Two new snail species discovered in Lake Biwa after systematic revision

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Diversification and systematic revision of Japanese freshwater snails—species Semisulcospira decipiens. Credit: KyotoU/Naoto Sawada

Snails may look slow and sleepy, but evolutionarily the freshwater

mollusks in Lake Biwa have been busy. However, despite evidence of morphological and genetic variation, new species divergence long went unnoticed.

Now, Kyoto University researchers have identified two new extant species of Semisulcospira, a highly divergent freshwater snail endemic to Japan's largest body of fresh water. Their findings come about despite a discordance between the shell morphology and the current definition of the species Semisulcospira decipiens.

"The results from our study resolve part of the taxonomic problem of the Semisulcospira genus by updating our knowledge of its species diversity, evolution, and interactions among the species in Biwa-ko," says lead author, Naoto Sawada.

Along with two new species—S elongata and S cryptica—two new lake phylogroups, S niponica group and S nakasekoae group, exhibited intraspecific variation highlighting shell morphology and habitat adaptation.

"The habitat-related variation has probably caused the taxonomic confusion of the lacustrine species," Sawada explains. Lake drainage—generating ecological isolation between river and lake habitats—has contributed to increased species diversity of the genus.

This uncertainty in the genus' systematic status necessitated genome-wide study of population genetics, based on single-nucleotide polymorphism. In addition, random forest classification of the shell morphology was crucial in clarifying the species diversity of Semisulcospira.

"Using these methods, our team not only determined the taxonomy of eleven known species and two new species but also enhanced our

understanding of species diversity, rarity, and evolutionary patterns of these species thriving in the ancient lake," says Sawada.

The paper "Systematic revision of the Japanese freshwater snail Semisulcospira decipiens (Mollusca: Semisulcospiridae): implications for diversification in the ancient Lake Biwa" appeared in *Invertebrate Systematics*.

More information: Naoto Sawada et al, Systematic revision of the Japanese freshwater snail, *Invertebrate Systematics* (2022). DOI: 10.1071/IS22042

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