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Primo simposio di Biologia Sperimentale applicata al mare e all'ambiente

First symposium on experimental biology: sea and environment

Trapani, Italy, 24-25 May 2019

ABSTRACT BOOK

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Primo simposio di biologia sperimentale applicata al mare e all'ambiente

First symposium on experimental biology: sea and environment

Trapani, Italy, 24-25 May 2019

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the mussel *Mytilus galloprovincialis*. The main objective of the study was to assess the acute effects of Thiacloprid and Calypso on *M. galloprovincialis*. Mussels were expose for 7 days to three different concentrations of these products (Thiacloprid: 1 mg/L; 5 mg/L; 10 mg/L; Calypso: 10 mg/l; 50 mg/L; 100 mg/L). The following biomarkers were then measured: cell vitality in haemocytes and digestive cells; antioxidant parameters, superoxide dismutase and catalase, in mussel digestive gland. Both the pure neonicotinoid and the Calypso showed the same mode of action. In fact, after acute exposure to the high concentrations, both cell lines maintained viability. As for antioxidant enzymes, activity of SOD and CAT showed significant (p <0.05) changes during the exposures to both substances, compared to controls. The results showed that these neonicotinoids, which alter physiological processes in evolutionarily more complex organisms, do not create obvious damage after acute exposure to *M. galloprovincialis*. In any case, results obtained do not exclude the possibility of more relevant damage following chronic exposure to pesticides.

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SYNERGIC EFFECT OF TOXICANT MIXTURE (CARBAMAZEPINE, CADMIUM CHLORIDE AND POLYBROMINATED DIPHENYL ETHER) IN MARINE FISH CELL LINE SAF-1

Cristobal Espinosa[1*], Giuseppe Renda[1], Rosaria Arena[1], Concetta Maria Messina[1], Santulli Andrea[1,2],

[1]*Università degli Studi di Palermo, Dipartimento di Scienze della terra e del Mare DiSTeM, Laboratorio di Biochimica Marina ed Ecotossicologia, Trapani;* [2]*Consorzio Universitario della Provincia di Trapani, Istituto di Biologia Marina, Trapani, Italy*

*Email: cristobal.espinosaruiz@unipa.it

It is a fact that human and their environments are exposed to a wide range of contaminants. Several compounds have been found in sea water overworld, like industry sub-products (as heavy metals, halogens…), plastics (microplastics, flame retardants…), or diverse pharmaceutic metabolites (paracetamol, atenolol, carbamazepine…). Although these elements are found at concentrations might be considered as sub-lethal, there is increasing concern about the potential adverse effects of the interactions between those substances when present simultaneously in a mixture. Under certain conditions, chemicals will act jointly in a way that the overall level of toxicity could be affected. To shed light into this issue, the cell line from fibroblast of *Sparus aurata* SAF-1 was exposed to increasing concentrations of carbamazepine (CBZ), polybrominated diphenyl ether 47 (BDE-47) and cadmium chloride ($CdCl_2$), until 72 h to evaluate the cytotoxicity and the expression of relevant genes (antioxidant defence, cell cycle and energetic balance) by real-time PCR. In general, both vitality and gene expression were affected by the exposure to the different toxicants, affecting the antioxidant defence and producing cell cycle disruption, showing the higher effects in the cells exposed to the toxicant mixture of three compounds. The continue exposure to the different mixture of contaminants severally increase the negative effects that produce the same compounds separately, increasing its toxicity and increase the impact of contaminants on health from marine organisms.

PLASTIC DEBRIS INGESTION BY DERMERSAL ELASMOBRANCH SPECIES FROM TYRRHENIAN SEA: *GALEUS MELASTOMUS, SCYLIORHINUS CANICULA* AND *RAJA MIRALETUS*

Giuseppe Panarello[1*], Serena Savoca[1], Gioele Capillo[1], Monique Mancuso[3,4], Teresa Bottari[3,4], Nunziacarla Spanò[2]

[1]*Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina;* [2]*Department of Biomedical, Dental and Morphological and Functional Imaging University of Messina, Messina;* [3]*Institute for Biological Resources and Marine Biotechnology (IRBIM) - CNR Section of Messina, Messina;* [4]*Stazione Zoologica Anton Dohrn, Centro Interdipartimentale della Sicilia, Italy*

*Email: gpanarello@unime.it

In recent years, based on the plastic feature, many techniques have been optimised to the mass production for a large scale of different plastic materials. Despite the internationally laws regulate the plastic debris entering in the marine environment, up to 10% of plastic produced reaches the oceans where increase in concentrations and spread beyond all limits. In this study, three elasmobranch species have been considered: *Galeus melastomus, Scyliorhinus canicula* and *Raja miraletus*. The specimens were collected during May/June 2017 in the southernmost part of the Tyrrhenian Sea. A total of 88 specimens were sampled and the GastroIntestinal Tracts (GIT) were analysed using visual sorting under fume hood to prevent atmospheric contamination. The study confirmed the presence of plastic microfibers, macrofibers and macrofragment in all the three demersal elasmobranch species. Plastic particles extracted from GITs were black, white and red. In all, 21 plastic particles were found as follow: 6 in *G. melastomus*, 13 in *S. canicula* and 2 in *R. miraletus*. Thanks to Attenuated Total Reflectance Fourier Transform Infrared (ATR–FTIR) and micro-Raman spectroscopies, the composition analysis of plastic particles were performed. Results showed the presence of PA and PE (50% for both) in *G. melastomus*, PP (71.4 %), PTFE and CA (both 14.20%) for *S. canicula* and only kraton G in *R. miraletus*. Results reflected both primary and secondary uptake of litter in accord to the feeding habits of elasmobranchs studied.

PLASTICS INGESTION EVIDENCES IN TWO COMMERCIALLY IMPORTANT SPECIES FROM CENTRAL MEDITERRANEAN SEA

Mariachiara Costanzo[1*], Gioele Capillo[1], Serena Savoca[1], Giuseppe Panarello[1], Teresa Bottari[2,3], Monique Mancuso[2,3], Nunziacarla Spanò[4]

[1]*Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina;* [2]*Institute for Biological Resources and Marine Biotechnology (IRBIM) - CNR Section of Messina, Messina;* [3]*Stazione Zoologica Anton Dohrn, Centro Interdipartimentale della Sicilia;* [4]*Department of Biomedical, Dental and Morphological and Functional Imaging University of Messina, Messina, Italy*

*Email: mariachiara.costanzo@libero.it

Plastics and microplastics (MPs) pollution is an emerging

threat to marine environment. Microplastics were reported in several marine environments, from the surface to bottom. Moreover, is well known their occurrence in the gastrointestinal tract (GIT) of several fish species from oceans and closed and semi-closed basins. In order to explore the microplastics contamination of our seas and in particular of the central Mediterranean Sea, the present study focuses on two demersal fish species: *Zeus faber (John Dory) and Lepidopus caudatus* (silver scabbardfish) from a fishery exclusion area (Gulf of Patti, Messina, Sicily, Italy). Visual sorting, using a dissecting microscope of the gastrointestinal tract of 67 specimens (35 *Z. faber* and 32 *L. caudatus*), was performed under controlled conditions, to avoid atmospheric contamination. The characterization of extracted microplastics was performed using a Raman spectroscopy. The results showed that the 51.4% of *Z. faber* and 78% of *L. caudatus* specimens were positive to plastic particles, with 2.1 and 4.8 item/specimen respectively. Of these particles, mostly were represented by microplastic (98.4% in *Z. faber* and 94% in *L. caudatus*) and mesoplastics for the remaining percentages. Both fragments and fibers of various colors showed an overall composition of polypropylene (PP), polyamide (PA), nylon and, to a lesser extent, polyethylene (PE). From our results it is conceivable that also in Gulf of Patti plastics ingestion is a serious threat to marine species. Further studies are necessary to deepen the knowledge about microplastic intestinal uptake to comprehend the real risks for the final consumer.

MICROFIBERS OCCURRENCE IN THE MEDITERRANEAN SEA: EVIDENCE OF INGESTION BY DEMERSAL-SEMIPELAGIC (*BOOPS BOOPS*) FISH SPECIES

Dario Di Fresco[1*], Giuseppe Panarello[1], Gioele Capillo[1], Serena Savoca[1], Teresa Bottari[2,3], Monique Mancuso[2,3], Nunziacarla Spanò[4]

[1]*Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina;* [2]*Institute for Biological Resources and Marine Biotechnology (IRBIM) - CNR Section of Messina, Messina;* [3]*Stazione Zoologica Anton Dohrn, Centro Interdipartimentale della Sicilia;* [4]*Department of Biomedical, Dental and Morphological and Functional Imaging University of Messina, Messina, Italy*

*Email: dariodifresco@gmail.com

Microfibers pollution has increased severely in almost every marine environment around the world, becoming a serious threat to marine habitats and biota. This study reported the presence of artificial cellulose fibers in the gastrointestinal tracts (GIT) of a commercially relevant demersal-semipelagic fish species (*Boops boops*) in the Mediterranean Sea. The samples were collected during an experimental trawl survey in the Fishery Exclusion Zone of the Gulf of Patti (38.19S–14.94W; 38.315S–15.06W; 38.17S–15.16W; 38.24S–15.21W), Messina Italy, on June 2017. Overall, 30 specimens of *B. boops* were examined. Results highlighted the ingestion of cellulose fibers in 63,3% of the total investigated bogues. Ingested fibers were detected at first using stereomicroscope and Scanning Electron Microscope (SEM), categorized according to size class, color and subsequently characterized using Raman spectroscopy technique. The study showed the presence of different colors and lengths of cellulose fibers with a maximum length of 30 mm and a minimum of 0,5 mm. All analyzed samples appeared black and red, 76 and 4 respectively. The study highlighted only the presence of cellulose fibers into the gastrointestinal tract of the bogues specimens and not plastic.

PRESENCE OF MICROPLASTICS IN THE GASTROINTESTINAL TRACT OF TWO SEABREAMS SPECIES (*PAGELLUS ERYTHRINUS* AND *PAGELLUS BOGARAVEO*)

Sergio Famulari[1*], Serena Savoca[1], Giuseppe Panarello[1], Gioele Capillo[1], Monique Mancuso[2,3], Teresa Bottari[2,3], Nunziacarla Spanò[4]

[1]*Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina;* [2]*Institute for Biological Resources and Marine Biotechnology (IRBIM) - CNR Section of Messina, Messina;* [3]*Stazione Zoologica Anton Dohrn, Centro Interdipartimentale della Sicilia;* [4]*Department of Biomedical, Dental and Morphological and Functional Imaging University of Messina, Messina, Italy*

*Email: sergio.famulari93@gmail.com

Microplastic pollution is probably one of the most discussed topics worldwide over the last few years. Due to their very small size (<5 mm), microplastics (MPs) can be ingested by a wide range of marine organisms, from zooplankton to large pelagic and benthic fishes. Once entered the trophic chain, MPs can be transferred along it through biomagnification processes not yet fully understood. Recent studies have shown how the ingestion of MPs can cause physiological injuries and general loss of welfare in aquatic organisms. However, not much is known about the actual damages caused by microplastics. The aim of this study was to investigate the presence of MPs in the gastrointestinal tract (GIT) of two high-values fish species in Mediterranean Sea, Pagellus erythrinus (Linnaeus, 1758) and Pagellus bogaraveo (Brünnich, 1768). A total of 39 specimens (15 P. erythrinus and 24 P. bogaraveo) were caught in the waters of Tyrrhenian Sea, between Rasocolmo Cape and Termini Imerese (Geographic coordinates: 38.350946S – 15.542023W; 38.306726S – 15.547955W; 38.229888S – 15.573224W; 38.0085189S – 14.589696W). During laboratory analysis, MPs were collected through visual sorting method, under controlled condition, to prevent airborne contamination. Microplastics composition were subsequently analysed using micro-Raman and FT-IR spectroscopies. The results showed that MPs were found in the GIT of 4 specimens; all microplastics found were black and fibrous. The most frequently observed polymer was Nylon 66 (Polyamide). The data collected in this study confirm that microplastics contamination is a serious and growing threat for marine ecosystems and their functioning.

EXTREMOTOLERANT BLACK YEASTS FROM THE DEPTHS OF THE MEDITERRANEAN SEA

Alessia Marchetta, Clara Urzì, Filomena De Leo*

Department of Chemical, Biological, Pharmaceutical and Environmental Sciences, University of Messina, Messina, Italy

*Email: fdeleo@unime.it

The black yeast-like fungus *Hortaea werneckii* was isolated for the first time in the Mediterranean Sea during two oceanographic cruises, from samples collected at different stations and depths (from surface to 3400 m) and resulted to