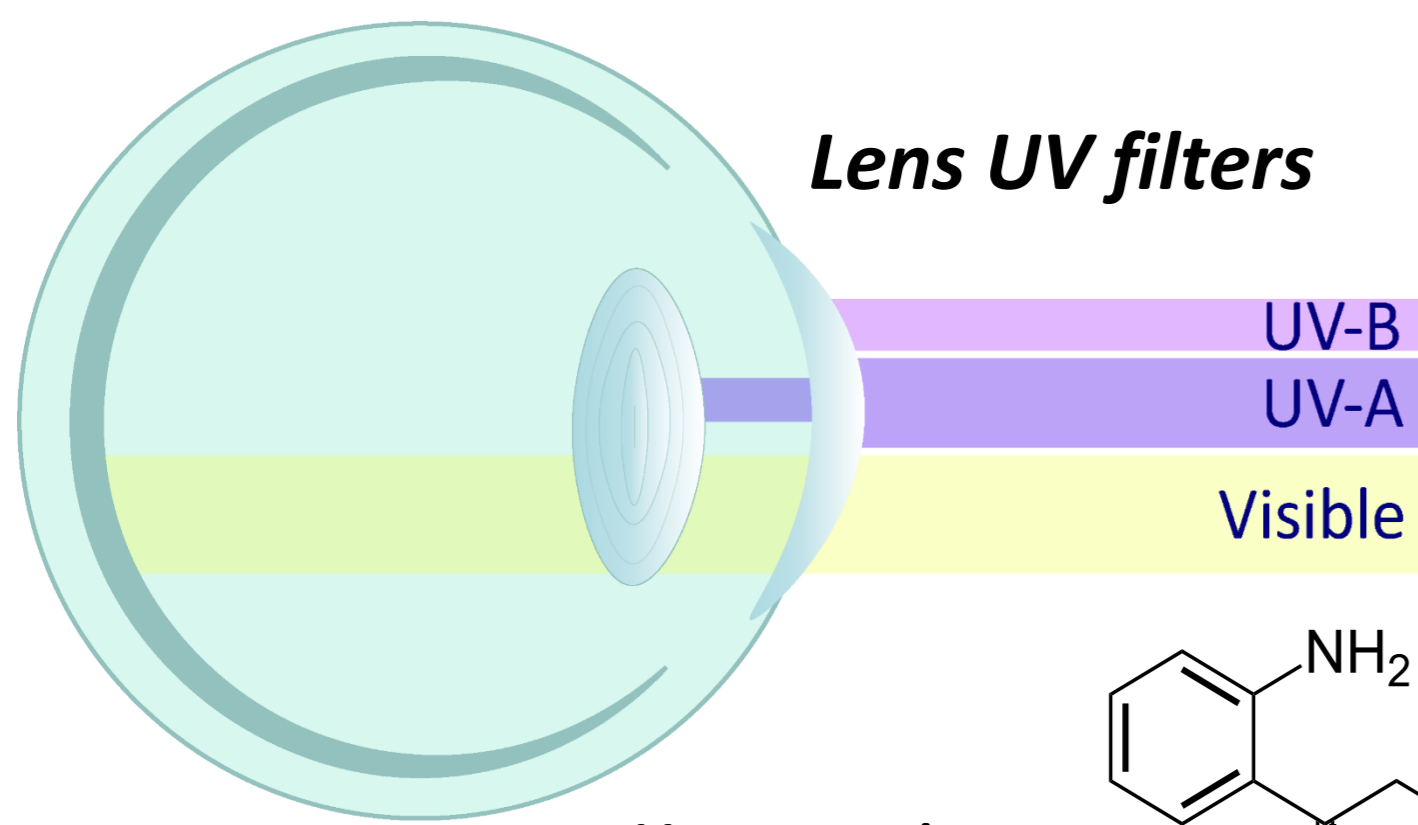


Osik Nataliya A.,^{1,2*} Zelentsova Ekaterina A.,^{1,2} Tsentlovich Yuri P.¹

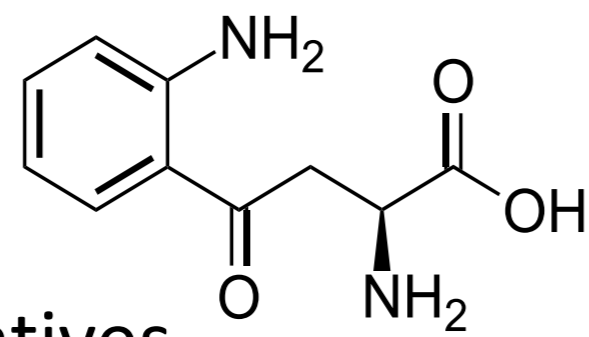
¹ International Tomography Center SB RAS, Novosibirsk, Russia

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Kynurenine and its derivatives



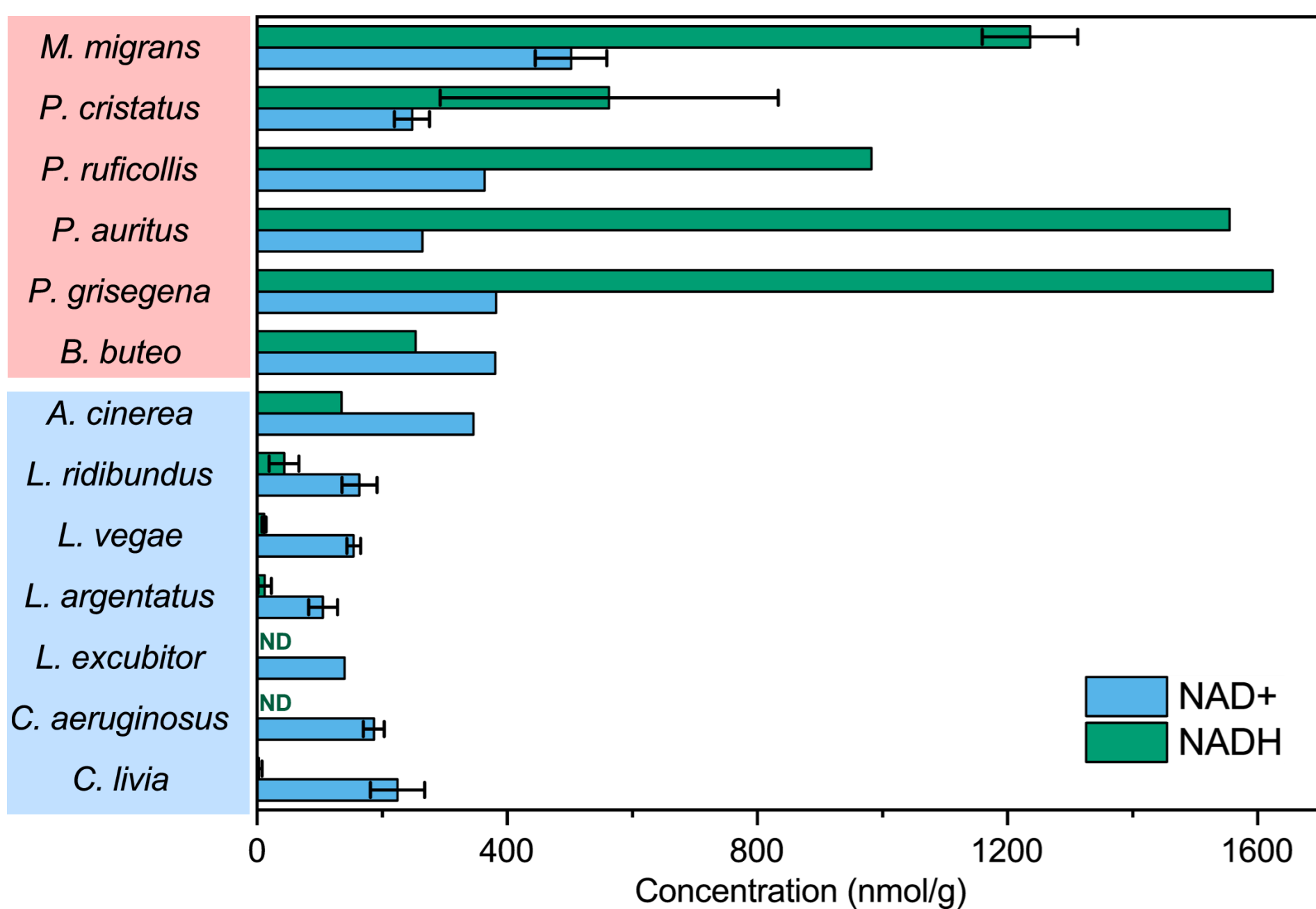
Bird lens metabolome characterization

Goals:

- To determine the bird species whose lenses contain UV filters
- To identify these compounds
- To characterize their photochemical properties

13 bird species:

- Waterfowl
- Raptors

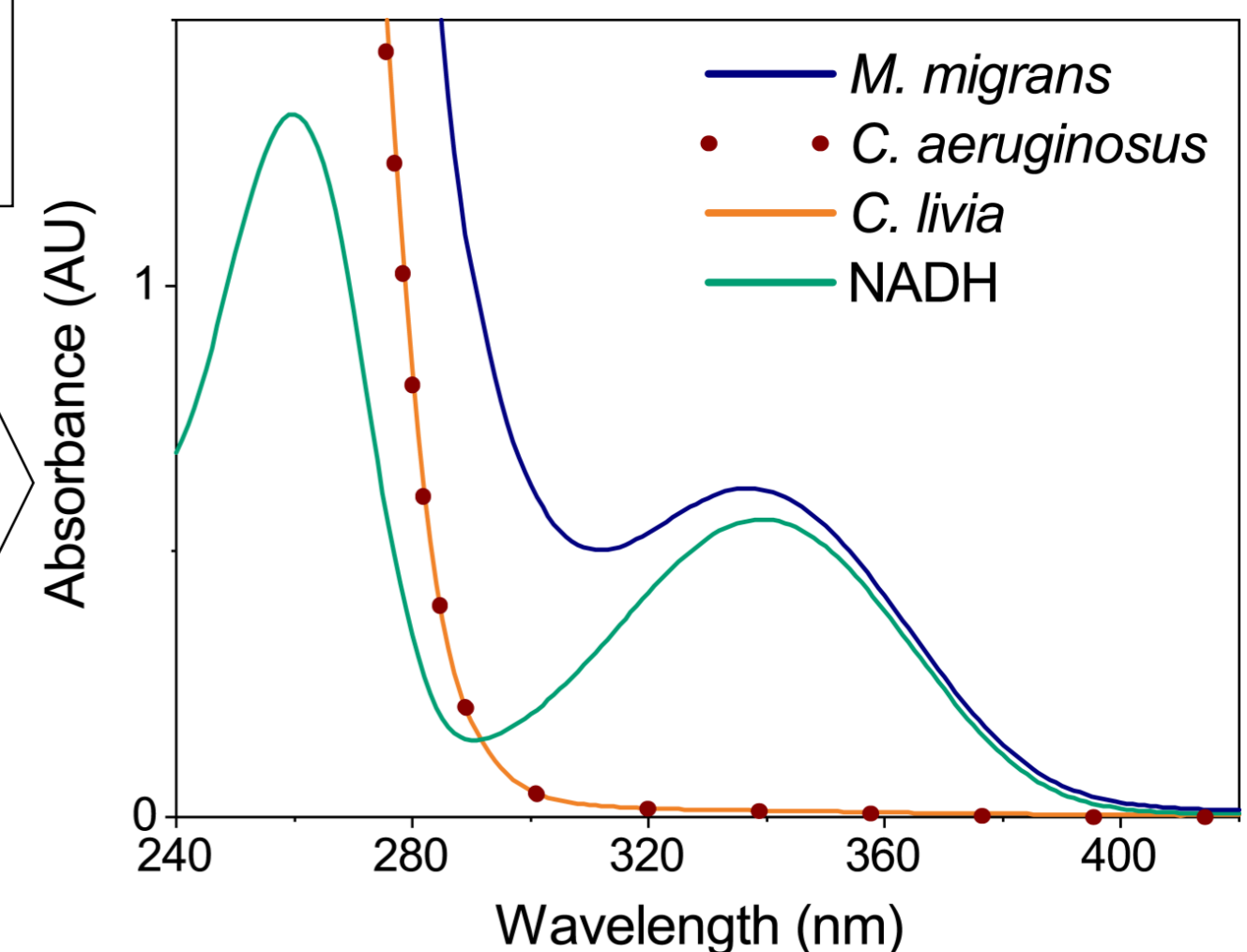


¹H NMR spectroscopy:

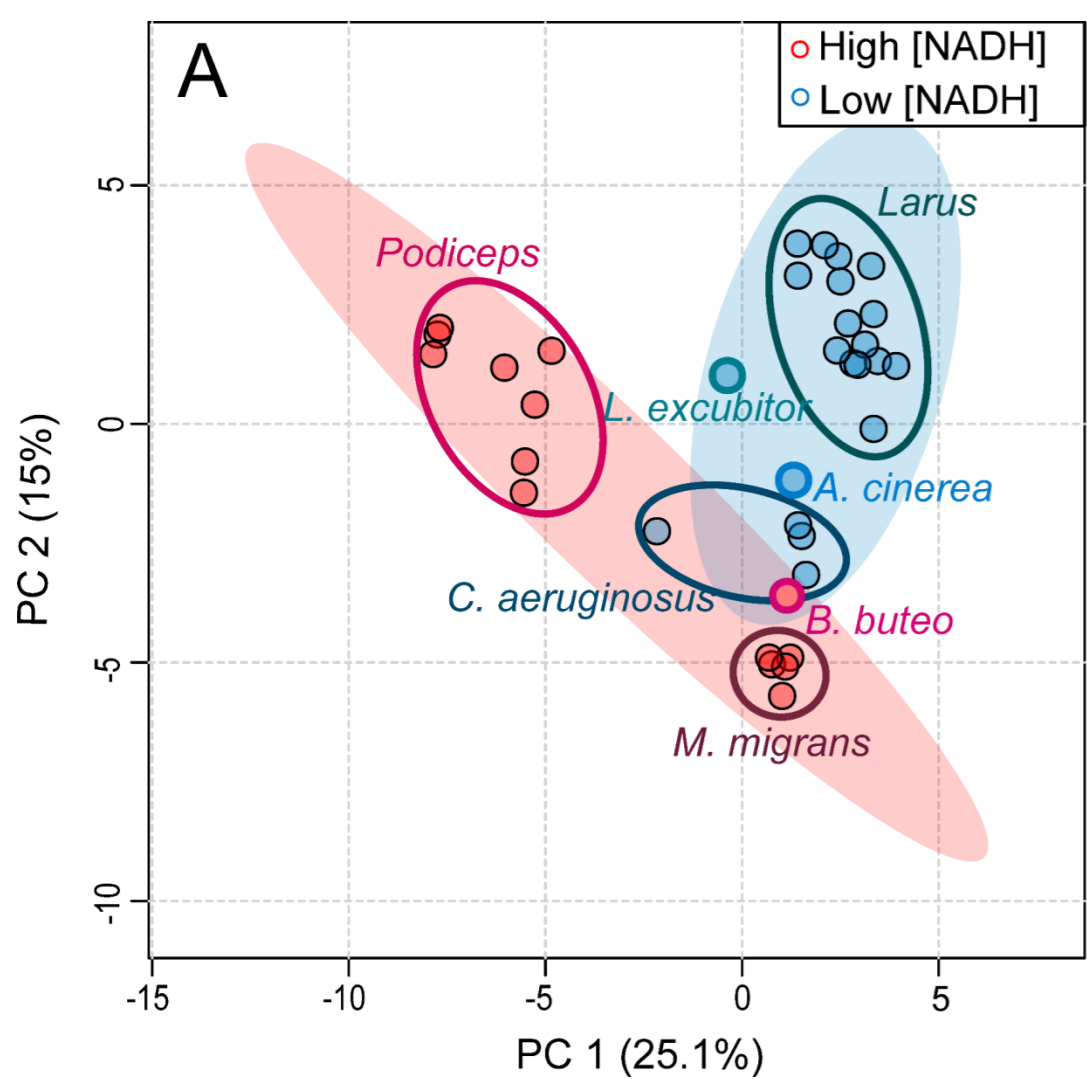
- High level of NADH
- Low NAD⁺/NADH ratio

Optical spectroscopy:

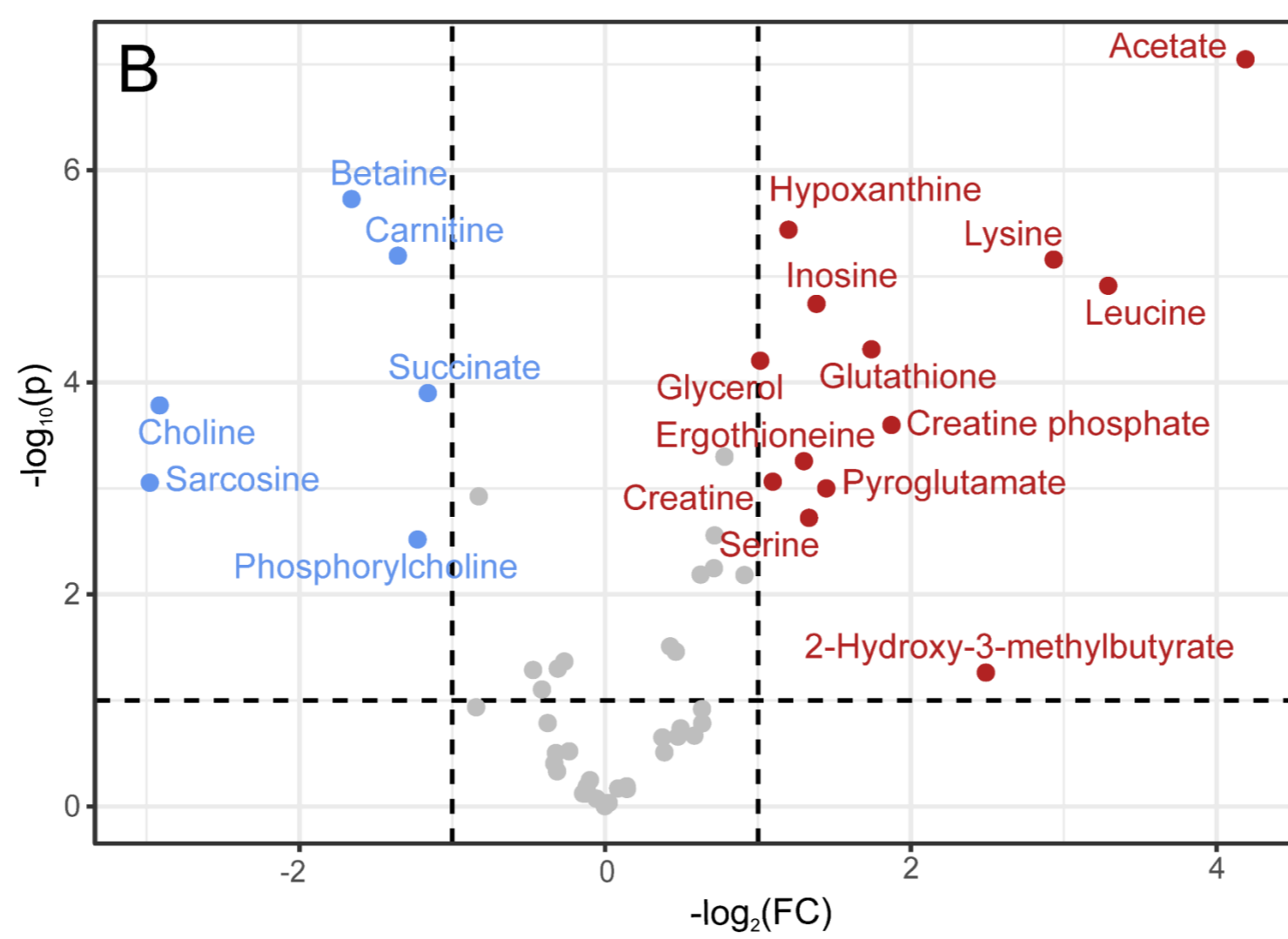
High absorbance in UV-A region $\lambda_{max} = 340$ nm



PCA



Volcano plot



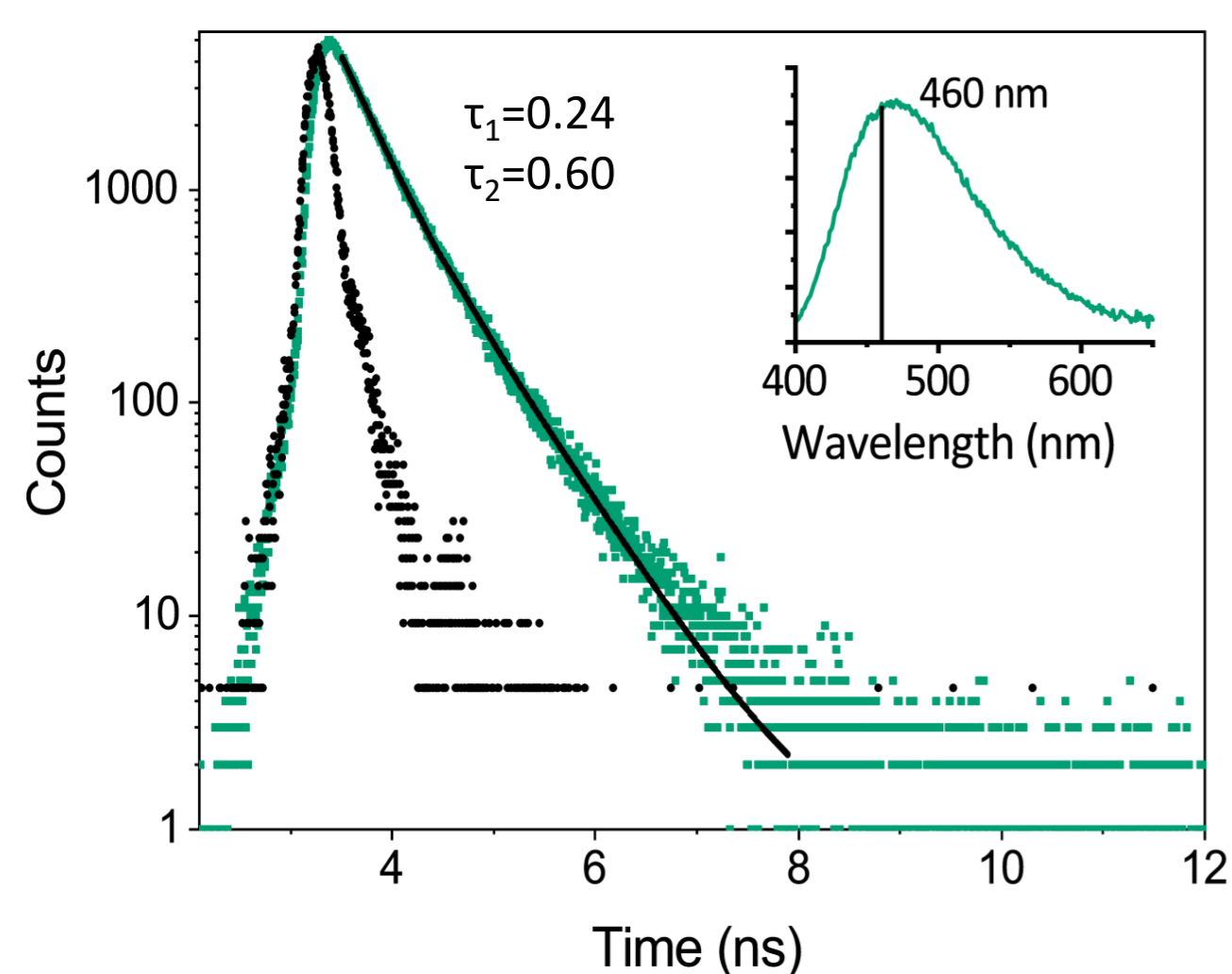
Conclusions:

- Quantitative metabolomic composition (58 compounds) of bird lenses has been determined
- *M. migrans*, *Podiceps*, *B. buteo* and *A. cinerea* have been found to have a molecular UV filter in their lenses
- High NADH concentration and low [NAD⁺]/[NADH] ratio do not influence on the metabolic processes inside the lens

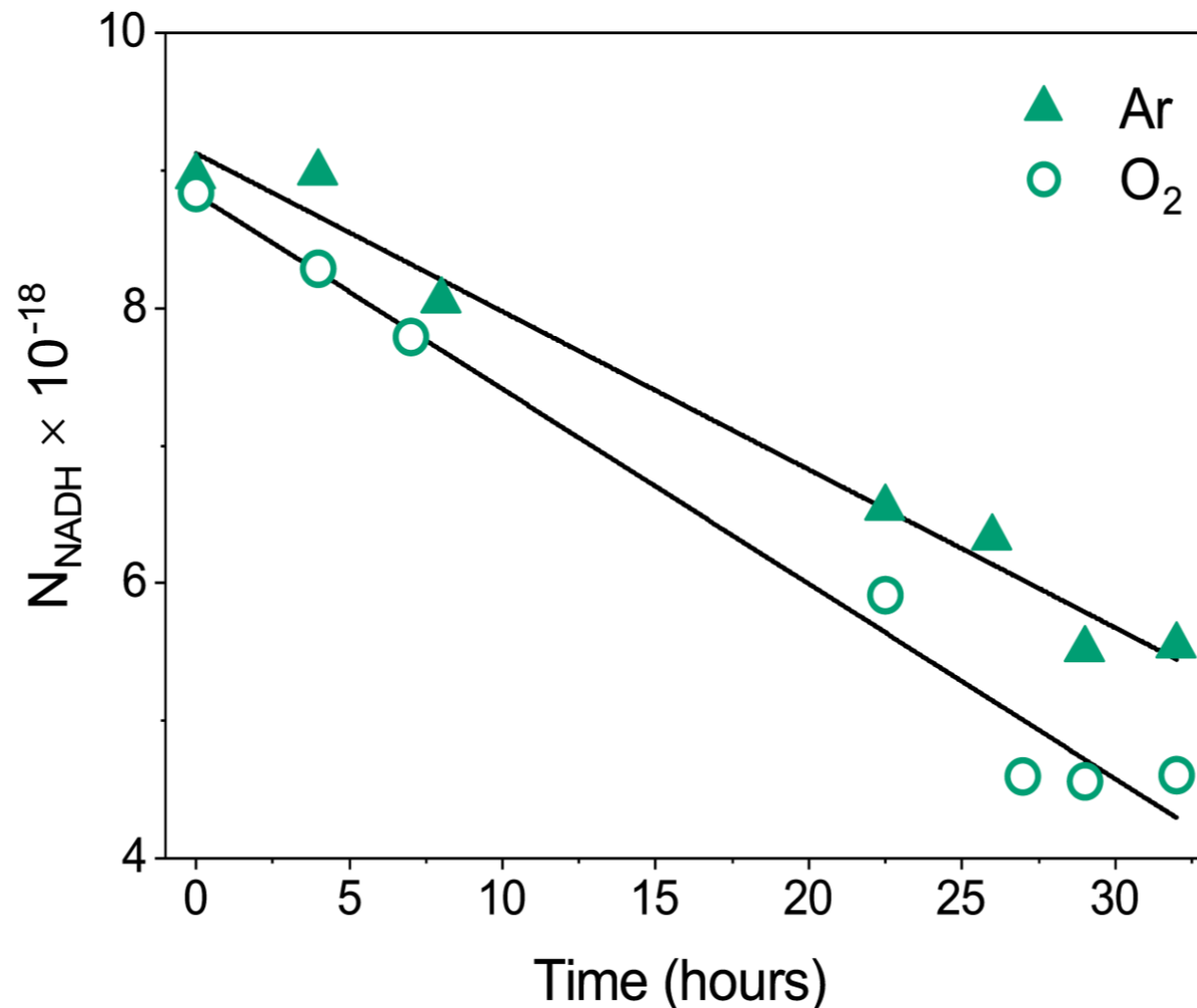
Photochemical analysis of NADH

- Nanosecond Laser flash photolysis
- Fluorometry
- Steady-state photolysis

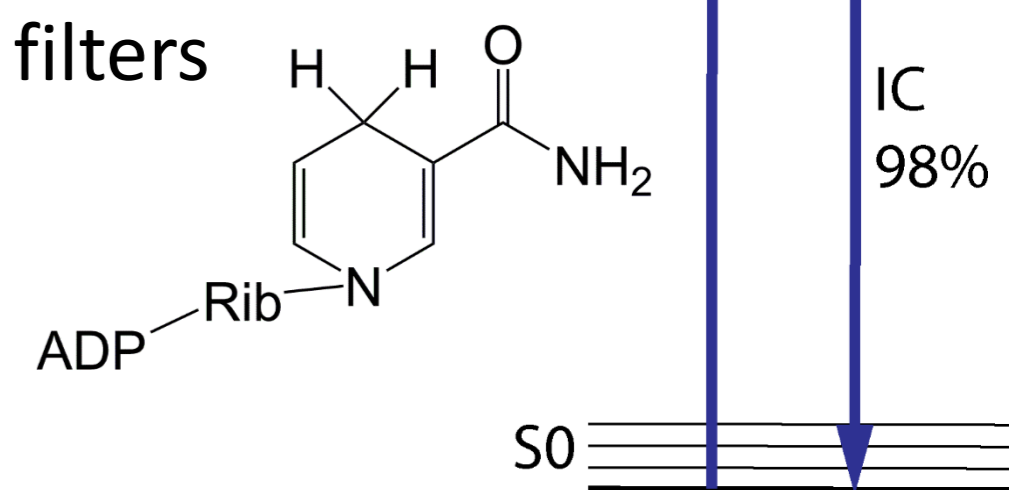
Fluorescence



Photodecomposition



- Photochemical properties of NADH meet all requirements to molecular UV filters



NADH – a well-known coenzyme, was proved to be a reliable UV filter of the bird lens.

It protects the retina from photoinduced damage and reduces chromatic aberrations increasing visual acuity of birds

	ϵ_{max} (M ⁻¹ cm ⁻¹)	ϕ_{fl}	$\phi_T \times 10^3$	$\phi_{dec}(Ar) \times 10^5$	$\phi_{dec}(O_2) \times 10^5$
NADH	6200	0.02*	ND	1.9 ± 0.3	2.3 ± 0.4
KN**	4500	9.2 × 10 ⁻⁴	7.0	1.5	11.0

* Visser, A.J.W.G. et al. *Photochemistry and Photobiology*, 1981

** Tsentlovich Y.P. et al. *IOVS*, 2011