

# Bulletin Board

## Contents

JUL. 31, 2020

[click on page numbers for links]

### CHEMICAL EFFECTS

Adrenal gland response to endocrine disrupting chemicals in fishes, amphibians and reptiles: a comparative overview.....	3
Interactions of sulfuric acid with common atmospheric bases and organic acids: Thermodynamics and implications to new particle formation.....	3
A year-long passive sampling of phenolic endocrine disrupting chemicals in the East River, South China.....	4

### ENVIRONMENTAL RESEARCH

Risk assessment and investigation of landfill leachate as a source of emerging organic contaminants to the surrounding environment: a case study of the largest landfill in Jinan City, China.....	5
Microplastics in the environment: Interactions with microbes and chemical contaminants.....	6

### OCCUPATIONAL

Senior interventional cardiologists are exposed to higher effective doses than other staff members.....	6
Levels and sources of PBDEs and PCBs in human nails from e-waste, urban, and rural areas in South China.....	7
Parental occupational exposure pre- and post-conception and development of asthma in offspring.....	8

### PHARMACEUTICAL/TOXICOLOGY

Long-term outcomes in patients with polyarticular juvenile idiopathic arthritis receiving adalimumab with or without methotrexate.....	9
Nano nickel oxide promotes epithelial-mesenchymal transition through transforming growth factor $\beta$ 1/smads signaling pathway in A549 cells.....	11

### CONTACT US

subscribers@chemwatch.net  
tel +61 3 9572 4700  
fax +61 3 9572 4777

1227 Glen Huntly Rd  
Glen Huntly  
Victoria 3163 Australia

## Bulletin Board

Technical

JUL. 31, 2020

## CHEMICAL EFFECTS

**Adrenal gland response to endocrine disrupting chemicals in fishes, amphibians and reptiles: a comparative overview**

2020-07-14

The adrenal gland is an essential component of the body stress response; it is formed by two portions: a steroidogenic and a chromaffin tissue. Despite the anatomy of adrenal gland is different among classes of vertebrates, the hormones produced are almost the same. During stress, these hormones contribute to body homeostasis and maintenance of ion balance. The adrenal gland is very sensitive to toxic compounds, many of which behave like endocrine-disruptor chemicals (EDCs). They contribute to alter the endocrine system in wildlife and humans and are considered as possible responsible of the decline of several vertebrate ectotherms. Considering that EDCs regularly can be found in all environmental matrices, the aim of this review is to collect information about the impact of these chemical compounds on the adrenal gland of fishes, amphibians and reptiles. In particular, this review shows the different behavior of these "sentinel species" when they are exposed to stress condition. The data supplied in this review can help to further elucidate the role of EDCs and their harmful impact on the survival of these vertebrates.

Authors: Mariana Di Lorenzo, Teresa Barra, Luigi Rosati, Salvatore Valiante, Anna Capaldo, Maria De Falco, Vincenza Laforgia

Full Source: General and comparative endocrinology 2020 Jul 14;113550. doi: 10.1016/j.ygcen.2020.113550.

**Interactions of sulfuric acid with common atmospheric bases and organic acids: Thermodynamics and implications to new particle formation**

2020-09

Interactions of the three common atmospheric bases, dimethylamine ((CH<sub>3</sub>)<sub>2</sub>NH), methylamine (CH<sub>3</sub>NH<sub>2</sub>), ammonia (NH<sub>3</sub>), all considered to be efficient stabilizers of binary clusters in the Earth's atmosphere, with H<sub>2</sub>SO<sub>4</sub>, the key atmospheric precursor, and 14 common atmospheric organic acids (COAs) (formic, acetic, oxalic, malonic, succinic, glutaric acid, adipic, benzoic, phenylacetic, pyruvic, maleic acid, malic, tartaric and pinonic acids) have been studied using the density functional theory (DFT) and composite high-accuracy G3MP2 method. The thermodynamic stability of mixed (COA)(H<sub>2</sub>SO<sub>4</sub>), (COA)(B1), (COA)(B2) and (COA)(B3)

**The adrenal gland is an essential component of the body stress response; it is formed by two portions: a steroidogenic and a chromaffin tissue.**

## Bulletin Board

Technical

JUL. 31, 2020

dimers and (COA)(H<sub>2</sub>SO<sub>4</sub>)(B1), (COA)(H<sub>2</sub>SO<sub>4</sub>)(B2) and (COA)(H<sub>2</sub>SO<sub>4</sub>)(B3) trimers, where B1, B2 and B3 refer to (CH<sub>3</sub>)<sub>2</sub>NH, CH<sub>3</sub>NH<sub>2</sub> and NH<sub>3</sub>, respectively, have been investigated and their impacts on the thermodynamic stability of clusters containing H<sub>2</sub>SO<sub>4</sub> have been studied. Our investigation shows that interactions of H<sub>2</sub>SO<sub>4</sub> with COA, (CH<sub>3</sub>)<sub>2</sub>NH, CH<sub>3</sub>NH<sub>2</sub> and NH<sub>3</sub> lead to the formation of more stable mixed dimers and trimers than (H<sub>2</sub>SO<sub>4</sub>)<sub>2</sub> and (H<sub>2</sub>SO<sub>4</sub>)<sub>2</sub>(base), respectively, and emphasize the importance of common organic species for early stages of atmospheric nucleation. We also show that although amines are generally confirmed to be more active than NH<sub>3</sub> as stabilizers of binary clusters, in some cases mixed trimers containing NH<sub>3</sub> are more stable thermodynamically than those containing CH<sub>3</sub>NH<sub>2</sub>. This study indicates an important role of COA, which coexist and interact with that H<sub>2</sub>SO<sub>4</sub> and common atmospheric bases in the Earth atmosphere, in formation of stable pre-nucleation clusters and suggests that the impacts of COA on new particle formation (NPF) should be studied in further details.

Authors: Yunfeng Li, Haijie Zhang, Qingzhu Zhang, Yisheng Xu, Alexey B Nadykto

Full Source: Journal of environmental sciences (China) 2020 Sep;95:130-140. doi: 10.1016/j.jes.2020.03.033.

**A year-long passive sampling of phenolic endocrine disrupting chemicals in the East River, South China**

2020-07-10

The occurrence of endocrine disrupting chemicals (EDCs) in the aquatic environment is a global concern. In this study, we employed two different passive samplers Diffusive Gradients in Thin-films (DGT) and Chemcatcher for in situ measurement of 8 phenolic EDCs in the East River of the Pearl River system over one-year. These data were assessed alongside results from traditional grab sampling. Six chemicals (4tOP, 4NP, BPA, E1, EE2 and DES) were regularly detected in the water samples, of which the three phenols (i.e. 4tOP, 4NP and BPA) were in all samples and at high concentrations (0.4-1040 ng/L for 4tOP, 2.6-58500 ng/L for NP and 11.4-123300 ng/L for BPA). Fewer target chemicals were detected in both passive samplers, with only 4tOP, 4NP and BPA found in most samplers; E1 and DES were occasionally measurable above detection limits. The higher (by about a factor of 2-3) measurements provided by DGT compared to Chemcatcher could be attributed to the effect of the diffusive boundary layer on Chemcatcher uptake or the strong adsorption of target chemicals on the Chemcatcher PES filter. The temporal trends of EDC monthly loadings indicated that they were from different sources

**The occurrence of endocrine disrupting chemicals (EDCs) in the aquatic environment is a global concern.**

## Bulletin Board

## Technical

JUL. 31, 2020

and that WWTPs were not effective in EDC removal and/or there was still some untreated wastewater discharged into the rivers.

Authors: Chang-Er Chen, You-Sheng Liu, Ricky Dunn, Jian-Liang Zhao, Kevin C Jones, Hao Zhang, Guang-Guo Ying, Andrew J Sweetman

Full Source: Environment international 2020 Jul 10;143:105936. doi: 10.1016/j.envint.2020.105936.

## ENVIRONMENTAL RESEARCH

### Risk assessment and investigation of landfill leachate as a source of emerging organic contaminants to the surrounding environment: a case study of the largest landfill in Jinan City, China

2020-07-17

Emerging organic contaminants (EOCs) have been widely studied in landfill leachates but not in the surrounding environment of landfills. In this study, two sampling campaigns were conducted to determine 45 EOCs in landfill leachates and environmental samples near a landfill in East China. Our study focused on the seasonal occurrence and spatial distribution of the target EOCs, as well as their ecological risks. The results showed 13 out of 45 EOCs were detectable and achieved individual concentrations that ranged from 2.0 to 5080 ng/L in the landfill leachates. Most of the detected EOCs exhibited higher concentrations in the leachates collected in summer than in winter. Effective removal of the EOCs by a two-stage disc tube reverse osmosis (DTRO) system led to a significant reduction in their concentration levels ( $< \text{LOQ} \sim 49 \text{ ng/L}$ ) in treated leachates. Eight EOCs ( $< \text{LOQ} \sim 62.7 \text{ ng/L}$ ) were detected in the groundwater adjacent to the landfill and had a similar composition pattern to raw leachates. The contamination levels of the target EOCs in groundwater decreased with the distance of sampling sites from the landfill. In soil samples, the occurrence of target EOCs was not consistent with raw or treated landfill leachates. Spatially, no apparent difference in the EOC concentrations was observed in the soil nearby the landfill. Crop plants sorbed the EOCs contained in soil ( $< \text{LOQ} \sim 30.4 \text{ ng/L}$ ), but they were not able to bioconcentrate the contaminants in either roots or edible parts. Risk assessment suggested that the individual EOC likely posed medium to high risks to aquatic organisms in groundwater while negligible impacts to human health through consumption of vegetables. To the best of our knowledge, this is the first report on the contribution of landfill leachates to EOC contamination in both aquatic and soil environments in East China.

Emerging organic contaminants (EOCs) have been widely studied in landfill leachates but not in the surrounding environment of landfills.

## Bulletin Board

## Technical

JUL. 31, 2020

Our findings emphasized the importance of investigating EOCs in landfill leachates and accumulative environmental risks of EOCs in the neighboring environment of landfills in China.

Authors: Kun Wang, Febelyn Reguyal, Tao Zhuang

Full Source: Environmental science and pollution research international 2020 Jul 17. doi: 10.1007/s11356-020-10093-8.

### Microplastics in the environment: Interactions with microbes and chemical contaminants

2020-07-02

Microplastics (MPs) are contaminants of emerging concern that have gained considerable attention during the last few decades due to their adverse impact on living organisms and the environment. Recent studies have shown their ubiquitous presence in the environment including the atmosphere, soil, and water. Though several reviews have focused on the occurrence of microplastics in different habitats, little attention has been paid to their interaction with biological and chemical pollutants in the environment. This review therefore presents the state of knowledge on the interaction of MPs with chemicals and microbes in different environments. The distribution of MPs, the association of toxic chemicals with MPs, microbial association with MPs and the microbial-induced fate of MPs in the environment are discussed. The biodegradation and bioaccumulation of MPs by and in microbes and its potential impact on the food chain are also reviewed. The mechanisms driving these interactions and how these, in turn, affect living organisms however are not yet fully understood and require further attention.

Authors: F K Mammo, I D Amoah, K M Gani, L Pillay, S K Ratha, F Bux, S Kumari

Full Source: The Science of the total environment 2020 Jul 2;743:140518. doi: 10.1016/j.scitotenv.2020.140518.

Microplastics (MPs) are contaminants of emerging concern that have gained considerable attention during the last few decades due to their adverse impact on living organisms and the environment.

## OCCUPATIONAL

### Senior interventional cardiologists are exposed to higher effective doses than other staff members

2020-07-16

Those working in interventional cardiology are exposed to varying radiation doses during diagnostic and interventional procedures. The work presented in this paper aimed to monitor the effective doses received by different categories of medical staff members practicing interventional

## Bulletin Board

## Technical

JUL. 31, 2020

cardiology procedures including senior cardiologists, junior cardiologists, anesthetists and nurses. Thermo-luminescence dosimeter (TLD) badges that consisted of lithium fluoride doped with magnesium and titanium were used to quantify radiation doses. Measurements were performed with the dosimeters mounted under and above leaded aprons worn by medical staff. The results revealed that the effective doses to senior cardiologists were the highest compared to those to other participating staff members, due to their position close to the X-ray tube. The average daily effective doses for senior cardiologists, junior cardiologists, anesthetists and nurses were higher for dosimeters located above the aprons than those for dosimeters located under the aprons. Above the apron, the average effective doses accumulated during the study period were  $0.44 \pm 0.06$ ,  $0.34 \pm 0.05$ ,  $0.29 \pm 0.03$  and  $0.29 \pm 0.04$  mSv, respectively; whereas, under the apron, they were  $0.20 \pm 0.02$ ,  $0.18 \pm 0.02$ ,  $0.17 \pm 0.02$  and  $0.18 \pm 0.02$ , respectively. Also, the fluoroscopy time was correlated with the dose acquired, especially for senior cardiologists. It is concluded that doses to senior cardiologists are quite high, and that many variables can affect staff exposure such as distance, direction, procedure and skills.

Authors: H A Abdel Ghany, H M Diab, Asmaa Salah, Ahmed A Taha  
Full Source: Radiation and environmental biophysics 2020 Jul 16. doi: 10.1007/s00411-020-00862-x.

### Levels and sources of PBDEs and PCBs in human nails from e-waste, urban, and rural areas in South China

2020-07-15

Human nails have been increasingly used as a biomarker for human exposure to persistent organic pollutants (POPs). In the present study, the fingernails of e-waste-dismantling workers from Longtang town, Qingyuan city, rural residents from Shijiao town, Qingyuan city, and urban residents from Guangzhou city, respectively, were collected from South China to monitor the human burdens of polybrominated diphenyl ether (PBDEs) and polychlorinated biphenyl (PCBs). The median concentrations of in the nails of the e-waste-dismantling workers, and urban and rural residents were 412, 129, and 82.1 ng g<sup>-1</sup>, respectively, and the median concentrations of were 108, 8.4, and 22.1 ng g<sup>-1</sup>, respectively. The levels of PCBs and PBDEs in the nails of e-waste-dismantling workers were significantly higher as compared to those for urban and rural residents ( $p < 0.05$ ), implying the continuous and greater exposure to these chemicals in the e-waste recycling areas. BDE 209 (92-98%) was the major congener of PBDEs and CB 52 (26-51%) was the main congener of PCB in nail samples. However, no significant gender difference was observed for PBDE and

**Human nails have been increasingly used as a biomarker for human exposure to persistent organic pollutants (POPs).**

## Bulletin Board

## Technical

JUL. 31, 2020

PCB levels in nails from all three investigated areas, and no significant correlation was found between their levels and the age of the participants. The enantiomer fractions (EFs) of CBs 95 and 132 indicated that the external sources (e.g. dust and/or air) were the primary sources for CBs 95 and 132 in human nails from the e-waste area, while the contribution from the internal sources (e.g. serum) could be in a small percentage. The results of this study indicate that human nails can be used as a proper indicator of human exposure to PCBs and PBDEs, and further studies are needed by a comprehensive investigation of the relationships between the PCB and PBDE levels in the nails and serum and/or other internal tissues.  
Authors: Hua-Jun Meng, Bin Tang, Jing Zheng, She-Xia Ma, Feng-Shan Cai, Xi Zhuang, Jun-Li Wang, Yun-Jiang Yu  
Full Source: Environmental science. Processes & impacts 2020 Jul 15. doi: 10.1039/d0em00221f.

### Parental occupational exposure pre- and post-conception and development of asthma in offspring

2020-07-14

Background: While direct effects of occupational exposures on an individual's respiratory health are evident, a new paradigm is emerging on the possible effects of pre-conception occupational exposure on respiratory health in offspring. We aimed to study the association between parental occupational exposure starting before conception and asthma in their offspring (at 0-15 years of age).  
Methods: We studied 3985 offspring participating in the Respiratory Health in Northern Europe, Spain and Australia (RHINESSA) generation study. Their mothers or fathers ( $n = 2931$ ) previously participated in the European Community Respiratory Health Survey (ECRHS). Information was obtained from questionnaires on parental job history pre- and post-conception which was linked to an asthma-specific job-exposure matrix (JEM). We assessed the association between parental occupational exposure and offspring asthma, applying logistic regression models, clustered by family and adjusted for study centre, offspring sex, parental characteristics (age, asthma onset, place of upbringing, smoking) and grandparents' level of education.  
Results: Parental occupational exposure to microorganisms, pesticides, allergens or reactive chemicals pre-conception or both pre- and post-conception was not related to offspring asthma; in general, subgroup analyses confirmed this result. However, maternal exposure both pre- and post-conception to allergens and reactive chemicals was associated with

**Background: While direct effects of occupational exposures on an individual's respiratory health are evident, a new paradigm is emerging on the possible effects of pre-conception occupational exposure on respiratory health in offspring.**

## Bulletin Board

## Technical

JUL. 31, 2020

increased odds for early-onset asthma in offspring (0-3 years of age); odds ratio 1.70 [95% CI: 1.02-2.84] and 1.65 [95% CI: 0.98-2.77], respectively. Conclusions: This study did not find evidence that parental occupational exposure, defined by an asthma JEM before conception only or during pre- and post-conception vs non-exposed, was associated with offspring asthma.

Authors: Kathrine Pape, Cecile Svanes, Camilla S Sejbæk, Andrei Malinowski, Byndis Benediktsdottir, Bertil Forsberg, Christer Janson, Geza Benke, Gro Tjalvin, José Luis Sánchez-Ramos, Jan-Paul Zock, Kjell Toren, Lennart Bråbäck, Mathias Holm, Rain Jõgi, Randi J Bertelsen, Thorarin Gíslason, Torben Sigsgaard, Xiaoqin Liu, Karin S Hougaard, Ane Johannessen, Caroline Lodge, Shyamali C Dharmage, Vivi Schlünssen  
Full Source: International journal of epidemiology 2020 Jul 14;dyaa085. doi: 10.1093/ije/dyaa085.

## PHARMACEUTICAL/TOXICOLOGY

### Long-term outcomes in patients with polyarticular juvenile idiopathic arthritis receiving adalimumab with or without methotrexate

2020-07

Objectives: Long-term safety and efficacy of adalimumab among patients with juvenile idiopathic arthritis (JIA) was evaluated through 6 years of treatment.

Methods: Children aged 4-17 years with polyarticular JIA were enrolled in a phase III, randomised-withdrawal, double-blind, placebo-controlled trial consisting of a 16-week open-label lead-in period, 32-week randomised double-blind period and 360-week long-term extension. Patients were stratified by baseline methotrexate use. Adverse events (AEs) were monitored, and efficacy assessments included JIA American College of Rheumatology (JIA ACR) 30%, 50%, 70% or 90% responses and the proportions of patients achieving 27-joint Juvenile Arthritis Disease Activity Score (JADAS27) low disease activity (LDA,  $\leq 3.8$ ) and inactive disease (ID,  $\leq 1$ ).

Results: Of 171 patients enrolled, 62 (36%) completed the long-term extension. Twelve serious infections in 11 patients were reported through 592.8 patient-years of exposure. No cases of congestive heart failure-related AEs, demyelinating disease, lupus-like syndrome, malignancies, tuberculosis or deaths were reported. JIA ACR 30/50/70/90 responses and JADAS27 LDA were achieved in 66% to 96% of patients at

**Objectives: Long-term safety and efficacy of adalimumab among patients with juvenile idiopathic arthritis (JIA) was evaluated through 6 years of treatment.**

## Bulletin Board

## Technical

JUL. 31, 2020

week 104, and 63 (37%) patients achieved clinical remission (JADAS27 ID sustained for  $\geq 6$  continuous months) during the study. Attainment of JIA ACR 50 or higher and JADAS27 LDA or ID in the initial weeks were the best predictors of clinical remission. Mean JADAS27 decreased from baseline, 22.5 (n=170), to 2.5 (n=30) at week 312 (observed analysis). Conclusions: Through 6 years of exposure, adalimumab was well tolerated with significant clinical response (up to clinical remission) and a relatively low retention rate.

Authors: Daniel J Lovell, Hermine I Brunner, Andreas O Reiff, Lawrence Jung, Katerina Jarosova, Dana Němcová, Richard Mouy, Christy Sandborg, John F Bohnsack, Dirk Elewaut, Christos Gabriel, Gloria Higgins, Isabelle Kone-Paut, Olcay Y Jones, Veronika Vargová, Elizabeth Chalom, Carine Wouters, Ivan Lagunes, Yanna Song, Alberto Martini, Nicolino Ruperto  
Full Source: RMD open 2020 Jul;6(2):e001208. doi: 10.1136/rmdopen-2020-001208.

tAnthrax Protective Antigen 63 (PA63): Toxic Effects in Neural Cultures and Role in Gulf War Illness (GWI)  
2020-06-30

Protective antigen (PA) 63 (PA63) is a protein derived from the PA83 component contained in the anthrax vaccine. The anthrax vaccine ("Biothrax") was administered together with other vaccines to Gulf War veterans, about 35% of whom later developed a multisymptom disease (Gulf War Illness [GWI]), with prominent neurological/cognitive/mood symptoms, among others. The disease has been traditionally attributed to exposures to toxic chemicals during the war but other factors could be involved, including vaccines received. Of these, the anthrax vaccine is the most toxic. Here, we assessed directly the PA63 toxin's harmful effects on cultured neuroblastoma 2A (N2A) cells with respect to cell spreading, process formation, apoptosis, and integrity of cell membrane, cytoskeleton, and mitochondria. We found that, when added in N2A cultures, PA63 toxin led to decreased cell spreading and cell aggregation, leading to apoptosis. The mechanisms of PA63-induced cell damage included compromised cell membrane permeability indicated by enhanced access of propidium iodide in cells. In addition, signaling pathways leading to organization of N2A cytoskeleton were negatively affected, as both actin and microtubular networks were compromised. Finally, the mitochondrial membrane potential was impaired in specific assays. Altogether, these alterations led

**Protective antigen (PA) 63 (PA63) is a protein derived from the PA83 component contained in the anthrax vaccine.**

# Bulletin Board

## Technical

JUL. 31, 2020

to apoptosis as a collective toxic effect of PA63 which was substantially reduced by the concomitant addition of specific antibodies against PA63.

Authors: Effie-Photini C Tsilibary, Eric P Souto, Marian Kratzke, Lisa M James, Brian E Engdahl, Apostolos P Georgopoulos

Full Source: Neuroscience insights 2020 Jun

30;15:2633105520931966. doi: 10.1177/2633105520931966.

### **Nano nickel oxide promotes epithelial-mesenchymal transition through transforming growth factor $\beta$ 1/smads signaling pathway in A549 cells**

2020-07-18

Our previous study demonstrated that nano nickel oxide (NiO) induce pulmonary fibrosis in rats and collagen excessive formation in A549 cells, which mechanism was related with the increasing transforming growth factor  $\beta$ 1 (TGF- $\beta$ 1) secretion. However, it remains unclear understanding the role of TGF- $\beta$ 1 in collagen excessive formation. Here, we found nano NiO could directly promote epithelial-mesenchymal transition (EMT) via the TGF- $\beta$ 1/Smads pathway in A549 cells. First, cytotoxicity induced by nano NiO has a dose- and time-dependent manner according to methylthiazol tetrazolium assay. Second, nano NiO led to the increased contents of type I collagen (Col-I), TGF- $\beta$ 1, p-Smad2, p-Smad3,  $\alpha$ -smooth muscle actin ( $\alpha$ -SMA), vimentin, and fibronectin, indicating Smads pathway activation and EMT occurrence. Third, to verify whether TGF- $\beta$ 1 activated Smads signaling pathway and EMT occurrence, A549 cells were exposed to nano NiO and TGF- $\beta$ 1 inhibitors (10  $\mu$ M SB431542). The results showed that TGF- $\beta$ 1 inhibitors alleviated the nano NiO-induced cytotoxicity and Col-I excessive formation. Meanwhile, TGF- $\beta$ 1 inhibitors reversed the proteins expression trends of Col-I, p-Smad2, p-Smad3,  $\alpha$ -SMA, vimentin, fibronectin, and E-cadherin. These observations suggested that EMT occurrence via TGF- $\beta$ 1/Smads pathway might play an important role in the collagen excessive formation induced by nano NiO in A549 cells.

Authors: Xuhong Chang, Minmin Tian, Qiong Zhang, Jinxia Gao, Sheng Li, Yingbiao Sun

Full Source: Environmental toxicology 2020 Jul 18. doi: 10.1002/tox.22995.

**Our previous study demonstrated that nano nickel oxide (NiO) induce pulmonary fibrosis in rats and collagen excessive formation in A549 cells, which mechanism was related with the increasing transforming growth factor  $\beta$ 1 (TGF- $\beta$ 1) secretion.**