

Why should Switzerland barcode its biodiversity?

DNA barcoding is a rapid and reliable method for identifying species using short DNA fragments. It complements traditional taxonomy by allowing the recognition of species lacking distinctive morphological characteristics or species only represented by undistinguishable tissue fragments, cryptic life-cycle stages (e.g. eggs) or organic traces only. Practical applications of DNA barcoding range from the detection of food products to the monitoring of invasive species or biological control agents, in the fields of biosafety and forensic science.

Above all, DNA barcoding plays an important role in biodiversity assessment, helping species identification and estimation of their richness and distribution. Genetic diversity and divergence of species cannot reliably be assessed from phenotypes alone. So called “cryptic species”, i.e. species the distinctiveness of which was not uncovered by traditional phenotype-based taxonomy, are commonly found in many taxonomic groups. Revealing this cryptic diversity is crucial in the fields of conservation biology and ecosystems ecology to generate a baseline for the protection of declining species, and to understand the responses of species diversity to ecosystem change and vice versa. Using molecular barcodes also expands the range of taxa that can be used for biodiversity monitoring and bioindication, by including poorly characterized groups, difficult to identify on the base of morphological features only. Recently, next generation sequencing enabled us to evaluate the biodiversity within environmental DNA samples through environmental barcoding

The efficiency of environmental barcoding as well as other barcoding applications depend on the existence of a DNA barcode reference library. Creating such a library at the worldwide scale is one of the objectives of the International Barcode of Life (IBOL) initiative. Over one million of DNA barcodes have already been entered into the interactive Barcode of Life Data System. The researchers of more than 25 countries participate in IBOL activities. In Europe, the contribution of official partners of IBOL (Germany, France, UK, Norway, Portugal, Netherlands, Finland and Russia) is complemented by local initiatives, such as Barcoding Fauna Bavarica, supported by regional governments.

Switzerland is not a member of IBOL and as far as we know there is no governmental funding focusing specifically on barcoding activities. Only one Swiss institution (Agroscope Changins-Wädenswil ACW) is currently involved in an international barcoding project, i.e., the EU-FP7 project “Quarantine Barcoding of Life” (QBOL), and the few projects using barcoding that are conducted in Switzerland are based on individual initiatives. It is generally assumed that the Swiss biodiversity is well known and most of the species can be easily identified. In reality, genetic data are available for few well-studied taxonomic groups and very little is known about the genetic structure and diversity within most described species. Yet it is such studies that very regularly lead to the discovery of “cryptic” species. Small organisms, including soil and aquatic invertebrates, fungi, and protists, and even larger fish are often neglected. Moreover, barcoding the species rich collections (including a remarkable number of type specimens) preserved in Swiss Museums and Herbaria, would represent an added value to an existing and ongoing taxonomic work.

We believe that a coordinated action to barcode Swiss biodiversity is necessary. The aims of such an action should be:

- to build up a comprehensive DNA barcode reference library for species living in Switzerland and/or preserved in Swiss collections.
- to create a Swiss biodiversity DNA bank, in which the DNA extracted from barcoded specimens will be deposited;
- to develop and stimulate projects of practical application of DNA barcoding in biodiversity surveys and environmental risk assessment.
- to extend DNA barcoding to multi-locus approaches that will be necessary to identify cryptic species that have arisen in the past few million years and will be easily achievable with Next Generation Sequencing applications
- that Switzerland joins IBOL as an official member and its projects are integrated within the IBOL system

We call on the Federal Office for the Environment and other governmental offices to provide funds to achieve these objectives. The genetic inventory of Swiss species should be one of the priorities of biodiversity and conservation research. Being an official member of IBOL and integrating national barcoding projects into international initiatives would remarkably increase the value of the related research in Switzerland and present a substantial added value for biodiversity assessment and monitoring.

We hope that this message raised your concern about the future development of DNA barcoding activities in Switzerland, and we are looking forward to seeing you at the barcoding meeting in Geneva, on September 9th.

Swiss DNA Barcoding Network

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