**Radiocarbon dating in wildlife forensics**

**Kateřina Pachnerová Brabcová,1,\* Jitka Kufnerová,1,2 and Ivo Světlík1**

*1Nuclear Physics Institute of the Czech Academy of Sciences, 180 00 Praha, Czech Republic*

*2Institute for Environmental Studies, Faculty of Science, Charles University, 128 01 Praha, Czech Republic*

\* *e-mail: brabcova@ujf.cas.cz corresponding/presenting author*

Under the international multilateral CITES convention, endangered species of animals and plants are granted various levels of legal protection that regulate trade and other forms of handling. For example, in most EU countries, an exemption from the ban on ivory trade may only be granted if it can be proven that the item originates from before 1947. Trade in raptors and large carnivores is usually also subject to regulation. Unfortunately, crime against protected species is widespread, and law enforcement in this area remains weak. This is due in part to the low priority given to such crimes in many parts of the world, as well as the lack of available forensic methods. Most forensic techniques are derived from human forensic science and require costly adaptation to account for the specific properties of animal tissues.

Radiocarbon dating is a promising complementary tool in wildlife forensic science and can provide crucial analytical evidence to determine whether an animal lived and died before or after the relevant regulations came into effect. However, its use in wildlife applications is subject to the same limitations as any other radiocarbon application.

The first major limitation is reduced temporal resolution, ambiguity in dating samples from the second half of the 20th century, as well as the emerging overlap between the post-2020 period and the pre-1950 era. To mitigate the impact of such ambiguities, we are testing strategies based on single- or multi-tissue chronological analysis and complementary analytical methods with potential for relative or absolute dating, such as electron paramagnetic resonance, Sr90 analysis, or the detection of anthropogenic pollutants.

The second key challenge is presented by heavily processed or contaminated materials, such as tanned hides or taxidermy specimens. These pose analytical difficulties due to chemical alterations and the incorporation of exogenous carbon.

The third major challenge lies in the sampling of artefacts that are claimed to have high artistic or cultural value, typically ivory carvings. Smart, minimally invasive solutions adapted to the specific characteristics of such artefacts are highly desirable, as ivory remains the most frequent sample type in our dataset, and the results indicate that the most of confiscated ivory is of illegal origin, dating back to the infamous and bloody poaching massacres of African elephants in the 1970s and 1980s.