Feeding of a wingless stonefly living on snow surface in Mt. Gassan, Yamagata prefecture, Japan

*Risako Yonechi[1], Nozomu Takeuchi[1]

1. Chiba University

There is a biological community on snow and ice consisting of cold-tolerant organisms. For examples, photosynthetic microbes (snow algae), heterotrophic invertebrates and bacteria are living on snow packs in Japan. Wingless stoneflies are also snowy insects commonly found in Japan. They are basically aquatic insects spending in streams when they are nymphs, but actively walks on the snow surface in winter and spring when they become adult. Wingless stoneflies in Japan have been classified into thirty species belonging to two genera (Apteroperla and Eocapnia) based on their morphological perspectives. Several species have been reported to appear on a snow surface simultaneously, however, it is still unknown that their feedings and life cycles. In this study, we reported the spatial distribution and feedings of wingless stoneflies found on snow packs in Mt. Gassan, Yamagata prefecture, Japan.
The fieldworks were conducted three times in April, May and June of 2018 in a south slope of Mt. Gassan, where heavy snow covers during winter and spring. We collected wingless stoneflies on snow surface at 13 sites in different elevations from a summit of Mt. Ubagatake (1487 m.a.s.l) down to Shizu camp site (770 m.a.s.l). We identified their species based on their body morphology using a microscope. We also analyzed carbon and nitrogen stable isotopes of the collected stonefly specimens. The stable isotopes were analyzed with an IRMS (Isotope Ratio Mass Spectrometer) at Research Institute for Humanity and Nature.
Fifty male specimens were classified into two genera. Apteroperla stoneflies were mostly found in the area above 1000 m a.s.l., conversely Eocapnia stoneflies were found in the area below 1000 m a.s.l. This suggests that the two genera have different habitats in this mountainous area. The nitrogen stable isotope of the wingless stoneflies was not significantly different between Apteroperla and Eocapnia (1.10 - 0.95‰ versus -1.63 - 1.05‰), indicating that the tropic levels of two genera are almost same. Carbon stable isotope also did not differ significantly between the two genera (-26.2‰ versus -25.7‰). However, the variance of the carbon stable isotopes of Apteroperla is smaller than that of Eocapnia (0.29‰ versus 3.00‰). This suggests that Apteroperla stoneflies have limited dietary habits while Eocapnia has broad eating habits.

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