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Maternal Diet During Oogenesis *Is the* Major Source *of* METHYLMERCURY *in* Fish Embryos

Environmental Programs: Liberal Arts Colleges and Interdisciplinary Education

Elevated Microbial Tolerance to Metals and Antibiotics in Industrial Environments

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Research

Critical Review

Characterization of Natural and Affected Environments

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3507
Comparative Investigation of Low-Molecular-Weight Fulvic Acids of Different Origin by SEC-Q-TOF-MS: New Insights into Structure and Formation

Thorsten Reemtsma and Anja These

Electrospray-mass spectrometry reveals that low-molecular-weight fulvic acids in isolates of very different origin consist of a large set of identical molecules.

■ 3513
Congener-Specific Tissue Distribution of Aroclor 1254 and a Highly Chlorinated Environmental PCB Mixture in Rats

Izabela Kania-Korwel, Keri C. Hornbuckle, Aaron Peck, Gabriele Ludewig, Larry W. Robertson, Wieslaw W. Sulkowski, Parvaneh Espandiari, C. Gary Gairola, and Hans-Joachim Lehmler

Multivariate analysis of PCB profiles from rats exposed to two different PCB mixtures reveals differences between the mixtures in the tissue distribution of individual congeners.

■ 3521
Distribution of Polybrominated Diphenyl Ethers in Sediments of the Pearl River Delta and Adjacent South China Sea

Bixian Mai, Shejun Chen, Xiaojun Luo, Laiguo Chen, Qingshu Yang, Guoying Sheng, Pingan Peng, Jiamo Fu, and Eddy Y. Zeng

Spatial and temporal distributions are examined of PBDEs in sediments of the Pearl River Delta and adjacent South China Sea of southern China.

■ 3528
Dissolved Trace Element Concentrations in the East River–Long Island Sound System: Relative Importance of Autochthonous versus Allochthonous Sources

Nathaniel J. Buck, Christopher J. Gobler, and Sergio A. Sañudo-Wilhelmy

Nutrient levels and distributions and major seasonal processes influence dissolved metals in the surface waters of Long Island Sound.

■ 3538
Long-Term Recovery of PCB-Contaminated Sediments at the Lake Hartwell Superfund Site: PCB Dechlorination. 1. End-Member Characterization

Victor S. Magar, Glenn W. Johnson, Richard C. Brenner, John F. Quensen, III, Eric A. Foote, Greg Durell, Jennifer A. Ickes, and Carole Peven-McCarthy

Congener fingerprinting and multivariate receptor modeling (polytopic vector analysis) are used to identify and characterize source and dechlorination PCB end-member patterns in Lake Hartwell sediments.

■ 3548
Long-Term Recovery of PCB-Contaminated Sediments at the Lake Hartwell Superfund Site: PCB Dechlorination. 2. Rates and Extent

Victor S. Magar, Richard C. Brenner, Glenn W. Johnson, and John F. Quensen, III

In situ PCB dechlorination rates in Lake Hartwell sediments are determined from linear regressions of meta plus para chlorines/PCB versus sediment age in sediment cores.

3555
Traffic as a Source of Organophosphorus Flame Retardants and Plasticizers in Snow

Anneli Marklund, Barbro Andersson, and Peter Haglund

Road vehicles, aircraft, and long-range air transport are identified as major sources of organophosphates in the outdoor environment.

■ 3563
Tracking Sources of Unsaturated Zone and Groundwater Nitrate Contamination Using Nitrogen and Oxygen Stable Isotopes at the Hanford Site, Washington

Michael J. Singleton, Katharine N. Woods, Mark E. Conrad, Donald J. DePaolo, and P. Evan Dresel

Nitrogen and oxygen isotopes in nitrate are used to distinguish natural and industrial sources in unsaturated zone and groundwater at the Hanford Site in Washington.

Environmental Processes

3571
Arsenate Adsorption Structures on Aluminum Oxide and Phyllosilicate Mineral Surfaces in Smelter-Impacted Soils

Brett T. Beaulieu and Kaye S. Savage

Particulate arsenic oxides from a copper smelter experience oxidation, dissolution, and limited vertical migration in downwind inceptisols; arsenic forms bridging bidentate structures.

3580
▶ Maternal Diet During Oogenesis Is the Major Source of Methylmercury in Fish Embryos

Chad R. Hammerschmidt and Mark B. Sandheinrich

Maternal diet during oogenesis—not methylmercury remobilized from parental somatic tissue—is the principal source of methylmercury in fish eggs.

3585
▶ Effects of Mercury on Neurochemical Receptors in Wild River Otters (*Lontra canadensis*)

Niladri Basu, Anton Scheuhammer, Nicole Grochowina, Kate Klenavic, Douglas Evans, Mike O'Brien, and Hing Man Chan

Neurochemical receptors are novel biomarkers of mercury exposure and effects in wild river otters.

■ 3592
Interaction Forces between Colloids and Protein-Coated Surfaces Measured Using an Atomic Force Microscope

Li-Chong Xu and Bruce E. Logan

The effect of a protein on colloidal adhesion between uncoated and protein-coated colloids and surfaces in the presence of four different proteins is examined.

3601
Effect of Airflow Setting on the Organic Composition of Woodheater Emissions

Timothy B. Jordan and Andrew J. Seen

As the airflow is closed, emission factors for organic compounds emitted from woodheaters increase for most particle-phase compounds, while levoglucosan varies relatively little.

3611
Hepatic CYP1A Induction by Dioxin-Like Compounds, and Congener-Specific Metabolism and Sequestration in Wild Common Cormorants from Lake Biwa, Japan

Akira Kubota, Hisato Iwata, Shinsuke Tanabe, Kumiko Yoneda, and Sachiko Tobata

Functional roles of cytochrome P450 1A protein associated with concentration profiles and tissue distribution of dioxin-like congeners in wild cormorants are extensively investigated.

3620
Spatial Distributions of *Cryptosporidium* Oocysts in Porous Media: Evidence for Dual-Mode Deposition

Nathalie Tufenkji and Menachem Elimelech

Observed deviation of *Cryptosporidium* deposition behavior from classical filtration theory is attributed to the influences of secondary-minimum deposition and surface-charge heterogeneities.

■ 3630
Triplet-Sensitized Photodegradation of Sulfa Drugs Containing Six-Membered Heterocyclic Groups: Identification of an SO_2 Extrusion Photoproduct

Anne L. Boreen, William A. Arnold, and Kristopher McNeill

The photodegradation mechanism of a class of sulfa drugs containing six-membered heterocyclic substituents is investigated in a natural water sample.

3639
Persistence and Biodegradation of Monoethanolamine and 2-Propanolamine at an Abandoned Industrial Site

Steven B. Hawthorne, Alena Kubátová, John R. Gallagher, James A. Sorensen, and David J. Miller

Alkanolamines persist for many years on soils at an abandoned industrial site and do not appear to transport to groundwater.

■ 3646
Photochemical Transformations of Benzo[*e*]pyrene in Solution and Adsorbed on Silica Gel and Alumina Surfaces

Silvina Fioressi and Rafael Arce

Photodegradation of benzo[*e*]pyrene is influenced by the microenvironment polarity; this finding shows the importance of studying the photodegradation of organic pollutants in different environments.

3656
Photochemical Production of Ionic and Particulate Aluminum and Iron in Lakes

Jiří Kopáček, Šárka Klementová, and Stephen A. Norton

Mass budgets and laboratory experiments suggest that photochemical liberations of organically bound aluminum and iron are important sources of their ionic forms in lakes.

3663
Long-Term Fate of Polychlorinated Biphenyls and Polycyclic Aromatic Hydrocarbons in an Agricultural Soil

Kieron J. Doick, Eva Klingelmann, Peter Burauel, Kevin C. Jones, and Kirk T. Semple

Two aged lysimeter soils show different patterns of fate and behavior for PAHs and PCBs in an Orthic Luvisol over 12 years.

3671
Elevated Microbial Tolerance to Metals and Antibiotics in Metal-Contaminated Industrial Environments

Ramunas Stepanauskas, Travis C. Glenn, Charles H. Jagoe, R. Cary Tuckfield, Angela H. Lindell, and J. V. McArthur

Trace-element-rich ash settling basings of coal-fired power plants harbor microbial communities with elevated tolerance to metals and antibiotics.

3679
Spatial Variation in Deposition Rate Coefficients of an Adhesion-Deficient Bacterial Strain in Quartz Sand

Meiping Tong, Terri A. Camesano, and William P. Johnson

A nonelectrostatic mechanism is demonstrated to drive deviation from filtration theory of profiles of retained adhesion-deficient bacteria in quartz sand.

3688
Sorption to Black Carbon of Organic Compounds with Varying Polarity and Planarity

Gerard Cornelissen, Joris Haftka, John Parsons, and Örjan Gustafsson

Strong sorption to black carbon is observed for nonplanar hexachloroethane, butylate, and diuron but not for atrazine.

3695
Direct Observation of Organic Contaminant Uptake, Storage, and Metabolism within Plant Roots

Edward Wild, John Dent, Gareth O. Thomas, and Kevin C. Jones

Visualization of the uptake movement and degradation of xenobiotics within plant roots are discussed.

■ 3703
Estrogenic Activity of Impurities in Industrial Grade Bisphenol A

Masanori Terasaki, Fujio Shiraishi, Tomohiro Nishikawa, John S. Edmonds, Masatoshi Morita, and Masakazu Makino

Impurities in industrial grade bisphenol A do not significantly raise the estrogenicity of the impure compound above that of the pure reagent.

3708
Use of Superoxide as an Electron Shuttle for Iron Acquisition by the Marine Cyanobacterium *Lyngbya majuscula*

Andrew L. Rose, Tim P. Salmon, Tredwell Lukondeh, Brett A. Neilan, and T. David Waite

Superoxide is generated by the cyanobacterium *Lyngbya majuscula* and appears to facilitate iron uptake by reduction to the ferrous state.

Environmental Modeling

■ 3716
In-Stream Nitrogen Attenuation: Model-Aggregation Effects and Implications for Coastal Nitrogen Impacts

Amélie Darracq and Georgia Destouni

Differing spatial process and parameter aggregation procedures in catchment-scale nitrogen-budget models may yield different rate magnitude and depth-dependence behavior, with practically important management implications.

3723
Percutaneous Absorption of 4-Cyanophenol from Freshly Contaminated Soil in Vitro: Effects of Soil Loading and Contamination Concentration

G. D. Touraille, K. D. McCarley, A. L. Bunge, J.-P. Marty, and R. H. Guy

Because dermal exposure to contaminated soil may influence health, the rate and extent of dermal penetration relative to soil loading and degree of contamination are characterized.

3732
Computer Model for Municipal Solid Waste Treatment in Developing Countries

Amit Jain, Harsangeet Kaur, and Sunil Khanna

The computer model attempts to minimize overall system cost and to identify low-cost alternatives by calculating energy recovery for various disposal options.

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Environmental Measurements Methods

■ 3736

Solid-Phase Dosing and Sampling Technique To Determine Partition Coefficients of Hydrophobic Chemicals in Complex Matrixes

Thomas L. ter Laak, Mojca Durjava, Jaap Struijs, and Joop L. M. Hermens

A simple solid-phase dosing and sampling technique for the determination of sorption coefficients of hydrophobic compounds to dissolved organic matter is presented.

3743

Evaluation of Air Acidity through Optical Sensors

M. Garcia-Heras, K. Kromka, J. Faber, P. Karaszkiewicz, and M. A. Villegas

Optical sensors developed from dye-doped coatings obtained through the sol–gel method are produced to evaluate the air acidity.

3748

Development of an Immunoassay for the Determination of Polyaromatic Hydrocarbons in Plasma Samples from Oiled Seabirds

G. M. Troisi and L. Borjesson

A commercially available immunoassay is developed and validated by GC-MS for determination of total PAHs in avian plasma.

3756

Miniaturized Lead Sensor Based on Lead-Specific DNAzyme in a Nanocapillary Interconnected Microfluidic Device

In-Hyoung Chang, Joseph J. Tulock, Juewen Liu, Won-Suk Kim, Donald M. Cannon, Jr., Yi Lu, Paul W. Bohn, Jonathan V. Sweedler, and Donald M. Cropek

A combination of a DNAzyme molecular beacon with nanofluidic–microfluidic architecture creates a sensitive and specific sensor for lead in water.

Remediation and Control Technologies

3762

Evaluating Factors Affecting the Permeability of Emulsions Used To Stabilize Radioactive Contamination from a Radiological Dispersal Device

Garey A. Fox and Victor F. Medina

Postdetonation decontamination with the use of emulsions, asphalt, or tall oil pitch to stabilize contamination released by a radiological dispersal device is evaluated.

3770

Preparation of Titania Nanotubes and Their Environmental Applications as Electrode

Xie Quan, Shaogui Yang, Xiuli Ruan, and Huiming Zhao

The structural and surface morphology of a TiO_2 nanotube-like electrode is described, and its pentachlorophenol degradation efficiency is compared with that of a TiO_2 film electrode.

■ 3776

▶ Silicate-Enhanced Enzymatic Dehairing: A New Lime-Sulfide-Free Process for Cowhides

Subramani Saravanabhavan, Palanisamy Thanikaivelan, Jonnalagadda Raghava Rao, and Balachandran Unni Nair

Use of silicate in the enzymatic dehairing improves the catalytic efficiency of the enzyme and provides an eco-benign lime-sulfide-free dehairing process for bovine hides.

■ 3784

Effects of pH and Catalyst Concentration on Photocatalytic Oxidation of Aqueous Ammonia and Nitrite in Titanium Dioxide Suspensions

Xingdong Zhu, Sunny R. Castleberry, Mark A. Nanny, and Elizabeth C. Butler

Optimization of photocatalytic oxidation requires pH control to increase the fraction of NH_4^+/NH_3 in the form of NH_3 and sufficient TiO_2 for complete oxidation of NO_2^- and NO_3^-.

3792

Occurrence, Sources, and Fate of Benzothiazoles in Municipal Wastewater Treatment Plants

Achim Kloepfer, Martin Jekel, and Thorsten Reemtsma

Polar benzothiazoles occur in household wastewater, street runoff, and municipal wastewater, and their total concentration is hardly diminished by activated-sludge wastewater treatment.

3799

Elucidation of Degradation Mechanism of Dioxins during Mechanochemical Treatment

Yugo Nomura, Satoshi Nakai, and Masaaki Hosomi

Model dioxin compounds, including 4-chlorobiphenyl, octachlorodibenzo-*p*-dioxin, and octachlorodibenzofuran, are degraded by a mechanochemical process.

3805

Electrochemical Oxidation for Low Concentration of Aniline in Neutral pH Medium: Application to the Removal of Aniline Based on the Electrochemical Polymerization on a Carbon Fiber

Minako Matsushita, Hideki Kuramitz, and Shunitz Tanaka

A new method for removal of low concentrations of aniline in water is developed on the basis of the electropolymerization of aniline at a carbon-fiber electrode.

3811

Influence of the Order of Reagent Addition on NDMA Formation during Chloramination

I. Marie Schreiber and William A. Mitch

The order of reagent addition during chloramination can significantly impact NDMA formation via dichloramine formation or chlorination of organic nitrogen precursors.

3819

Continuous Fermentative Hydrogen Production Using a Two-Phase Reactor System with Recycle

Jeremy T. Kraemer and David M. Bagley

A two-phase anaerobic microbial reactor system converts glucose to hydrogen and methane and, with recycle, significantly reduces the alkali needed for hydrogen-reactor pH control.

3826

(*E*)-5-[2-(Methoxycarbonyl)ethenyl]cytidine as a Chemical Actinometer for Germicidal UV Radiation

Chengyue Shen, Shiyue Fang, Donald E. Bergstrom, and Ernest R. Blatchley, III

(*E*)-5-[2-(Methoxycarbonyl)ethenyl]cytidine is examined for use as a chemical actinometer for germicidal UV radiation.

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