

# Identification of transgenic organisms

March 27 2018

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The left panel shows two adult individuals that carry the transgene on only one of their chromosome pairs. Both beetles have inherited variants of the transgene with different markers that have led to either green or blue fluorescent compound eyes. The right panel shows a descendant of the two adult individuals on the left which carries the transgene in both chromosomes -- but with different markers. Thus, its compound eyes are fluorescent turquoise. Credit: Strobl/Stelzer, Goethe University Frankfurt

Researchers at Goethe University Frankfurt have developed a concept called AGameOfClones, which allows them to distinguish whether transgenic organisms carry an inserted foreign gene on one or on both chromosomes. This facilitates breeding and also benefits animal welfare.

To understand biological processes, researchers often use model [organisms](#) such as mice, zebrafish and various species of insects, with the underlying idea that their discoveries can also be transferred to other species. A common technique is genetic manipulation, a process where a

foreign gene (also known as a transgene) is inserted into one of the chromosomes of the target organism. Many model organisms have pairs of chromosomes—one inherited from each parent. In these pairs, the [genes](#) are arranged in the same order but are not necessarily identical.

Newly created transgenic organisms, however, carry the transgene on only one of the chromosomes. This can pose a problem for researchers because many experiments require [individuals](#) that carry the foreign gene on both. Unfortunately, only costly and error-prone methods can distinguish between these individuals. To overcome these drawbacks, Frederic Strobl from the research group led by Professor Ernst Stelzer at the Buchmann Institute for Molecular Life Sciences of Goethe University Frankfurt developed a genetic concept called AGameOfClones and applied it to the red flour beetle *Tribolium castaneum*.

In this approach, the foreign gene also contains sequences for two [protein markers](#) with different fluorescent colours. After several generations of breeding, two variants of the transgene emerge that each retain only one marker. This means that in the following generation, the descendants with both markers must be the progeny that carry the transgene on both [chromosomes](#).

The AGameOfClones concept has several major advantages: Individuals with different markers can be easily identified and the procedure is cost-efficient, reliable and can be applied to almost all model organisms. This benefits especially [animal welfare](#), since individuals that are unsuitable for use in experiments can be excluded as soon as the markers become detectable.

**More information:** Frederic Strobl et al, A universal vector concept for a direct genotyping of transgenic organisms and a systematic creation of homozygous lines, *eLife* (2018). [DOI: 10.7554/eLife.31677](https://doi.org/10.7554/eLife.31677)

Provided by Goethe University Frankfurt am Main

Citation: Identification of transgenic organisms (2018, March 27) retrieved 21 June 2024 from <https://phys.org/news/2018-03-identification-transgenic.html>

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