Research on the Conservation, Growth Conditions and Ecology of Unionoida

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Freshwater mussels of the order Unionoida is a spawning ground for bitterlings and are therefore an important species in freshwater ecosystems. However, they face global extinction threat due to habitat destruction and pollution. In this study, we investigated a species of Unionoida, Unio douglasiae nipponesis (U.d.nipponesis), in a riverine environment to determine its growth, lifestyle, and conservation strategies. Previous research has shown that U.d.nipponesis typically resides in sandy gravel riverbeds without sulfide deposits and eddies formed around their shells enhance their foraging efficiency in flowing water. Additionally, reproduction of U.d.nipponesis requires a host fish species. This study examined the possible variation in the shell orientation of U.d.nipponesis in response to localization direction of current velocity. An aquarium with the same flow conditions as those in the field was set-up to examine the behavior of U.d.nipponesis. Results showed that U.d.nipponesis tended to align their shells with the flow velocity, similar to their behavior in the wild. Therefore, water flow was visualized using a mixture of colored water and laundry glue, and it was found that the shape of the surrounding vortex changed depending on the orientation of the shell. In fast currents, U.d.nipponesis positioned themselves to reduce resistance, whereas in slow currents, they created a higher resistance to optimize vortex formation. These findings suggest that U.d.nipponesis adjust its shell orientation in response to current strength. Therefore, U.d.nipponesis can be protected by maintaining a moderate-current environment and a sandy gravel bottom with a variety of coexisting fish species.

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