

Abstracts

Hereditary effects of radioactive fallout on gall-forming aphids and the subsequent recovery process near the Fukushima Daiichi Nuclear Power Plant

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To evaluate the effects of fallout from the Fukushima Daiichi Nuclear Power Plant (FNPP) accident on organisms, I compared the morphology and viability of gall-forming aphids in a Fukushima population with that of control populations from non-contaminated area. The gall is a part of a tree that aphids have transformed from the leaf tissue, and aphids develop and parthenogenetically produce offspring within the gall. Galls are useful for identifying the aphid species, the survival rate and fecundity. I focused on the morphology of the first-instar gall-formers derived from the first sexual reproduction after the accident. Of 164 instars of *Tetraneura sorini* galls obtained 32 km from FNPP in spring 2012, 13.2% exhibited morphological abnormalities; 2.4% were conspicuously malformed individuals [1]. In contrast, in seven control areas, the average percentage of the first instars with abnormal morphology was 3.8% (0.0–5.1% in the total range). The frequencies of abnormality and mortality were significantly higher in Fukushima than in control areas. However, only 0.37% of second-generation larvae from Fukushima had abnormalities, suggesting that abnormalities found in the first generation were not inherited by the next generation. It was interesting that radioactive contamination was reported in the bark, but inside the galls (made of new leaves) was not directly affected by the fallout. Furthermore, analysis of the aphids collected in spring 2013 indicated that the viability and

healthiness of the aphids were significantly improved compared with those collected in 2012. Thus, the results of this study suggest the possibility that a reduced level of radiation and/or selection for radiation tolerance may have led to improved viability and healthiness of the Fukushima population. These results suggest that radioactive contamination near to the FNPP had deleterious effects on embryogenesis in eggs, but a negligible influence on the second generation (produced in closed galls). I am now undertaking further research, analyzing how the DNA sequences vary over years.

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REFERENCE

1. Akimoto S. Morphological abnormalities in gall-forming aphids in a radiation-contaminated area near Fukushima Daiichi: selective impact of fallout? *Ecol Evol* 2014;4:355–69.