changes in overall invertebrate community structure (e.g., species richness and EPT richness) and temporal trends in different invertebrate feeding guilds. We measured Hg and MeHg concentrations in invertebrates in 2014-2015 to infer the magnitude of Hg trophic transfer from each invertebrate guild over time, comparing predictions to long term Hg bioaccumulation trends in fish. While benthic macroinvertebrate community surveys do not provide direct information on Hg bioaccumulation, long term changes in community structure provide useful information relevant to understanding food web dynamics that can affect trends in Hg bioaccumulation in upper-level consumers.

TP271 Acute toxicity of copper to the larval stage of three species of ambystomatid salamanders

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Copper (Cu) appears to be consistently toxic to amphibian species relative to other taxa. There has been limited Cu toxicity data for salamanders, and much of the data available used embryos. We performed acute toxicity experiments with three species of ambystomatid salamanders using the larval stage. We found very high toxicity for these three species compared to previously published research on the embryo stage. Specifically, the 4 d LC50s for Ambystoma tigrinum and Ambystoma opacum were 35.3 µg/L and 18.73 µg/L, respectively. The same test concentrations of Cu caused similar toxicity to Ambystoma talpoideum (LC50 = 47.88 µg/L), but exposures required up to 48 days to elicit the same toxicity. Our results suggest that Cu is much more toxic to larval salamander stages than for embryos, which has been found for anurans as well.

TP272 Concentration of copper in gulls: A Review of published data

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Gulls are birds that are present in most aquatic and terrestrial ecosystems. These birds are excellent bio-indicators of anthropogenic pollution, because they are opportunistic, omnivores and coexist with humans. They are particularly important to assess the ecosystem´s health because can reflect the environmental levels of pollutants. Copper is an essential trace element which can become toxic depending on dosage. We reviewed the Cu levels (dry weight) in different species of gulls, taking into account the biological matrix analyzed and the geographical location. The highest Cu concentrations were reported in Larus argentatus (19.87 ± 8.05 µg/g, n=18), whereas the lowest levels were in Larus genei (0.33 µg/g, n=18). The highest Cu concentrations were reported in excreta (60.1 µg/g, n=13), and the lowest in the subcutaneous fat (0.77 µg/g, n=5). With regard to the geographic location, the higher and lower Cu concentrations were reported in the Southern Hemisphere (11.41 ± 6.68 µg/g, n=166) and in the Northern Hemisphere (9.78 ± 8.61 µg/g, n = 1583), respectively. According to metal distribution in gull matrices, the Cu levels are as follows: excreta > liver > kidney > muscle > heart > feathers > stomach contents > intestine > brain > lung > salt gland > uropygial gland > gallbladder > gonads > stomach > pancreas > eyeball > eggs > skin > bones > blood > subcutaneous fat. High Cu levels in excreta may correspond to detoxification processes. Since most of the data at global scale are from Northern Hemisphere, future studies should be conducted in gulls from Southern Hemisphere. The gull excreta can be a good biological matrix for monitoring Cu. Standardized methodology for Cu detection in excreta is quite needed in order to compare data at global scale. Acknowledgements: Winfred E. Espejo is a scholarship CONICYT-Chile for PhD studies. This study was financially supported by FONDECYT-Chile 1140466 granted to R. Barra.

TP273 Concentration of Manganese in gulls: A global overview

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Gulls are present in extensive aquatic and terrestrial ecosystems. They are typically coastal species and fly long distances. They are excellent bio-indicators of pollution, because they are opportunistic, omnivores, and it is often possible to see them in towns, far to the coast. They are particularly important to assess the ecosystem´s health and can reflect the environmental levels of pollutants. In this work, we made an extensive review about gulls and manganese (Mn), to understand in a better way, this trace element distribution in the environment and its biological matrix selection, at a global scale. We reviewed the Mn levels (dry weight) in different species of gulls, depending on the biological matrix analyzed and the geographical location. This analysis gathered bibliographic data from Scopus, Springer, Web of Science and Science direct. The highest Mn concentrations were reported in Larus crassirostris (14.93 ± 32.5 µg/g, n=889), whereas the lowest levels were in Larus atricilla (0.003 ± 0.0017 µg/g, n=10). The highest Mn concentrations were reported in stomach contents (78.6 µg/g, n=20), and the lowest in the subcutaneous fat (0.18 µg/g, n=5). With regard to the geographic location, the higher and lower Mn concentrations were reported in the Southern Hemisphere (2.37 ± 4.08 µg/g, n= 61) and in the Northern Hemisphere (7.84 ± 21.62 µg/g, n = 2205), respectively. According to metal distribution in gull matrices, the Mn levels are as follows: stomach contents > feathers > liver > kidney > pancreas > gonads > salt gland > intestine > bones > eyeball > gallbladder > eggs > stomach > heart > muscle > brain > lung > blood > uropygial gland > skin > subcutaneous fat. The main studies are performed in genus Larus from Northern Hemisphere. Feathers were the main biological tissue that accumulated this metal. Moreover, we can conclude that standardized non-lethal methodology for measuring metals in biotic matrices can be an adequate methodology to compare data at global scale. In order to understand the effects of metals on gulls, more studies from the Southern Hemisphere are urged. Acknowledgements: Winfred E. Espejo is a scholarship CONICYT-Chile for PhD studies. This study was financially supported by FONDECYT-Chile 1140466 granted to R. Barra and FONDECYT 1140164.

TP274 Impaired swim bladder inflation in early-life stage fathead minnows exposed to a deiodinase inhibitor, iopanoic acid

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The thyroid axis plays a critical role in teleost fish development. The present study investigated whether inhibition of deiodinase, the enzyme which converts thyroxine (T4), to the more biologically-active form, 3,5,3'-triiodothyronine (T3), would impact inflation of the posterior and/or anterior swim bladder (SB), processes which we previously demonstrated to be thyroid-hormone regulated. Two experiments were conducted using iopanoic acid (IOP), a pharmaceutical used to treat hyperthyroidism, as a model deiodinase inhibitor. In the first study, fathead minnow (Pimephales promelas) embryos (~1 day post-fertilization [dpf]) were exposed in a flow-through system to three concentrations of IOP (0.6, 1.9, 6.0 mg/L) or

control water and sampled at 4 and 6 dpf. Whole body T4 and T3 concentrations were measured using LC-MS/MS. Abundance of deiodinase 1-3 (dio1-3), thyroid-stimulating hormone (tsh), and thyroperoxidase (tpo) transcripts was examined using quantitative polymerase-chain reaction. Posterior SB inflation was assessed at 6 dpf. To examine effects on anterior SB inflation, a second study was conducted in which 6 dpf larvae, whose posterior SB had already inflated, were exposed to the same IOP concentrations. Fish were sampled at 10, 14, 18, and 21 dpf for T4/T3 measurements, gene transcription analyses, and thyroid histopathology. In the embryo study, incidence and length of inflated posterior SBs were significantly reduced in the 6.0 mg/L treatment at 6 dpf. Dose-dependent increases in T4 and T3 concentrations were measured at 4 dpf, but only T3 concentrations remained elevated until 6 dpf. Significant dose-dependent down-regulation of tpo transcript abundance was observed at 6 dpf. Incidence and length of anterior SB inflation in larval fish were significantly reduced in all IOP treatments at 14 dpf. However by 18 dpf, anterior SBs had inflated in fish from all treatments, suggesting inflation was delayed, not prevented. Significant up-regulation of dio2 mRNA was observed at 14, 18, and 21 dpf, and significant down-regulation of tpo mRNA was observed at 10, 14, and 18 dpf in all IOP treatments. Overall, exposure to IOP altered thyroid hormone concentrations, gene transcription, and swim bladder inflation in early-life stage fathead minnows. The contents of this abstract neither constitute nor necessarily reflect USEPA policy.

TP275 The effects of early-life stage thyroid disruption on morphology, thyroid signaling, and reproduction in fathead minnows (Pimephales promelas)

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The thyroid hormone signaling pathway has been a major focus of research into the effects of endocrine disrupting compounds (EDCs). Thyroid disruptors are typically associated with alterations in growth, development, and metabolism and elicit their effects by binding to thyroid hormone receptors and transport proteins or interfering with hormone synthesis. This study examined the effects thyroid disruption in the fathead minnow (Pimephales promelas), a commonly used model organism for EDC screening and toxicity testing. Specifically, this study sought to assess the impacts of early life stage thyroid disruption on growth, thyroid hormone signaling, reproductive endocrine signaling, and reproductive success in minnows. Newly-hatched fathead minnows were exposed to either thyroxine (T_4) or propylthiouracil (PTU) for 42 days to induce hyper- and hypothyroidism, respectively. At the end of the exposure, the length, weight, and overall physical appearance (i.e., body shape and pigmentation) of exposed fish was recorded and gene expression analysis was performed to identify alterations in thyroid hormone signaling (e.g., thyroid hormone receptors, transthyretin, deiodinases, etc.), and sex steroid hormone signaling (e.g., aromatase, estrogen receptor, etc.). In addition, a subset of fish were transferred to clean water and raised to sexual maturity for the assessment of reproductive performance. It was found that thyroid disruption leads to significant changes in the growth, morphology, and expression of genes related to thyroid hormone signaling. Overall, this study represents an effort to better understand the effects of thyroid disruption in a common model species and provides information that will aid in making predictions about mechanisms of thyroid EDC action on early life stage organism.

TP276 Evaluation of the toxic effect of 2 analgesics in juvenile of zebrafish Danio rerio

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Nonsteroidal anti-inflammatory analgesics, such as aspirin and paracetamol are important pharmaceuticals worldwide, with an estimated annual production of several kilotons. These drugs are sold freely and are substances that are eliminated in considerable amounts aquatic systems it is detected in concentrations 0.001-5 mg L^{-1}. The purpose of this study was to evaluate the toxicity of two analgesics (Paracetamol and Acetylsalicylic acid) in juvenile of zebrafish. Static bioassays were performed with a duration of 96 hours, where five drug concentrations were tested to determine the LC_{50}. Subsequently a chronic test with duration of 22 days was performed exposing the fish to two sublethal concentrations (LC_1 and LC_{10}) to evaluate the following responses: increase in weight rate and 3 biomarkers: lipoperoxidation, Ache activity and genotoxicity (micronucleus frequency). The results showed that the most toxic compound was acetylsalicylic acid (LC_{50} = 34.9 mg L^{-1}). Organisms exposed to sublethal concentrations of analgesics showed a decrease in weight ranged from 23 to 66%. Also a decrease in activity of AChE enzyme between 12 to 34% was observed. The degree of lipid peroxidation ranged from 112.3 to 85.2 and 51.8 to 58.7 nM MDA g^{-1} on tests with Paracetamol and Acetylsalicylic acid respectively (control = 18.2 nM MDA g^{-1}). Micronucleus frequency was high in tests with acetylsalicylic acid, indicating that probably have a genotoxic effect. According to the results we can conclude that both drugs affect the juveniles of Danio rerio, and probably cause adverse to other species of aquatic organisms that are exposed to these medications.

TP277 The effects of Ibuprofen, Naproxen, and 17α-ethinylestradiol on American Flagfish (Jordanella floridae)

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Pharmaceuticals are a very diverse group of bioactive compounds that are frequently detected in the environment. Steroid hormones and non-steroidal anti-inflammatory drugs are often detected due to their high level of use. More knowledge regarding the impacts of environmentally relevant concentrations of pharmaceuticals alone and in mixture are required. American flagfish (Jordanella floridae) were exposed to ibuprofen (0.1 µg/L), naproxen (0.1 µg/L), and 17α-ethinylestradiol (10 ng/L) alone, and in a mixture. Flagfish were placed into breeding harems with 4 females and 2 males per treatment and both a pre-exposure phase (21-d) and an exposure phase (21-d) were completed. Total length, wet weight, liversomatic index, and gonadosomatic index were assessed and had no significant differences. Fertilization, hatchability, and egg production were also monitored. Flagfish exposed to 0.1 µg/L naproxen, and 10 ng/L 17α-ethinylestradiol had a significant decrease ($p \leq 0.05$) in fertilization. 17α-ethinylestradiol (10 ng/L) had a significant decrease ($p \leq 0.05$) in hatchability and average cumulative egg production for ibuprofen (0.1 µg/L) was significantly increased ($p \leq 0.05$). The reproductive effects of 17α-ethinylestradiol are well known, but effects of naproxen and ibuprofen are much less so. These findings suggest that more research is needed to assess the potential reproductive effects of naproxen and ibuprofen on fish and other aquatic organisms.

TP278 An investigation of the mechanisms of action of ethinylestradiol and ammonia on fathead minnow (Pimephales promelas) reproduction

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Understanding the mechanisms of action of individual toxicants and how combined effects manifest at the level of the individual may improve our knowledge of multiple-stressor impacts on fish populations. Complex, municipal effluents in the aquatic environment often are a source of the synthetic estrogen, 17a-ethinylestradiol (EE2) and ammonia (NH3); both compounds are known to negatively affect fish reproduction. This study employed a flow-through exposure of fathead minnows to target concentrations of EE2 (10 ng/L) and NH3 (3 mg/L) alone and in combination to investigate the hormonal and molecular effects of treatment on spawning inhibition. The pre-exposure and exposure phases of the experiment were 25 and 15 days, respectively. LC-MS-MS analyses confirmed the EE2 exposure levels (ng/L) to be 8.2 ± 0.31 and 8.4 ± 0.23 in the EE2 and EE2+NH3 treatments. NH3 was quantifiable in all treatments due to the nitrogenous waste cycle of the fish but was significantly