Microflora Investigation Experiment

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Many microorganisms were isolated from condensed water, wiping and scratching of cabin wall and air sampler in Russian space station Mir by Russian astronauts Lazutkin *et al.* in February 1997 as part of NASDA "First MIR Utilization Space Experiment (JMIR)". For example, there were about 2×10^6 cells/ml in condensed water sample No. 1 isolated from the transfer-docking compartment of Crystal module. We tried the colony isolation, pure culturing and identification from these sampled microorganisms. After the bacteria separated from filamentous fungi and yeasts were observed using the phase contrast optical microscopy and gram stain method, twenty-one kinds of biochemical characters, *e.g.*, oxidase test, activity of β -galactosidase and fermentation of glucose *etc.*, were investigated on the isolated bacteria. Then, we found *Serratia liquefaciens* and *Yersinia enterocolitica* and the chemoheterotroph Pseudomonadaceae, *Stenotrophomonas maltophilia*. Furthermore, using ultraviolet (UV) lamp we tried the isolation of radioresistant bacteria, we found the radioresistant *Sphingomonas paucimobilis* (90.8% identification) by comparing with radioresistant *Escherichia coli* B/t strain. Considering Mir environment under cosmic radiation, this radioresistant *S. paucimobilis* might be the mutant from radiosensitive one. Following papers were published.

Papers published on this subject

- 1) NASDA Pamphlet (1997) First Mir utilization space experiment. National Space Development Agency of Japan, Tokyo.
- 2) Harada, K., Ozaki, Y., Oshima, T., Yamagishi, A., Ezaki, T., Takata, T., Ishikawa, Y., Kawasaki, Y., Koike, J., Ohnishi, T., Nakano, T., Nagaoka, S., Shimazu, T. and Saitoh, S. (1997) What are microorganisms living in Russian space station Mir? (in Japanese) *Bio. Sci. Space*, **11**, 262-263.
- 3) Harada, K., Ozaki, Y., Tarui, M. and Miki, S. (1998) First report for microflora investigation experiment on board Mir. (in Japanese) *Proceedings of the Meeting of Shuttle/Mir Mission (S/MM) and First Mir Utilization Space Experiment (JMIR)*, Tokyo, p.IV167-IV180.
- 4) Harada, K., Sugahara, T., Miki, S., Nakano, T., Nagaoka, S. and Shimazu, T. (1998) What is radioresistant bacterium living in Russian space station Mir? (in Japanese) *Abstracts for the Annual Meeting of the Japan Society for Bioscience, Biotechnology, and Agrochemistry*, Tokyo, p.8.
- 5) Harada, K., Ozaki, Y., Obiya, Y., Oshima, T., Ezaki, T., Takata, T., Tsuchiya, M., Sugawara, I., Nakano, T., Nagaoka, S., Shimazu, T., Nakane, Y., Saitoh, S. and Kumagai, T. (1998) Microorganisms living in aquatic areas of Russian space station Mir. (in Japanese) *Abstracts for the Meeting of the Japanese Society of Fisheries Science*, Tokyo, p.131.

Fig. 1 Photograph and location of sampling area by dry filter in core module of Russian space station Mir (Courtesy of RSA/NASDA).