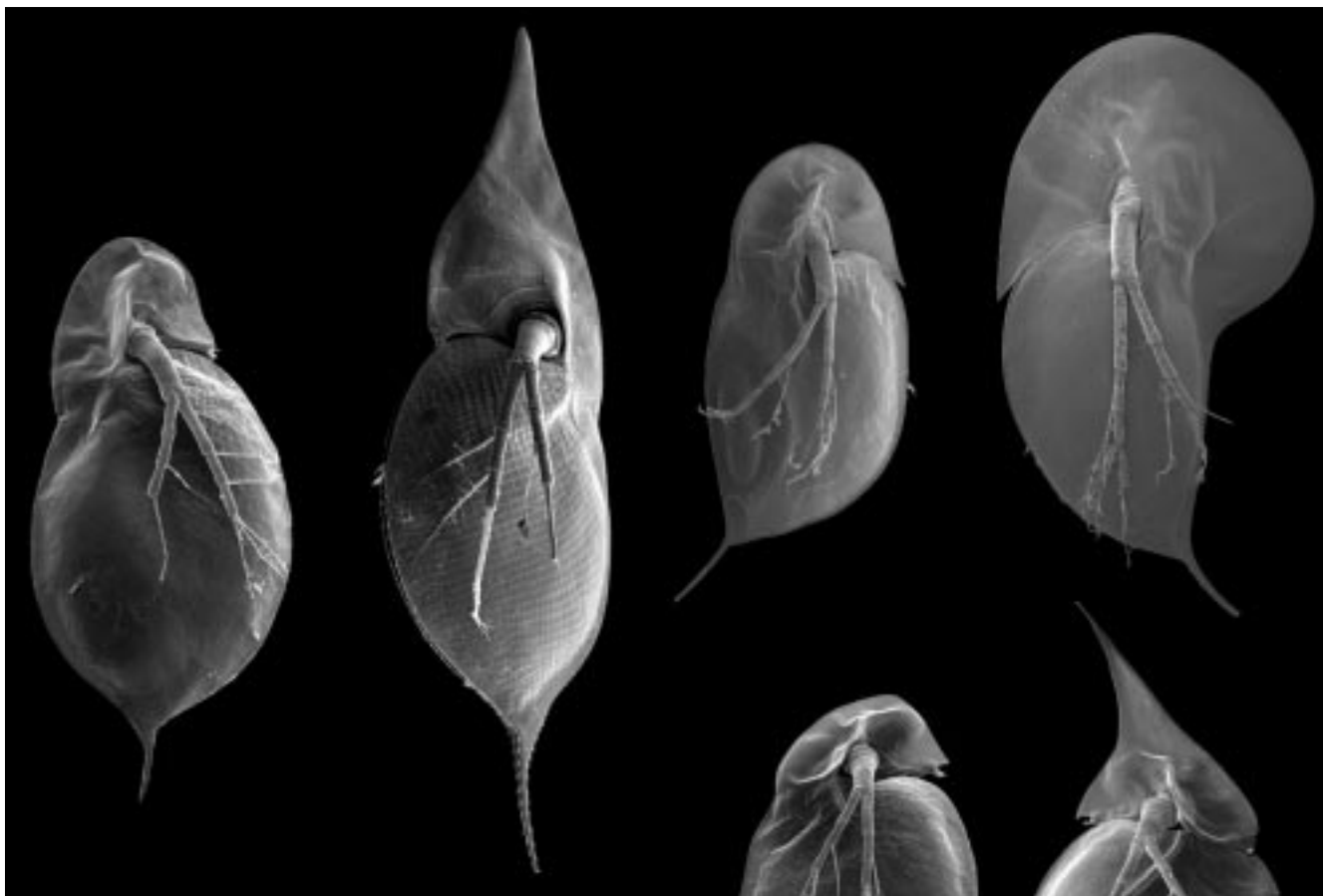


Biology in pictures

Safety helmets



Unlike the helmet of Perseus, the helmet of the water flea (*Daphnia* spp.) does not make it invisible, but it does confer some protection against predators by making the fleas harder to catch. Water fleas do not necessarily begin life with a helmet but can form one as a morphological defence in response to chemicals released by their predators. The images above show three pairs of water fleas from different species; the non-helmeted morph is on the left in each pair of fleas. Clockwise from the top left these are: *Daphnia cucullata*; the Australian species *Daphnia longicephala*, whose huge crests keep their predator, the backswimmer, from getting a firm grasp on them; and the Asian/African

species *Daphnia lumholtzi*, whose distinctive helmets protect them against even fish.

But being able to develop a helmet is no good to the water flea if it is attacked before it has done so. In *Daphnia*, females who have grown helmets can transmit this benefit to their offspring, thereby improving their reproductive success. Their offspring not only start life with a form that provides better protection but, in the face of predatorial threat, can go on to develop larger helmets than the offspring of nonhelmeted females in the same environment. This bequeathing of a helmet is an

example of a maternally induced (transgenerational) adaptation; genes activated in the mother are expressed as a phenotype in their offspring. For further details, see Agrawal A.A., Laforsch C. and Tollrian R., *Nature* 1999, **401**: 60-63. Images provided by Ralph Tollrian and Christian Laforsch, Ludwig-Maximilian University, Zoological Institute, Karlstrasse 25, 80333 München, Germany.