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Are baleen whales exposed to the threat of microplastics? A case study of the Mediterranean fin whale (*Balaenoptera physalus*)

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ABSTRACT

Baleen whales are potentially exposed to micro-litter ingestion as a result of their filter-feeding activity. However, the impacts of microplastics on baleen whales are largely unknown. In this case study of the Mediterranean fin whale (*Balaenoptera physalus*), we explore the toxicological effects of microplastics on mysticetes. The study included the following three steps: (1) the collection/count of microplastics in the Pelagos Sanctuary (Mediterranean Sea), (2) the detection of phthalates in surface neustonic/planktonic samples, and (3) the detection of phthalates in stranded fin whales. A total of 56% of the surface neustonic/planktonic samples contained microplastic particles. The highest abundance of microplastics (9.63 items/m^3) was found in the Portofino MPA (Ligurian Sea). High concentrations of phthalates (DEHP and MEHP) were detected in the neustonic/planktonic samples. The concentrations of MEHP found in the blubber of stranded fin whales suggested that phthalates could serve as a tracer of the intake of microplastics. The results of this study represent the first warning of this emerging threat to baleen whales.

1. Introduction

The emerging issue of microplastics (plastic fragments smaller than 5 mm) in the marine environment has recently received increasing attention (Hidalgo-Ruz et al., 2012). This ubiquitous, persistent form of micro-debris requires centuries to degrade completely. Microplastics are primarily the result of the degradation of plastics released into the environment since the beginning of the plastic age. Micro-debris floating in the Mediterranean Sea has reached maximum levels of 892,000 particles/km^2. Recently, Collignon et al. (2012) determined neustonic microplastic and zooplankton abundance in the northwestern Mediterranean Sea and showed that the estimated mean abundance of microplastics was of the same order of magnitude as that found for the North Pacific Gyre (0.334 particles/m^2, Moore et al., 2001), underscoring the high level of this emerging threat in the Mediterranean environment.

Microplastics accumulate at the sea surface, especially within the neustonic habitat (Ryan et al., 2009). This habit harbors a specifically adapted zooplankton fauna. There is increasing concern that a wide range of marine organisms are affected by plastic wastes in the sea. However, the mechanical, physical and toxicological impacts of these wastes are largely unknown. More than 180 species, including planktophagous species, have been shown to absorb plastic debris. Macrodebris ingestion and entanglement are well documented in sea birds, mammals and turtles and more recently in fishes (planktivorous and benthophagous) and invertebrates (Robards et al., 1995; Derraik, 2002; Thompson et al., 2004; Ryan et al., 2009; Boerger et al., 2010; Collignon et al., 2012; Possatto et al., 2011; Dantas et al., 2012; Murray and Cowie, 2011).

No information has previously been reported on the impacts of microplastics on baleen whales, such as fin whales (*Balaenoptera physalus*). The filter-feeding activities of these whales represent a potential source of exposure to micro-litter ingestion. The fin whale, the only resident mysticete in the Mediterranean Sea, forms aggregations during the summer on the feeding grounds of the Pelagos Sanctuary Marine Protected Area (MPA) (Notarbartolo di Sciara et al., 2003). These whales feed primarily on planktonic euphausiid species. With each mouthful, the whales can trap approximately 70,000 l of water, and their feeding activities include surface feeding. They could therefore face risks caused by the ingestion and degradation of microplastics. Micro-debris can be a significant source of lipophilic chemicals (primarily persistent organic pollutants – POPs) and a source of pollutants such as polyethylene, polypropylene and, particularly, phthalates. These chemical pollutants can potentially affect organisms (Teuten et al., 2007), are potential endocrine disruptors and can affect population viability. With their long lifespan, whales could be chronically

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exposed to these persistent contaminants derived from the ingestion and degradation of microplastics.

One toxicological feature of the marine environment that can affect filter-feeding organisms is the influence that microplastics may produce by enhancing the transport and bioavailability of persistent, bioaccumulative and toxic substances. In fact, chemicals for which the logarithm of the octanol/water partitioning coefficient (K(OW)) > 5 can potentially be partitioned >1% to polyethylene, a major component of microplastics. Moreover, contaminants such as phthalates and polycyclic aromatic hydrocarbons (PAHs) are among the principal constituents of plastics. The dialkyl or alkyl/aryl esters of 1,2-benzenedicarboxylic acid, commonly known as phthalates, are high-production-volume synthetic chemicals; moreover, they are not covalently bound to plastic and migrate from the products to the environment, thus becoming ubiquitous contaminants (Latini et al., 2009). Public and scientific concern about the potential human and wildlife health risks associated with exposure to phthalates has increased in recent years. The primary focus has moved away from the hepatotoxic effects to the endocrine-disrupting potency of these chemicals (Latini, 2005), which have been shown to be reproductive toxicants in animals (Borch et al., 2006). Di-(2-ethylhexyl) phthalate (DEHP) is the most abundant phthalate in the environment. In both invertebrates and vertebrates, DEHP is rapidly metabolized in the form of its primary metabolite, MEHP (mono-(2-ethylhexyl) phthalate) (Barron et al., 1989), which can be used as a marker of exposure to DEHP.

This case study examines the Mediterranean fin whale, one of the largest filter feeders in the world. This study is the first investigation of the potential impact of microplastics in a baleen whale and suggests the use of phthalates as a tracer of the intake of microplastics through the ingestion of micro-debris and plankton.

2. Methodology

The study included the following three steps: (1) the collection, counting and sorting of microplastics and planktonic organisms in surface neustonic/planktonic and water column samples from the Pelagos Sanctuary MPA (NW Mediterranean Sea); (2) the measurement of phthalate concentrations in surface neustonic/planktonic and water column samples; and (3) the measurement of phthalate concentrations in stranded fin whale specimens collected on the coasts of Italy.

2.1. Step I: collection and sorting of microplastics in surface neustonic/planktonic and water column samples in the Pelagos Sanctuary

Surface neustonic/planktonic and water column samples were collected in the Ligurian Sea and Sardinian Sea (Fig. 1a) in summer 2011 (June–July) during the day with a WP2 standard net (57 cm mouth diameter, 200 μm mesh size) equipped with a flowmeter for the measurement of the filtered volumes. For each surface sample ($n = 23$; MPM3–MPM26), the net was towed horizontally just below the water surface at a speed of approximately 1 knot for 15 min. For each water column sample (MPP3, MPP10 and MPP22, corresponding to the same geographical coordinates as MPM3, MPM10 and MPM22) (Fig. 1a), the same net was vertically towed from a depth of 50 m to the surface at a speed of 1 m/s. In both cases, the net was washed on board, and each 2-l sample was split into two separate aliquots of 1 l each with a Folsom splitter. One 1-l aliquot was filtered on a 200 μm mesh sieve and immediately frozen in liquid nitrogen for the subsequent analysis of phthalates. The second aliquot was preserved in 4% formaldehyde-seawater buffered solution for subsequent quali-quantitative analyses. A total of 26 frozen and preserved samples were used for this study. For the analysis of plankton and plastic particles, the samples were observed under a Leica Wild M10 stereomicroscope. The organisms were counted and taxonomically classified (Table 1, Supplementary data). The plastic particles were counted and measured, and those smaller than 5 mm were classified as microplastics. All the data were normalized to the total volume filtered and expressed as individuals and items/m^3. To compare the data with data expressed as items/m^2 in the literature, the present data can be converted by multiplying the values (items/m^3) by 0.5 m, the thickness of the water stratum sampled with the WP2 net as described above.

2.2. Step II: detection of phthalates in surface neustonic/planktonic and water column samples

DEHP and MEHP were analyzed in the surface neustonic/planktonic and water column samples (0.5–0.7 g) from the two sampling sub-areas (Ligurian Sea and Sardinian Sea) following a method described by Takatori et al. (2004), with a few modifications described in Guerranti et al. (2012). Each sample was thawed and weighed, and acetone was added. The sample obtained in this way was sonicated. The organic part, containing DEHP and MEHP, was separated from the remaining water, and the supernatant was isolated. The supernatant phase was then recovered and combined with that resulting from the first extraction and was then evaporated in a centrifugal evaporator. The extract was then resuspended with 0.5 ml of acetonitrile and passed through a nylon filter with pores of 2 μm. Subsequently, the sample was placed in an autosampler vial and injected into an LC-ESI-MS system. The instrumental analysis was performed with a Finnigan LTQ Thermo LC/MSn 110 with an ESI interface. A total of 5 μl of the extracted sample was injected via the autosampler into the HPLC system. A reverse-phase HPLC column (Wakosil 3C18, 2.0 × 100 mm, 3 μm; Wako Pure Chemical Industries Ltd.) was used. The mobile phases consisted of 100% acetonitrile (A) and 0.05% aqueous acetic acid (B). Elution was performed using an isocratic mode (A/B: 15/85, v/v) at 0.25 ml/min. ESI-MS was operated in the negative or positive ion mode depending on the analytes (MEHP was detected in the negative mode, whereas DEHP was detected in the positive mode). The heated capillary and voltage were maintained at 500 °C and ±4.0 kV, respectively. The ions used for identification were (parent ion/daughter ion) 277/134 and 391/149 for MEHP and DEHP, respectively. For the quantitative analysis, a four-point calibration curve prepared by the progressive dilution of a solution of the two analytes of interest was used. Blanks were analyzed with each set of five samples as a check for possible laboratory contamination and interference. The data quality assurance and quality control protocols also included matrix spikes and continuing calibration verification. The limits of detection (LODs) and limits of quantification (LOQs) for the compounds analyzed were the values of the compound in the +3 SD and +10 SD blanks, respectively. The LOD and LOQ were 1 and 2 ng/g, respectively, for MEHP and 5 and 10 ng/g, respectively, for DEHP.

The levels of analytes below the limits of detection (<LOD) were specified as values equal to the value of the LOD. If the analyte was present at levels between the LOD and the LOQ, the LOQ value was used. The values are expressed as fresh weight (f.w.).

2.3. Step III: measurement of phthalate concentrations in stranded fin whale specimens collected along the coasts of Italy

Blubber samples were collected close to the dorsal fin in five stranded fin whales (sub-adults and adults) during the period July 2007–June 2011 at five different sites on the Italian coast. The samples were stored at −20 °C prior to analysis. The details of the location and gender of the stranded whales are shown in Fig. 1b. DEHP

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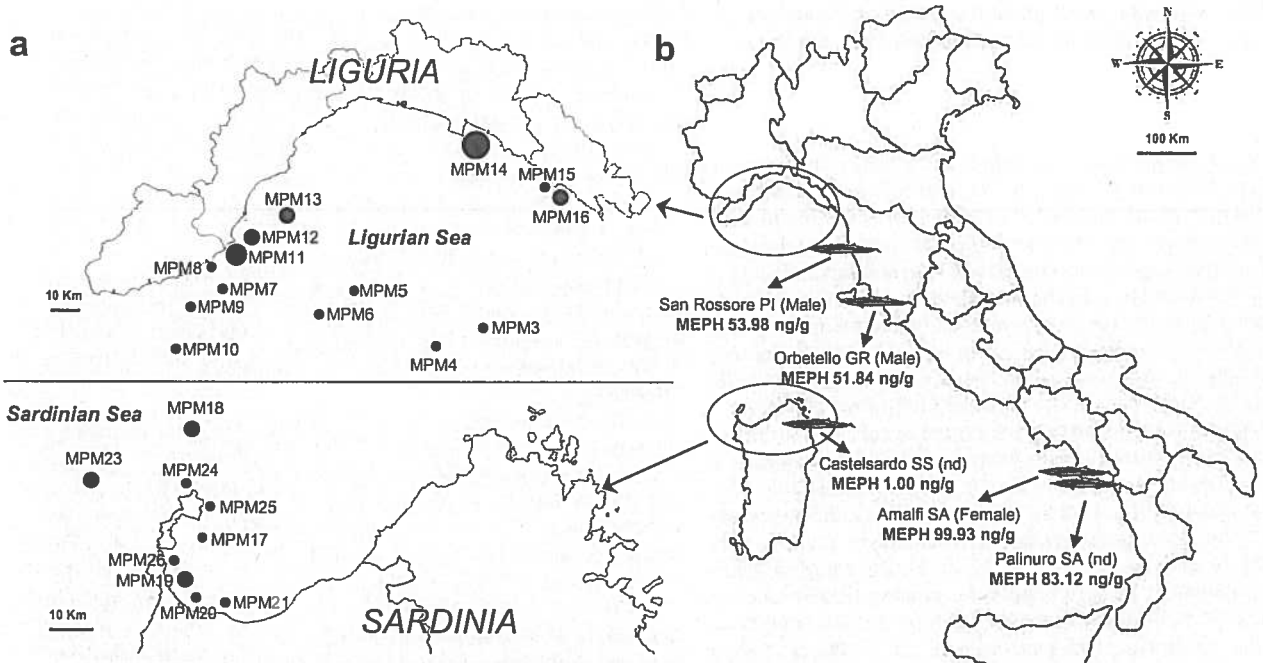

Microplastics (Items/m³)
0-0.1
0.11-1
1.01-5
5.01-10

Phthalates concentration in superficial neustonic/planktonic samples						
AREA	DEHP (ng/g)			MEHP (ng/g)		
	n	mean	s.d.	n	mean	s.d.
Ligurian Sea	14	18.38	44.39	14	61.93	124.26
Sardinian Sea	9	23.42	32.46	9	40.30	41.55

MEHP concentration in stranded fin whales (n=5)		
SPECIES	TISSUE	Mean MEHP (ng/g)
Balaenoptera physalus	Blubber	57.97

Fig. 1. (a) Microplastic particles in superficial neustonic/planktonic samples (items/m³) collected in the Pelagos Sanctuary (Ligurian Sea and Sardinian Sea) and mean DEPH and MEPH concentrations (ng/g). Geographical coordinates of sampling sites are reported in Table 2 of Supplementary data. (b) DEHP concentrations (ng/g) in blubber samples of five stranded fin whales collected along the Italian coasts during the period July 2007–June 2011 in five different locations.

Table 1
Microplastic particles in superficial neustonic/planktonic samples (items/m³) collected in the Pelagos Sanctuary, zooplankton abundance (ind/m³), DEPH and MEPH concentrations (ng/g f.w.), mean values ± S.D. (see Fig. 1 for sampling sites).

Sample	Items/m³	Zooplankton abundance (ind/m³)	DEHP (ng/g)	MEHP (ng/g)
Ligurian Sea				
MPM3	0.00	403.96	5.00	1.00
MPM4	0.10	167.78	5.00	55.20
MPM5	0.10	23.45	10.00	1.00
MPM6	0.00	43.67	172.41	3,12
MPM7	0.00	36.77	5.00	5.75
MPM8	0.05	204.71	5.00	454.07
MPM9	0.00	4275.51	5.00	1.00
MPM10	0.00	193.15	5.00	2.00
MPM11	1.35	377.49	5.00	37.64
MPM12	0.50	496.35	5.00	4.87
MPM13	0.33	6147.00	10.00	1.00
MPM14	9.67	4253.33	10.00	188.94
MPM15	0.04	179.51	10.00	25.68
MPM16	0.95	4645.71	5.00	85.78
Mean	**0.94 ± 2.55**	**1532.03**	**18.38 ± 44.39**	**61.93 ± 124.26**
Sardinian Sea				
MPM17	0.00	82.74	76,02	19.83
MPM18	0.83	27.07	10.00	1.00
MPM19	0.11	744.54	10.00	11.30
MPM20	0.00	668.66	5.00	107.11
MPM21	0.03	90.19	10.00	35.56
MPM23	0.24	102.73	5.00	1.00
MPM24	0.00	523.27	84.81	109.93
MPM25	0.00	15000.00	5.00	30.64
MPM26	0.00	3919.72	5.00	46.34
Mean	**0.13 ± 0.27**	**2350.99**	**23.42 ± 32.46**	**40.30 ± 41.55**
Total Mean	**0.62 ± 2.00**	**1852.49**	**20.36 ± 39.42**	**53.47 ± 99.34**

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and MEHP were extracted from blubber (1 g), and phthalate concentrations were measured with the method described above.

3. Results

Of the 23 surface neustonic/planktonic samples, 13 contained plastic particles (Table 1, Fig. 1a). The highest microplastic abundance (9.67 items/m^3, equivalent to 4.83 items/m^2) was found in a sample collected near the Portofino MPA (Ligurian Sea). Large amounts of plastic particles were detected in the surface neustonic/planktonic samples collected in the Pelagos Sanctuary areas investigated (mean value 0.62 items/m^3). The amounts of plastic particles were approximately seven times higher in the samples from the Ligurian Sea (mean value 0.94 items/m^3) than in the samples from the Sardinian Sea (mean value 0.13 items/m^3) (Table 1). Plastic particles were not found in the three water column samples (Table 2). The planktonic species were taxonomically determined, and the results are shown in Table 1 of Supplementary data.

High concentrations of the phthalates MEHP and DEHP were detected for the first time in the surface neustonic/planktonic samples collected in the Pelagos Sanctuary areas. The values of MEHP were approximately 1.5 times higher in the samples from the Ligurian Sea than in the samples from the Sardinian Sea. Lower concentrations of MEHP were detected in the 3 water column samples than in the surface samples (Table 2).

The presence of harmful chemicals in Mediterranean fin whales, associated with the potential intake of plastic derivatives by water filtering and plankton ingestion, was demonstrated for the first time by the results of this study, which documented the presence of relevant concentrations of MEHP in the blubber of four out of five stranded fin whales (Fig. 1b). MEHP is a marker for exposure to DEHP, whereas DEHP was never detected in the samples. It is not surprising that DEHP was not detected in these samples, as it is well known that the DEHP is rapidly metabolized to MEHP, its primary metabolite (Latini et al., 2004). The preliminary data obtained by the current study suggest that phthalates can serve as a tracer of the intake of microplastics by fin whales resulting from the ingestion of micro-litter and plankton.

4. Discussion

The present study, following the recent publication by Collignon et al. (2012), provides an initial insight into microplastic pollution in the Mediterranean Sea by reporting the concentrations and spatial distribution of microplastics in the area of Pelagos Sanctuary. We emphasize that the mean abundance of microplastics estimated in this study is of the same order of magnitude as that found for the North Pacific Gyre (Collignon et al., 2012), suggesting the high level of this emerging threat in the only pelagic MPA of the Mediterranean Sea.

The Pelagos Sanctuary for Mediterranean Marine Mammals is a marine protected area of approximately 90,000 km^2 in the northwestern Mediterranean Sea. A remarkable cetacean fauna consisting of 8 species, including the baleen whale *B. physalus*, coexists in the Sanctuary with very high levels of human pressure. Plastic from coastal tourism, recreational and commercial fishing, marine vessels and marine industries can directly enter the marine environment and pose a risk to biota both as macroplastics and, following long-term degradation, as microplastics. Within the Pelagos Sanctuary, the Portofino MPA showed the highest values of microplastic items/m^3. This area was also confirmed as a "hot spot" for microplastics by Collignon et al. (2012). These results serve to focus particular attention on the conservation status of an area with a high level of exploitation by tourists and on the balance between conservation measures and management.

Previously, very few studies have addressed the impact of microplastics on filter-feeding organisms or other planktivorous animals. No previous studies have assessed the potential impact of microplastics on large filter-feeding organisms, such as baleen whales.

At the lowest level of the food web, the great abundance of microplastics in the photic zone could both interfere with and be a severe threat to plankton viability. Microplastic debris has been found in the gastrointestinal tracts of several planktivorous fishes (*Myctophidae*, *Stomiidae* and *Scomberesocidae*) in the North Pacific Gyre (Boerger et al., 2010). In the Mediterranean Sea, during the survey recently carried out by Collignon et al. (2012), plastic micro-debris was found in the stomachs of myctophids (*Myctophum punctatum*). Moreover, several studies report the ingestion of plastic debris of different sizes, colors and shapes by both epibenthophagous and hyperbenthophagous fish species (*Ariidae*, *Scianidae*) inhabiting a demersal estuarine environment in the tropical Western South Atlantic (Costa et al., 2011; Possatto et al., 2011; Dantas et al., 2012). The occurrence of interactions between several species of marine mammals and marine debris (Williams et al., 2011) and of plastic ingestion in Franciscana dolphins were also recently reported (Denuncio et al., 2011). However, the physiological and toxicological effects of plastic ingestion by filter-feeding organisms are poorly investigated and understood, as are the implications of plastic ingestion occurring through the food chain.

Marine plastics have been found to adsorb and transport chemicals, including high concentrations of organochlorines such as polychlorinated biphenyls (PCBs), dichlorodiphenyl trichloroethane (DDT) and PAHs (Teuten et al., 2007). After the ingestion of plastics by an organism, the presence of digestive surfactants is known to increase the bioavailability of these compounds sorbed to plastics (Voparil and Mayer, 2000) by markedly increasing the desorption rate of plastics compared with that found in sea water (Teuten et al., 2007). Due to the large surface-area-to-volume ratio of microplastics, marine organisms may be particularly at risk of exposure to leached additives after microplastics are ingested. Such additives may interfere with biologically important processes, potentially resulting in endocrine disruption (Barnes et al., 2009; Lithner et al., 2009, 2011). In this context, it is known that commonly used additives, such as brominated flame retardants, phthalates and the constituent monomer bisphenol A, can act as endocrine-disrupting chemicals because they can mimic, compete with or disrupt the synthesis of endogenous hormones (Talsness et al., 2009). In particular, phthalates have been associated with a range of molecular, cellular and organ effects in aquatic invertebrates and fish (Oehlmann et al., 2009). Bisphenol A is both

Table 2
Microplastic particles in water column samples (items/m^3) collected in the Pelagos Sanctuary, zooplankton abundance (ind/m^3), DEPH and MEPH concentrations (ng/g f.w.), mean values ± S.D (see Fig. 1 for sampling sites).

Sample	Items/m^3	Zooplankton abundance (ind/m^3)	DEHP (ng/g)	MEHP (ng/g)
MPP3	0.00	49.71	5.00	1.00
MPP10	0.00	1266.05	5.00	4.32
MPP22	0.00	864.88	5.00	1.00
Mean	**0.00**	**726.88**	**5.00 ± 0.00**	**2.11 ± 1.92**

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an estrogen agonist and an androgen antagonist, and it can differentially affect reproduction and development, depending on its concentration and the species affected. Nevertheless, Oehlmann et al. (2009) note that there has been relatively little research into the chronic effects of long-term exposure to these additives in aquatic organisms.

The present data represent the first evidence of the potential impact of the most abundant plastic derivatives (phthalates) in a baleen whale, the second-largest filter feeder in the world: the Mediterranean fin whale. The fin whale is a cosmopolitan cetacean. It is found in the largest water masses of the world, from the equator to the polar regions. Despite its cosmopolitan distribution, it is classified as Endangered on the IUCN Red List. In general, rorqual feeding has been described as the largest biomechanical event that has ever existed on Earth (Croll and Tershy, 2002). Fin whales capture food by initially swimming rapidly toward a school of prey and then decelerating while opening the mouth to gulp vast quantities of water and schooling prey. Fin and blue whales foraging on krill off the coast concentrate their foraging effort on dense aggregations of krill (150–300 m) in the water column during the day and feed near the surface at night (Croll et al., 2005).

It is well known that the fin whale in the Mediterranean Sea feeds preferentially on the planktonic euphausiid *Meganyctiphanes norvegica*. Nevertheless, depending on the area and the season, the whale feeds on a wide spectrum of marine organisms, including copepods, other euphausiid species (e.g., *Thysanoessa inermis*, *Calanus finmarchicus*, *Euphausia krohni*) and small schooling fish (Orsi Relini and Giordano, 1992; Relini et al., 1992; Notarbartolo di Sciara et al., 2003). With each mouthful, a fin whale can trap approximately 70,000 l of water. For this reason, a whale could risk ingesting a great amount of microplastic debris, both directly from the water and indirectly from the plankton (during both surface feeding and deeper feeding activity). After microplastics are ingested, a fin whale may be exposed directly to leached additives, such as polybrominated diphenyl ethers, phthalates and bisphenolA and their potential toxicological effects.

Preliminary data on MEHP in 5 samples of *Euphausia krohni* collected in the Sicilian Channel reported high concentrations of this contaminant ranging from 8.35 to 51.14 ng/g. These results suggested that plastic derivatives also occur in planktonic species inhabiting the water column (unpublished data, Guerranti personal communication).

In view of the presence of microplastics in the Mediterranean environment, the detection of plastic additives in the blubber of fin whales and the long lifespan of the species, fin whales appear to be chronically exposed to persistent and emerging contaminants as a result of microplastic ingestion. In this context, the preliminary observations presented in this paper suggest that phthalates can serve as a tracer for the intake of microplastics in micro-litter and in plankton by fin whales. These observations represent a warning that the endangered Mediterranean population of this baleen whale is exposed to endocrine disruptors such as MEHP. The results of this study are consistent with the evidence previously reported by Fossi et al. (2010) of an early warning signal of endocrine interference furnished by the up-regulation of the estrogen receptor alpha gene detected in skin biopsies of male Mediterranean fin whales compared with fin whales from the Sea of Cortez (Mexico). This "undesirable biological effect" (in agreement with the description of the concept of biomarkers in Descriptor 8 of the Marine Strategy Framework Directive) can suggest that the Mediterranean population is exposed to a mixture of persistent and emerging contaminants, such as endocrine disruptors, that may impair the population viability of this already endangered species.

In this context, surveys covering much of the western Mediterranean basin have estimated the fin whale population to be 3.583 individuals (Forcada et al., 1996), 901 of which inhabit the Corsican-Ligurian-Provencal basin (Forcada et al., 1995). However, according to more recent data on the Pelagos Sanctuary, the estimated population has decreased markedly (approximately by a factor of six) in the past 20 years (Panigada et al., 2011) raising particular concerns about the status of this species.

In conclusion, the present data represent the first evidence of the potential impact of plastic additives (phthalates) in baleen whales. These results underscore the importance of future research on the detection of the toxicological impact of micro-plastics in filter-feeding species such as mysticete cetaceans, the basking shark and the devil ray. The results also underscore the potential use of these species in the implementation of Descriptor 10 (marine litter) in the EU Marine Strategy Framework Directive as indicators of the presence and impact of micro-litter in the pelagic environment.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.marpolbul.2012.08.013.

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Note

Contributing to marine pollution by washing your face: Microplastics in facial cleansers

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ABSTRACT

Plastics pollution in the ocean is an area of growing concern, with research efforts focusing on both the macroplastic (>5 mm) and microplastic (<5 mm) fractions. In the 1990s it was recognized that a minor source of microplastic pollution was derived from liquid hand-cleansers that would have been rarely used by the average consumer. In 2009, however, the average consumer is likely to be using microplastic-containing products on a daily basis, as the majority of facial cleansers now contain polyethylene microplastics which are not captured by wastewater plants and will enter the oceans. Four microplastic-containing facial cleansers available in New Zealand supermarkets were used to quantify the size of the polythelene fragments. Three-quarters of the brands had a modal size of <100 microns and could be immediately ingested by planktonic organisms at the base of the food chain. Over time the microplastics will be subject to UV-degradation and absorb hydrophobic materials such as PCBs, making them smaller and more toxic in the long-term. Marine scientists need to educate the public to the dangers of using products that pose an immediate and long-term threat to the health of the oceans and the food we eat.

1. Introduction

Plastics are a ubiquitous part of modern life, encountered on a daily basis in the packaging of foods and drinks, in household items such as combs, toothbrushes and pens, and in shopping bags. The final destination of many large plastic items are the oceans, where they form the macroplastic debris (>5 mm, Moore, 2008) that is a dominant component of ocean pollution, threatening marine life through consumption and/or entanglement (Derraik, 2002; Moore, 2008). Recent research has described areas of the open oceans where oceanographic features have concentrated this material (e.g., the North Pacific Gyre, Moore et al., 2001; Moore, 2008; the Kuroshio Current, Yamashita and Tanimura, 2007) and areas far from human habitation are littered with macroplastics, particularly fishing debris (e.g. the Sub-Antarctic islands, Derraik, 2002; Moore, 2008).

In the last few years there has, however, been a major change in the potential for microplastic (<5 mm, Moore, 2008) pollution in the oceans, with the shift from natural to microplastic exfoliators in skin cleansers. Although first recognized as a minor source of plastic pollution in the 1990s (Zitko and Hanlon, 1991; Gregory, 1996), these microplastics were primarily present in hand-cleansers, as liquid plastic–sand soaps that might typically be used on rare occasions by the average consumer. However, because microplastics have now replaced natural exfoliating materials (e.g. pumice, oatmeal, apricot or walnut husks) in facial cleansers, the average consumer now has a microplastic-containing product in their home and uses it on a daily, or at least weekly, basis. The majority of facial cleansers in New Zealand supermarkets list polyethylene as an ingredient, present in forms variously described as "micro-beads", "microbead formula" or "micro exfoliates".

Once used in face-washing the microplastics travel through city wastewater systems, but because of their small size are likely to escape capture by the preliminary treatment screens on wastewater plants (typically coarse, >6 mm, and fine screens, 1.5–6 mm Vesilend, 2003) and enter the oceans (Browne et al., 2007). To determine the impact of plastic from facial cleansers on the marine environment we here quantify the size of plastic contained in four brands readily available from New Zealand supermarkets. The size range of particles present suggest that facial cleansers may now be a major source of microplastics pollution in the ocean, and will have both immediate and long-term impacts on plankton and filter-feeding organisms at the base of marine food-chains.

2. Materials and methods

Four water-based facial cleansers containing polyethylene were purchased at a supermarket in Auckland, New Zealand (brands A–D). The brands chosen were produced by major cosmetic manufacturers, <$NZ15 per tube, and are readily available to consumers in the developed world.

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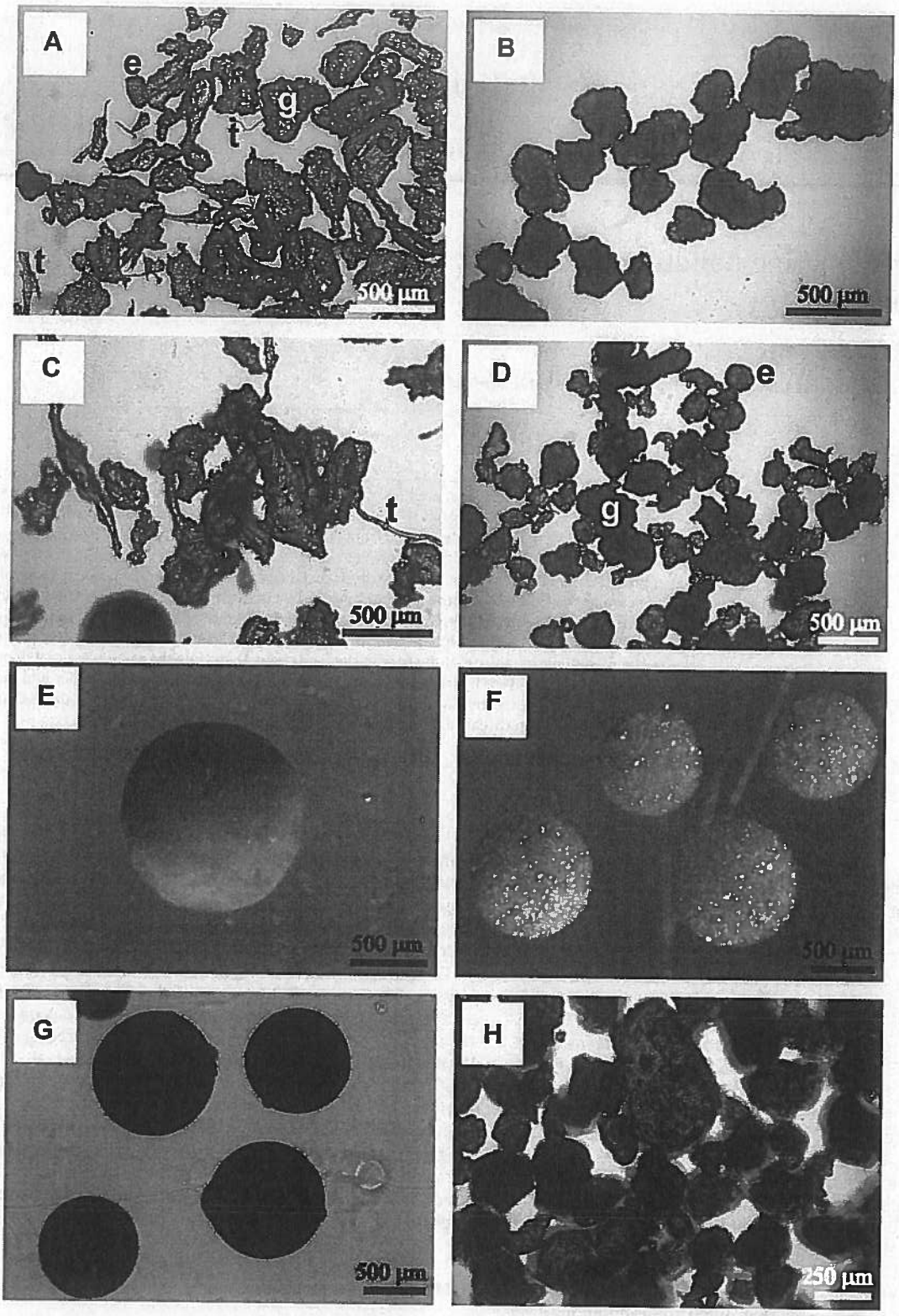

Fig. 1. Photomicrographs of the microplastics and coloured inclusions in facial cleanser brands A–D. Scale bar in all panels except H 500 µm. (A) Microplastics from brand A include variable irregular shapes that include granular particles (g), ellipses (e), and threads (t). (B) Microplastics from brand B are uniform and granular in shape. (C) Microplastics from brand C include variable irregular shapes that are rounded or thread-like (t). (D) Microplastics from brand D are uniform and elliptical (e) or slightly granular (g) in shape. (E) Blue coloured material from brand A. Product labelling refers to these as "pore cleansing power beads" that contain lactic acid to "help open clogged pores". (F) Orange coloured material from brand B. Chemical composition unknown. (G) Blue coloured material from brand C. Chemical composition unknown. (H) Blue coloured material from brand D. Chemical composition unknown.

In order to extract the microplastic we added 0.5 g (wet weight, ww) of each product to 25 mL of 70 °C water in the barrel of a 30 mL plastic syringe, with the Luer lock fitting attached to a stainless steel 25 mm microsyringe filter holder (Millipore) containing an 8 μm nitrocellulose membrane filter (SCWP, Millipore). The syringe, with attached filter unit, was shaken vigorously for up to a minute to get the cleanser into solution. The temperature used, while slightly higher than might be used in face-washing (ca 40 °C), was required to get two of the four brands into complete solution.

The syringe was slowly discharged through the 8 μm filter, the filter was removed using filter forceps (Millipore), and the plastic was washed off the filter and into a small petri dish or directly onto a Sedgewick-Rafter cell using a laboratory squirt bottle. Size measurements were made using a calibrated eyepiece graticule on a Leica compound microscope at either 40x or 100x magnification. For each brand we used three replicate 0.5 g extractions and measured the lengths of the first 50 pieces of microplastic encountered in transects across the Sedgewick-Rafter cell (Total $N = 150$ pieces per brand).

Two of the brands, A and B, also contained larger sized bursting beads that burst in the hot water treatment, so were thus isolated in cold water. The coloured material in brands C and D were isolated in warm water.

3. Results

The microplastics contained in all brands of facial cleansers are not smooth and spherical, but show a variety of irregular shapes (Fig. 1A–D). Whereas brands B and D contained plastics fairly uniform in shape, plastic in brands A and C ranged from ellipses, ribbons, and threads, to completely irregular fragments (Fig. 1A–D). As the brands are manufactured in Germany, Korea, France and Thailand respectively, it is unlikely that there is a common source for the polyethylene microplastics contained in these cleansers.

Microplastics in the facial cleansers showed a wide size range, with few larger than 1 mm (Fig. 2a–d, Table 1). In all brands, the majority of microplastics were smaller than 0.5 mm, and in three of the four brands (A, C, D) the mode was <0.1 mm (Fig. 2). Brands A and C had the longest fragments, but as these long threads were generally very thin (Fig. 1A and C), their high surface area would make them likely to be quickly broken into smaller fragments.

Table 1
Size of microplastic fragments in four brands of facial cleanser.

Brand	Median size (μm)	Size range (μm)	Shape
A	196.81	10.2–1075.0	Variable, includes ellipses, rods, threads
B	375.00	52.5–847.5	Uniform, granular
C	247.50	4.1–1240.0	Variable, irregular, rounded to thread-like
D	196.94	31.6–418.4	Uniform, elliptical, slightly granular

($N = 150$ fragments per brand).

In addition to the microplastics all brands included coloured material that did not appear to be constructed from plastic (Fig. 1E–H). Brands A and B contained large beads >0.5 mm which burst during face-washing (Fig. 1E and F). The product label on brand A referred to these as "pore cleansing power beads" that contain lactic acid to "help open clogged pores". Brand C contained smaller beads that were not readily crushed, and brand D contained blue fragments that were similar in shape to the microplastics (Fig. 1G and H).

4. Discussion

Research on plastics pollution in the ocean has focused on the macroplastics fraction which affects at least 267 marine species by ingestion or entanglement (Derraik, 2002; Moore, 2008). Although macroplastics in the oceans are broken down into smaller pieces and therefore become available to more organisms for ingestion (Moore, 2008), here we have highlighted that the average consumer is directly releasing microplastics of a size suitable for ingestion by marine organisms without degradation.

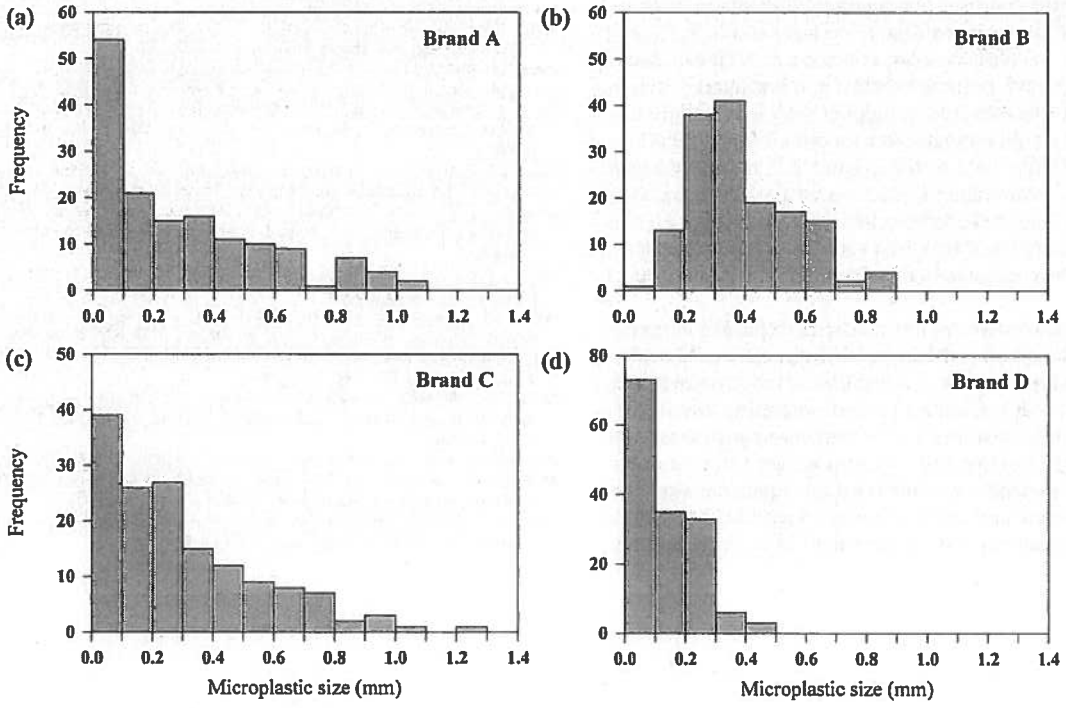

Fig. 2. Size frequency distributions of the microplastics from facial cleanser brands A–D. $N = 150$ fragments per brand.

The long-term impacts of microplastics on marine organisms are currently unknown. Small animals consuming microplastics are at particular risk from starvation, reduced food consumption due to satiation, or intestinal blockage leading to death (Derraik, 2002). Microplastics of the size shown here (<2 mm) can be ingested by filter-feeding polychaetes, echinoderms, bryozoans, bivalves and barnacles (Ward and Shumway, 2004; Thompson et al., 2004), deposit feeding lugworms (Thompson et al., 2004) and sea cucumbers (Graham and Thompson, 2009), and by detritovores such as amphipods (Thompson et al., 2004). More disturbingly, Browne et al. (2008) have recently shown that microplastics accumulate in the gut of filter-feeding mussels, are translocated to the circulatory system within three days of ingestion, and persist for more than 48 days.

The microplastics described here are polyethylene, which with a specific density <1 will float on the water surface (Eriksson and Burton, 2003), and be available to a wide variety of planktonic organisms feeding in the euphotic zone, as well as fish and seabirds that feed at the water surface. Microplastics are consumed by planktonic organisms (arrow worms, larval fish, Carpenter et al., 1972; salps, Moore et al., 2001) and plastic microspheres (0.01–0.07 mm) are consumed in laboratory feeding trials of copepods (Wilson, 1973) and invertebrate larvae (trochophores: Bolton and Havenhand, 1998; echinoderm echinoplutei, ophioplutei, bipinnaria and auricularia: Hart, 1991). Both the field collections and laboratory experiments suggest that microplastics of the size reported here (modal size <0.1 mm in 3/4 brands) would not be rejected by typical inhabitants of the euphotic zone.

If microplastics are ingested by small planktonic organisms such as copepods, there is the potential for the plastic to pass to, and accumulate, at higher levels of the food chain. For example, microplastics found in seal scat are believed to have been first accumulated in myctophid fish which feed on copepods of the same size as the plastic particles (Eriksson and Burton, 2003).

Two other areas of concern arise with respect to microplastics in the ocean. The first is that because synthetic polymers persist in the environment with minimal degradation (Moore, 2008), plastic debris remains in successively smaller fragments due to wave action, sand grinding, exposure to sunlight (Eriksson and Burton, 2003) and passing through the digestive systems of other organisms. Since many microplastics float, exposure to UVB radiation causes plastic polymers to become brittle and break apart, leaving smaller and smaller pieces until nanoparticles (Handy and Shaw, 2007) and even individual polymers are reached (Moore, 2008).

Secondly, plastic fragments in the ocean can bind and uptake toxic hydrophobic contaminants (Vom Saal et al., 2008), such as polychlorinated biphenyls (PCBs) on their surfaces (Rios et al., 2007; Teuten et al., 2007), and may be a vector for organic contaminants to enter food webs (Zitko and Hanlon, 1991; Derraik, 2002; Moore, 2008).

In conclusion, the presence of microplastics in facial cleansers, and their potential use by millions of consumers world-wide, should be of increasing concern to marine biologists. The size range of particles makes them available to small organisms low in the food chain, and their persistence in the environment means that microplastics become smaller and more toxic over time. As open ocean food chains depend on filter-feeding organisms such as copepods, arrow worms and salps, there is a high likelihood that once ingested by organisms low in the food chain, microplastics will be accumulated in species of pelagic fish that are consumed by humans. We believe that microplastics in facial cleansers are largely unnecessary, and may result in long-term impacts to the marine environment.

In a recent editorial in Marine Pollution Bulletin, Galloway (2008) asked scientists to think about the use of plastics in their laboratories, encouraging us to "reduce, reuse, and recycle". Here we ask scientists, and the households of which they are part, to be aware of the potential contribution to microplastics pollution made when washing one's face.

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131)

[redacted]

Van: [redacted]@ncv-cosmetica.nl]
Verzonden: donderdag 6 juni 2013 14:00
Aan: [redacted]
Onderwerp: Bedrijvenlijst
Bijlagen: Lijst met bedrijven.docx

Beste [redacted]

In de bijlage vind je de lijst met bedrijven.

Met vriendelijke groet,

[redacted]
Consultant Scientific & Regulatory Affairs

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Nederlandse Cosmetica Vereniging

Lijst met bedrijven die hebben aangegeven in de toekomst te stoppen met het gebruik van microplastic scrubbeads

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Juni 2013, Nederlandse Cosmetica Vereniging te Zeist
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132)

[redacted]

Van: [redacted]@plasticsoupfoundation.org]
Verzonden: donderdag 6 juni 2013 13:20
Aan: [redacted]
Onderwerp: Re: APP Beat the Micro Bead!
Bijlagen: Beiersdorf.txt; L'Oréal.txt; Colgate palmolive.txt; Fwd: SV: Producentsvar

Hi [redacted]

Zoals beloofd: de correspondentie uit Denemarken onder de paperclip.

Gegevens journaliste:
[redacted]
Journalist, Kontant, DR
Emil Holms Kanal 20
09999 København C
TLF: [redacted]
[redacted]@dr.dk
www.dr.dk

Voor Johnson & Johnson, zie: http://5gyres.org/posts/2013/06/04/victory_2/

Dan IKEA:

--- Origineel bericht volgt ---
Onderwerp: IKEA producten op de rode lijst
Van: [redacted]@ikea.com>
Aan: [redacted]@noordzee.nl>
Datum: 31-05-2013 17:14

Beste mensen,

Bijna een jaar geleden heeft een klant ons geattendeerd dat wij op de rode lijst vermeld stonden met 2 producten waarin microplastic zaten.
De klant had gelijk en wij hebben meteen maatregelen genomen. De inkoop werd gestaakt en de kleine voorraad die wij nog in de vestigingen hadden hebben wij uitverkocht. Tevens hebben wij besloten als IKEA dergelijke producten nooit meer in onze range op te nemen.
Ik verzoek u derhalve onze naam en de producten van de rode lijst af te halen. De producten zijn ook in geen enkele vestiging meer te verkrijgen.

Met vriendelijke groeten
[redacted]

IKEA

[redacted]
Product Requirement & Compliance specialist IKEA Nederland

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1105 BE Amsterdam
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UNEP volgt separaat.

HGR,

[redacted]

Van: [redacted]@minienm.nl>
Datum: Thu, 6 Jun 2013 08:30:32 +0000
Aan: [redacted]@jippiejajeetv.nl>
Onderwerp: Re: APP Beat the Micro Bead!

Dag [redacted]

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Van [redacted]@jippiejajeetv.nl [redacted]@jippiejajeetv.nl]
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Tot morgen!
Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@minienm.nl>
Date: Wed, 5 Jun 2013 14:33:24 +0000
To: [redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org>
Subject: Re: APP Beat the Micro Bead!

[redacted]

Van: [redacted]@plasticsoupfoundation.org]
Verzonden: Wednesday, June 05, 2013 04:30 PM
Aan: [redacted]
Onderwerp: Re: APP Beat the Micro Bead!

[redacted]

Van: [redacted]@minienm.nl>
Datum: Wed, 5 Jun 2013 14:22:55 +0000
Aan: [redacted]@jippiejajeetv.nl>
Onderwerp: Re: APP Beat the Micro Bead!

[redacted]

Groet

[redacted]

Van [redacted]@jippiejajeetv.nl [redacted]@jippiejajeetv.nl]
Verzonden: Wednesday, June 05, 2013 04:18 PM
Aan: [redacted]
Onderwerp: Re: APP Beat the Micro Bead!

[redacted]

Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@minienm.nl>
Date: Wed, 5 Jun 2013 14:04:13 +0000
To: [redacted]@plasticsoupfoundation.org>
Subject: Re: APP Beat the Micro Bead!

[redacted]

Van: [redacted]@plasticsoupfoundation.org]
Verzonden: Wednesday, June 05, 2013 03:44 PM
Aan [redacted]
Onderwerp: Re: APP Beat the Micro Bead!

[redacted]

Van: [redacted]@minienm.nl>
Datum: Wed, 5 Jun 2013 13:32:11 +0000
Aan: [redacted]nl>
Onderwerp: Re: APP Beat the Micro Bead!

Dag [redacted]

[redacted]

Mvg

[redacted]

Van: [redacted]@jippiejajeetv.nl [[redacted]@jippiejajeetv.nl]
Verzonden: Wednesday, May 29, 2013 05:45 PM
Aan: [redacted]
Onderwerp: Fw: APP Beat the Micro Bead!

Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@jippiejajeetv.nl
Date: Wed, 29 May 2013 15:44:58 +0000
To: [redacted]@unep.org>
ReplyTo: [redacted]@jippiejajeetv.nl
Subject: Re: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@unep.org>
Date: Wed, 29 May 2013 18:31:48 +0300
To: [redacted]@jippiejajeetv.nl>
Subject: Re: APP Beat the Micro Bead!

H[redacted]

[redacted]

Best,

[redacted]

From: [redacted]@jippiejajeetv.nl
To: [redacted]@unep.org>
Date: 29/05/2013 06:26 PM
Subject: Re: APP Beat the Micro Bead!

[redacted]

Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@unep.org>
Date: Wed, 29 May 2013 18:19:05 +0300
To: [redacted]@jippiejajeetv.nl>
Cc: [redacted]@unep.org>
Subject: Re: APP Beat the Micro Bead!

Hi [redacted] Number below,

[redacted]
Programme Officer
Freshwater & Marine Ecosystems Branch
Global Programme of Action
for the Protection of the Marine Environment
from Land-based Activities (GPA)*

United Nations Environment Programme
P.O. Box 30552 (00100)
Nairobi, Kenya

Ph. [redacted]
Fax. [redacted]
==========
*It's your GPA! - The GPA is a long-standing multilateral commitment for comprehensive, continuing and adaptive action within a framework of integrated coastal area

management. Support your government to build a better tomorrow through the GPA. Visit www.gpa.unep.org <www.gpa.unep.org>

From: [redacted]@jippiejaieetv.nl
To: [redacted]@unep.org>
Date: 29/05/2013 05:58 PM
Subject: Re: APP Beat the Micro Bead!

[redacted]

Verzonden vanaf mijn BlackBerry®-toestel

From: [redacted]@unep.org>
Date: Wed, 29 May 2013 16:43:51 +0300
To: [redacted]@plasticsoupfoundation.org>
Cc: [redacted] ABC Legal [redacted]@abc-legal.com>
Subject: Re: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

[redacted]

From: [redacted]@plasticsoupfoundation.org>
To: [redacted]@unep.org>
Cc: [redacted] ABC Legal <[redacted]@abc-legal.com>
Date: 29/05/2013 11:55 AM
Subject: Re: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

[redacted]

[redacted]

Van: [redacted]@unep.org <Heidi.Savelli@unep.org> >
Datum: Tue, 28 May 2013 09:35:39 +0300
Aan: [redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org> >
Onderwerp: Re: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

Thanks!

[redacted]

From: [redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org> >
To: [redacted]@unep.org [redacted]@unep.org> >
Date: 27/05/2013 08:29 PM
Subject: Re: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

[redacted]

[redacted]

Van: [redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org>
<[redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org> > >
Datum: Fri, 24 May 2013 16:08:33 +0200
Aan: [redacted]@unep.org [redacted]@unep.org> [redacted]@unep.org
<[redacted]@unep.org> > >
CC: [redacted]ABC Legal [redacted]@abc-legal.com [redacted]@abc-legal.com> [redacted]@abc-legal.com
[redacted]@abc-legal.com> > >
Discussie: APP Beat the Micro Bead!
Onderwerp: APP Beat the Micro Bead!

Hi [redacted]

[redacted]

[redacted]

[redacted]
M. [redacted]
E. [redacted]@plasticsoupfoundation.org [redacted]@plasticsoupfoundation.org> [redacted]@plasticsoupfoundation.org
<[redacted]@plasticsoupfoundation.org> >
W. http://plasticsoupfoundation.org <http://plasticsoupfoundation.org/> <http://plasticsoupfoundation.org/
<http://plasticsoupfoundation.org/> >

[attachment "SSFA Plastic Soup 29-05.docx" deleted by [redacted]/UNEP/NBO/UNO]

Dit bericht kan informatie bevatten die niet voor u is bestemd. Indien u niet de geadresseerde bent of dit bericht abusievelijk aan u is toegezonden, wordt u verzocht dat aan de afzender te melden en het bericht te verwijderen. De Staat aanvaardt geen aansprakelijkheid voor schade, van welke aard ook, die verband houdt met risico's verbonden aan het elektronisch verzenden van berichten.
This message may contain information that is not intended for you. If you are not the addressee or if this message was sent to you by mistake, you are requested to inform the sender and delete the message. The State accepts no liability for damage of any kind resulting from the risks inherent in the electronic transmission of messages. .

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132)

Beiersdorf

(This is not an official translation)

Answer from Beiersdorf:

Dear [redacted]

Here, as you asked, is a little more information.

The decision to look for alternatives for microplastics in scrubs and peeling products was taken some time ago. The phase-out process takes time as microplastics in these products are the safest and most allergy friendly for the consumer.

We believe that microplastics, precisely because they are not water-soluble, are collected in water treatment plants. However, we listen to our customers and are therefore looking for a substitute.

To replace microplastics, with for example, natural ingredients, is not so easy as it sounds. Natural ingredients are often associated with many allergic reactions. For example one might think that nuts could be a great natural alternative, however, there are many people allergic to nuts who would react to this replacement.

It is dificult to give a date as to when an alternative is ready. The work has begun, but we must prioritise consumer safety and legislation for the cosmetics industry into our considerations and only when we feel comfortable with a safe alternative will microplastics be replaced.
We expect this to occur within the next couple of years.

Yours sincerely

[redacted]
Issue Manager
Beiersdorf A/S
Sydhavnsgade 16, 2.
2450 København SV

Dir.
Mob. [redacted]

Original document:

Svar fra Beiersdorf:

Kære [redacted]

Her er lidt flere oplysninger, som du efterlyste.

Beslutningen om at se på alternativerne til mikroplastik i scrub og peeling produkter, blev truffet for nogen tid siden. Når udfasningen er en proces, der tager tid, skyldes det, at mikroplastik i disse produkter er den mest sikre og allergivenlig løsning overfor forbrugeren. Vi mener at mikroplastiken, netop fordi den ikke er vandopløslig, bliver opsamlet i vandrensningsanlæg. Men vi lytter til vores forbrugere og derfor ser vi på en erstatning.

At erstatte mikroplastik med f.eks. naturlige ingredienser, er ikke så lige til som det måske lyder. Naturlige ingredienser er ofte forbundet med flere allergiske reaktioner. F.eks. kunne man tro at nødder kunne være et oplagt naturligt alternativ, men der findes mange nøddeallergikere, der ville reagere på den erstatning.

Hvornår et alternativ er helt på plads er svært at give en dato på. Arbejdet er begyndt, men vi er nødt til at tage det største hensyn til forbrugersikkerhed og lovgivning inden for kosmetikområdet med i overvejelserne, og først når vi er trygge ved et sikkert alternativ, vil mikroplastpartiklerne blive erstattet. Vi forventer det sker inden for de næste par år.

Venlig hilsen

[redacted]
Issue Manager
Beiersdorf A/S
Sydhavnsgade 16, 2.
2450 København SV

Dir. [redacted]
Mob.

(132)

L'Oréal

(This is not an official translation)

Answer from L'Oréal:

Dear [redacted]

Thank you for our conversation today.

As mentioned L'Oréal takes the question of environmental impact very seriously and works to ensure that all our products have the very best environmental profiles.

Therefore, L'Oréal has decided not to develop any new products with microplastic-pearls as an exfoliating agent and we will also work to substitute these in existing product formulas, even though they are not shown to be ecotoxic.

We only use microplastic-pearls in exfoliating products.

Furthermore, we can state that since 1995 LÓréal has had a research laboratory, specifically for the evaluation of its formulas impact on water-based ecosystems.

I hope you can use this information.

Yours sincerely

[redacted]

Med venlig hilsen / Best regards,

[redacted]
Communications Director
L'Oréal Danmark A/S
Stationsparken 37, DK-2600 Glostrup
T: [redacted] M: [redacted]
@: [redacted]@dk.loreal.com<mailto:[redacted]@dk.loreal.com>
W: www.loreal.com<http://www.loreal.com/>

Original document:

Kære [redacted]

Tak for samtalen tidligere i dag.

Som nævnt tager L'Oréal spørgsmålet om miljøpåvirkning meget alvorligt og arbejder på at sikre, at alle vores produkter har den allerbedste miljøprofil. Derfor har L'Oréal besluttet ikke at udvikle nogen nye produkter med mikroplastperler som exfolierende middel, og vi vil også arbejde på at substituere disse i eksisterende produktformler, selv om de ikke er bevist økotoksiske.
Mikro-plastperler anvender vi kun i exfolierende produkter.
Desuden kan vi oplyse, at L'Oréal siden 1995 har haft et forskningslaboratorie specielt til evaluering af sine formlers indvirkning på økosystemer i vandet.

Jeg håber, du kan bruge denne information.

De bedste hilsener

[redacted]

Med venlig hilsen / Best regards,
<image001.jpg>
[redacted]
Communications Director
L'Oréal Danmark A/S

L'Oréal
Stationsparken 37, DK-2600 Glostrup
T: [redacted] M: [redacted]
@: [redacted]dk.loreal.com<mailto[redacted]@dk.loreal.com>
W: www.loreal.com<http://www.loreal.com/>

132

Colgate palmolive
(This is not an official translation)

Answer from Colgate- Palmolive:

Colgate-Palmolive's products contain relatively small amounts of microplastic, used to help the cleaning effect as well as improve the look of the product. These ingredients are safe and their use is allowed.
Some groups have expressed concern over microplastic's potential contribution to the pollution of the World's Oceans. We are therfore working together with the industry to map out the full lifecycle of microplastic, including what happens during the purification of wastewater.
Current scientific evidence suggests that the presence of microplastics in the oceans is due mainly to the degradation of larger plastics, whilst the presence of microplastic from cosmetics is very limited.
We recognize, however, concern and therefore decided, already in 2012 that we would no longer use microplastic and that we will, as quickly as possible, find alternative ingredients for our products. By the end of 2013 all products sold in Europe will be without microplastics.
Globably our aim is to phase out their use and through ongoing changes in formulas will almost all our products be microplastic free by 2014.

Yours sincerely

[redacted]
Nordic Legal Manager
Parallelvej 16, DK-2800 Kgs Lyngby, Denmark Tel : [redacted]
Fax: [redacted]
E-mail: [redacted]@colpal.com <mailto:[redacted]colpal.com>
www.colgate.dk

Original document:

Colgate-Palmolives produkter indeholder relativt små mængder mikroplastik, som anvendes til at bidrage til den rengørende effekt samt forbedre produkternes udseende. Disse ingredienser er sikre og brugen er tilladt.
>
> Nogle grupper har udtrykt bekymring for mikroplastiks potentielle
> bidrag
til forurening af verdenshavene. Vi arbejder derfor sammen med industrien for at kortlægge hele livscyklussen for mikroplastik, herunder hvad der sker i rensningsprocessen af spildevand. Ifølge den videnskabelige dokumentation, som er tilgængelig i dag, tyder det på, at tilstedeværelsen af mikroplastik i verdenshavene primært stammer fra nedbrydning af større stykker plast, mens forekomsten af mikroplastik fra ingredienser i produkter til personlig pleje er meget begrænset.
>
> Vi anerkender imidlertid bekymringen og derfor besluttede vi allerede
> i
2012, at vi ikke længere vil anvende mikroplastik, og at vi hurtigst muligt vil finde alternative ingredienser til vores produkter. Inden udgangen af 2013 vil alle produkter vi sælger i Europa være uden mikroplastik. Globalt er vores mål at udfase brugen, og ved løbende omformuleringer vil så godt som alle vores produkter være uden mikroplastik i 2014.
>
> Med venlig hilsen
>
> [redacted]
>
> Nordic Legal Manager
>
> <ATT00001.jpg>
>
> Parallelvej 16, DK-2800 Kgs Lyngby, Denmark Tel : [redacted]
> Fax: +[redacted]
> E-mail: [redacted]@colpal.com <mailto:[redacted]@colpal.com>
> www.colgate.dk

32

[redacted]

Van: [redacted]N@dr.dk]
Verzonden: woensdag 1 mei 2013 17:01
Aan: [redacted]@plasticsoupfoundation.org
Onderwerp: Fwd: SV: Producentsvar
Bijlagen: Colgate palmolive.txt; Beiersdorf.txt; L'Oréal.txt

Hi [redacted]

Here are the original answers and the translations.

Regards, [redacted]

> ---
> Fra: [redacted] DR Nyheder
> Sendt: 2. maj 2013 12:56
> Til: [redacted] DR Nyheder
> Emne: Producentsvar
>
> Svar fra Colgate- Palmolive:
>
>
>
> Colgate-Palmolives produkter indeholder relativt små mængder
>
> mikroplastik, som anvendes til at bidrage til den rengørende effekt samt forbedre produkternes udseende. Disse ingredienser er sikre og brugen er tilladt.
>
>
>> Nogle grupper har udtrykt bekymring for mikroplastiks potentielle
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>> bidrag
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> til forurening af verdenshavene. Vi arbejder derfor sammen med industrien for at kortlægge hele livscyklussen for mikroplastik, herunder hvad der sker i rensningsprocessen af spildevand. Ifølge den videnskabelige dokumentation, som er tilgængelig i dag, tyder det på, at tilstedeværelsen af mikroplastik i verdenshavene primært stammer fra nedbrydning af større stykker plast, mens forekomsten af mikroplastik fra ingredienser i produkter til personlig pleje er meget begrænset.
>
>
>> Vi anerkender imidlertid bekymringen og derfor besluttede vi allerede
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>> i
>
> 2012, at vi ikke længere vil anvende mikroplastik, og at vi hurtigst muligt vil finde alternative ingredienser til vores produkter. Inden udgangen af
>
> 2013 vil alle produkter vi sælger i Europa være uden mikroplastik. Globalt er vores mål at udfase brugen, og ved løbende omformuleringer vil så godt som alle vores produkter være uden mikroplastik i 2014.
>
>
>> Med venlig hilsen
>
>
>> [redacted]
>
>
>> Nordic Legal Manager

>
>
>> <ATT00001.jpg>
>
>
>> Parallelvej 16, DK-2800 Kgs Lyngby, Denmark Tel : [redacted]
>
>> Fax: +45 [redacted]
>
>> E-mail: [redacted]@colpal.com<mailto:[redacted]@colpal.com>
<mailto:[redacted]@colpal.com>
>
>> www.colgate.dk<http://www.colgate.dk>
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>
>
> Svar fra L'oreal:
>
>
>
> Kære [redacted]
>
>
>
> Tak for samtalen tidligere i dag.
>
>
>
> Som nævnt tager L'Oréal spørgsmålet om miljøpåvirkning meget alvorligt og arbejder på at sikre, at alle vores produkter har den allerbedste miljøprofil.
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>
> Mikro-plastperler anvender vi kun i exfolierende produkter.
>
> Desuden kan vi oplyse, at L'Oréal siden 1995 har haft et forskningslaboratorie specielt til evaluering af sine formlers indvirkning på økosystemer i vandet.
>
>
>
> Jeg håber, du kan bruge denne information.
>
>
>
> De bedste hilsener
>
> [redacted]
>
>
>
>
>
> Med venlig hilsen / Best regards,
>
> <image001.jpg>
>

[redacted]
Communications Director

L'Oréal Danmark A/S

Stationsparken 37, DK-2600 Glostrup

T: [redacted] M: [redacted]

@:
[redacted]@dk.loreal.com<mailto:[redacted]@dk.loreal.com<mailto:[redacted]@dk.loreal.com%
3cmailto:[redacted]@dk.loreal.com>>

W: www.loreal.com<http://www.loreal.com/<http://www.loreal.com%3chttp:/www.loreal.com/>>

Svar fra Beiersdorf:

Kære [redacted]

Her er lidt flere oplysninger, som du efterlyste.

Beslutningen om at se på alternativerne til mikroplastik i scrub og peeling produkter, blev truffet for nogen tid siden. Når udfasningen er en proces, der tager tid, skyldes det, at mikroplastik i disse produkter er den mest sikre og allergivenlig løsning overfor forbrugeren. Vi mener at mikroplastiken, netop fordi den ikke er vandopløslig, bliver opsamlet i vandrensningsanlæg. Men vi lytter til vores forbrugere og derfor ser vi på en erstatning.

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Venlig hilsen

[redacted]
Issue Manager
Beiersdorf A/S
Sydhavnsgade 16, 2.
2450 København SV

Dir. [redacted]
Mob. [redacted]

[redacted]
Journalist, Kontant, DR
Emil Holms Kanal 20
09999 København C

· TLF: [redacted]
· [redacted]@dr.dk
· www.dr.dk
·

Colgate palmolive (2)
(This is not an official translation)

Answer from Colgate- Palmolive:

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Globably our aim is to phase out their use and through ongoing changes in formulas will almost all our products be microplastic free by 2014.

Yours sincerely

[redacted]
Nordic Legal Manager
Parallelvej 16, DK-2800 Kgs Lyngby, Denmark Tel : [redacted]
Fax: [redacted]
E-mail: [redacted]@colpal.com <mailto:[redacted]@colpal.com>
www.colgate.dk

Original document:

Colgate-Palmolives produkter indeholder relativt små mængder mikroplastik, som anvendes til at bidrage til den rengørende effekt samt forbedre produkternes udseende. Disse ingredienser er sikre og brugen er tilladt.
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>
> Med venlig hilsen
>
> [redacted]
>
> Nordic Legal Manager
>
> <ATT00001.jpg>
>
> Parallelvej 16, DK-2800 Kgs Lyngby, Denmark Tel : [redacted]
> Fax: [redacted]
> E-mail: [redacted]@colpal.com <mailto[redacted]@colpal.com>
> www.colgate.dk

Beiersdorf (2)
(This is not an official translation)

Answer from Beiersdorf:

Dear [redacted]

Here, as you asked, is a little more information.

The decision to look for alternatives for microplastics in scrubs and peeling products was taken some time ago. The phase-out process takes time as microplastics in these products are the safest and most allergy friendly for the consumer.

We believe that microplastics, precisely because they are not water-soluble, are collected in water treatment plants. However, we listen to our customers and are therefore looking for a substitute.

To replace microplastics, with for example, natural ingredients, is not so easy as it sounds. Natural ingredients are often associated with many allergic reactions. For example one might think that nuts could be a great natural alternative, however, there are many people allergic to nuts who would react to this replacement.

It is dificult to give a date as to when an alternative is ready. The work has begun, but we must prioritise consumer safety and legislation for the cosmetics industry into our considerations and only when we feel comfortable with a safe alternative will microplastics be replaced.
We expect this to occur within the next couple of years.

Yours sincerely

[redacted]
Issue Manager
Beiersdorf A/S
Sydhavnsgade 16, 2.
2450 København SV

Dir. [redacted]
Mob.

Original document:

Svar fra Beiersdorf:

Kære [redacted]

Her er lidt flere oplysninger, som du efterlyste.

Beslutningen om at se på alternativerne til mikroplastik i scrub og peeling produkter, blev truffet for nogen tid siden. Når udfasningen er en proces, der tager tid, skyldes det, at mikroplastik i disse produkter er den mest sikre og allergivenlig løsning overfor forbrugeren. Vi mener at mikroplastiken, netop fordi den ikke er vandopløslig, bliver opsamlet i vandrensningsanlæg. Men vi lytter til vores forbrugere og derfor ser vi på en erstatning.

At erstatte mikroplastik med f.eks. naturlige ingredienser, er ikke så lige til som det måske lyder. Naturlige ingredienser er ofte forbundet med flere allergiske reaktioner. F.eks. kunne man tro at nødder kunne være et oplagt naturligt alternativ, men der findes mange nøddeallergikere, der ville reagere på den erstatning.

Hvornår et alternativ er helt på plads er svært at give en dato på. Arbejdet er begyndt, men vi er nødt til at tage det største hensyn til forbrugersikkerhed og lovgivning inden for kosmetikområdet med i overvejelserne, og først når vi er trygge ved et sikkert alternativ, vil mikroplastpartiklerne blive erstattet. Vi forventer det sker inden for de næste par år.

Venlig hilsen

[redacted]
Issue Manager
Beiersdorf A/S
Sydhavnsgade 16, 2.
2450 København SV

Dir. [redacted]
Mob.

L'Oréal (2)

(This is not an official translation)

Answer from L'Oréal:

Dear [redacted]

Thank you for our conversation today.

As mentioned L'Oréal takes the question of environmental impact very seriously and works to ensure that all our products have the very best environmental profiles.

Therefore, L'Oréal has decided not to develop any new products with microplastic-pearls as an exfoliating agent and we will also work to substitute these in existing product formulas, even though they are not shown to be ecotoxic.

We only use microplastic-pearls in exfoliating products.

Furthermore, we can state that since 1995 LÓréal has had a research laboratory, specifically for the evaluation of its formulas impact on water-based ecosystems.

I hope you can use this information.

Yours sincerely

[redacted]

Med venlig hilsen / Best regards,

[redacted]
Communications Director
L'Oréal Danmark A/S
Stationsparken 37, DK-2600 Glostrup
T: [redacted] M: [redacted]
@: [redacted]@dk.loreal.com<mailto:[redacted]@dk.loreal.com>
W: www.loreal.com<http://www.loreal.com/>

Original document:

Kære [redacted]

Tak for samtalen tidligere i dag.

Som nævnt tager L'Oréal spørgsmålet om miljøpåvirkning meget alvorligt og arbejder på at sikre, at alle vores produkter har den allerbedste miljøprofil. Derfor har L'Oréal besluttet ikke at udvikle nogen nye produkter med mikroplastperler som exfolierende middel, og vi vil også arbejde på at substituere disse i eksisterende produktformler, selv om de ikke er bevist økotoksiske.
Mikro-plastperler anvender vi kun i exfolierende produkter.
Desuden kan vi oplyse, at L'Oréal siden 1995 har haft et forskningslaboratorie specielt til evaluering af sine formlers indvirkning på økosystemer i vandet.

Jeg håber, du kan bruge denne information.

De bedste hilsener

[redacted]

Med venlig hilsen / Best regards,
<image001.jpg>

[redacted]
Communications Director
L'Oréal Danmark A/S

L'Oréal (2)
Stationsparken 37, DK-2600 Glostrup
T: [redacted] M: [redacted]
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W: www.loreal.com<http://www.loreal.com/>

133)

[redacted]

Van: [redacted]@vu.nl]
Verzonden: vrijdag 7 juni 2013 12:31
Aan: [redacted]
Onderwerp: RE: milieuraad notitie

Effects of nanopolystyrene on the feeding behavior of the blue mussel (Mytilus edulis L.)
Wegner, A. , Besseling, E. , Foekema, E.M. , Kamermans, P. , Koelmans, A.A. (2012)*Environmental Toxicology and Chemistry 31 (2012)11. - ISSN 0730-7268 - p. 2490 - 2497.*

Van: [redacted]@minienm.nl]
Verzonden: vrijdag 7 juni 2013 12:25
To: [redacted]
Onderwerp: FW: milieuraad notitie

Van: [redacted]
Verzonden: vrijdag 7 juni 2013 11:46
Aan: [redacted]
Onderwerp: milieuraad notitie

Dag [redacted]

Ter informatie de definitieve notitie over microplastics die wordt besproken in de Milieuraad. Dank voor de hulp.

Mvg

[redacted]

34)

[redacted]

Van: [redacted]@noordzee.nl]
Verzonden: maandag 10 juni 2013 11:32
Aan: [redacted]
Onderwerp: Re: notitie voor de Milieuraad
Bijlagen: 7.6.13.Green paper plastics - North Sea Foundation response.pdf

Hallo [redacted]

Dank voor de notitie voor de Milieuraad. Goede inbreng van Nederland. Aan het rijtje cosmetica bedrijven zou je Johnson & Johnson nog kunnen toevoegen, niet zo groot in Nederland, maar wel in de VS. Eigenlijk heeft alleen P&G nog niet gezegd het gebruik van microplastics te gaan beëindigen.

Over het voorkomen van in het milieu brengen van (micro) plastics in de toekomst:
- Wat mij zeer heeft verbaasd is dat het volgens de wet gewoon is toegestaan microplastics aan cosmetica toe te voegen, terwijl dit vanuit water/milieubeheer zeer ongewenst is.
- Centraal staat de vraag 'Hoe voorkom je in de toekomst een nieuwe introductie van microplastic in 'een product' dat gemakkelijk in milieu terecht kan komen?'
- Zie ook de inbreng van Stichting De Noordzee voor het Groenboek Plastics (bijlage), vraag 14 in het bijzonder.

Groet
[redacted]

(14) How can challenges arising from the use of micro plastics in products or industrial processes and of nano-particles in plastics be best addressed?

Plastic, or waste in European inland waters, is not a standard in the EU Water Framework Directive. Plastic is not monitored in European rivers, canals and lakes and there is no program and no action plan to manage plastic waste in inland European waters. This is problematic for the inland European ecosystems, but also creates a problem to achieve a Good Environmental Status within the EU Marine Strategy Framework Directive. In our view, there should be a program within the EU Water Framework Directive to cope with litter in European inland waters. This will also prevent that new sources will be introduced. A recent example is the adding of micro plastics, micro beads, to cosmetics. This is perfectly legal according to European legislation. Nevertheless, this is a very undesirable development. Future legislation should avoid this kind of waste introductions into the environment by stating that plastic does not belong in our environment, and if standard/normal use of the product creates a plastic waste stream to the environment, this product is prohibited.

| Stichting De Noordzee | Drieharingstraat 25 | 3511 BH Utrecht |
| [redacted] T [redacted] | http://noordzee.nl |

)p Vrijdag, 07-06-2013 om 16:00 schreef [redacted]

)ag [redacted]

)p 18 juni a.s. is de Milieuraad waar ook het onderwerp microplastics op de agenda staat. Hierbij de otitie die NL inbrengt. Het is niet voor brede verspreiding bedoelt, ga er svp vertrouwelijk mee om.

:n mocht je nog opmerkingen of vragen hebben, dan hou ik me aanbevolen. Kan ik vast en zeker ıuttig gebruiken bij eventuele vragen van de Commissie of andere Lidstaten.

4vg

[redacted]

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184)

ENV-PLASTIC-GREEN-PAPER@ec.europa.eu

Stichting De Noordzee/North Sea Foundation ID: 39552406251-59
User name: Stichting De Noordzee/ Northsea Foundation is: Stich347856252
Drieharingstraat 25
3511 BH Utrecht
The Netherlands

GREEN PAPER
On a European Strategy on Plastic Waste in the Environment

On the coastline of the Netherlands, southern North Sea, about 50% of the waste found in the system originates from sea based sources like shipping and fishing, 25% originates from packaging of waste from land based sources like consumers and of about 25% of the waste the origin is unknown (in most cases because of the high degraded form the items are found in the environment, for example as small plastic pieces < 5 cm). This knowledge is based on our more than ten years of experience with OSPAR Beach Litter Monitoring surveys and cleanup actions with our volunteers.

In this response to the Greenpaper 'On a European Strategy on Plastic Waste in the Environment' the North Sea Foundation, based in Utrecht the Netherlands, focusses on Marine Litter in the North Sea. Our main objective is to achieve a clean and healthy marine environment. For discussions related to more inland management topics like recycling, bioplastics, landfills, we support the input of Seas at Risk (SAR).

To achieve our goal of a healthy and clean sea without plastic pollution, we see only one solution; tackling all sources of marine litter at its source i.e. improved waste management, ending the input of plastic waste into rivers, banning free single use plastic bags, banning micro plastics (micro beads) use in cosmetics, improving the producers responsibility, etc.

The setting of an EU quantifiable and measurable target, and related quantified targets at regional and country levels, is crucial, as is the coordinated development of action plans and monitoring systems.

Answers 1 to 9, 18, 23, 24, 25, 26 see answers of our partner organization Seas At Risk (SAR)

(1) Can plastic be appropriately dealt with in the existing legislative framework for waste management or does the existing legislation need to be adapted?
The existing legislative framework has failed to deal with plastic, as shown by the huge quantity entering the marine environment and the large amount of waste being disposed off in landfills by many Member States. Existing legislation should be adapted and fully implemented to ensure plastic waste is addressed according to the waste hierarchy. Changes need to be made to the enforcement procedures to ensure that illegal landfills are identified and closed down. Recycling targets for plastic waste should be strengthened, and a target set for a reduction in marine litter.

(2) How can measures to promote greater recycling of plastic best be designed so as to ensure positive impacts for enhanced competitiveness and growth?
Increased recycling of plastic can create jobs and provide a boost to economy as shown in a report by EEA titled: Earnings, jobs and innovation: the role of recycling in a green economy. The report states that overall employment related to the recycling of materials in European countries increased by 45 % between 2000 and 2007. To prevent waste disposal monopolies and ensure maximum benefits to local communities, incentives and financial assistance could be provided for the setting up of small scale local recycling operations, to keep recycling as close to the source of waste as possible and maximize localized economic growth. To enhance competitiveness, assistance for recycling operators to specialize in harder to recycle materials should be provided.

(3) Would full and effective implementation of the waste treatment requirements in the existing landfill legislation reduce sufficiently current landfilling of plastic waste?
No, there is no provision in the Landfill Directive 1999/31/EC that would lead to a 50% reduction of plastic waste. The current waste treatment requirements would not lead to a great enough reduction even if fully implemented. Other legislation is required to address the source of plastic waste before it reaches the disposal phase.

(4) What measures would be appropriate and effective to promote plastic re-use and recovery over landfilling? Would a landfill ban for plastic be a proportionate solution or would an increase of landfill taxes and the introduction of diversion targets be sufficient?

Yes, a landfill ban would be a proportionate response to the level of environmental harm created by plastics. A ban would ensure that small scale recyclers are able to survive by providing continuous supply of recyclable materials. Legislation must ensure that plastic waste streams are not diverted to incinerators. A ban would force producers to accept extended producer responsibility for their products as the disposal of throw away plastics would become more problematic, over time leading to a reduction in plastic use and more thought on product design. Also, this kind of action by the European Community would serve as an excellent public awareness campaign, bringing home to the public the reality that plastic is a severe problem that needs to be addressed urgently. This would also be true for the wider international community, and hopefully would lead to others following the Union's good example.

The landfill directive specifically states that "inert waste" means waste that does not undergo any significant physical, chemical or biological transformations. Inert waste will not dissolve, burn or otherwise physically or chemically react, biodegrade or adversely affect other matter with which it comes into contact in a way likely to give rise to environmental pollution or harm human health. New research shows that plastics cannot be classed as inert waste, as they have been shown to leach chemicals into the environment (Policy: Classify plastic waste as hazardous, Rochman et al. 2013, Nature 494). If land filling of plastics is allowed to continue, as hazardous waste, plastic should only be disposed of in hazardous waste landfill sites.

(5) What further measures might be appropriate to move plastic waste recovery higher up the waste hierarchy thereby decreasing energy recovery in favour of mechanical recycling? Would a tax for energy recovery be a useful measure?

Yes, a tax on energy recovery would serve as a deterrent for the use of this kind of disposal. Also, the current practice of awarding incinerators long term contracts should be ended, to prevent Member States becoming locked in to incineration and unable to improve their recycling levels. Incentives should be available for plastic recycling facilities to make them more competitive in the market place against incinerators.

(6) Should separate door step collection of all plastic waste combined with pay-asyou-throw schemes for residual waste be promoted in Europe, or even be made mandatory?

Yes, combined with a landfill ban on plastic waste. In places where pay as you throw has been implemented, a reduction in overall volume of waste has been seen. This could also be combined with no fees for recyclables and compost collection, or discounts on waste collection earned through plastic/bottles reverse vending or similar.

(7) Are specific plastic waste recycling targets necessary in order to increase plastic waste recycling? What other type of measures could be introduced?

If plastic waste is banned from landfills, this should naturally increase recycling, combined with disincentives for incineration.

(8) Is it necessary to introduce measures to avoid substandard recycling or dumping of recyclable plastic waste exported to third countries?

Yes, it should be ensured that countries receiving exported waste adhere to European standards of recycling.

(9) Would further voluntary action, in particular by producers and retailers, be a suitable and effective instrument for achieving better resource use in the life cycle of plastic products?

Yes, producers need to accept extended producer responsibility, as laid out in the Waste Framework Directive, and improve the design of their products to ensure end of life value. Retailers can achieve better resource efficiency by providing consumers with recycling and reuse information for products purchased, and also by requesting less packaging of products from the manufacturers. However, voluntary action alone is unlikely to achieve the required reduction in plastic waste, and needs to be coupled with targets and other incentives.

10) Is there scope to develop deposit and return or lease systems for specific categories of plastic products? If so, how could negative impacts on competition be avoided?

There should be a scope in deposit and return or lease systems for specific categories that have a high potential of entering the environment. The potential of entering the

environment has a strong relation with the location where the product is used. Packaging food/drinks that are used in the public space (on the streets, to go) have a much higher potential of entering the environment than packaging used within the household.

(11) What type of information would you consider necessary to empower consumers to make a direct contribution to resource efficiency when choosing a plastic product?

Consumers should be made aware of the plastic footprint of the product. What is the potential of the packaging of the product entering the environment?, What are the consequences of this? What actions does the producer en retailer of the product undertake to avoid the product entering the environment? What is the recycling rate of the product?

(12) Which changes to the chemical design of plastics could improve their recyclability?

-

(13) How could information on the chemical content of plastics be made available to all actors in the waste recycling chain?

-

(14) How can challenges arising from the use of micro plastics in products or industrial processes and of nano-particles in plastics be best addressed?

Plastic, or waste in European inland waters, is not a standard in the EU Water Framework Directive. Plastic is not monitored in European rivers, canals and lakes and there is no program and no action plan to manage plastic waste in inland European waters. This is problematic for the inland European ecosystems, but also creates a problem to achieve a Good Environmental Status within the EU Marine Strategy Framework Directive. In our view, there should be a program within the EU Water Framework Directive to cope with litter in European inland waters. This will also prevent that new sources will be introduced. A recent example is the adding of micro plastics, micro beads, to cosmetics. This is perfectly legal according to European legislation. Nevertheless, this is a very undesirable development. Future legislation should avoid this kind of waste introductions into the environment by stating that plastic does not

belong in our environment, and if standard/normal use of the product creates a plastic waste stream to the environment, this product is prohibited.

(15) Should product design policy tackle planned obsolescence of plastic products and aim at enhancing re-use and modular design in order to minimize plastic waste?

-

(16) Could new rules on eco-design be of help in achieving increased reusability and durability of plastic products?

-

(17) Should market based instruments be introduced in order to more accurately reflect environmental costs from plastic production to final disposal?

The ecologic and economic damage of plastic waste in the environment together with the cleaning costs should be incorporated in a market based approach.

(18) How can the waste burden posed by short-lived and single-use disposable plastic products best be addressed?

The waste burden of single use plastics is significant, and not reflected in their cost. Single use plastic bags should be banned, as called for by overwhelming public opinion. Other single use plastic products could carry a tax to reflect the ecological harm they cause, which can then be used to fund suitable waste treatment.

(19) What are the applications for which biodegradable plastics deserve to be promoted, what framework conditions should apply?

Biodegradable product can be promoted for products with a high potential of entering the environment. Nevertheless, it should be kept in mind that the claim of 'biodegradability' is not in place for most products as they don't biodegrade in the environment, for example in cold, anoxic, dark conditions. Using the term 'biodegradability' in such a context is misleading and confusing for the public. Further more, it should be kept in mind that stating that a product is biodegradable might encourage people to throw the product sooner in the environment.

(20) Would it be appropriate to reinforce existing legal requirements by making a clear distinction between naturally compostable and technically biodegradable plastics, and should such a distinction be subject to mandatory information?
See also answer (19).

(21) Would the use of oxo-degradable plastic require any kind of intervention with a view to safeguarding recycling processes, and if so, on which level?
Oxo-degradable plastics should be banned. They are non recyclable and have a very high potential of entering the environment as micro plastics.

(22) How should bio-based plastics be considered in relation to plastic waste management and resource conservation? Should the use of bio based plastics be promoted?
Bio based products should not be promoted as a solution to solve marine litter. A bottle made of bio-based PET is still PET and has the same negative impact on the environment.

(23) What actions other than those described in this Green Paper could be envisaged to reduce marine litter? Should some marine litter related actions be coordinated at EU level (e.g. by setting up a coordinated European Coastal Clean-up Day to raise awareness)?
A European Coastal Clean Up Day, run in conjunction with the successful clean up initiatives already being run by various NGOs would help raise public awareness of the problem, and assist municipalities in the burden of removing marine litter from the beaches. However, the problem of marine litter is extremely serious and this action alone would in no way be sufficient considering the litter that washes up on beaches is only a small percentage of the total amount in the marine environment. It needs to be recognized that once in the marine environment, effective, large scale removal is very difficult, and efforts should be focused on preventing plastic waste from entering the marine environment. This can be accomplished through better waste water treatment facilities, ensuring the removal of all size grades of plastics including micro particles, preventing storm water overflow into the seas, and other methods of dealing with plastic waste mentioned previously. More funding needs to be available for research into different methods of waste removal from the marine environment, and to ensure adequate monitoring methods are developed. Port reception facilities need to be

improved to ensure that all ships remove their waste at port and do not dump at sea, and existing legislation of MARPOL Annex V must be properly enforced.

(24) In its proposal for a new Environment Action Programme the Commission suggests that an EU wide quantitative reduction target for marine litter be established. How can the setting of such a target provide added value to measures that reduce plastic waste generally? How could such a target be developed?

NGOs advocate a 50% marine litter reduction target by 2020 as a stepping stone towards achieving Good Environmental Status – see our Marine Litter Manifesto. In addition, NGOS want to see a generational target of ending the marine litter problem in 2035. The 50% reduction target needs to be complemented with operational targets for land based waste sources, i.e. waste needs to be stopped at its source in order for it not to entire the riverine and marine environments.

The Regional Seas Conventions have the coordinating responsibility under the MSFD. It is important that the EU quantitative targets is translated to the regional setting and that RSCs implement related action plans and monitoring.

The marine litter targets that the Members States have set under the MSFD are currently lacking in concreteness; none of the MSs has proposed a quantified reduction target. If Member States set general targets such as a 'reduction' the effects are likely to be negligible. Setting a target ensures that a baseline is set and improvements are measurable. It is also likely to facilitate regional cooperation to achieve the target. Often gaps in data and knowledge are used as an argument by countries not to set quantitative targets. We would argue that in such situations, the precautionary principle should be adhered to, i.e. that gaps in data and knowledge should not prevent the taking of immediate no-regret actions to end litter at the source.

The Commission should, in its review according to Article 12 of the MSFD, send a strong message to the Member States emphasizing the need of SMART (specific, measurable, attainable, realistic and timely) targets.

(25) Should the EU attach a higher priority to plastic waste in the framework of its "New Neighbourhood Policy", particularly in order to reduce plastic littering in

the Mediterranean and in the Black Seas?

Yes, marine litter knows no boundaries, and no improvement will occur unless all countries address the sources of the problem through better waste management and waste reduction schemes. The EU can assist its neighbors in working towards a common goal of marine litter free seas by sharing best practices and research and providing incentives.

(26) How could the EU promote more effectively international action to improve plastic waste management worldwide?

The EU can set a good example to other nations through banning of plastic land filling, single use plastic bags and implementing the waste hierarchy. Then we can raise the issues at the relevant international organizations, with examples of best practices to follow.

(1345)

COUNCIL OF
THE EUROPEAN UNION

Brussels, 10 June 2013

10736/13

ENV	541
MI	516
IND	178
CONSOM	107
MARE	11

NOTE

from:	General Secretariat
to:	Delegations
Subject:	Micro-plastic litter: a growing environmental problem - Information from the Netherlands delegation

Delegations will find in Annex an information note from the Netherlands delegation on the above-mentioned subject, which will be dealt with under "other business" at the Council (Environment) meeting on 18 June 2013.

Micro-plastic litter: a growing environmental problem

- Information from the Netherlands delegation -

The Netherlands invites EU member states and the European Commission to start a discussion on the occurrence of micro-plastics in water systems and to propose a way forward on this issue.

The European Commission recently published a Green Paper on a European Strategy on Plastic Waste in the Environment.[1] In this Green Paper the European Commission mentions micro-plastics as one of the public policy challenges posed by plastic waste.

Micro-plastics are an important category of marine litter referred to in the EU Marine Strategy Framework Directive (MSFD), for which Member States will have to develop (future) targets and measures.

Micro-plastics are small plastic particles that can persist in the environment for hundreds of years. Sources include:

- plastic waste from land- and sea-based sources that degrades into smaller particles;
- micro-plastics which are increasingly being used in industry, household products and cosmetics (e.g. scrubs or toothpaste).

The Green Paper also points out that the concentration of micro-plastics in water is sometimes higher than that of plankton.

[1] COM(2013) 123 final

Plastics contain chemical additives. These chemicals can be released and enter the marine environment. Micro-plastics can adsorb toxic additives like PCBs or DDT. Relatively high concentrations of toxic substances have been found on micro-plastics.[1] Micro-plastics can enter the food chain through ingestion by marine fauna like sea cucumbers, plankton and mussels. Micro-plastics may harm plankton and mussels. The findings of a recent study on plankton[2] imply that micro-plastics can negatively impact upon zooplankton function and health if ingested in large quantities. Studies on mussels[3,4] show the same result.

The potential ecological and human health risks of micro-plastics are a relatively new area of scientific research. Although there is a still a large degree of uncertainty, what we already know gives us cause for concern. In this case, the precautionary principle applies.

The Netherlands believes that part of the solution would be to develop an EU policy that focuses on the sources of micro-plastics. Furthermore, since the cosmetics industry is already starting to take its share of responsibility, we would suggest considering a European ban on micro-plastics in cosmetics as a possible measure. According to the Dutch association of manufacturers and importers of cosmetics, or products for personal care, Beiersdorf, Unilever, Colgate-Palmolive and L'Oréal Group are examples of companies that will stop using micro-plastic scrub beads in their cosmetic products.

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[1] Mato Y., et al., 'Plastic Resin Pellets as a Transport Medium of Toxic Chemicals in the Marine Environment', *Environmental Science & Technology*, 2001, *35* (2), p.318-324

[2] Cole M, et al., 'Micro-plastic ingestion by zooplankton', *Environmental Science & Technology*, 2013

[3] Von Moos, N., et al., 'Uptake and effects of microplastics on cells and tissue of the blue mussel *Mytilus edulis* L. after an experimental exposure', *Environmental Science & Technology*, 2012, *46* (20), pp 11327–11335

[4] Besseling, E. et al.: 'Effects of microplastic on fitness and PCB bioaccumulation by the lugworm Arenicola marina (L.)', *Environmental Science & Technology*, 2013, *47* (1), pp 593–600

136)

[redacted]

Van: [redacted]
Verzonden: woensdag 11 juni 2014 15:31
Aan: [redacted]
Onderwerp: Concept memo mircoplastics
Bijlagen: Juridische inbedding verbod microplastics.docx

Dag [redacted]

Hierbij alvast voor onze bespreking morgenochtend een memo dat onze juridische collega heeft gemaakt. Dit stuk staat niet op de agenda de 19e maar het is wel belangrijk voor onze bespreking.

Mvg

[redacted]

136)

Ministerie van Infrastructuur en Milieu

Bestuurskern
Hoofddirectie Bestuurlijke en Juridische Zaken
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Contactpersoon
[redacted]
Senior-jurist
T [redacted]
M [redacted]
F [redacted]

Datum
27 mei 2014

memo

Juridische inbedding verbod op microplastics in cosmetica

Aanleiding

De Staatssecretaris heeft aan de kamer toegezegd te streven naar een Europees verbod op microplastics in cosmetica. Achtergrond van deze toezegging zijn de schadelijke effecten van microplastics op met name het mariene milieu. Doel van het verbod is dan ook bescherming van het milieu.

In dit memo wordt beoordeeld hoe de juridische inbedding van een dergelijk verbod kan worden vormgegeven. De beoordeling zal zich richten op de mogelijkheid om het verbod in Europese regelgeving op te nemen.

Inbedding in Europese regelgeving

I. Verordening (EG) nr. 1223/2009 – Cosmeticaverordening

De Cosmeticaverordening is gebaseerd op artikel 114 van het Verdrag inzake de werking van de Europese Unie (VWEU). Dit artikel biedt de grondslag om de interne markt te reguleren op terreinen als volksgezondheid, veiligheid en milieubescherming. Een verbod op microplastics ter bescherming van het (mariene) milieu valt binnen deze grondslag.

De Cosmeticaverordening heeft tot doel de interne markt te bevorderen en een hoog niveau van bescherming van de volksgezondheid te waarborgen. Bescherming van het milieu is geen expliciet doel van de verordening. Daarnaast bevat de verordening echter ook een verbod op het gebruik van dierproeven. Dit wordt gelinkt aan de beschikbaarheid van alternatieven voor het testen van de veiligheid van producten. [redacted]

Ten aanzien van milieuproblemen die stoffen in cosmetica kunnen veroorzaken zegt de verordening in overweging 5 dat deze al in aanmerking worden genomen in verordening (EG) nr. 1907/2006, REACH verordening. [redacted]

[1] Zie bijv. Richtlijn 2009/28/EG waar bij wijziging naast milieu de interne markt een grondslag werd

[redacted]

REACH heeft stoffen als aanknopingspunt en heeft niet als hoofddoel milieuproblemen rondom het gebruik van stoffen te voorkomen, maar ziet met name op informatievoorziening, eisen aan de productie, en het weren van ongewenste stoffen. [redacted]

Om het het doel van de verordening te bereiken wordt onder andere een aantal stoffen aangewezen die niet in cosmetica verwerkt mag worden. [redacted]

Conclusie: [redacted]

II. Verordening (EG) nr. 648/2004 – Detergentenverordening

De Detergentenverordening is ook gebaseerd op artikel 114 VWEU, zoals gezegd een artikel dat grondslag biedt voor stellen van regels ten behoeve van de bescherming van het milieu.

De verordening heeft tot doel de interne markt te verwezenlijken en hoog beschermingsniveau voor het milieu en de menselijke gezondheid te waarborgen. Bescherming van het milieu is dus nadrukkelijk een doel van de verordening.

Onderwerp van de verordening zijn detergentia, alle stoffen en mengels die zepen of andere oppervlakteactieve stoffen bevatten die bedoeld zijn voor was- en reinigingsprocedes. Wassen en reinigen ziet op het schoonmaken van produkten, niet op mensen. Cosmetica vallen nu niet onder het toepassingsbereik van de verordening. [redacted]

Conclusie: [redacted]

III. Richtlijn nr. 2000/60/EG – Kaderrichtlijn water

De Kaderrichtlijn water is gebaseerd op artikel 192 VWEU, het artikel dat de grondslag biedt voor het stellen van regels omtrent milieubeleid.

Het doel van de KRW is het geven van een kader voor de bescherming van landoppervlaktewater, overgangswater, kustwater en grondwater. Lidstaten hebben op grond van de KRW de verplichting om beheersmaatregelen te nemen. Daarnaast heeft de Europese Commissie een lijst opgesteld van stoffen waarvan lidstaten moeten zorgen dat de emissie ervan stopt dan wel wordt verminderd.

Momenteel is nog onduidelijk in hoeverre microplastics van invloed zijn op de doelen en beheersplannen die de lidstaten moeten opstellen. Het is hierdoor niet te bepalen of de KRW aanknopingspunten biedt voor het reguleren van microplastics.

IV. Zelfstandige regelgeving voor microplastics

Mircoplastics zitten niet alleen in cosmetica, maar zitten in meerdere producten.

[redacted]

[redacted]

[redacted]

Conclusie: [redacted]

Conclusie

[redacted]

[redacted]
Senior-jurist

137)

[redacted]

Van: [redacted]
Verzonden: dinsdag 18 juni 2013 13:17
Aan: [redacted]
CC:
Onderwerp: RE: Environment Council, 18 June - Microplastics

I have spoken to one company myself, Unilever. And that's due to the fact that this company has its headquarters in the NL and that it's a big company. Furthermore I have contact with our Dutch association that represents the cosmetic industry on this topic. Our Dutch association is very active and has introduced this topic to their colleagues in Europe. And I have contact with a NGO, The Plastic Soup Foundation. This NGO is very active and has a lot of influence on companies in the NL that add micro beads to cosmetic. [redacted]

My contacts with the industry are via the Dutch association (represents 80% of the cosmetic industry). What I see is that the Dutch industry is willing to take action on this topic because consumers are getting more and more aware of the issue. And they are able to take action because there are good natural alternatives to micro beads. And what I also see is that companies that buy cosmetics to sell it to their clients now starting to demand to their suppliers that they deliver products without microbeads (on a very small scale but it's a beginning).

[redacted] The association wrote a letter to our Minister in which it declared that 80% of their members will have found an alternative to micro beads in the next 1,5 years (2015).

I hope this will give you some ideas.

Best regards,

[redacted]

Van: [redacted]@defra.gsi.gov.uk]
Verzonden: donderdag 13 juni 2013 12:00
Aan: [redacted]
CC: [redacted]
Onderwerp: RE: Environment Council, 18 June - Microplastics

[redacted]

Thanks. Our position on the paper is influenced by our Government's general wish not to introduce legislation and burden on business. A lot of my time at the moment is tied up in initiatives to reduce and remove legislation and regulation across all marine related businesses and activities.

However, I am interested in your ideas of removing micro-plastics from use by industries and would like to hear more of how you are approaching industry on the ideas and their thoughts. There could be opportunities to discuss with industries here and put together some ideas that might contribute to MSFD measures.

Thanks and regards

[redacted]

[redacted]
Marine Programme Manager
Defra
8B Millbank
Nobel House
17 Smith Square

London
SW1P 3JR
[redacted]@defra.gsi.gov.uk

From: [redacted]@minienm.nl]
Sent: 13 June 2013 05:15
To: [redacted]
Subject: RE: Environment Council, 18 June - Microplastics

Good morning [redacted]

[redacted]

[redacted] One thing I learned however [redacted] And another thing I learned is [redacted] In the NL we have quite a lot of experience with private companies that are willing to take action on a voluntary bases and from those processes we know this. In other words: [redacted]

[redacted]

Best regards,

[redacted]
Sustainability Department

[redacted]

Van: [redacted]@defra.gsi.gov.uk]
Verzonden: woensdag 12 juni 2013 18:32
Aan: [redacted]
Onderwerp: RE: Environment Council, 18 June - Microplastics

[redacted]
Thanks again for further information.

[redacted]
It would be helpful to have some clarification on the last part of the AOB paper for 18 June where it proposes:

The Netherlands believes that part of the solution would be to develop an EU policy that focuses on the sources of micro-plastics.

Could you say what this might include?

On the idea of a ban on micro-plastics in cosmetics, I think our line will be to encourage further voluntary action by industry before a ban is considered but yet to be confirmed.

Thanks and regards

[redacted]

Marine Programme Manager
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8B Millbank
Nobel House
17 Smith Square
London
SW1P 3JR
[redacted]@defra.gsi.gov.uk

From: [redacted]@rws.nl]
Sent: 12 June 2013 07:52
To: [redacted](Defra)
Subject: RE: Environment Council, 18 June - Microplastics

Hi [redacted]

Thanks a lot for sending the UK Green Paper comments. My colleague [redacted]

[redacted]

Van: [redacted] Defra) [mailto:[redacted]@defra.gsi.gov.uk]
Verzonden: dinsdag 11 juni 2013 12:47
Aan [redacted]
CC: [redacted]
Onderwerp: RE: Environment Council, 18 June - Microplastics

Hi [redacted]

[redacted]

Regards

[redacted]

Marine Programme Manager
Defra
8B Millbank
Nobel House
17 Smith Square
London
SW1P 3JR
[redacted]@defra.gsi.gov.uk

From: [redacted]@rws.nl]
Sent: 11 June 2013 10:39
To [redacted] (Defra)
Cc [redacted]
Subject: RE: Environment Council, 18 June - Microplastics

Hi [redacted]

Main outcome is to put in on the Agenda. And to discuss it further at the meeting in October (?). We realise that at that stage there should be a good basis to present. Could you send me/us your comments on the Green Paper [redacted]

Kind regards
[redacted]

Van: [redacted]@defra.gsi.gov.uk]
Verzonden: dinsdag 11 juni 2013 11:24
Aan [redacted]
CC: [redacted] (Defra); [redacted] (Defra); [redacted] (Defra); [redacted] (CEFAS); [redacted] (Defra)
Onderwerp: Environment Council, 18 June - Microplastics

Hello [redacted]

I hope you are well.

I have been asked to provide some brief comment on a paper to be presented by the Netherlands to the Environment Council meeting on 18 June on 'Microplastics in the environment'. I attach a copy.

<<Micro-plastic st10736.en13.doc>>

The main discussion in the paper is about microplastics entering the marine environment and a call for a ban on microplastics in cosmetics. The paper quotes the Commission's green paper on plastics, particularly the section on microplastics.

As you know, the UK has some concerns about the way research has been quoted in the Green Paper. As we discussed at TSG, when papers are quoted they tend to acquire authority and it is then difficult to ensure the true picture is understood by a wider audience.

I wanted to check with you what outcome is expected from the paper.

Thanks and regards

[redacted]

[redacted]

Marine Programme Manager

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Department for Environment, Food and Rural Affairs (Defra)