

FINAL REPORT SWITCH-LODZ / RTD 2007 M: 13-24	
WG VII: Ecohydrology and Urban Aquatic Ecosystems	
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Prepared by:	Dr Joanna Mankiewicz Boczek European Regional Centre for Ecohydrology under the auspices of UNESCO, Polish Academy of Sciences
Content:	Analysis of ecohydrological processes by application of nucleic acid

Summary

What has been analyzed in the Sokolowka and Ner Rivers was the dependence between aquatic ecosystem contamination (stresogenic factors) and fish condition based on analysis of the *Perca fluviatilis* L. RNA/DNA ratio. The goal of the study was to estimate whether this sensitive molecular method could be recommended as a proper tool for comparison of rivers' condition including two degraded rivers (Sokołówka and Ner) and Grabia – a reference natural river.

Stresogenic factors influence cells' metabolism, which depends on different chemical reactions including protein synthesis. The amount of RNA in a cell varies in proportion to protein synthesis, whereas DNA concentration remains fairly constant (Caldarone et al., 2006). Therefore the RNA/DNA ratio serves as an indicator of the protein-synthesizing potential of each cell in the organism. The method is based on determination of binding of fluorescence dye to the nucleic acids.

Objective of study

Description of dependence between aquatic ecosystem contamination and fish condition based on analysis of the *Perca fluviatilis* RNA/DNA is done.

The usefulness of RNA/DNA ratio analysis for determination of stresogenic factors such as contaminated water is tested.

Study site

River Sokołówka - degraded ecosystem, contaminated river of Lodz

River Ner - degraded ecosystem, contaminated river of Lodz

River Grabia – natural ecosystem, a reference river

Material and methods

RNA/DNA ratio in perch (*Perca fluviatilis*) is determined according to the methods proposed by Caldarone and Buckley (1991) and Esteves et al (2000).

Caldarone E.M., Clemmesen C.M., Berdalet E., Miller T.J., Folkvord A., Holt G.J., Olivar M.P., Suthers I.M. 2006. Intercalibration of four spectrofluorimetric protocols for measuring RNA/DNA ratios in larval and juvenile fish. *Limnol. Oceanogr. Methods* 4, 2006, 153-163.

Results

1st stage:

1. Development of proper condition for RNA/DNA ratio analysis.
2. Preparation of standard curve for RNA and DNA analysis.

The optimal extinction and emission spectrums in series dilution of DNA and RNA were determined. The proper extinction spectrum is 477 nm and emission spectrum is 614 nm (Fig. 1).

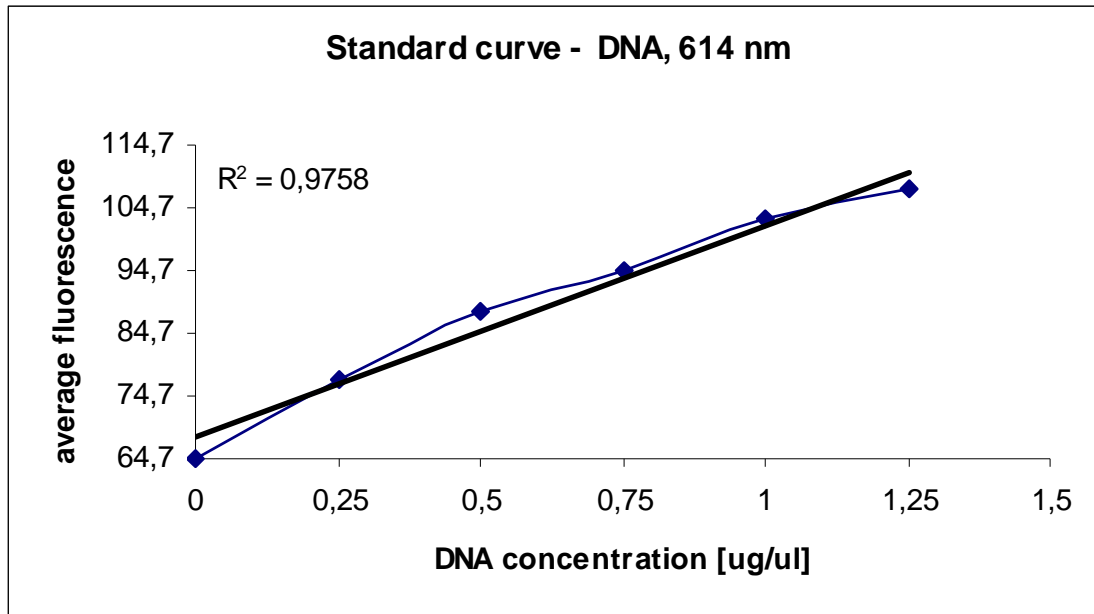
2nd stage –Gathering of the material (*Perca fluviatilis*) from Ner, Sokołówka and Grabia. 10 perches from each river were collected.

University of Lodz has been granted a permission (a certificate) to catch perch (30 fish) from the rivers under study.

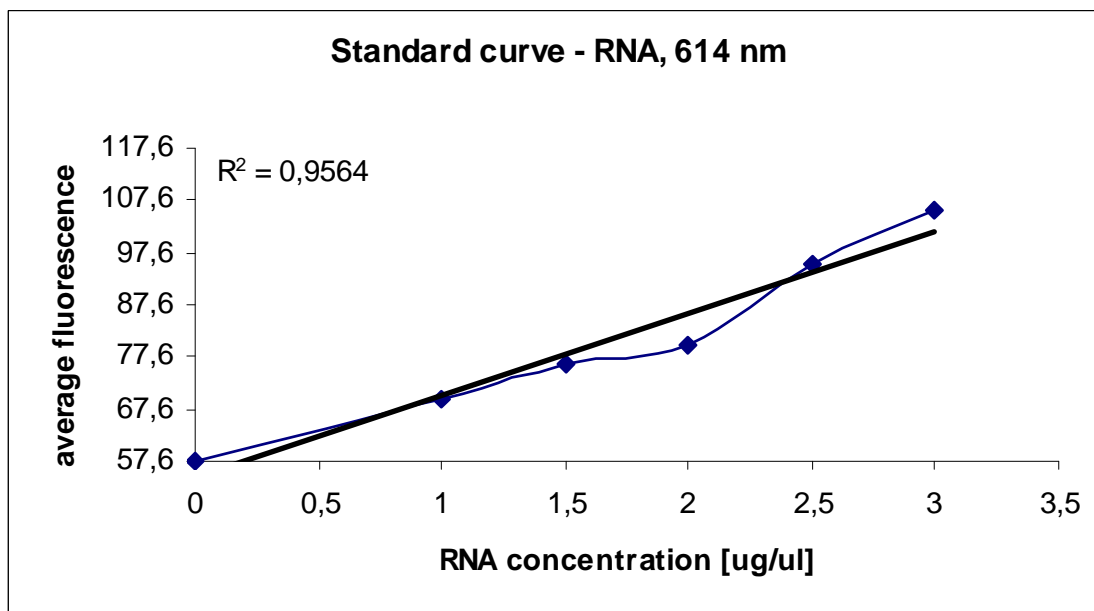
Plan and objectives

RNA/DNA ratio in fish (*Perca fluviatilis*) representative of the three different rivers will be determined.

Received results enable to repeat the question if molecular tools as RNA/DNA ratio could be an indicator of stressogenic condition in the studied rivers of Lodz.



a.



b.

Figure 1. Standard curves a. DNA and b. RNA needed for determination of RNA/DNA ratio as an indicator of stressogenic condition in the studied rivers of Lodz.