Supplementary information for

# Core gut microbes *Cloacibacterium* and *Aeromonas* associated with different gastropod species could be persistently transmitted across multiple generations

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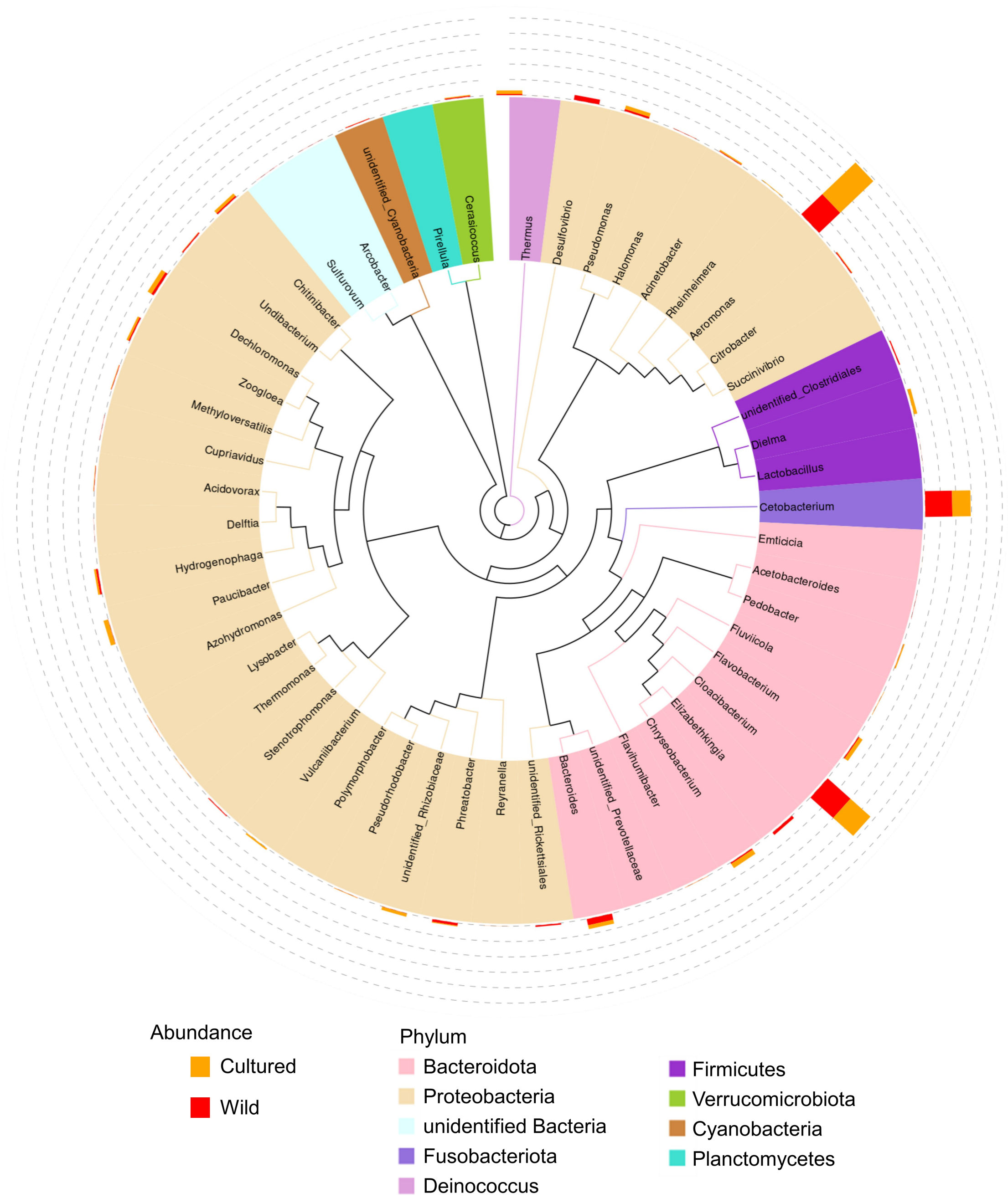

**Fig. S1** Overview of the gut microbiome of freshwater gastropods at the genus (Top 50) and phylum level. The yellow and red columns indicated the relative abundance of gut microbes of wild and cultured populations, respectively. Cultured snails refer to the laboratory snails cultured under laboratory conditions.

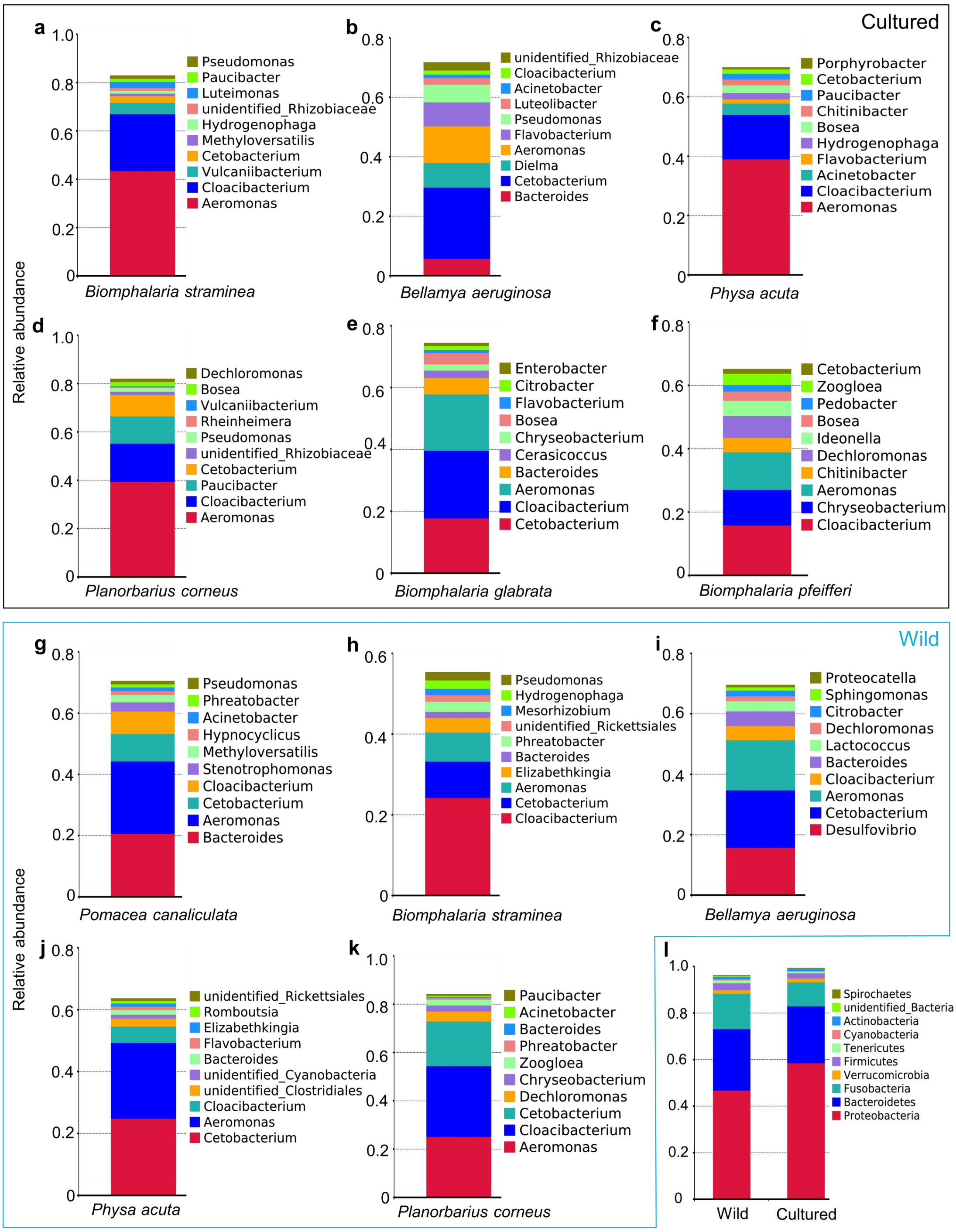

**Fig. S2** Overview of the gut microbiome of freshwater gastropods at the genus and phylum level. **a-f** Gut bacterial genera of cultured freshwater gastropods, including *B. straminea* (n =6), *B. aeruginosa* (n =8), *P. acuta* (n =4)*, P. corneus* (n =6), *B. glabrata* (n =7) and *B. pfeifferi* (n =8). **g-k** Gut bacterial genera of wild-caught freshwater snails, including *P. canaliculata* (n =3), *B. straminea* (n =14), *B. aeruginosa* (n =6), *P. acuta* (n =6) and *P. corneus* (n =6). **l** The relative abundance of bacterial phyla. Cultured snails refer to the laboratory snails cultured under laboratory conditions.

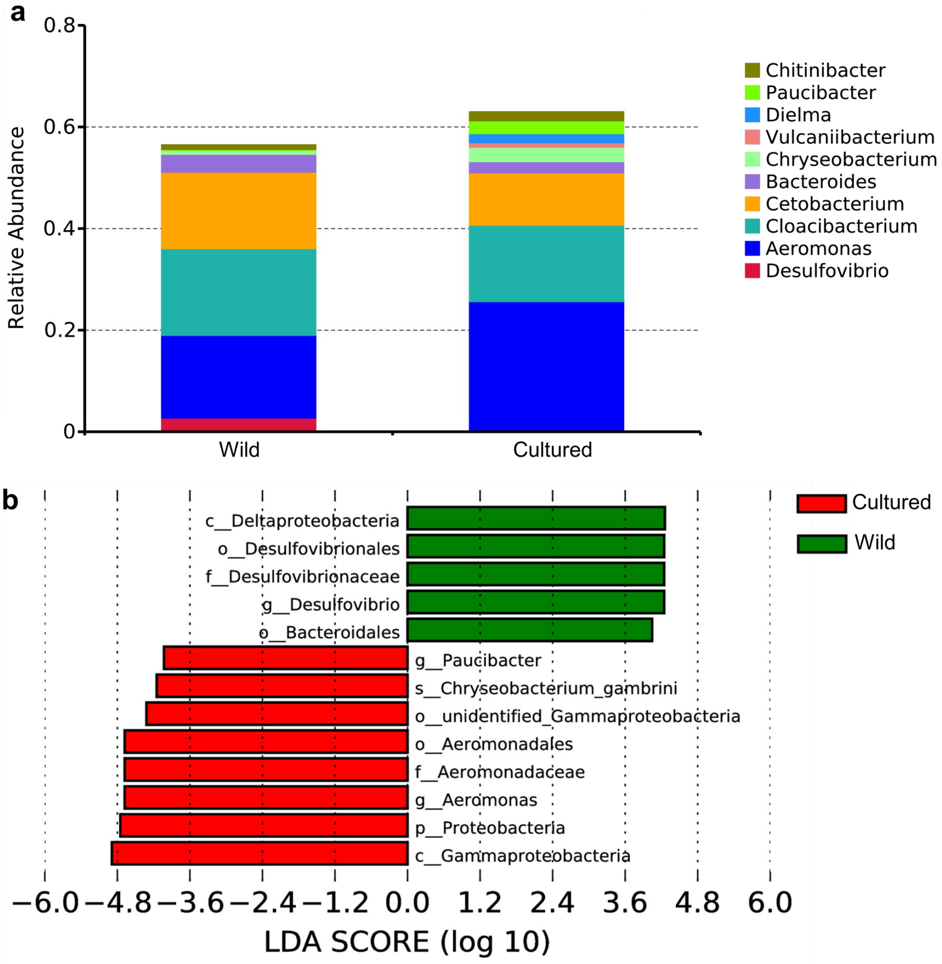

**Fig. 3** Difference in gut microbiota between wild and cultured freshwater gastropods. **a** At the genus level. **b** A linear discriminant analysis (LDA) effect size (LEfSe) analysis. Cultured snails refer to the laboratory snails cultured under laboratory conditions.

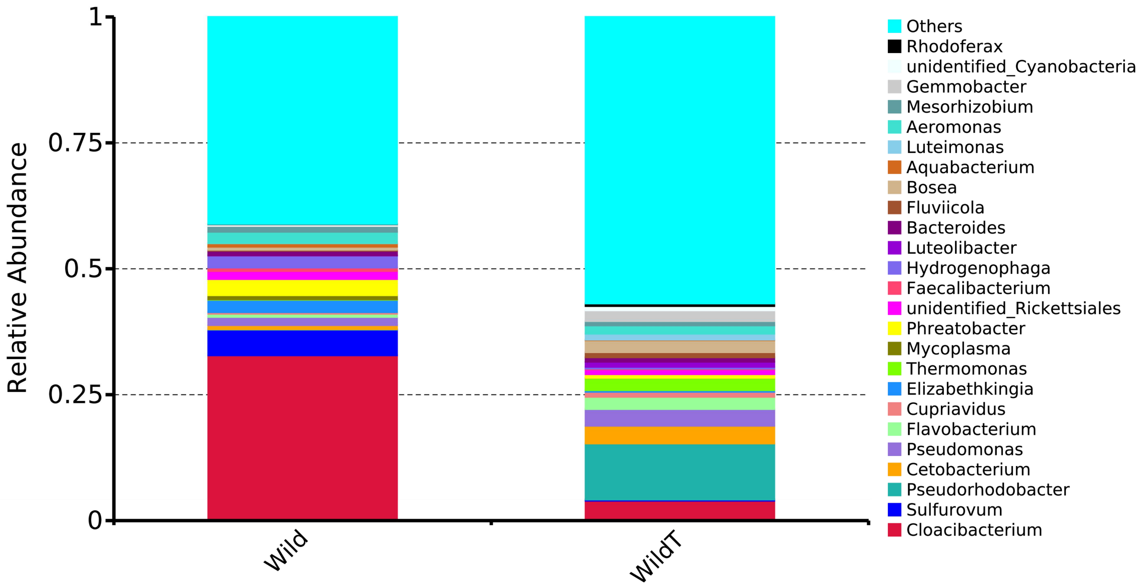

**Fig. S4** The relative abundance of gut microbiota of Wild and Wildt gastropods. Wild: wild-caught snails. WildT: wild-caught snails being transferred to the laboratory.

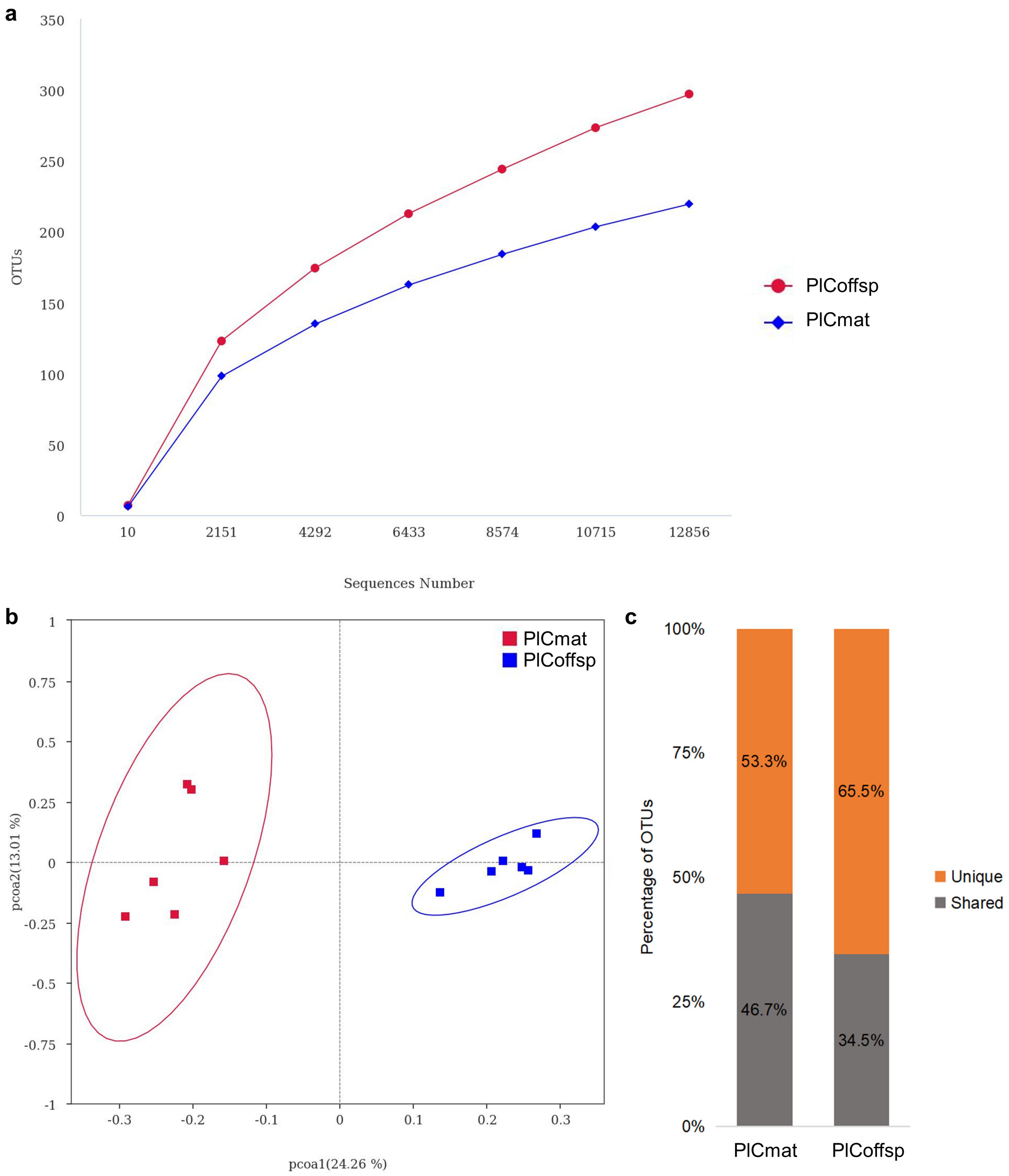

**Fig. S5** Overview of vertical shifts of gut microbes in *Planorbarius corneus* gastropods over generations. **a** PCoA of gut microbiota communities of wild and the F1 generation of *Planorbarius corneus* snails. **b** PCoA. **c** The number of OTUs are shared or unique to sample types. PlCmat: Maternal *P. corneus* snails. PlCoffsp: the offspring (F1 genernation) of maternal *P. corneus* snails reared under laboratory conditions.

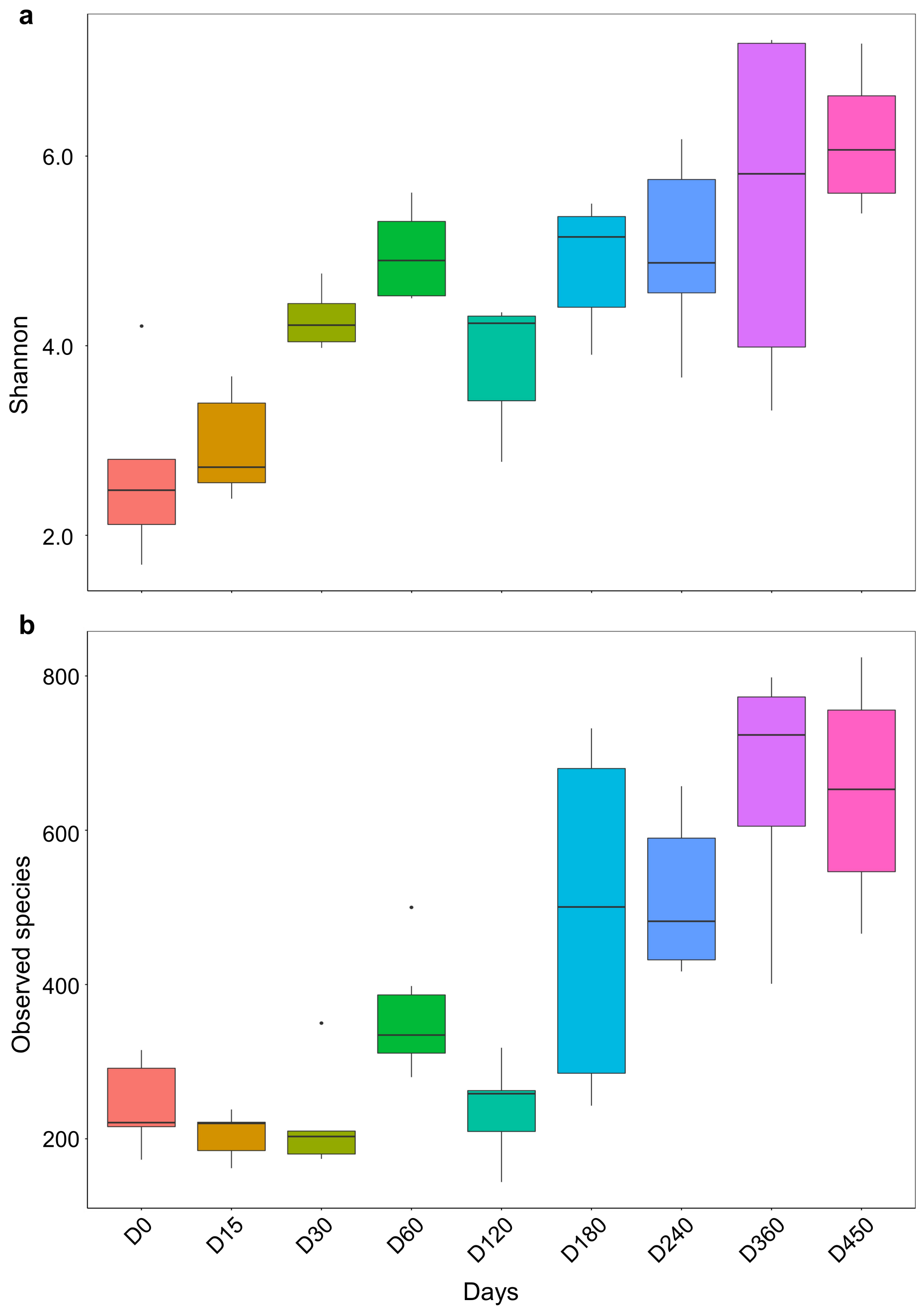

**Fig. S6** Longitudinal shifts (from 0 days to 450 days) in the gut microbiome community diversity of freshwater snails. **a** Shannon index. **b** Observed species index.

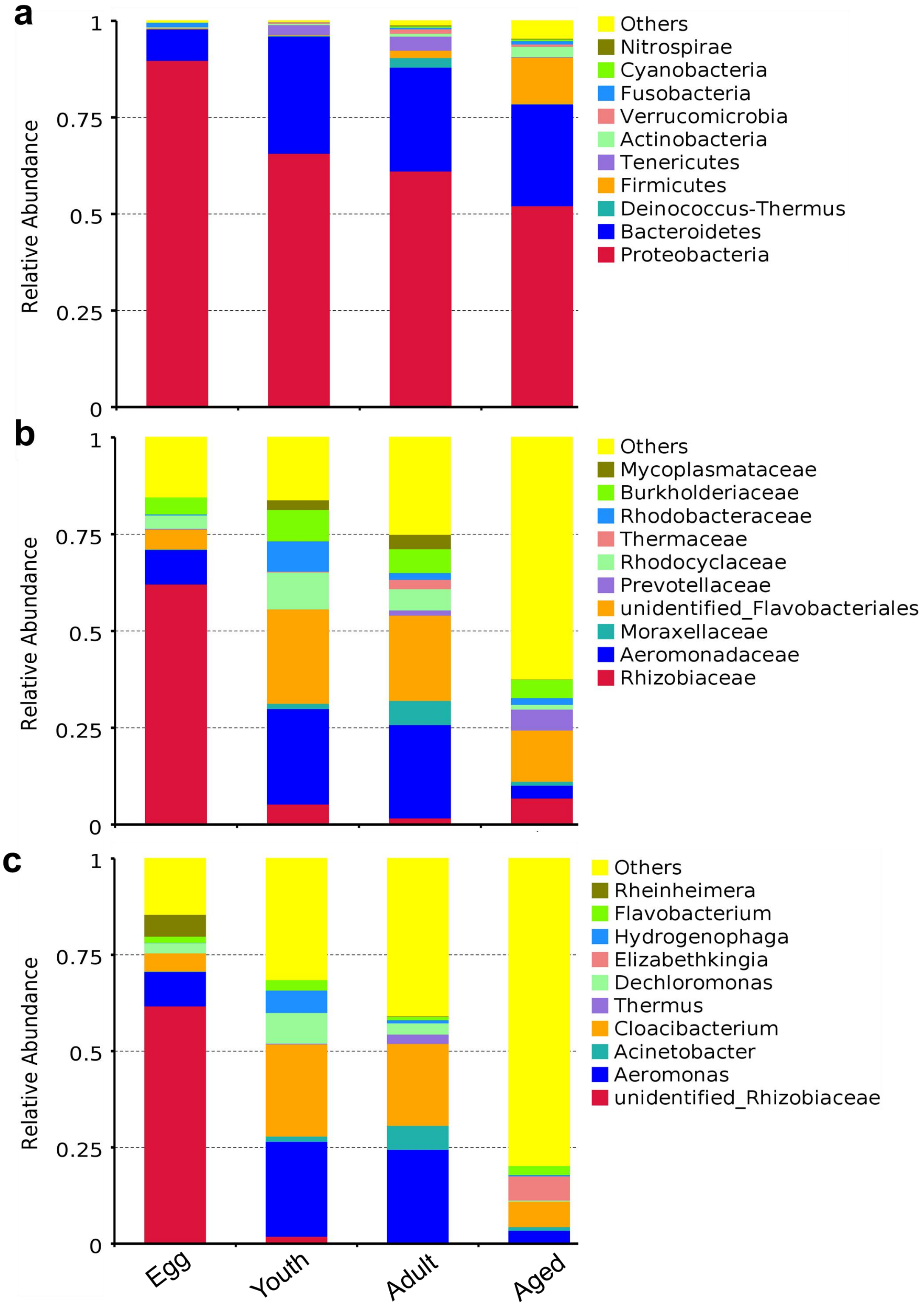

**Fig. S7** The relative abundance of gut microbiota of freshwater gastropods across developmental stages. **a** At the phylum level. **b** At the family level. **c** At the genus level.

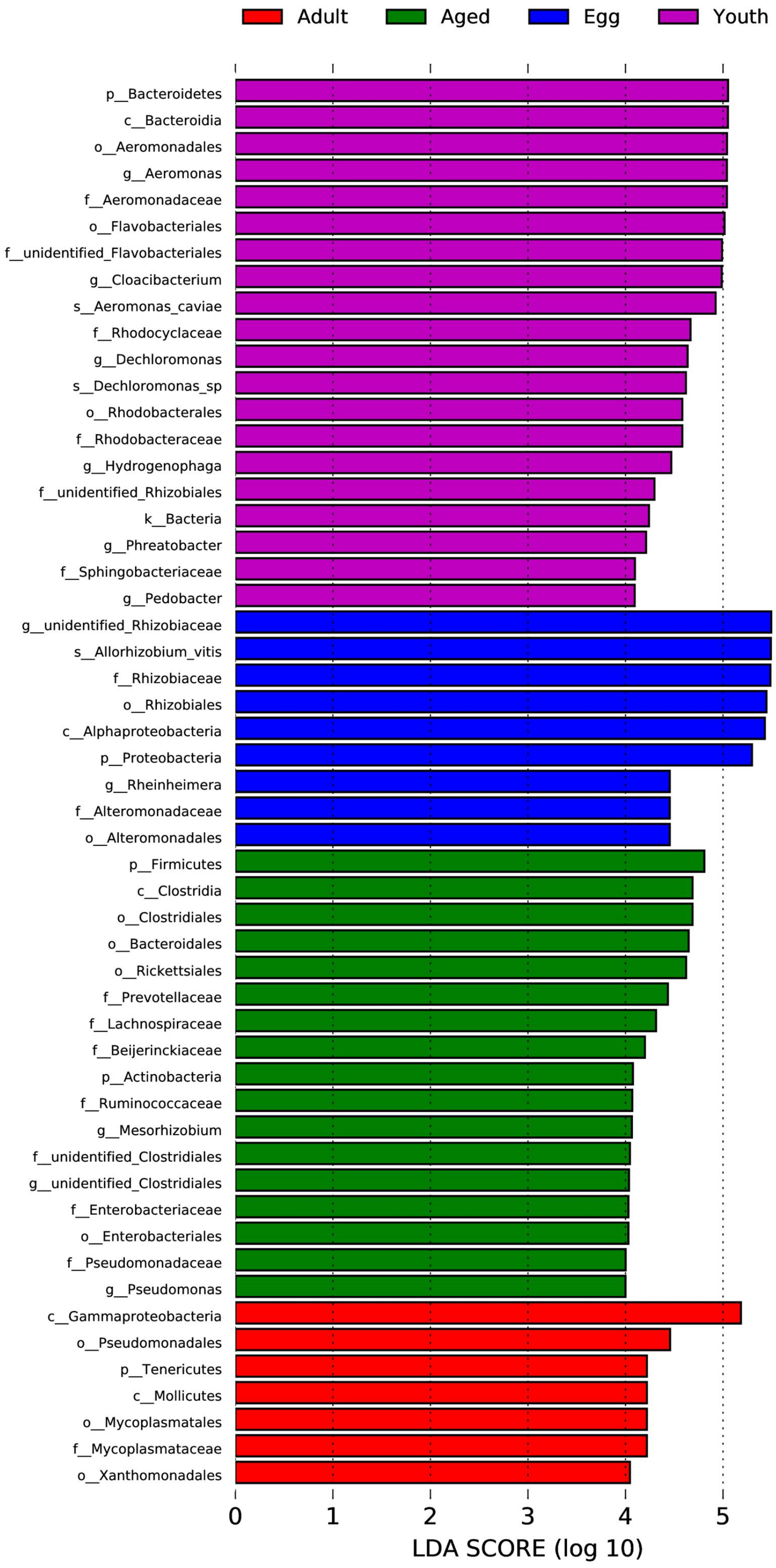

**Fig. S8** Differential gut bacterial taxa analyzed by LEfSe analysis with LDA score >4 across developmental stages.

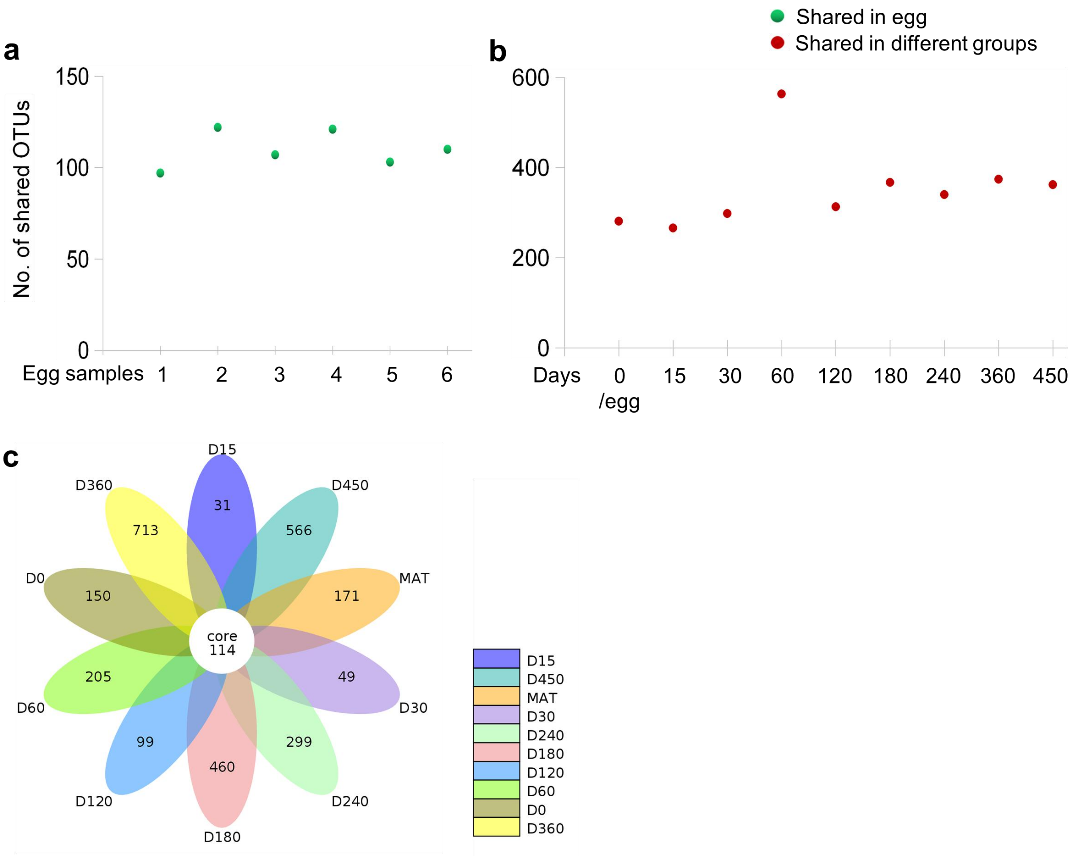

**Fig. S9 a** Percentage of OTUs from maternal snails transmitted to eggs. **b** Percentage of OTUs from maternal snails transmitted to snails at different developmental stages. **c** Venn diagram of the "core" microbes shared among different developmental stages.

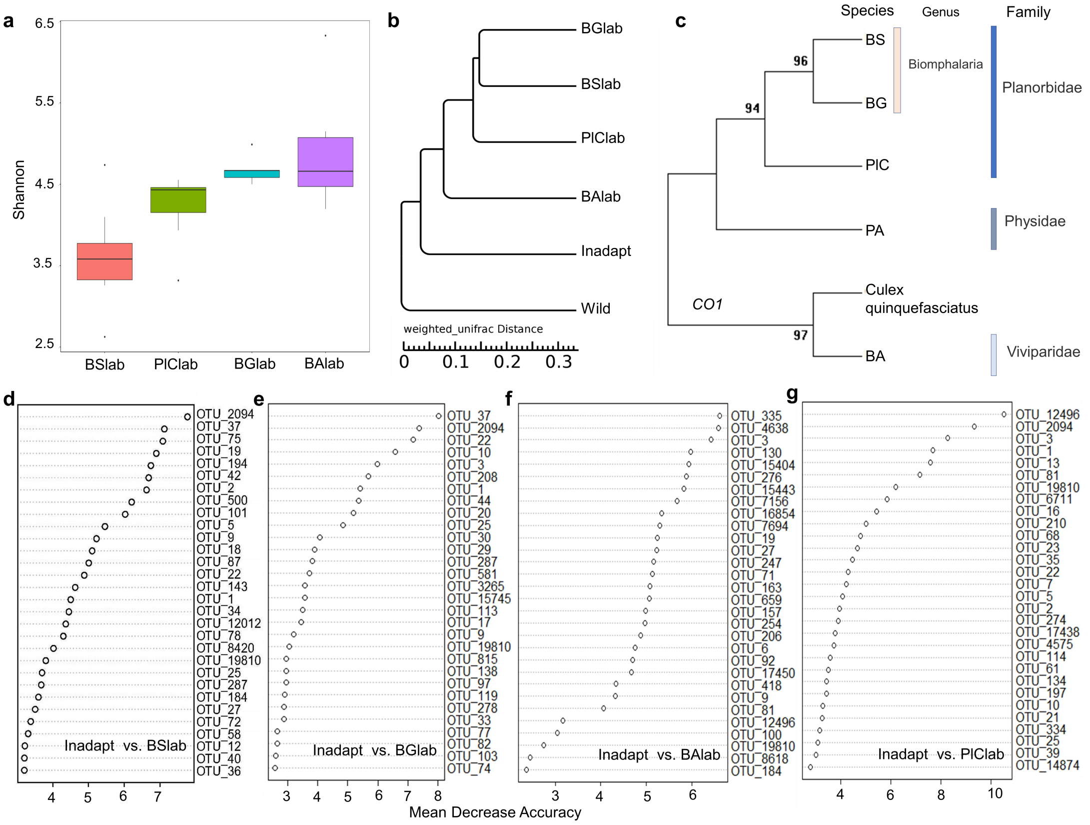

**Fig. S10** Adaptation of gastropods is associated with gut microbiota. **a** Shannon index. **b** UPGMA analysis conducted based on binary Jaccard distance. **c** Phylogenetic evolutionary constructed based on the maximum-likelihood algorithm for *CO1* gastropod sequences. **d-g** Top 30 fitness-related OTUs compared with different local populations are shown.

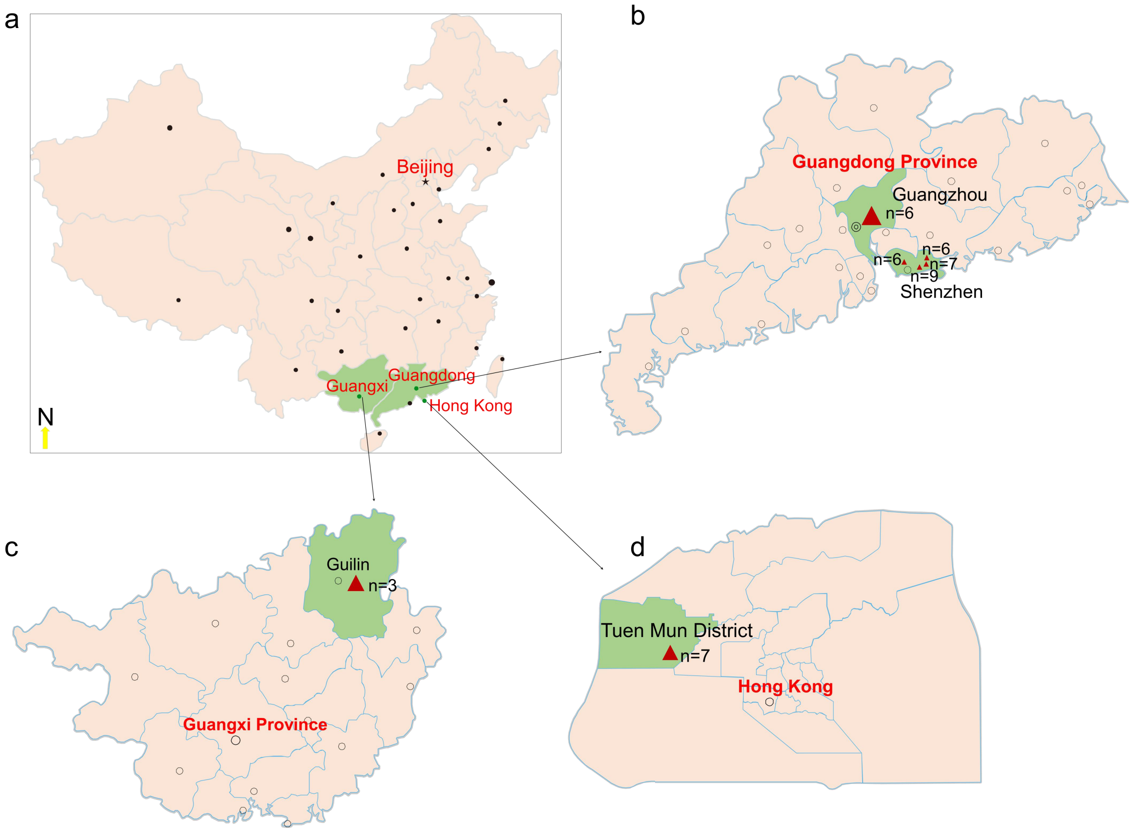

**Fig. S11** Overview of sampling study of wild snails. **a** Wild snails were collected from Guangdong (**b**), Guangxi (**c**), and Hong Kong (**d**) in China. The major sites were marked on the maps. The red triangles indicate the sampling sites.

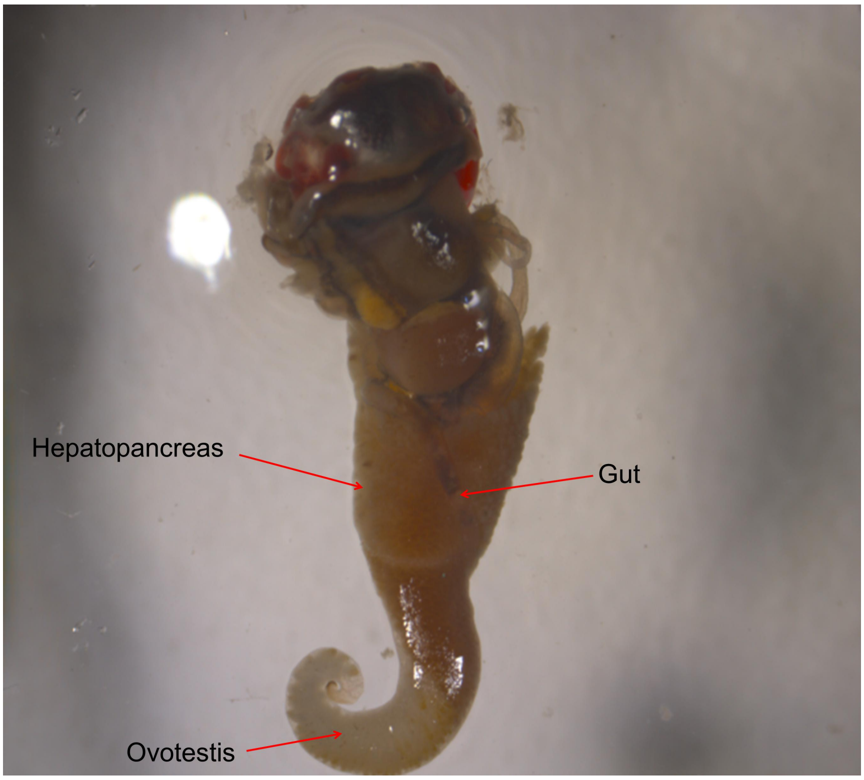

**Fig. S12** Picture of body tissue of *Biomphalaria straminea*.