

**Title of Research:**

19\_R05-01

**Study on the contribution of microplastics to bioaccumulation and biological magnification towards fish**

**Principal Investigator:**

Tatarazako Norihisa (Professor, Ehime University, Graduate School of Agriculture)  
3-5-7 Tarumi, Matsuyama, Ehime, 790-8566 Japan

**Collaborators:**

Tatsuhiro Niino (LSI Medience Corporation)  
1000 Kamoshidacho, Aoba-ku, Yokohama-shi, Kanagawa 227-0033, Japan  
Shin Takahashi (Ehime University, Graduate School of Agriculture)  
3-5-7 Tarumi, Matsuyama, Ehime, 790-8566 Japan  
Yoshifumi Horie (Akita Prefectural University)  
241-438 Kaidobata-Nishi Nakano Shimoshinjo Akita City 010-0195 Japan

**Summary of Research:**

The microplastics (MPs) are detected from sewage treated water or sea water, and harmful chemical substances are known to adsorbed to those MPs. And there is a concern about those adsorbed chemicals may be taken more efficiently to organisms intermediated by MP and that biological concentration or biological magnification is accelerated. Our study will try to clarify whether the chemical substances adhered to MP are eluted, and absorbed / transferred / accumulated in the body of organisms.

This year, we reviewed the kind of solvent to be adsorbed on MP of PAHs and the quantitative analysis procedure, and when the amount of adsorption was re-measured under new procedure, the result was PE> PP> TF. A significant correlation was observed between the amount of PAHs adsorbed and the octanol / water partition coefficient. Furthermore, the amount of PAHs adsorbed on MP was higher in seawater than in pure water. It is necessary to confirm the acute toxicity of MPB itself in medaka and daphnia in order to determine the set concentration for the accumulation test. Medaka did not die with MPB of all sizes, whereas daphnia showed acute toxicity with MPB of 0.2 and 0.5  $\mu\text{m}$  in diameter. Medaka was toxic to benzo [a] pyrene and pyrene in an extended acute toxicity test. When larvae and Daphnia larvae were fed 5  $\mu\text{m}$ -diameter fluorescent MPB and observed under a microscope, both were confirmed to accumulate MPB in the digestive tract, but no transfer to other internal organs and muscle tissues was observed. In addition, in order to examine biomagnification, it was examined whether fluorescent MP was transferred to juvenile medaka through daphnia. Although water flea was eaten by medaka, MPB was transferred, but no accumulation of MPB was detected.

In the next fiscal year, we will determine the concentration of chemicals accumulated in fish by feeding MPs with PAHs adsorbed. The transfer efficiency is determined from the total intake and the amount of chemicals in the fish.

**Timeline:**

March 1, 2019 - February 29, 2020

**Topics:**

Poster presentation at JCIA LRI Annual Workshop 2019 "Study on the contribution of microplastics to bioaccumulation and biological magnification towards fish" (Tokyo, August 30th, 2019)

**Publications:**

1. Norihisa Tatarazako, Kazufumi Misawa, Yukiyo Okazaki, SETAC Europe 29th Annual Meeting 26–30 May 2019 | Helsinki, Finland, poster
2. Yukiyo Okazaki, Takahiro Ishizaka, Norihisa Tatarazako, SETAC Europe 29th Annual Meeting 26–30 May 2019 | Helsinki, Finland, poster
3. Norihisa Tatarazako, Yukiyo Okazaki, SETAC North America 40th Annual Meeting 3–7 November 2019, Metro Toronto Convention Centre, Toronto, Ontario



Other issues to be urgently addressed.

4. Yukiyo Okazaki, Norihisa Tatarazako, Shin Takahashi, Harumi Kasahara, Yaeko Sera, Tatsuhiro Niino, SETAC North America 40th Annual Meeting 3–7 November 2019, Metro Toronto Convention Centre, Toronto, Ontario