The Kerguelen Islands: where carnivorous fish digest carbohydrates

Two laboratories of the INRA at Saint-Pée-sur-Nivelle, NuMéA and Ecobiop, have shown that the trout of the Kerguelen Islands can digest and metabolize carbohydrates. Quite a surprising feature in a fish that is theoretically carnivorous.

Those who are not familiar with salmonids, the discovery of the Ecobiop and NuMéA researchers on the capacity of Kerguelen Island trout to metabolize carbohydrates will probably remain indifferent.

This is however an amazing revelation as salmonids, generally described as strictly carnivorous, are used to displaying marked hyperglycemia when they ingest carbohydrates. It was thought for a long time that this was due to the absence - or non-functionality - of a key enzyme involved in the carbohydrate metabolism: glucokinase. A first step was made in the early 2000s, when Stéphane Panserat (NuMéA) succeeded in proving the presence and functionality of glucokinase in farm fish.

The hypothesis put forward at the time was that this gene was probably involved in other functions that had not yet been uncovered.

The work carried out since 2015 by the two laboratories of the INRA on a common trout population of the Kerguelen Islands has shown that fish raised in their natural environment can also digest and metabolize carbohydrates.

As it happens, the glycogen found in the fishes' stomachs comes from insects that feed on Acaena (endemic plant species).

This discovery raised many other questions as pointed out by Lucie Marandel (NuMéA) and Jacques Labonne (Ecobiop) who benefited from the support of the MIRA research federation and the Paul-Emile Victor Polar Institute: "Does this phenomenon exist elsewhere than in the Kerguelen Islands? If this fish naturally metabolizes carbohydrates, can we imagine feeding farm fish with greater amounts of dietary carbohydrates? Has the genome of salmonids kept this characteristic to face environmental changes or to colonize new environments?"

The papers on the subject are published in STOTEN.

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