

Dr. Charles Wong

Department Head

Chemistry Department

Southern California Coastal Water Research Project

Education:

Ph.D., Civil Engineering, University of Minnesota, Minneapolis MN 1998

S.M., Civil Engineering, Massachusetts Institute of Technology Cambridge MA, 1992

Areas of Expertise

Prior to joining SCCWRP in 2019 as Department Head, Dr. Wong was Professor and Canada Research Chair (Tier II) at the University of Winnipeg. He continues to hold an adjunct faculty appointment there, as well as serving as Jinan University Chair Professor (China). He mentors students there, and through concurrent appointments at the University of Manitoba and the Costa Rica Institute of Technology. Dr. Wong's current research interests include the development of novel methods for quantifying chemicals of emerging concern such as pharmaceuticals, polyfluorinated alkyl substances, and their metabolites and degradates. He also works on elucidating sources, fate processes, and ecotoxicological consequences of these chemicals through bench- to mesocosm-scale controllable experiments; and in tropical, temperate, and polar climates through case studies.

Professional Experience:

Professor and former Canada Research Chair in Ecotoxicology, University of Winnipeg. 2008-2019

Assistant Professor of Chemistry, University of Alberta. 2002-08

Adjunct faculty member, Costa Rica Institute of Technology. 2016-present

Adjunct faculty member University of Manitoba. 2014-present

Adjunct faculty member University of Alberta. 2008-12

Scientist, Children's Hospital Research Institute of Manitoba. 2012-18

Chair Professor, Jinan University. 2016-present

Visiting Scientist, Guangzhou Institute of Geochemistry. 2012

Postdoctoral Associate, University of Toronto and Environment Canada. 1999-02

Postdoctoral Associate, U.S. Environmental Protection Agency. 1997-99

Honors and Awards:

Excellence in Review Award, Environmental Science & Technology Letters, 2018.

Jinan University Chair Professor, November 2016–November 2019. This is a three-year renewable endowed visiting professor position, to attract outstanding researchers with an international reputation to share their expertise with students and staff at one of China's foremost postsecondary institutions (in Project 211 comprising about 6% of the country's universities, and Plan 111 for the development of 100 university-based innovation centers).

Canada Research Chair (Tier II) in Ecotoxicology, University of Winnipeg, awarded 29 April 2013, expired 30 June 2018. The Tier II CRC is a five-year, \$500,000 CAD endowed chair, renewable once, established by the Government of Canada to attract and retain exceptional emerging researchers.

Society of Environmental Toxicology and Chemistry/Weston Environmental Solutions Award, sponsored by the Monsanto Company, 2007. This award (\$1,000 USD) is given to the outstanding environmental chemist under age 40 for the year, and encourages the advancement of environmental problem solving and professional development of environmental chemistry.

Society of Environmental Toxicology and Chemistry/American Chemistry Council Early Career Award for Applied Ecological Research, 2003. Only one of these prestigious \$100,000 USD awards awarded annually in North America. This was only the second time in which this prize was given to a scientist at a Canadian university.

U.S. Environmental Protection Agency Bronze Medal for Commendable Service, 2000. Citation reads: "For unusual research productivity and cooperation with extramural investigators to produce experimental results providing comprehensive documentation of the enantioselectivity of chiral persistent environmental pollutants."

American Chemical Society, Division of Environmental Chemistry, Graduate Student Award, 1992.

American Chemical Society, Division of Environmental Chemistry, and Lewis Publishers, Graduate Student Paper Award [Wong CS, Chin YP, Gschwend PM (1992). Sorption of radon-222 to natural sediments. *Geochim Cosmochim Acta* 56, 3923-3932], 1992.

Selected Presentations and Conference Proceedings

Southern California Coastal Water Research Project Authority, Costa Mesa CA, August 2018.

The Ohio State University, Department of Civil, Environmental and Geodetic Engineering, Columbus OH, August 2018.

ETH Z^urich, Environmental Chemistry Group, Z^urich, Switzerland, August 2018.

Xiamen University, College of the Environment & Ecology, Xiamen, China, June 2018.

Southern California Coastal Water Research Project Authority, Costa Mesa CA, August 2017.

Chinese University of Geosciences, Beijing, China, May 2017.

Charles Shiu Wong 22 last updated 31 May 2019

Hong Kong Baptist University, Department of Chemistry, Hong Kong SAR, February 2017.

Trent University, Trent Water Quality Centre, Peterborough ON, August 2016.

Instituto Tecnol^ogico de Costa Rica, Department of Chemistry, Cartago, Costa Rica, June 2016.

University of California Riverside, Department of Environmental Sciences, Riverside CA, February 2016.

Publications

Yu Z, Peng B, Liu L-Y, Wong CS, Zeng EY. Development and validation of an efficient method for analyzing microplastics in biota samples. *Environ Toxicol Chem*, in press (accepted 12 March 2019). (DOI:10.1002/etc.4416)

Steinke D, Lari E, Woodman SG, Steinke R, Luong KH, Wong CS, Pyle GG (2019). The effects of diltiazem on growth, reproduction, energy reserves, and calcium-dependent physiology in *Daphnia magna*. *Chemosphere* 232, 424-429. (DOI:10.1016/j.chemosphere.2019.05.176)

Workman CE, Becker AB, Azad MB, Moraes TJ, Mandhane PJ, Turvey PJ, Subbarao P, Brook JR, Sears MR, Wong CS (2019). Associations between concentrations of perfluoroalkyl substances in human plasma and maternal, infant, and home characteristics in Winnipeg, Canada. *Environ Pollut* 249, 758–76. (DOI:10.1016/j.envpol.2019.03.054)

Li T-Y, Bao L-J, Wu C-C, Liu L-Y, Wong CS, Zeng EY (2019). Organophosphate flame retardants emitted from thermal treatment and open burning of e-waste. *J Haz Mat* 367, 390–396. (DOI:10.1016/j.jhazmat.2018.12.041)

Challis JK, Stroski KM, Luong KH, Hanson ML, Wong CS (2018). Field evaluation and in situ stress testing of the organic-diffusive gradients in thin-films passive sampler. *Environ Sci Technol* 52, 12573–12582. (DOI:10.1021/acs.est.8b03622)

Brown AK, Wong CS (2018). Distribution and fate of pharmaceuticals and their metabolite conjugates in a municipal wastewater treatment plant. *Wat Res* 144, 774–783. (DOI:10.1016/j.watres.2018.08.034) Charles Shiu Wong 4 last updated 31 May 2019

Chaves-Barquero LG, Luong KH, Rudy MD, Frank RA, Hanson ML, Wong CS (2018). Attenuation of pharmaceuticals, nutrients and toxicity in a rural sewage lagoon system integrated with a subsurface filtration technology. *Chemosphere* 209, 767–775. (DOI:10.1016/j.chemosphere.2018.06.119)

Mai L, Bao L-J, Wong CS, Zeng EY (2018). Microplastics in the terrestrial environment. In *Microplastic contamination in aquatic environments: An emerging matter of environmental urgency* (Zeng EY, ed.), Elsevier (ISBN 978-0-12-813747-5), 365–378.

Lobson C, Luong KH, Seburn D, White M, Hann M, Prosser R, Wong CS, Hanson ML (2018). Fate of thiamethoxam in mesocosms and response of the zooplankton community. *Sci Total Environ* 637-638, 1150–1157. (DOI:10.1016/j.scitotenv.2018.05.087)

Kang AJ, Brown AK, Wong CS, Huang Z, Yuan Q (2018). Variation in bacterial community structure of aerobic granular and suspended activated sludge in the presence of the antibiotic sulfamethoxazole. *Bioresour Technol* 261, 322–328. (DOI:10.1016/j.biortech.2018.04.054)

Wang F, Wong CS, Chen D, Lu X, Wang F, Zeng EY (2018). Interaction of toxic chemicals with microplastics: A critical review. *Wat Res* 139, 208–219. (DOI:10.1016/j.watres.2018.04.003)

Mai L, Bao L-J, Shi L, Wong CS, Zeng EY (2018). A review of methods for measuring microplastics in aquatic environments. *Environ Sci Pollut Res* 25, 11319–11332. (DOI:10.1007/s11356-018-1692-0) \

Challis JK, Cuscito LD, Joudan S, Luong KH, Knapp CW, Hanson ML, Wong CS (2018). Inputs, source apportionment, and transboundary transport of pesticides and other polar organic

contaminants along the lower Red River, Manitoba, Canada. *Sci Total Environ* 635, 803–816. (DOI:10.1016/j.scitotenv.2018.04.128)

Stroski KM, Challis JK, Wong CS (2018). The influence of pH on sampler uptake for an improved configuration of the organic-diffusive gradients in thin films passive sampler. *Anal Chim Acta* 1018, 45–53. (DOI:10.1016/j.aca.2018.02.074)

Jha A, Rhy MH, Ojo OO, Bews HJ, Carlson JC, Schwartz J, Basu S, Wong CS, Halayko AJ (2018). Prophylactic benefits of systemically delivered simvastatin treatment in a house dust mite challenged murine model of allergic asthma. *Brit J Pharmacol* 175, 1004–1016. (DOI:10.1111/bph.14140).

Challis JK, Hanson ML, Wong CS (2018). Pharmaceuticals and pesticides archived on polar passive sampling devices can be stable for up to six years. *Environ Toxicol Chem* 37, 762–767. (DOI:10.1002/etc.4012).

Kang AJ, Brown AK, Wong CS, Yuan Q (2018). Removal of antibiotic sulfamethoxazole by anoxic/anaerobic/oxic granular and suspended activated sludge processes. *Bioresour Technol* 251, 151–157. (DOI:10.1016/j.biortech.2017.12.021).

Steinke D, Lari E, Woodman SG, Luong KH, Wong CS, Pyle GG (2018). Effects of gemfibrozil on the growth, reproduction, and energy stores of *Daphnia magna* in the presence of varying food concentrations. *Chemosphere* 192, 75–80. (DOI:10.1016/j.chemosphere.2017.10.124).

Brown AK, Wong CS (2017). Measurement of thyroxine and its glucuronide in municipal wastewater and solids using weak anion exchange solid phase extraction and ultrahigh performance liquid chromatography–tandem mass spectrometry. *J Chromatogr A* 1525, 71–78. (DOI:10.1016/j.chroma.2017.10.010).

Wang J-X, Bao L-J, Luo P, Shi L, Wong CS, Zeng EY (2017). Intake, distribution, and metabolism of decabromodiphenyl ether and its main metabolites in chickens and implications for human dietary exposure. *Environ Pollut* 231, 795–801. (DOI:10.1016/j.envpol.2017.08.084).

Mi X-B, Bao L-J, Wu C-C, Wong CS, Zeng EY (2017). Tissue distribution, metabolism, and elimination of decabrominated diphenyl ether (BDE-209) in rats after multi-dose oral exposure. *Chemosphere* 186, 749–756. (DOI:10.1016/j.chemosphere.2017.08.049).

Lohmann R, Muir DCG, Zeng EY, Bao L-J, Allan IJ, Arinaitwe K, Booij K, Helm P, Kaserzon S, Mueller JF, Shibata Y, Smedes F, Tsapakis M, Wong CS, You J (2017). Aquatic global passive sampling (AQUA-GAPS) revisited: First steps towards a network of networks for organic contaminants in the aquatic environment. *Environ Sci Technol* 51, 1060–1067. (DOI:10.1021/acs.est.6b05159).

Cardinal P, Anderson JC, Carlson JC, Low JE, Challis JK, Wong CS, Hanson ML (2016). Late season pharmaceutical fate in wetland mesocosms with and without phosphorous addition. *Environ Sci Pollut Res* 23, 22678-22690. (DOI: 10.1007/s11356-016-7433-3).

Challis JK, Hanson ML, Wong CS (2016). Development and calibration of an organic-diffusive gradients in thin films aquatic passive sampler for a diverse suite of polar organic contaminants. *Anal Chem* 88, 10583- 10591. (DOI:10.1021/acs.analchem.6b02749)

Brown AK, Wong CS (2016). Simultaneous quantification of propranolol and sulfamethoxazole and major human metabolite conjugates 4-hydroxy-propranolol and sulfamethoxazole- β -glucuronide in municipal wastewater using liquid chromatography-tandem mass spectrometry: A framework for multiple classes of drugs and conjugates. *J Chromatogr A* 1471, 34-44. (DOI:10.1016/j.chroma.2016.10.011)

Wu C-C, Yao Y, Bao L-J, Wu F, Wong CS, Tao S, Zeng EY (2016). Fugacity gradients of hydrophobic organics across the air-water interface measured with a novel passive sampler. *Environ Pollut* 218, 1108- 1115. (DOI:10.1016/j.envpol.2016.08.064)

Chaves-Barquero LG, Luong KH, Mundy CJ, Knapp CW, Hanson ML, Wong CS (2016). The release of wastewater contaminants in the Arctic: A case study from Cambridge Bay, Nunavut, Canada. *Environ Pollut* 218, 542-550. (DOI:10.1016/j.envpol.2016.07.036)

Brown AK, Challis JK, Wong CS, Hanson ML (2015). Selective serotonin reuptake inhibitors and β blocker transformation products may not pose a significant risk of toxicity to aquatic organisms in wastewater effluent-dominated receiving waters. *Integ Environ Assess Manage* 11, 618-639. (DOI:10.1002/ieam.1637)

Anderson JC, Joudan S, Shoichet E, Cuscito LD, Alipio AEC, Donaldson CS, Khan S, Goltz DM, Knapp CW, Hanson ML, Wong CS (2015). Reducing nutrients, organic micropollutants, antibiotic resistance, and toxicity in rural wastewater effluent with subsurface filtration treatment technology. *Ecol Eng* 84, 375-385. (DOI:10.1016/j.ecoleng.2015.08.005)

Lu Z, Challis JK, Wong CS (2015). Quantum yields for direct photolysis of neonicotinoid insecticides in water: Implications for exposure to nontarget aquatic organisms. *Environ Sci Technol Lett* 2, 188-192. (DOI:10.1021/acs.estlett.5b00136) • Featured in American Chemical Society Presspac press release, 8 July 2015.

Brown AK, Wong CS (2015). Current trends in environmental analysis of human metabolite conjugates of pharmaceuticals. *Trends Environ Anal Chem* 5, 8-17. (DOI:10.1016/j.teac.2015.01.002)

Rhu MH, Jha A, Ojo OO, Mahood TH, Basu S, Detillieux KA, Nikoobakht N, Wong CS, Loewen M, Becker AB, Halayko AJ (2014). Chronic exposure to perfluorinated compounds: Impact on airway

hyperresponsiveness and inflammation. *Am J Physiol Lung Cell Mol Physiol* 307, L765-L774. (DOI:10.1152/ajplung.00100.2014)

Dai S, Wong CS, Qiu J, Wang M, Chai T, Fan L, Yang S (2014). Enantioselective accumulation of chiral polychlorinated biphenyls in lotus plant (*Nelumbonucifera* spp.) *J Haz Mat* 280, 612-618. (DOI:10.1016/j.hazmat.2014.08.034)

Challis JK, Hanson ML, Friesen KJ, Wong CS (2014). A critical assessment of the photodegradation of pharmaceuticals in aquatic environments: Defining our current understanding and identifying knowledge gaps. *Environ Sci: Processes Impacts* 16, 672-696. (DOI:10.1039/C3EM00615H) • Included as one of 20 papers in journal's 2014 Most Accessed Articles themed collection.

Cardinal P, Anderson JC, Carlson JC, Low JE, Challis JK, Beattie SA, Bartel CN, Elliott AD, Montero OF, Lokesh S, Favreau A, Kozlova T, Knapp CW, Hanson ML, Wong CS (2014). Macrophytes may not contribute significantly to removal of nutrients, pharmaceuticals, and antibiotic resistance in model surface constructed wetlands. *Sci Total Environ* 482-483, 294-304. (DOI:10.1016/j.scitotenv.2014.02.095)

Bews HJ, Carlson JC, Jha A, Basu S, Halayko AJ, Wong CS (2014). Simultaneous quantification of simvastatin and simvastatin hydroxy acid in blood serum at physiological pH by ultrahigh performance liquid chromatography-tandem mass spectrometry (UHPLC/MS/MS). *J Chromatogr B* 947-948, 145-150. (DOI:10.1016/j.jchromb.2013.12.030)

Lu Z, Fisk AT, Kovacs K, Lydersen C, McKinney M, Tomy GT, Rosenburg B, McMeans BC, Muir DCG, Wong CS (2014). Temporal and spatial variation in polychlorinated biphenyl chiral signatures of the Greenland shark (*Somniosus microcephalus*) and its arctic marine food web. *Environ Pollut* 186, 216-225. (DOI:10.1016/j.envpol.2013.12.005)

Lu Z, Kania-Korwel I, Lehmler H-J, Wong CS (2013). Stereoselective formation of mono- and di-hydroxylated polychlorinated biphenyls by rat cytochrome P450 2B1. *Environ Sci Technol* 47, 12184-12192. (DOI:10.1021/es402838f)

Liu L-Y, Wei G-L, Wang J-Z, Guan Y-F, Wong CS, Zeng EY (2013). Anthropogenic activities have contributed moderately to increased inputs of organic materials in marginal seas off China. *Environ Sci Technol* 47, 11414-11422. (DOI:10.1021/es401751k)

Lu Z, Ma G, Veinot JGC, Wong CS (2013). Disruption of biomolecule function by nanoparticles: How do gold nanoparticles affect Phase I biotransformation of persistent organic pollutants? *Chemosphere* 93, 123-132. (DOI:10.1016/j.chemosphere.2013.05.004) • Selected as "Editors' Choice" Article, June 2015

Challis JK, Carlson JC, Friesen KJ, Hanson ML, Wong CS (2013). Aquatic photochemistry of the sulfonamide antibiotic sulfapyridine. *J Photochem Photobiol A* 262, 14-21.

(DOI:10.1016/j.jphotochem.2013.04.009)

Anderson JC, Carlson JC, Low JE, Challis JK, Wong CS, Knapp CW, Hanson ML (2013). Performance of a constructed wetland in Grand Marais, Manitoba, Canada: Removal of nutrients, pharmaceuticals, and antibiotic resistance genes from municipal wastewater. *Chem Cent J* 7, 54. (DOI:10.1186/1752-153X-7-54)

Carlson JC, Challis JK, Hanson ML, Wong CS (2013). Stability of pharmaceuticals and other polar organic compounds stored on Polar Organic Chemical Integrative Samplers and solid phase extraction cartridges. *Environ Toxicol Chem* 32, 337-344. (DOI:10.1002/etc.2076)

Liu L-Y, Wang J-Z, Wong CS, Qiu J-W, Zeng EY (2013). Applications of multiple geochemical markers to investigate organic pollution in a dynamic coastal zone. *Environ Toxicol Chem* 32, 312-319. (DOI:10.1002/etc.2062)

Carlson JC, Anderson JC, Low JE, Cardinal P, MacKenzie SD, Beattie SA, Challis JK, Bennett RJ, Meronek SS, Wilks RPA, Buhay WM, Wong CS, Hanson ML (2013). Presence and hazards of nutrients and emerging organic micropollutants from sewage lagoon discharges into Dead Horse Creek, Manitoba, Canada. *Sci Total Environ* 445-446, 64-78. (DOI:10.1016/j.scitotenv.2012.11.100)

Cooper VI, Letcher RJ, Dietz R, Sonne C, Wong CS (2012). Quantification of achiral and chiral methylsulfonyl polychlorinated biphenyl metabolites by column-switching liquid chromatography-atmospheric pressure photoionization-tandem mass spectrometry. *J Chromatogr A* 1268, 64-73. (DOI:10.1016/j.chroma.2012.10.030)

Dai S-H, Zhao H-L, Wang M, Wong CS, Chai T-T, Yang S-M, Qiu J (2012). Determination of polychlorinated biphenyl enantiomers in lotus root and sediment by chiral gas chromatography-mass spectrometry. *Chin J Anal Chem* 40, 1758-1763. (DOI:10.1016/S1872-2040(11)60582-3)

Yu H-Y, Hu Y-A, Bao L-J, Wong CS, Zeng EY (2012). Sedimentary loadings and ecological significance of polycyclic aromatic hydrocarbons in a typical mariculture zone of South China. *J Environ Monit* 14, 2685-2691. (DOI:10.1039/C2EM30292F)

Asher BJ, Wang Y, De Silva AO, Backus S, Muir DCG, Wong CS, Martin JW (2012). Enantiospecific perfluorooctane sulfonate (PFOS) analysis reveals evidence for the source contribution of PFOS-precursors to the Lake Ontario foodweb. *Environ Sci Technol* 46, 7653-7660. (DOI:10.1021/es301160r)

Zhang B-Z, Zhang K, Li S-M, Wong CS, Zeng EY (2012). Size-dependent dry deposition of polybrominated diphenyl ethers in urban Guangzhou, China. *Environ Sci Technol* 46, 7207-7214. (DOI:10.1021/es300944a)

Liu L-Y, Wang J-Z, Wei G-L, Guang Y-F, Wong CS, Zeng EY (2012). Sediment records of polycyclic aromatic hydrocarbons (PAHs) in the continental shelf of China: Implications for evolving anthropogenic impacts. *Environ Sci Technol* 46, 6497–6504. (DOI:10.1021/es300474z)

Asher BJ, Ross MS, Wong CS (2012). Tracking chiral polychlorinated biphenyls near a hazardous waste incinerator: Fresh emissions or weathered revolatilization? *Environ Toxicol Chem* 31, 1453–1460. (DOI:10.1002/etc.1852)

Zhang K, Zhang B-Z, Li S-M, Wong CS, Zeng EY (2012). Calculated respiratory exposure to indoor sizefractionated polycyclic aromatic hydrocarbons in an urban environment. *Sci Total Environ* 431, 245–251. (DOI:10.1016/j.scitotenv.2012.05.059)

Ross MS, Wong CS, Martin JW (2012). Isomer-specific biotransformation of perfluorooctane sulfonamide in Sprague-Dawley rats. *Environ Sci Technol* 46, 3196–3203. (DOI:10.1021/es204028v)

Ross MS, Letcher RJ, McKinney MA, Sonne C, Dietz R, Wong CS (2011). Comparison of the enantiomer distribution of chiral organochlorine contaminants in captive West Greenland sled dogs and polar bears from Baffin Bay. In *Chiral Pesticides: Stereoselectivity and Its Consequences* (AW Garrison, J Gan, W Liu, eds.), American Chemical Society Symposium Series 1085, 45–63. (DOI:10.1021/bk-2011-1085.ch003)

Lu Z, Wong CS (2011). Factors affecting Phase I enantioselective biotransformation of chiral polychlorinated biphenyls by rat cytochrome P-450 isozyme. *Environ Sci Technol* 45, 8298–8305. (DOI:10.1021/es200673q)

Ross MS, Pulster EL, Ejsmont MB, Chow EA, Hessel CM, Maruya KA, Wong CS (2011). Enantioselectivity of polychlorinated biphenyl atropisomers in sediment and biota from the Turtle/Brunswick River Estuary, Georgia, USA. *Mar Poll Bull* 63, 548–555. (DOI:10.1016/j.marpolbul.2011.02.001)

Ross MS, Wong CS (2010). Comparison of electrospray ionization, atmospheric pressure photoionization, and anion attachment atmospheric pressure photoionization for the analysis of hexabromocyclododecane enantiomers in environmental samples. *J Chromatogr A* 1217, 7855–7863. (DOI:10.1016/j.chroma.2010.09.083)

Sharpe RL, Benskin JP, Laarman AH, MacLeod SL, Martin JW, Wong CS, Goss GG (2010). Perfluorooctane sulfonate toxicity, isomer-specific accumulation, and maternal transfer in zebrafish (*Danio rerio*) and rainbow trout (*Oncorhynchus mykiss*). *Environ Toxicol Chem* 29, 1957–1966. (DOI:10.1002/etc.257)

Clark RJ, Veinot JGC, Wong CS (2010). Nanoparticles in the environment: The good, the bad, and

the ugly. In Trace Analysis with Nanomaterials (DT Pierce and JX Zhao, eds.), Wiley-VCH (ISBN 978-3-527-32350-0), 255–282. 38. Lehmler H-J, Harrad SJ, Hühnerfuss H, Kania-Korwel I, Lee CM, Lu Z, Wong CS (2010). Chiral polychlorinated biphenyl transport, metabolism, and distribution: A review. *Environ Sci Technol* 44, 2757–2766. (DOI:10.1021/es902208u)

MacLeod SL, Wong CS (2010). Loadings, trends, comparisons, and fate of achiral and chiral pharmaceuticals in wastewaters from urban tertiary and rural aerated lagoon treatments. *Wat Res* 44, 533–544. (DOI:doi:10.1016/j.watres.2009.09.056)

Wong CS, Warner NA (2010). Chirality as an environmental forensics tool. In *Persistent Organic Pollutants* (Harrad SJ, ed.), Wiley (ISBN 978-1-4051-6930-1), 71–136. (DOI:10.1002/9780470684122.ch4)

Wong CS, Elmayergi BH (2009). Chiral environmental contaminants. In *Encyclopedia of Analytical Chemistry* (Meyers EA, ed.), Supplementary Volumes S1-S3, Wiley, 220-244. (DOI:10.1002/9780470027318.a9055)

Wong CS, MacLeod SL (2009). JEM Spotlight: Recent advances in analysis of pharmaceuticals in the aquatic environment. *J Environ Monit* 11, 923–936. (DOI:10.1039/b819464e) • Featured as a Spotlight Article, foreword written by B Escher (Escher, 2009, *J Environ Monit* 11, 921– 922). • One of top 10 most downloaded articles (May 2009, January 2010, March 2010).

Asher BJ, D'Agostino LA, Way JD, Wong CS, Harynuk JJ (2009). Comparison of peak integration methods for the determination of enantiomeric fraction in environmental samples. *Chemosphere* 75, 1042– 1048. (DOI:10.1016/j.chemosphere.2009.01.041)

Warner NA, Martin JW, Wong CS (2009). Chiral polychlorinated biphenyls are biotransformed enantioselectively by mammalian cytochrome P-450 isozymes to form hydroxylated metabolites. *Environ Sci Technol* 43, 114–121. (DOI:10.1021/es802237u)

Ross MS, Verreault J, Letcher RJ, Gabrielsen GW, Wong CS (2008). Chiral organochlorine contaminants in blood and eggs of glaucous gulls (*Larus hyperboreus*) from the Norwegian Arctic. *Environ Sci Technol* 42, 7181–7186. (DOI:10.1021/es8000147)

Wong CS (2008). Chiral polychlorinated biphenyls and their metabolites. In *PCBs: Human and Environmental Disposition and Toxicity* (Hanson LG and Robertson LW, eds.), University of Illinois Press (ISBN 978-0-252-03254-7), 30–50.

MacLeod SL, McClure EL, Wong CS (2007). Laboratory calibration and field deployment of the Polar Organic Chemical Integrative Sampler for pharmaceuticals and personal care products in wastewater and surface water. *Environ Toxicol Chem* 26, 2517–2529. (DOI:10.1897/07-238.1)

MacLeod SL, Sudhir P, Wong CS (2007). Stereoisomer analysis of wastewater-derived beta-

blockers, selective serotonin re-uptake inhibitors, and salbutamol by high performance liquid chromatography-tandem mass spectrometry. *J Chromatogr A* 1170, 23-33. (DOI:10.1016/j.chroma.2007.09.010)

McClure EL, Wong CS (2007). Solid phase microextraction of macrolide, trimethoprim and sulfonamide antibiotics in wastewaters. *J Chromatogr A* 1169, 53-62. (DOI:10.1016/j.chroma.2007.08.062)

Asher BJ, Wong CS, Rodenburg LA (2007). Chiral source apportionment of polychlorinated biphenyls to the Hudson River estuary atmosphere and food web. *Environ Sci Technol* 41, 6163-6169. (DOI:10.1021/es070763n)

Charles Shiu Wong 8 last updated 31 May 2019

Wong CS, Pakdeesusuk U, Morrissey JA, Lee CM, Coates JT, Garrison AW, Mabury SA, Marvin CH, Muir DCG (2007). Enantiomeric composition of chiral polychlorinated biphenyl atropisomers in dated sediment cores. *Environ Toxicol Chem* 26, 254-263. (DOI:10.1897/06-164R.1)

Morrissey JA, Bleackley DS, Warner NA, Wong CS (2007). Enantiomer fractions of chiral polychlorinated biphenyls in three selected Standard Reference Materials. *Chemosphere* 66, 326-331. (DOI:10.1016/j.chemosphere.2006.04.085)

Nikolai LN, McClure EL, MacLeod SL, Wong CS (2006). Stereoisomer quantification of the β -blocker drugs atenolol, metoprolol, and propranolol in wastewaters by chiral high performance liquid chromatography-tandem mass spectrometry. *J Chromatogr A* 1131, 103-109. (DOI:10.1016/j.chroma.2006.07.033)

Wong CS (2006). Environmental fate processes and biochemical transformations of chiral emerging organic pollutants. *Anal Bioanal Chem* 386, 544-558. (DOI:10.1007/s00216-006-0424-3)

Warner NA, Wong CS (2006). The aquatic invertebrate *Mysis relicta* can eliminate chiral organochlorine compounds enantioselectively. *Environ Sci Technol* 40, 4158-4164. (DOI:10.1021/es052166b)

Buckman AH, Wong CS, Chow EA, Brown SB, Solomon KR, Fisk AT (2006). Biotransformation of polychlorinated biphenyls (PCBs) and bioformation of hydroxylated PCBs in fish. *Aquat Toxicol* 78, 176-185. (DOI:10.1016/j.aquatox.2006.02.033)

Warner NA, Norstrom RJ, Wong CS, Fisk AT (2005). Enantiomeric fractions of chiral polychlorinated biphenyls provide insights on biotransformation capacity of Arctic biota. *Environ Toxicol Chem* 24, 2763- 2767. (DOI:10.1897/05-121R.1)

Wong CS, Mabury SA, Whittle DM, Backus SM, Teixeira C, DeVault DS, Bronte CR, Muir DCG (2004). Organochlorine compounds in Lake Superior: Chiral polychlorinated biphenyls and

biotransformation in the aquatic food web. *Environ Sci Technol* 38, 84–92.
(DOI:10.1021/es0346983)

Martin JW, Mabury SA, Wong CS, Noventa F, Solomon KR, Alaei M, Muir DCG (2003). Airborne haloacetic acids. *Environ Sci Technol* 37, 2889–2897. (DOI:10.1021/es026345u)

Hoekstra PF, Braune BM, Wong CS, Elkin B, Muir DCG (2003). Profile of chlorinated contaminants, including selected chiral compounds, in wolverine (*Gulo gulo*) livers from the Canadian Arctic. *Chemosphere* 50, 551–560. (DOI:10.1016/S0045-6535(03)00514-9)

Pakdeesusuk U, Jones WJ, Lee CM, Garrison AW, O’Niell WL, Freedman DL, Coates JT, Wong CS (2003). Changes in enantiomeric fraction (EF) during microbial reductive dechlorination of PCB 132, PCB 149, and Aroclor 1254 in Lake Hartwell sediment microcosms. *Environ Sci Technol* 37, 1100–1107. (DOI:10.1021/es026039g)

Wong CS, Muir DCG, Mabury SA (2003). Measurement of $^{13}\text{C}/^{12}\text{C}$ of chloroacetic acids by gas chromatography/combustion/isotope ratio mass spectrometry (GC/C/IRMS). *Chemosphere* 50, 903–909. (DOI:10.1016/S0045-6535(02)00696-3)

Singer AC, Wong CS, Crowley DE (2002). Differential enantioselective transformation of atropisomeric polychlorinated biphenyls by multiple bacterial strains with differing inducing compounds. *Appl Environ Microbiol* 68, 5756–5759. (DOI:10.1128/AEM.68.11.5756-5759.2002)

Wong CS, Hoekstra PF, Karlsson H, Backus SM, Mabury SA, Muir DCG (2002). Enantiomer fractions of chiral organochlorine pesticides and polychlorinated biphenyls in Standard and Certified Reference Materials. *Chemosphere* 49, 1339–1347.
(DOI:10.1016/S0045-6535(02)00166-2)

Hoekstra PF, Wong CS, O’Hara TM, Solomon KR, Mabury SA, Muir DCG (2002). Enantiomer-specific accumulation of PCB atropisomers in the bowhead whale (*Balaena mysticetus*). *Environ Sci Technol* 36, 1419–1425. (DOI:10.1021/es015763g)

Wong CS, Lau F, Clark M, Mabury SA, Muir DCG (2002). Rainbow trout (*Oncorhynchus mykiss*) can eliminate chiral organochlorine compounds enantioselectively. *Environ Sci Technol* 36, 1257–1262. (DOI:10.1021/es0156791)

Wong CS, Garrison AW, Smith PD, Foreman WT (2001). Enantiomeric composition of chiral polychlorinated biphenyl atropisomers in aquatic and riparian biota. *Environ Sci Technol* 35, 2448–2454. (DOI:10.1021/es0018872)

Wong CS, Capel PD, Nowell LH (2001). National-scale, field-based evaluation of the biota-sediment accumulation factor model. *Environ Sci Technol* 35, 1709–1715.
(DOI:10.1021/es0016452)

Wong CS, Garrison AW, Foreman WT (2001). Enantiomeric composition of chiral polychlorinated biphenyl atropisomers in aquatic bed sediment. *Environ Sci Technol* 35, 33-39. (DOI:10.1021/es0012570)

Wong CS, Capel PD, Nowell LH (2000). Organochlorine pesticides and PCBs in stream sediment and aquatic biota: Initial results from the National Water-Quality Assessment Program, 1992-1995. US Geological Survey Water Resources Investigations Report 00-4053.

Wong CS, Garrison AW (2000). Enantiomer separation of polychlorinated biphenyl atropisomers and polychlorinated biphenyl retention behavior on modified cyclodextrin capillary gas chromatography columns. *J Chromatogr A* 866, 213-220. (DOI:10.1016/S0021-9673(99)01104-8)

Wong CS, Sanders G, Engstrom DR, Long DT, Swackhamer DL, Eisenreich SJ (1995). Accumulation, inventory, and diagenesis of chlorinated hydrocarbons in Lake Ontario sediments. *Environ Sci Technol* 29, 2661-2672. (DOI:10.1021/es00010a031)

Golden KA, Wong CS, Jeremiason JD, Eisenreich SJ, Sanders G, Hallgren J, Swackhamer DL, Engstrom DR, Long DT (1993). Accumulation and preliminary inventory of organochlorines in Great Lakes sediments. *Water Sci Technol* 28 (8-9), 19-31.

Wong CS, Chin Y-P, Gschwend PM (1992). Sorption of radon-222 to natural sediments. *Geochim Cosmochim Acta* 56, 3923-3932. (DOI:10.1016/0016-7037(92)90006-5)

Stolzenbach KD, Newman KA, Wong CS (1992). Aggregation of fine particles at the sediment-water interface. *J Geophys Res* 97 (C11), 17889-17898. (DOI:10.1029/92JC01827)