



EDITORIAL NOTE

Microplastics - challenges ahead

ALEXANDER W.A. KELLNER

There is no other way to say it: microplastics are already present in the diet of various species on our planet. And that includes us, *Homo sapiens*! Derived from the fragmentation of plastic material, microplastics are defined as all plastic particles smaller than 5 mm (e.g., Van Sebille et al. 2015). No one will question that plastics – which consist of a variety of synthetic materials formed mainly by polymers – have revolutionized various areas of industrial activity. Furthermore, this material has provided great improvements to human life and brought many benefits to the world economy.

However, its long durability, undoubtedly one of its main attractions, is paradoxically considered to be its greatest danger due to the absurd accumulation that tends to increase exponentially in the coming decades (e.g., Jambeck et al. 2015), with worrying scenarios for the future (e.g., Lebreton & Andrady 2019). In some geographical regions, such as Antarctica, the concentration of microplastics seems to still be in an early stage (Miranda et al. 2023), but, considering the planet, concern is growing among scientists and beginning to reach decision-makers. As a personal experience, I still remember the horror I felt while conducting fieldwork in remote areas of Angola, walking along beaches littered with tons of plastic material. It was shocking to realize that it did not come from the small villages in the region, but from elsewhere, carried by the sea to these otherwise idyllic locations, negatively affecting those who did not produce this garbage.

Although pollution is a widespread problem in current ecosystems, such as that caused by pesticides (e.g., Cunha et al. 2024) – which has been of greater public concern –, the degree of microplastic contamination has been drawing the attention of researchers for some time. However, the general perception is that the average person has not yet fully grasped the danger these polymers pose to humanity, with potential effects on our health whose consequences are not yet fully understood. There is no doubt, however, that microplastics are already integrated into the food chain of various species, including fish, and accumulate as we move up the trophic level (e.g., Carty et al. 2025). Even more striking is the finding that microplastics are being found in placentas (Oliveira et al. 2025), and even in the brain (Academia Brasileira de Ciências 2025).

Seeking to raise awareness and find ways to mitigate this problem, the Brazilian Academy of Sciences recently published a report on the subject (Academia Brasileira de Ciências 2025). Coordinated by Adalberto Luis Val (Instituto Nacional de Pesquisas da Amazônia, Manaus) and Mário Barletta (Universidade Federal de Pernambuco), the report involved the participation of approximately 10 researchers to study the problem. Furthermore, Adalberto Luis Val and Maria Inês Bruno Tavares

(Universidade Federal do Rio de Janeiro) edited this special edition of the Annals of the Brazilian Academy of Sciences, which includes several original studies on the issue of microplastics, offering a Brazilian perspective on the problem.

For some time now, the AABC has been publishing thematic volumes addressing specific topics (e.g., Kellner 2024). This is also the case with AABC 97.Suppl.3, which brings together a total of 20 articles, all on different aspects of microplastics. The contributions were divided into the following areas: Chemical Sciences (2), Health Sciences (1), Ecosystems (8), Geosciences (1), Animal Science (2), and Engineering Sciences (6). The breadth of scientific areas covered demonstrates the complexity of the topic, but also how it is possible to seek solutions from different perspectives. I would like to thank the editors who brought together these thought-provoking articles, which offer an interesting perspective on the problem of microplastics through the eye of Brazilian researchers.

I believe it is common sense that solutions to microplastic contamination fall into the same category as fossil fuels: we are overly dependent on them. While humanity is not going to get rid of plastic anytime soon, there are some approaches that can (or should) be developed to mitigate the problem. Education, as always, is fundamental, as the Brazilian Academy of Sciences report of 2025 makes clear. Increased recycling efforts are another crucial point that can mitigate the situation (Lau et al. 2020). Brazil has innovated in several areas (e.g., McManus et al. 2024), but microplastic research is not one of them. Perhaps this edition of the AABC can contribute to changing this situation, as well as supporting the efforts of scientists worldwide to raise awareness and find viable solutions to this complex and threatening problem.

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