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Water quality — Sampling, capture and preservation of environmental DNA from water

Qualité de l'eau — Échantillonnage, collecte et conservation de l'ADN environnemental prélevé dans l'eau

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Foreword

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This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 5, *Biological methods,* in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 230, *Water analysis,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

The monitoring of organisms is key to the assessment of the status of aquatic ecosystems and is required by national and international legislation such as the European Union Water Framework Directive (2000/60/EC). A wide range of methods exist that describe how to monitor organisms in aquatic environments (e.g. EN 14011[2], EN 14757[3], EN 15460[4]). These approaches, however, necessitate either the capture or collection, or both, of the organisms of interest, which can be a laborious and time-consuming process.

The possibility either to detect the presence of organisms or quantify relative abundance (e.g. see Reference [7]), or both, in aquatic environments via the analysis of environmental DNA (eDNA) provides a novel means to monitor biodiversity across a wide range of taxonomic groups, including microorganisms, plants and animals[8][9][10]. This approach allows examination of organismic diversity without the need to directly isolate and capture organisms and it is expected to play a key role for future biomonitoring aiming at species inventories with high temporal and spatial resolution[11]. Albeit the power of the eDNA approach has been repeatedly reported[12], there is a great need for standardizing the application of eDNA-based assessment of aquatic biodiversity[13][14].

This document addresses the first crucial step for any further downstream eDNA-based analyses of biodiversity. Routine sampling of benthic diatoms from rivers and lakes adapted for metabarcoding analyses is given in CEN/TR 17245[5].

Water quality — Sampling, capture and preservation of environmental DNA from water

WARNING 1 — Persons using this document should be familiar with water sampling protocols used to assess biological diversity. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

WARNING 2 — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff.

1 Scope

This document specifies procedures for sampling, capture and preservation of environmental DNA (eDNA) in aquatic environments, originating from organisms

— that are present or have recently been present in a water body, or

— whose DNA has been introduced to the water body through some mechanism.

This document also specifies procedures for avoiding sample contamination and ensuring the integrity of environmental DNA during water filtration and sample preservation. It also specifies the required equipment and metadata reporting.

This document excludes:

— methods for the collection of eDNA from biofilms, sediments or similar sample types;

— passive sampling methods;

— sampling designs.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
cross-contamination
unintended transfer of any source of DNA from one sample to another sample