Photo: M. Kalbe, MPI for Evolutionary Biology, Plön

The Lab in the Big Lake

Sunshine, water, blue skies and a castle in the background – many people associate the lakes in and around Plön, in northern Germany, with carefree vacation days. The scientists at the Max Planck Institute for Evolutionary Biology have certainly not lost sight of the beauty of the landscape, but the main focus of their interest is one of the lakes' inhabitants and its genes. The three-spined stickleback (*Gasterosteus aculeatus*) feels very much at home along the shores of Great Plön Lake. And right here, amid the natural nesting grounds of these small fish, is where the Institute's open water research labs are located.

In six large cages, the sticklebacks – bred in a lab and released into the lake in the spring – are able to claim territories in natural environments, build nests and reproduce, while at the same time being exposed to the parasites that are found there. What makes these fish special is that the specific individual combination of immune genes of every single animal is known. This enables the researchers to observe which sticklebacks are the most resilient in the never-ending competition with the parasites and – as father and mother are determined for every single egg with the help of molecular genetic methods throughout the entire breeding season – how many progeny each fish has.

The most resistant fish pass on their immunocompetence to their numerous offspring. It appears that female sticklebacks prefer mating partners whose immune genes best complement their own – and that, through their healthy coloration, prove that they possess the necessary genotypes against the currently prevalent parasites. The mother's choice of partner thus has a direct advantage for her young.

The females identify which male is worth considering for mating not only by coloration, but also by the odor of the potential partner, because odor is determined – just as in humans, incidentally – by the composition of the immune genes.