary sinks.

Environmental Processes

4435

Extraction of Oxidized and Reduced Forms of Uranium from Contaminated Soils: Effects of Carbonate Concentration and pH

Ping Zhou and Baohua Gu

Uranium-contaminated soil is extracted with carbonate/bicarbonate at varying concentrations, pH values, and redox conditions to evaluate the effects of these conditions on extraction efficiency and selectivity.

■ 4441

Isoprene Forms Secondary Organic Aerosol through Cloud Processing: Model Simulations

Ho-Jin Lim, Annmarie G. Carlton, and Barbara J. Turpin

Cloud processing of isoprene is an important contributor to SOA production; this alters the global distribution of hygroscopic organic aerosol and cloud condensation nuclei.

4447

1,4-Hydroxycarbonyl Products of the OH Radical Initiated Reactions of C₅-C₈ *n*-Alkanes in the Presence of NO

Fabienne Reisen, Sara M. Aschmann, Roger Atkinson, and Janet Arey

Solid-phase microextraction fibers precoated with *O*-(2,3,4,5,6-pentafluorobenzyl)hydroxylamine are used for on-fiber derivatization of carbonyl-containing compounds with subsequent analyses of their oxime derivatives.

■ 4454

Indirect Photolysis Promoted by Natural and Engineered Wetland Water Constituents: Processes Leading to Alachlor Degradation

Penney L. Miller and Yu-Ping Chin

Indirect photolysis of alachlor in wetland waters occurs via a hydroxyl radical pathway that is promoted by dissolved organic matter and is dependent on pH.

■ 4463

Cross-Coupling of Sulfonamide Antimicrobial Agents with Model Humic Constituents

Heidi M. Bialk, André J. Simpson, and Joel A. Pedersen

Phenoloxidases and acid birnessite mediate the oxidative cross-coupling of sulfonamide antimicrobial agents with substituted phenols; this suggests that similar reactions occur with humic substances.

■ 4474

Oxidative Transformation of Fluoroquinolone Antibacterial Agents and Structurally Related Amines by Manganese Oxide

Huichun Zhang and Ching-Hua Huang

Fluoroquinolone antibacterial agents are susceptible to oxidation by manganese oxide via their piperazine functional group; oxidation yields a range of dealkylated, hydroxylated, and possibly coupled products.

4484

Seasonal Temperature Fluctuations Induces Rapid Inactivation of *Cryptosporidium parvum*

Xunde Li, Edward R. Atwill, Lissa A. Dunbar, Ted Jones, Jimmy Hook, and Kenneth W. Tate

Seasonal fluctuations of temperature generate at least 3.27 log reduction/day for the infectivity of *Cryptosporidium parvum*.

■ 4490

Speciation of Zn Associated with Diatoms Using X-ray Absorption Spectroscopy

Oleg S. Pokrovsky, Gleb S. Pokrovski, Alexandre Gélabert, Jacques Schott, and Alain Boudou

Zinc is tetracoordinated with oxygens of carboxylate on diatom surfaces and bound to carboxyl, phosphate, and thiols inside the cells.

■ 4499

Cr(VI) Reduction and Immobilization by Magnetite under Alkaline pH Conditions: The Role of Passivation

Y. Thomas He and Samuel J. Traina

Chromate reduction by magnetite under alkaline pH conditions is limited because of passivation by goethite, maghemite, and iron-chromium oxides formation.

4505

Cesium Desorption from Illite as Affected by Exudates from Rhizosphere Bacteria

Laura A. Wendling, James B. Harsh, Thomas E. Ward, Carl D. Palmer, Melinda A. Hamilton, Jeffrey S. Boyle, and Markus Flury

Some bacteria isolated from the rhizosphere of crested wheat-grass produce exudates that enhance the release of cesium sorbed to highly selective frayed edge sites of micaceous minerals.

■ 4513

Modeling the Influence of Intermittent Rain Events on Long-Term Fate and Transport of Organic Air Pollutants

Olivier Jolliet and Michael Hauschild

A model is proposed that describes intermittent rain and its effect on atmospheric fate, and a new approximation is provided for steady-state modeling.

■ 4523

Bioaccumulation Factors for PCBs Revisited

Katrine Borga, Aaron T. Fisk, Barry Hargrave, Paul F. Hoekstra, Deborah Swackhamer, and Derek C. G. Muir

Zooplankton PCB bioaccumulation data from marine and freshwater ecosystems are evaluated, and reasons for the large variability in BAFs are discussed.

■ 4533

Organic Coprecipitates with Calcite: NMR Spectroscopic Evidence

Brian L. Phillips, Young J. Lee, and Richard J. Reeder

NMR spectroscopy results show that in a solution that precipitates calcite, some of the organic molecules present, especially citrate, are coprecipitated into the calcite structure.

■ Supporting information is available free at <http://pubs.acs.org/est>.

4540

Oxidative Microbial Degradation of 2,4,6-Trinitrotoluene via 3-Methyl-4,6-dinitrocatechol

Jacqueline M. Tront and Joseph B. Hughes

With stable isotope labeling and tandem mass spectrometry, 3-methyl-4,6-dinitrocatechol is identified in TNT-only systems seeded with organisms from laboratory cultures and historically contaminated soils.

Environmental Modeling

4550

Effect of Vapor Source–Building Separation and Building Construction on Soil Vapor Intrusion as Studied with a Three-Dimensional Numerical Model

Lilian D. V. Abreu and Paul C. Johnson

The numerical model allows for diffusive and advective transport, multicomponent systems and reactions, spatially distributed foundation cracks, and transient indoor and ambient pressure fluctuations.

■ 4562

Modeling Kinetics of Cu and Zn Release from Soils

Zhenqing Shi, Dominic M. Di Toro, Herbert E. Allen, and Alexander A. Ponzovsky

A kinetics model describes the release of copper and zinc from soils at different pH, dissolved organic matter content, and flow rates.

Environmental Measurements Methods

■ 4569

Determination of Single Particle Mass Spectral Signatures from Light-Duty Vehicle Emissions

David A. Sodeman, Stephen M. Toner, and Kimberly A. Prather

Chemical composition data with high time and size resolution show the mixing state of nonrefractory elements in particles such as elemental carbon during dynamometer source testing.

4581

Inter-comparison of Laser Photoacoustic Spectroscopy and Gas Chromatography Techniques for Measurements of Ethene in the Atmosphere

William C. Kuster, Frans J. M. Harren, and Joost A. de Gouw

Concurrent measurements of ethene in synthetic and ambient urban air by a laser photoacoustic spectrometer and a gas chromatograph show quantitative agreement.

4586

Trace Analysis of Bromate, Chlorate, Iodate, and Perchlorate in Natural and Bottled Waters

Shane A. Snyder, Brett J. Vanderford, and David J. Rexing

A novel LC-MS/MS method is presented for determining trace levels of perchlorate, bromate, iodate, and chlorate in a variety of matrices.

4594

Biomonitoring of Mercury Exposure with Single Human Hair Strand

Melissa Legrand, Carlos José Sousa Passos, Donna Mergler, and Hing Man Chan

From a single strand of human hair, mercury exposure is measured with combustion, gold amalgamation, and atomic absorption spectroscopy.

Remediation and Control Technologies

■ 4599

Chromium-Removal Processes during Groundwater Remediation by a Zerovalent Iron Permeable Reactive Barrier

Richard T. Wilkin, Chunming Su, Robert G. Ford, and Cynthia J. Paul

Secondary iron-bearing minerals formed via corrosion reactions and microbially mediated reactions enhance the capacity of zerovalent iron systems to remediate chromium-contaminated groundwater.

■ 4606

Removal of Heavy Metals from Mine Waters by Natural Zeolites

Ulla Wingenfelder, Carsten Hansen, Gerhard Furrer, and Rainer Schulin

Removal of iron, lead, cadmium, and zinc from synthetic mine waters by natural zeolites is investigated.

4614

Development of an E–H₂O₂/TiO₂ Photoelectrocatalytic Oxidation System for Water and Wastewater Treatment

X. Z. Li and H. S. Liu

The innovative E–H₂O₂/TiO₂ PEC reactor system uses an anodized TiO₂/Ti mesh as a photoanode and a reticulated vitreous carbon electrode as a cathode.

■ 4621

Recovery and Fractionation of Phosphorus Retained by Lightweight Expanded Shale and Masonry Sand Used as Media in Subsurface Flow Treatment Wetlands

Margaret G. Forbes, Kenneth L. Dickson, Farida Saleh, William T. Waller, and Robert D. Doyle

Expanded shale and similar products with high hydraulic conductivity and phosphorus sorption capacity could greatly improve performance of phosphorus retention in constructed wetlands.

4628

Adsorption of Fluoride on Zirconium(IV)-Impregnated Collagen Fiber

Xue-pin Liao and Bi Shi

A Zr(IV)-impregnated collagen fiber is prepared, and its adsorption behavior toward F⁻ is investigated.

4633

Inactivation of *Microcystis aeruginosa* by Continuous Electrochemical Cycling Process in Tube Using Ti/RuO₂ Electrodes

Wenyan Liang, Jiuhui Qu, Libin Chen, Huijuan Liu, and Pengju Lei

The electrochemical cycling process with Ti/RuO₂ used as an anode in a tubular reactor inefficiently inactivates algae cells in water.

4640

Taking the Fungal Highway: Mobilization of Pollutant-Degrading Bacteria by Fungi

Stefanie Kohlmeier, Theo H. M. Smits, Roseanne M. Ford, Christoph Keel, Hauke Harms, and Lukas Y. Wick

Model systems that mimic water-saturated and unsaturated soil environments show the capacity of fungi to serve as vectors for the dispersion of pollutant-degrading bacteria.

4647

Fractionation of UV and VUV Pretreated Natural Organic Matter from Drinking Water

W. Buchanan, F. Roddick, N. Porter, and M. Drikas

The effects are compared of UV and vacuum-UV irradiation on the characteristics of the various fractions of natural organic matter.

Sustainability Engineering and Green Chemistry

■ 4655

Contemporary Anthropogenic Silver Cycle: A Multilevel Analysis

Jeremiah Johnson, Julie Jirikowic, Marlen Bertram, D. van Beers, R. B. Gordon, Kathryn Henderson, R. J. Klee, Ted Lanzano, R. Lifset, Lucia Oetjen, and T. E. Graedel

Human mobilization of silver is examined throughout its entire life cycle for 64 countries, 9 regions, and the planet as a whole.

4666

Microbial Fuel Cell Using Anaerobic Respiration as an Anodic Reaction and Biomineralized Manganese as a Cathodic Reactant

Allison Rhoads, Haluk Beyenal, and Zbigniew Lewandowski

Biomineralized manganese oxides are electrochemically reduced in the cathodic compartment of a microbial fuel cell; manganese oxides are efficient as cathodic reactants and are superior to oxygen.

Additions and Corrections

4672

Wet Deposition of Persistent Organic Pollutants to the Global Oceans

Elena Jurado, Foday Jaward, Rainer Lohmann, Kevin C. Jones, Rafel Simó, and Jordi Dachs

“There are few, if any, who have contributed as many new and original ideas that became obvious truths, and often basic truths, for his contemporaries and for succeeding generations.”

— Karol Mysels on Irving Langmuir

Helping researchers keep current on new and original ideas in the chemical sciences is an essential part of our mission at the American Chemical Society. That's why ACS Publications provides subscribers access to more than 125 years of the most read, most cited, and most requested journals in chemistry. And with that kind of access, anything is possible.



AMERICAN CHEMICAL SOCIETY
PUBLICATIONS
HIGH QUALITY. HIGH IMPACT.
<http://pubs.acs.org>

Visit the ACS Journal Archives Timeline at <http://pubs.acs.org/archives> to gain free access to the article, “Forces Near the Surfaces of Molecules,” by Irving Langmuir.

