Applications of an extensive DNA barcode reference library
NGS-based Analyses of Mixed and Bulk Samples

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BACKGROUND INFORMATION

Here we present applications and workflows of DNA metabarcoding utilizing Next Generation Sequencing (NGS) for identification of animal species present in environmental samples. All projects take place within the framework of the German Barcode of Life (GBL) initiative at the Bavarian State Collection of Zoology (SNSB-ZSM).

FOOD SECURITY

We investigate species compositions of processed food for human consumption, in order to test the potential of metabarcoding for the validation of ingredients and contaminants.

THE WORKFLOW:

1. Obtain food of interest
2. Sample preparation
3. Sequencing
4. Identification of ingredients

PROCESSED FISH FOODS. Processed foods containing fish such as flaked fish sticks, tuna fish sticks, and other bought soups were tested via DNA barcoding. DNA barcoding could not contain Alaska pollock instead of the promised salmon.

PROCESSED ARTHROPODS IN NOVEL FOODS. An energy bar containing a 1% content of buffalo semen (Alphitobius diaperinus) was analyzed and the species. throws the result away. Is the lab able to find proof? Aristillus crenatus<br>Thanasimus formicarius

FUTURE PROJECTS. Future plans include testing alcoholic beverages such as beer and wine for the presence of animal contamination, and the application of metabarcoding with ITS2 to test beer, juice and apple samples provided by the TUM (Technische Universität München).

BIODIVERSITY MONITORING

We use NGS techniques for biodiversity monitoring, with the goal of providing an early warning system of invasive and pest arthropod species recovered from traps in the Bavarian Forest National Park.

THE WORKFLOW:

1. Sampling
2. Bulk sample preparation
3. Sequencing
4. Identification of pest species

DETECTING PEST SPECIES. With an in-depth database, pest species within bulk samples can be identified easily.

FORENSIC ENTOMOLOGY

We have applied this technique to provide forensic entomologists with a reference library containing forensically relevant arthropod species collected from multiple sites of decomposing organisms, with the goal of relieving the workload and obtaining accurate and rapid results.

THE LIBRARY. The reference library contains 136 different species collected from various locations across Germany.

PIG CADAVERS. v. an experienced with dead pigs are examined the arthropod community composition is preserved (including self) in the corpses and test it changed over time.

OUTLINE: Difficult to identify are cases, where visual identification would be either too time-consuming (e.g. within bulk samples) or impossible because the organisms are present as immature life stages, belong to cryptic species, or are present only in fragments or trace amounts.