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Can microplastics transfer *Toxoplasma gondii* parasites to marine foodwebs?*

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Introduction

Toxoplasma gondii, a cosmopolitan apicomplexan protozoan parasite with a well documented zoonotic capability, infects an estimated two billion people worldwide, thereby causing particularly severe disease forms in immunocompromised patients. Food consumption, with special emphasis on raw or undercooked meat, is an important source of *T. gondii* infection for mankind (Belluco et al., 2018).

T. gondii oocysts, shed into the surrounding environment by infected cats and/or wild felids, the definitive parasite hosts, may subsequently reach the marine ecosystem via a "land-to-sea cycle/transfer", thus infecting the resident cetofauna, whose health and conservation status may be severely impacted by such pathogen (Di Guardo et al., 2010). In this respect, while *T. gondii* exposure and infection appear to be largely plausible in "coastal/inshore" species like bottlenose dolphins (*Tursiops truncatus*), the modalities through which "pelagic/offshore" species like striped dolphins (*Stenella coeruleoalba*) may acquire the infection are totally unknown (Di Guardo et al., 2010). It has been hypothesized that the increasing global contamination by plastics/microplastics/nanoplastics - the powerful activity of which as "attractants and concentrators" of chemical pollutants has been repeatedly documented – could also be responsible for *T. gondii* transfer into the open sea, with the additional support of water movements secondary, at their turn, to dramatic events like tsunamis (Di Guardo and Mazzariol, 2017). Indeed, a huge distance dispersal across the Pacific Ocean has been reported for hundreds of (mostly) invertebrate organisms after the catastrophic tsunami occurred in March 2011 along the Eastern coast of Japan. Such an impressive trans-oceanic spread of living organisms was greatly enhanced by micro-nanoplastics, which most likely acted as "rafts" for them (Carlton et al., 2017).

Noteworthy, *T. gondii* has been recently identified also in several edible fish species sold on the market (Marino et al., 2019) and, since no clear-cut evidence is hitherto available to my knowledge on the fish susceptibility to this infection, such an alarming finding of public health concern provides further support to the assumption that *T. gondii*-contaminated micro-nanoplastics behaved as the likely infection's vehicle after having been eaten by fish.

In conclusion, while the herein hypothesized "*T. gondii*/micro-nanoplastics synergism" warrants further study, an integrated approach based upon the complementary "One Health" and "One Ocean One Health" concepts would be highly recommended in order to elucidate the complex dynamics driving the mutual "animal/human host-parasite-foodweb interactions" within the marine ecosystem.

* This article is published as an "Opinion in dispute". Members of the Editorial Board of "Protistology" do not necessarily concur with the author.

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