Biological Station
Gdańsk University
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Biological Station

- Laboratory of Ecotoxicology

- Laboratory of Comparative Biochemistry
Research topics - molecular biodiversity

- biochemistry of fish spermatozoa

- fish sperm viability as indicator of environmental pollution

- biochemistry of invertebrate and vertebrate enzymes (LDH, ME, CK)

- fish parasitic pathogens
Activities of some enzymes in fish sperm cells

<table>
<thead>
<tr>
<th></th>
<th>CK</th>
<th>LDH</th>
<th>MDH</th>
<th>IDH</th>
<th>ME</th>
<th>G-6-PDH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semen</strong></td>
<td><strong>Creatine kinase</strong></td>
<td><strong>Lactate dehydrogenase</strong></td>
<td><strong>Malate dehydrogenase</strong></td>
<td><strong>Isocitrate dehydrogenase</strong></td>
<td><strong>Malic enzyme</strong></td>
<td><strong>Glucose -6-phosphate dehydrogenase</strong></td>
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<tr>
<td>Herring <em>Clupea harengus</em></td>
<td>482.1±38.2</td>
<td>0.41±0.13</td>
<td>41.0±7.18</td>
<td>0.95±0.29</td>
<td>2.73±0.91</td>
<td>0.41±0.14</td>
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<tr>
<td>Carp <em>Cyprinus carpio</em></td>
<td>118.2±13.7</td>
<td>4.30±0.75</td>
<td>23.25±5.99</td>
<td>1.06±0.36</td>
<td>0.38±0.14</td>
<td>0.29±0.10</td>
</tr>
<tr>
<td>Catfish <em>Clarias gariepinus</em></td>
<td>89.4±11.0</td>
<td>3.09±1.08</td>
<td>2.04±0.65</td>
<td>0.38±0.09</td>
<td>0.06±0.014</td>
<td>0.035±0.016</td>
</tr>
</tbody>
</table>
Effect of tributyltin on herring spermatozoa observed in confocal microscope

Control without tributyltin

Spermatozoa with 10 μM TBT after incubation for 3h

Spermatozoa with 10 μM TBT after incubation for 6h
Cellulose acetate native electrophoresis of creatine kinase isoenzymes from herring

- spermatozoa
- mitochondria
- cytosol

origin
Electrophoretic patterns of crude cod *Gadus morhua* LDH tissue extracts
Electrophoretic pattern of crude LDH tissues extracts from herring (*Clupea harengus*)

1 - skeletal muscle
2 – heart
3 – eye
4 – liver
5 – spermatozoa
6 – kidney
7 – gills
8 – stomach
9 – brain
Separation of the LDH-A$_2$B$_2$ and LDH-B$_4$ isoenzymes from herring spermatozoa on DEAE-Sepharose and polyacrylamide gel electrophoresis

![Graph showing separation of LDH isoenzymes](image)

- **LDH-A$_4$**
- **LDH-A$_2$B$_2$**
- **LDH-B$_4$**

**Origin**
- 1 – eye
- 2 – skeletal muscle
- 3 – spermatozoa
- 4 – spermatozoa
Tissue specificity of the mitochondrial forms of malic enzyme in herring *Clupea harengus* tissues

Fig. 1. Elution profiles of NADP- and NAD(P)-dependent malic enzyme activities of the mitochondrial fraction from herring: (A) skeletal muscle, (B) liver and (C) testes following DEAE-Sephael chromatography. The column (1.5 x 30 cm) was equilibrated with buffer A. A linear KCl gradient (- - - - -) formed by mixing 300 ml of buffer A with 300 ml 0.5 M KCl in buffer A was used to elute malic enzyme activities. Effluent fractions (10 ml) were analyzed for both the NADP- and NAD(P)-dependent malic enzyme activities with NADP (●●●●) and NAD (▼▼▼▼) as described in Materials and Methods.
Serious infection of *G. salaris* on *S. salar* in Swedish west coasts

SEM by Göran Malmberg, Stockholm
Gyrodactylus salaris Malmberg, 1957
Phylogenetic tree based on ITS2 rDNA
Thank you for your attention

Staff

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