

**DNA BARCODING AND NATURE CONSERVATION – MUTUALLY BENEFICIAL FUTURE**

**Urmas Kõljalg**

*Institute of Ecology and Earth Sciences, University of Tartu*

The present and future of DNA based taxon identification technologies in nature conservation will be discussed. If the rapid and reliable identification of native, alien or protected taxa is necessary from the air, water, soil, remains of specimen, etc., the DNA based identification is the most accurate. Also, the identification of population or the level of cryptic species are mostly achieved by molecular methods. However, the bottlenecks of the DNA based taxon identification are a small number of web based DNA keys and the lack of cheap DNA sequencing technologies. Fortunately, both fields are developing fast and the problems will disappear probably in next few years.

First, there are many international and national initiatives which develop DNA based identification tools (CBOL, UNITE, INSD, etc.). There is Estonian national initiative to develop and implement DNA identification tools for the protected species. Web based solutions for the DNA based taxon identifications of both Estonian native and alien taxa will be demonstrated as well.

Secondly, there are many emerging DNA sequencing technologies which will make DNA extraction and sequencing faster and hopefully also cheaper. Already today, some machine-based taxon observations are made by new technologies, such as massively parallel pyrosequencing (454 Roche platform). The use of DNA as a taxon identification agent will probably promote the development of DNA based technologies which can be easily utilised directly in the field.

The morphology-based identification will not lose its importance due to the emerging DNA methods. On the contrary, the value of morphology-based knowledge will even grow, because we need reference specimens of local taxa deposited in scientific collections. These specimens will serve as a backbone of the DNA keys and can always be revisited in order to check identification or for another DNA extraction. Such reference specimens must be collected and deposited continuously, as we need information on population level changes as well. For example, as a result of global warming, the current population might be easily replaced by the southern population of the same species. Such changes can be recorded only if we have specimens deposited in the collections over the years.

The nature conservation should be ready to implement emerging DNA technologies already today. Because in many cases it is only DNA which can tell us whether fish or other meat sold on market comes from protected species, whether the plant tissue from destroyed site belongs to the threatened species and et cetera.