ATENÇÃO: Este modelo **NÃO** representa uma prova integral, apenas parte dela.

Centro Interdepartamental de Línguas FFLCH • USP desde 1991

Universidade de São Paulo
Faculdade de Filosofia, Letras e Ciências Humanas
Av. Prof. Lineu Prestes nº 159 - CCJ - Sala 05 CEP: 05508-000
Cidade Universitária – São Paulo-SP.
Site- http://clinguas.fflch.usp.br Tel (11) 3091-2417

CENTRO INTERDEPARTAMENTAL DE LÍNGUAS – EXAME DE PROFICIÊNCIA EM LÍNGUA INGLESA
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MAIO/2019

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DOUTORADO

PARTE II: SOMENTE PARA CANDIDATOS AO DOUTORADO

- Responda em **INGLÊS**.
- NÃO copie trechos do texto ou a questão será ANULADA.
- O critério de correção avaliará:
  - Estruturas gramaticais;
  - Coerência;
  - Vocabulário;
  - Pertinência ao assunto proposto.
- Esta questão **vale de 0 a 10 pontos**.
- **Observação:**
  - A Parte I possui peso 2 e a Parte II possui peso 1.
  - A **Nota Final** será a média ponderada das duas provas (Parte I e Parte II):

$$\mathbf{NF = \frac{(Parte\ I \times 2) + (Parte\ II \times 1)}{3}}$$

Plastics and microplastics in the oceans: From emerging pollutants to emerged threat

Carlo Giacomo Avio, Stefania Gorbi, Francesco Regoli*

https://www.sciencedirect.com/science/article/pii/S0141113616300733

The benefits of plastics, including versatility, resistance and durability to degradation, are well known and led to the actual definition of "age of Plastics", where almost everything contains this material. Plastic production increased dramatically worldwide over the last 60 years, passing from 0.5 million tons/yr1 in 1960 to almost 300 million tons in 2013. Europe ranks second at global level with 20% of the total production, corresponding to 57 million tons of plastics produced in 2012; European plastic industry gives direct employment to over 1.45 million people, generating about 26.3 billion euro for public finance and welfare (Plastic Europe, 2014/ 2015). Plastic materials also pose a serious threat to the marine environment when not properly disposed or recycled. Approximately 60e80% of the word's litter is in form of plastic (Derraik, 2002), and almost 10% of the annual production ends up into the oceans, where degradation of plastic objects can take several hundred years. The main inputs of plastics into the sea derive from beaches and land-based sources like rivers, storm water runoff, wastewater discharges, or transport of land litter by wind (Ryan et al., 2009). Maritime activities contribute with materials lost by professional and recreational fishing, and debris dumped by commercial, cruise or private ships (Cooper and Corcoran, 2010). Plastic accumulation in the marine environment produces several negative repercussions: from the aesthetic impact of litter and economic costs for beach cleaning, to adverse biological and ecological effects which, according to last conservative estimates from UNEP, would cause an overall economic damage to marine ecosystems of $13 billion each year (Year Book and Valuing Plastic, Nairobi, 2014).

A recent analysis revealed that 663 marine species experience adverse effects from interaction with plastic (CBD, 2012), a 40% increase compared to a previous census (Laist, 1997). Entanglement in and ingestion by large organisms can have fatal but also sub lethal consequences, compromising their ability to capture and digest food, sense of hunger, escape from predators, decrease of body condition and impairment of locomotion, including migration. Marine mammals, seabirds, turtles, fishes are the most impacted organisms by macro debris (Laist, 1997; Derraik, 2002; Allsopp et al., 2006) with an impressive percentage of affected individuals in some species: at least 96% of North Sea fulmars have been reported to contain at least one piece of plastic in the stomach. Since plastic waste production is continuously increasing, it is expected that also the number of influenced species will grow in the future. The knowledge on the presence of plastics in small fish and invertebrates has been hampered by the greater technical difficulty in isolation and identification of microscopic particles from tissues (Cole et al., 2014; Avio et al., 2015b). Ingestion is the most likely interaction with microplastics for many organisms particularly when feeding mechanisms do not allow to discriminate between particles (Moore et al., 2001). Absorption of microplastics by organisms from the primary trophic level, e.g. phytoplankton and zooplankton, could be a pathway for transfer into the food chain. Some organisms such as shore crabs (Carcinus maenas) and filter feeding bivalves not only ingest microplastics along with food, but also contain these particles in the gills due to ventilation mechanisms (Browne et al., 2008; Moore, 2008; Watts et al., 2014).

Beside studies describing the presence of microplastics in tissues of marine organisms, a few investigations considered the potential for microplastics to be transferred between trophic levels following ingestion. Many zooplankton species undergo diurnal migrations, possibly acting as vectors of microplastics to greater depths and relative inhabitants, either through predation or production of fecal pellets sinking to the seafloor (Wright et al., 2013a). Field observations highlighted the presence of microplastics in the scats of fur seals (Arctocephalus spp.) and the authors suggested that microplastics had initially been ingested by the

planktonfeeding fish, Mycophii, which is the main prey consumed by fur seals (Eriksson and Burton, 2003). In feeding experiments under controlled conditions, microplastics previously been ingested by blue mussels (Mytilus edulis), were identified in the gut and haemolymph of the shore crab (Carcinus maenas) (Farrell and Nelson, 2013): caution was suggested in interpreting these results due to large variability in the amount of microspheres in tissues samples, the low number of analyzed individuals, and the exposure levels exceeding those from natural field conditions. Fish fed with Nephrops norvegicus containing polypropylene filaments, were found to ingest but not to excrete the microplastic strands (Murray and Cowie, 2011), further corroborating the potential for trophic transfer.

Plastic pollution in the marine environment is now recognized as a real threat with a global-scale distribution and adverse effects spanning from molecular level, physiological performance and organisms health, up to the loss of ecosystemic services. Due to the long-life of plastics on marine ecosystems, harm to marine life would continue for many decades even if the production and disposal of plastics suddenly stopped.

In this respect, it is imperative that severe measures are taken to address the problem at both international and national levels. Further studies are needed to better elucidate factors influencing the occurrence of microplastics in marine organisms, and modulation of biological effects. New scientific data should sustain input for conservation management, provide marine scientists with better evidence for political authorities responsible for normative guidelines, and strengthen the basis for educational campaigns.

At the same time, the rise of public awareness on environmental microplastics should also stimulate technological innovation to reduce the use and consumption of plastics, minimize their input into the environment, stimulate a new approach toward collection and re-use of stranded materials.

Escreva um ***ABSTRACT*** em inglês para o texto *Plastics and microplastics in the oceans: From emerging pollutants to emerged threat.*

O modelo de abstract geralmente contém *objetivo, metodologia, resultado, recomendação, conclusões e palavras-chave*. No abstract que você irá criar a partir desse texto, você deverá escrever entre 80 a 100 palavras, detendo-se apenas às informações apresentadas no texto.

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