International Standard

ISO 17174

Molecular biomarker analysis — DNA barcoding of fish and fish products using defined mitochondrial cytochrome b and cytochrome c oxidase I gene segments

Analyse de biomarqueurs moléculaires — Codes-barres d'ADN de poissons et de produits à base de poisson à l'aide de segments de gènes mitochondriaux de cytochrome b et cytochrome c oxydase I

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Foreword

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Introduction

Food safety is a key aspect in terms of consumer protection. In the last three decades, globalization has taken place in the trade of food. Fish trade channels are becoming steadily longer and more complicated so that sophisticated traceability tools are needed to ensure food safety. Correct food labelling is a prerequisite to ensure safe fish products and fair trade as well as to minimize illegal, unreported and unregulated (IUU) fishing. In particular, the fact that fish is increasingly being processed in export countries makes the identification of species by morphological characteristics impossible. The development of reliable, harmonized and standardized protocols for the authentication of fish products is necessary to ensure consumer protection and the detection of potential food fraud.

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Molecular biomarker analysis — DNA barcoding of fish and fish products using defined mitochondrial cytochrome b and cytochrome c oxidase I gene segments

1 Scope

This document specifies a method for the identification of single fish and fish fillets to the level of genus or species. It allows the identification of a large number of commercially important fish species using DNA barcoding.

This method was validated on raw fish. Laboratory experience indicates additional applicability to processed fish products (e.g. cold smoked, hot smoked, salted, frozen, cooked, fried and deep-fried samples).

The described method is usually unsuitable for the analysis of highly processed foods (e.g. tins of fish with highly degraded DNA where the fragment lengths are not sufficient for amplification of the targets). Furthermore, it does not apply to complex fish products containing mixtures of two or more fish species.

The identification of fish species is carried out by PCR amplification of either a segment of the mitochondrial cytochrome b gene (*cytb*) or the cytochrome c oxidase I gene (*cox1, syn COI*), or both, followed by sequencing of the PCR products and subsequent sequence comparison with entries in databases.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 16577, *Molecular biomarker analysis — Vocabulary for molecular biomarker analytical methods in agriculture and food production*

ISO 20813, *Molecular biomarker analysis — Methods of analysis for the detection and identification of animal species in foods and food products (nucleic acid-based methods) — General requirements and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16577 and the following 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
alignment
sequence alignment
arrangement of nucleic acid sequences or protein sequences according to regions of similarity

Note 1 to entry: Alignment is a process or result of matching up the nucleotide residues of two or more biological sequences to achieve maximal levels of *identity* (3.3).

[SOURCE: ISO 16577:2022, 3.7.18, modified — “alignment” was added as the preferred term; Note 1 to entry was added.]

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