



Parasites as bioindicators in aquatic ecosystems

Bernd Sures

Main research activities

Ecological status

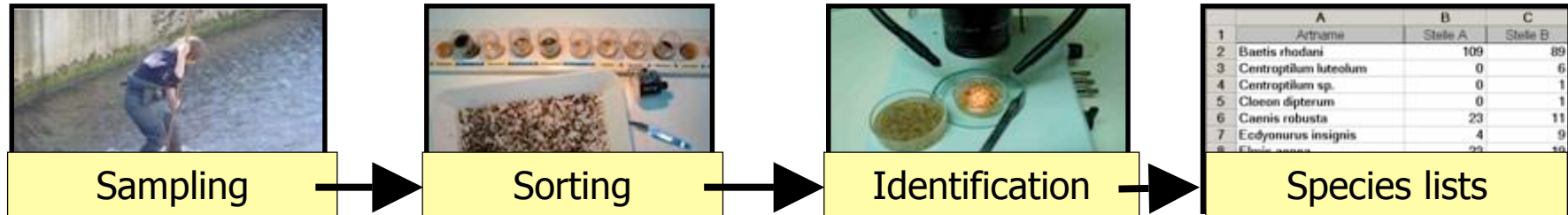
Climate change

River restoration

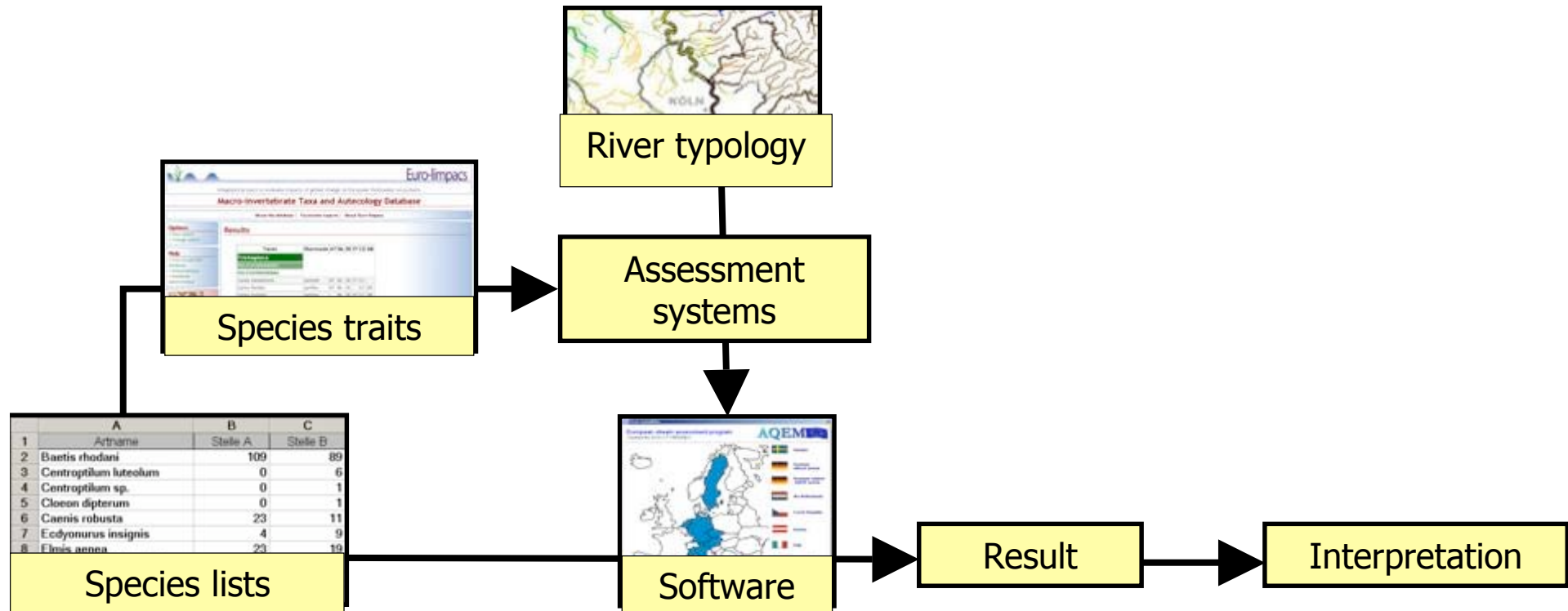
Ecotoxicology – Environmental Chemistry

Aquatic Parasitology

Ecological status of freshwater systems






















	A	B	C
1	Actname	Stelle A	Stelle B
2	Baetis rhodani	109	89
3	Centroptilum luteolum	0	6
4	Centroptilum sp.	0	1
5	Cloeon dipterum	0	1
6	Caenis robusta	23	11
7	Ecdyonurus insignis	4	9
8	Elmis aeneus	23	10



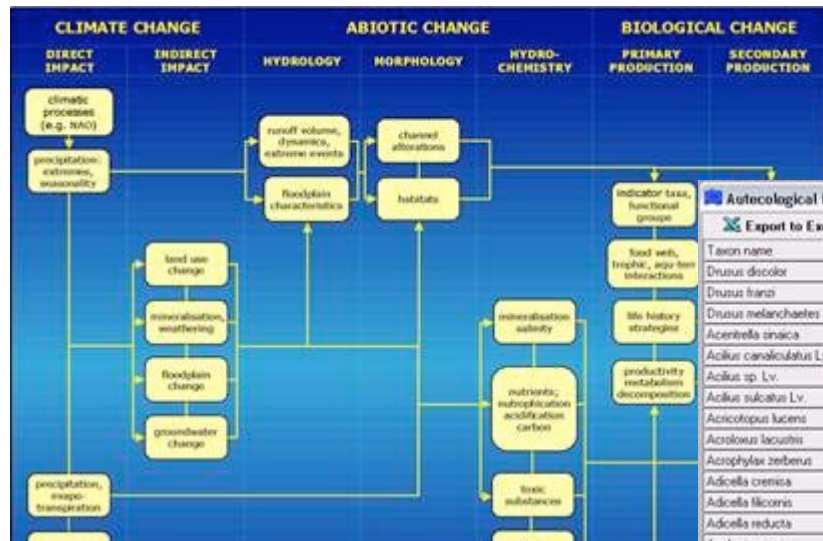
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Indication potential of organisms: ecological status

Eutrophication	Land use	Morphology	Micro habitat	General degradation
				
				
				
				

Data base assessment software



Autecological information

Export to Excel

Taxon name	Sample1	Sample2	TaxaGroup	Family	Subfamily	sin	ign	pio	ngo	zeu
Drusus discolor	0	0	Trichoptera	LIMNeph	DRUSINA	1	16	0	0	1
Drusus franco	1	10	Trichoptera	LIMNeph	DRUSINA	0	0	0	0	
Drusus melanochaetes	2	20	Trichoptera	LIMNeph	DRUSINA	0	0	0	0	
Acentrella sinica	3	30	Ephemeroptera	BAETIDIAE	BAETINAI	0	0	0	0	0
Aclis candicatus Lv	4	40	Coleoptera	DYTISCID	DYTISCID	0	0	0	0	0
Aclis sp. Lv	5	50	Coleoptera	DYTISCID	DYTISCID	0	0	0	0	0
Aclis sulcatus Lv	6	60	Coleoptera	DYTISCID	DYTISCID	0	0	0	0	0
Acricotopus lucens	7	70	Diptera	CHIRONOM	ORTHOCID	0	0	0	0	0
Acroloxus locustis	8	80	Gastropoda	ACROLOX	(Fan)ACR 2.2	4	0	0	0	0
Acroghlyx zerberus	9	90	Trichoptera	LIMNeph	LIMNeph	0	0	0	0	1
Adicella crenata	10	100	Trichoptera	LEPTOC	LEPTOC	0	0	0	0	0
Adicella lliconis	11	110	Trichoptera	LEPTOC	LEPTOC	0	0	0	0	5
Adicella reducta	12	120	Trichoptera	LEPTOC	LEPTOC	1.5	8	0	0	0
Aeolosoma sp.	13	130	Oligochaeta	AEOLOSC	(Fan)AEO	0	0	0	0	0
Aeshna affinis	14	140	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Aeshna cyanea	15	150	Odonata	AESHNID	AESHNIN	0	2	8	0	0
Aeshna grandis	16	160	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Aeshna isoceles	17	170	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Aeshna maita	18	180	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Aeshna sp.	19	190	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Aeshna viridis	20	200	Odonata	AESHNID	AESHNIN	0	0	0	0	0
Agabus affinis Lv	21	210	Coleoptera	DYTISCID	COLYMBE	0	0	0	0	0

Staat auswählen

European stream assessment program
Contract No. EVK1-CT1999-00027

ASTERICS

- Schweden
- Deutschland (PERLGOES)
- Deutschland (AGEM System)
- Niederlande
- Tschechische Republik
- Österreich
- Italien
- Portugal
- Griechenland
- Europa

? Hilfe X Beenden

in (sensu Illies)

ER9 ER10 ER11 ER12 ER13 ER14 ER15

10

ER24 ER25 ERX ERY Map Ref

stream zonation preference

euc hyc erh mrl hrh epo mpo hpo lit pro Ref

3 4 3

altitude preference (WFD)

g8h 28h l2h Ref

1 1

altitude preference

niv snl alp sal mon smo col pla Ref

5 5

current preference

lib lip lrp rlp rhp rhb ind Ref


1


emergence/flight period

win spr sum aut Ref

10

Data base on ecology of European freshwater organisms

www.freshwaterecology.info  The Taxa and Autecology Database for Freshwater Organisms

powered by  Euro-impacs

Search

- > **Macro-invertebrates**
- > **Fish**
- > **Diatoms**
- > **Macrophytes** (coming soon)
- > Quick search
- > Distribution map

Info

- > About the database
- > Experts
- > Terms of use (citation)
- > About Euro-impacs
- > Home

Help

- > How to use the database
- > Abbreviations
- > Database administrators

Database info

- > Last update: 12.04.2007
- > Version: 3.1 - 02/2007


Welcome

Welcome to the **freshwaterecology.info** database. Here you can find autecological characteristics and distribution patterns of **more than 12.000 European freshwater organisms** belonging to **macro-invertebrates, fish, diatoms and macrophytes**.

The ecology data feature (amongst others) **ecoregional distribution, saprobity, stream zonation preference, substrate or microhabitat preference, feeding type, life duration, locomotion type** and many more. All ecological parameters can be individually combined and queried.


Check it out here!

Quick search



quick search


Find your freshwater organism and its ecological preferences.




distribution map

View the ecoregional distribution of benthic invertebrates on distribution maps.


Detailed search




macro-invertebrates



diatoms



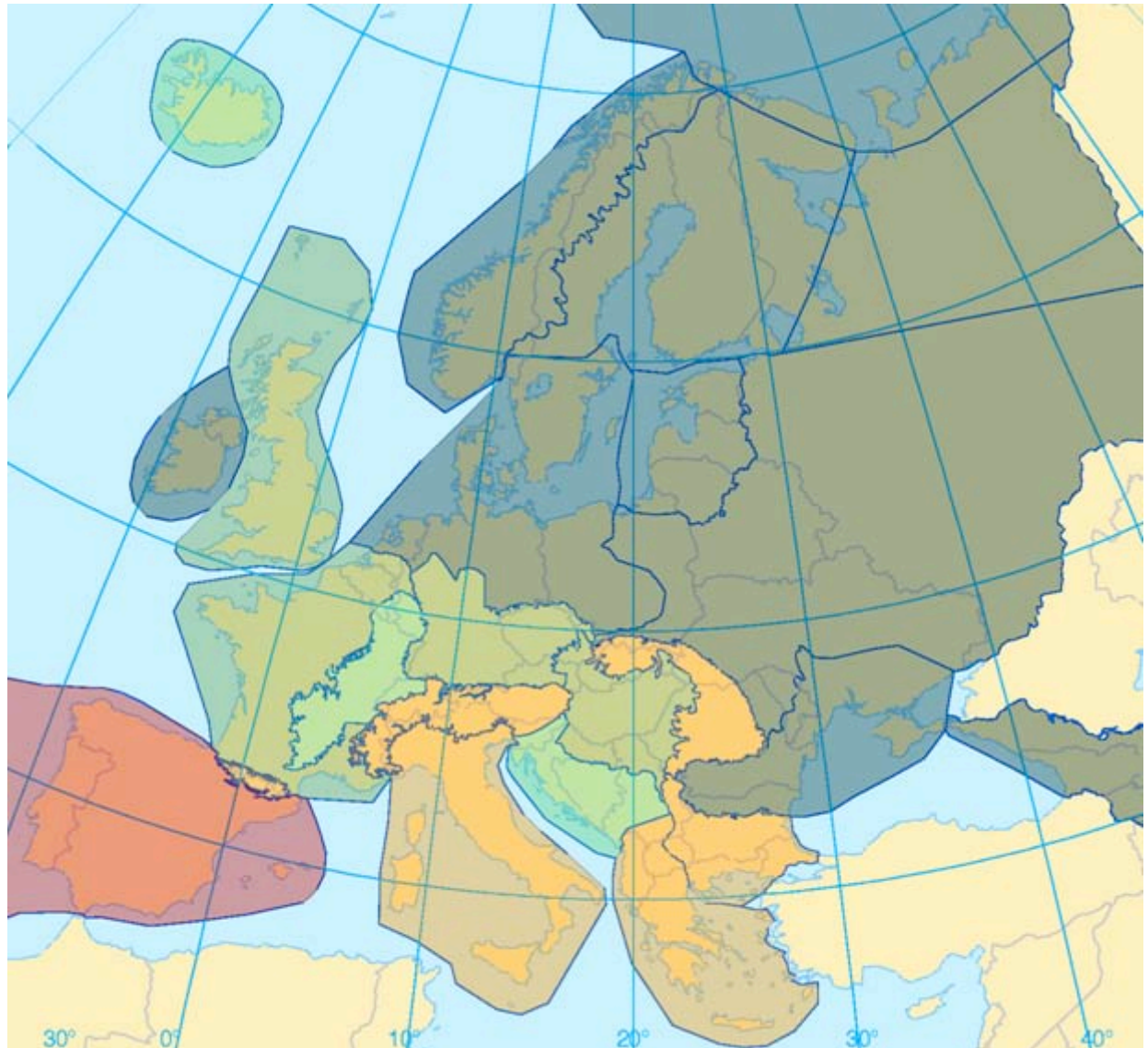
fish



coming soon
macrophytes

22,000 Species; > 100 ecological parameters

Proportion of species endangered by climate change



River restoration

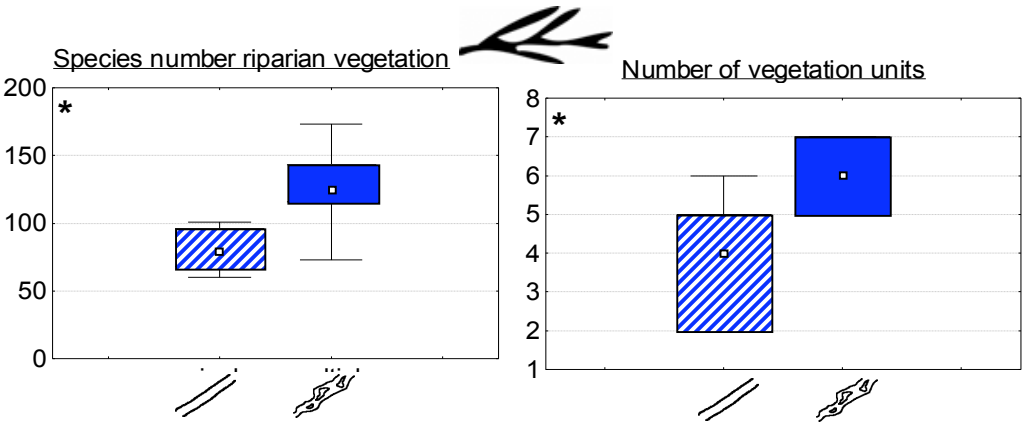
From single channel...





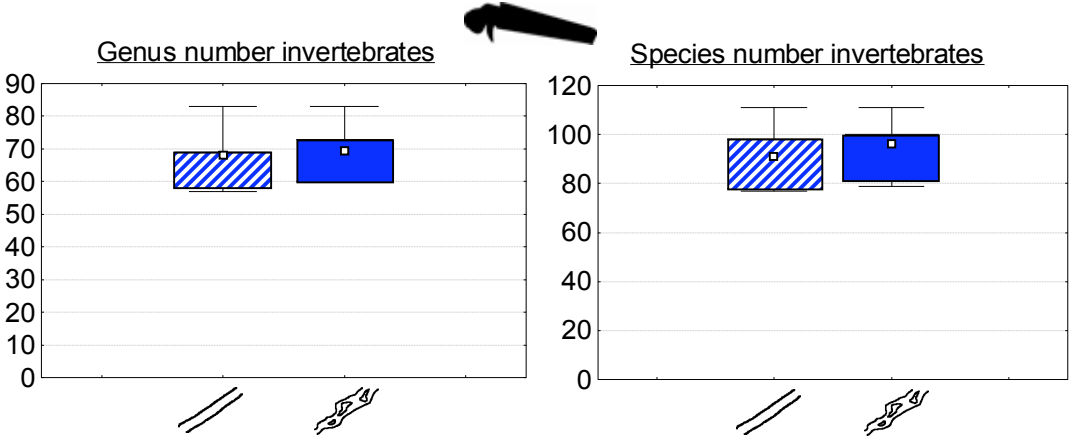
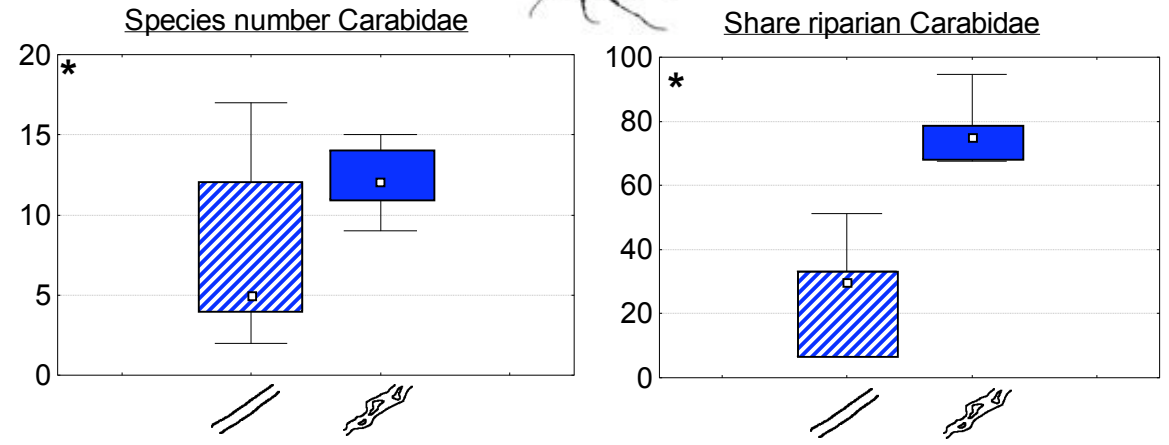
**...to multiple
channel sections.**

Comparison of single- and multiple-channel sections



Macrophytes

Beetles



Macroinvertebrates

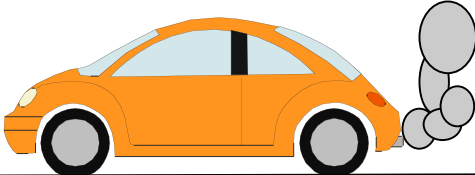
Ecotoxicology – Environmental Chemistry



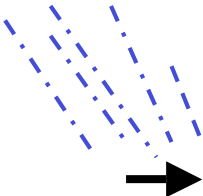
Catalyst emitted precious metals

Combining cars and biota

Atmospherical transport



Road dust



Field sampling: Road dust Soil Water Sediment Biota



Highways

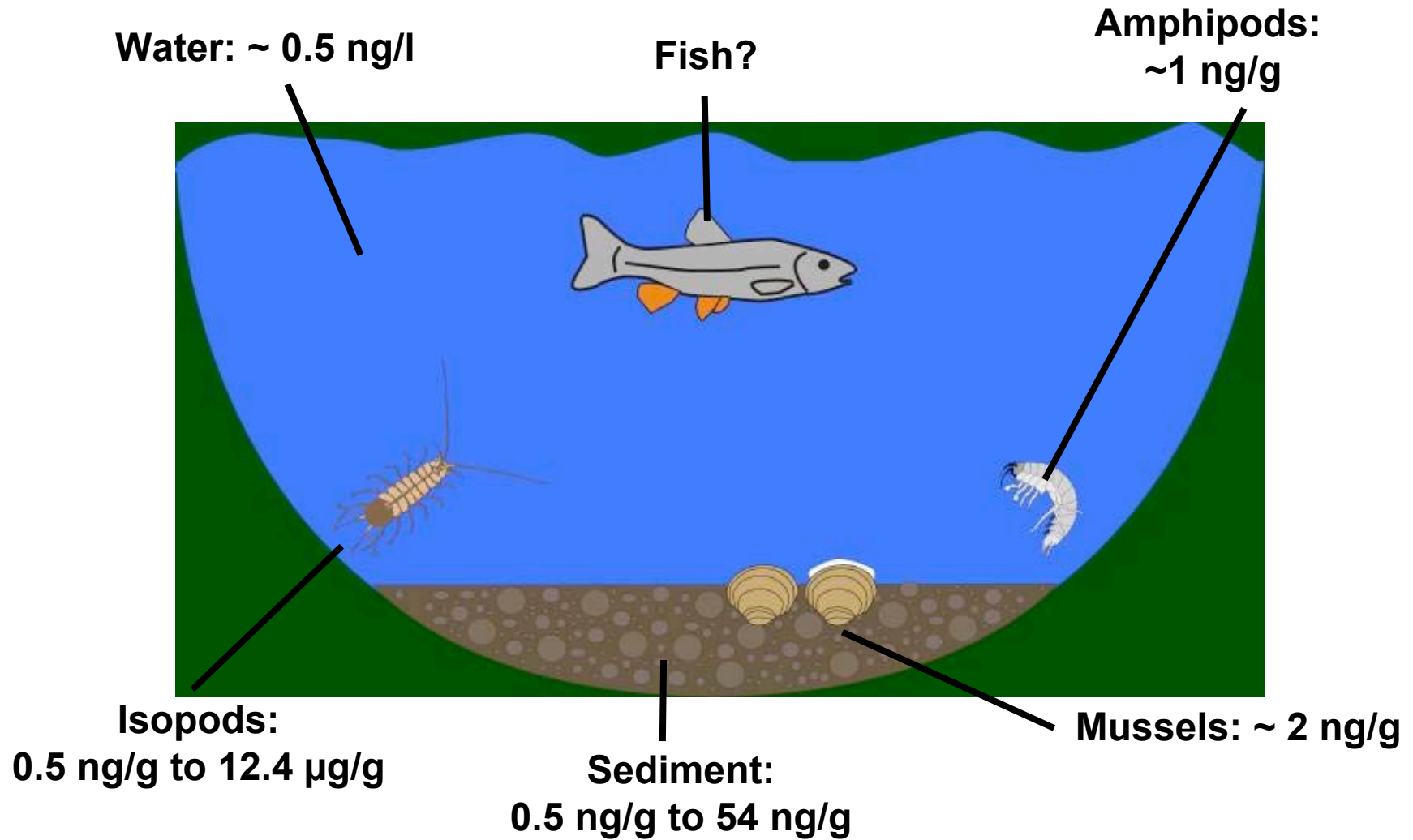


Run off reservoirs

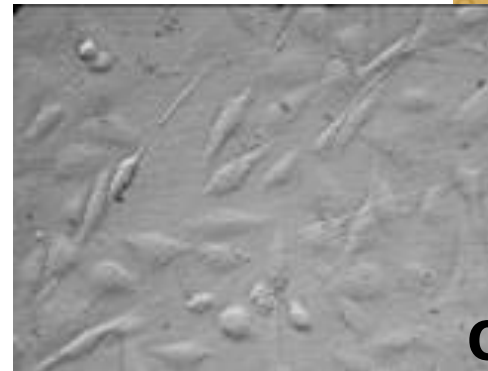


Rivers/lakes

Concentrations of Pt in the field



Effects? Exposure studies



Vitality

**Oxidative stress
(ROS)**

Metal accumulation

HSP-induction

MT-Induction

Genotoxicity

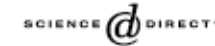
Research related to aquatic parasites



Review

TRENDS in Ecology and Evolution Vol.xx No.xx Monthxxxx

Full text provided by www.sciencedirect.com



Is a healthy ecosystem one that is rich in parasites?

Peter J. Hudson¹, Andrew P. Dobson² and Kevin D. Lafferty³

¹Center for Infectious Disease Dynamics, Penn State University, University Park, PA 16802, USA

²Ecology and Evolutionary Biology, Princeton University, Princeton, NJ 08544-1013, USA

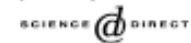
³Western Ecological Research Center, US Geological Survey, Marine Science Institute, University of California, Santa Barbara, CA 93106, USA



Review

TRENDS in Parasitology Vol.20 No.4 April 2004

Full text provided by www.sciencedirect.com

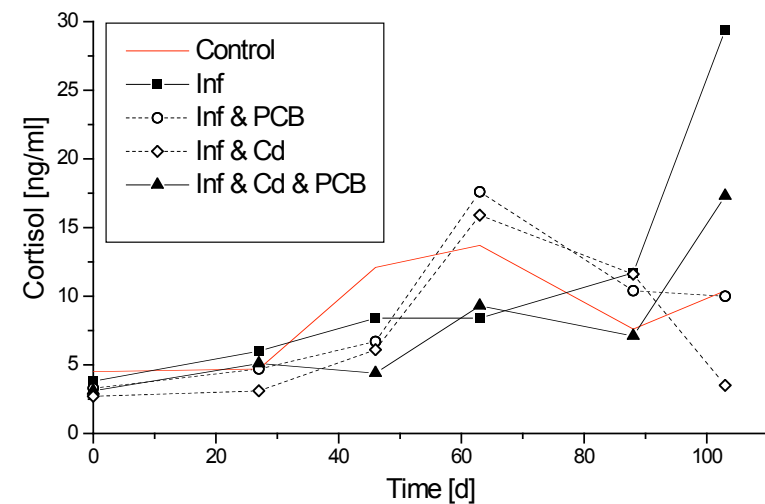
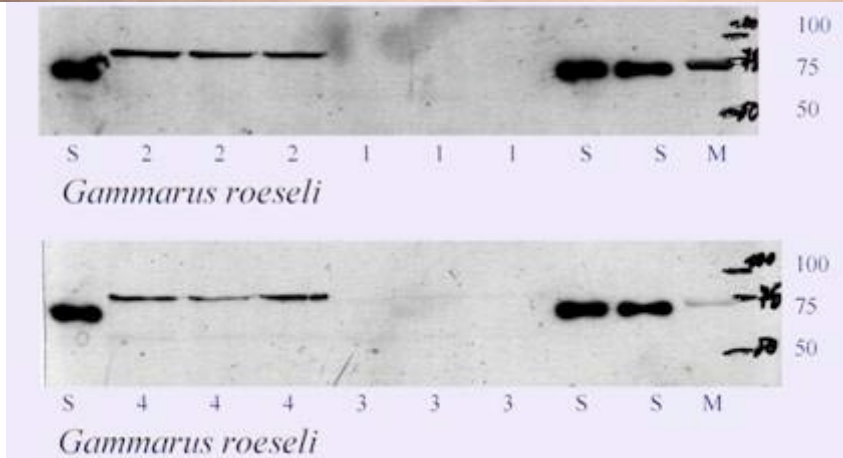


Environmental parasitology: relevancy of parasites in monitoring environmental pollution

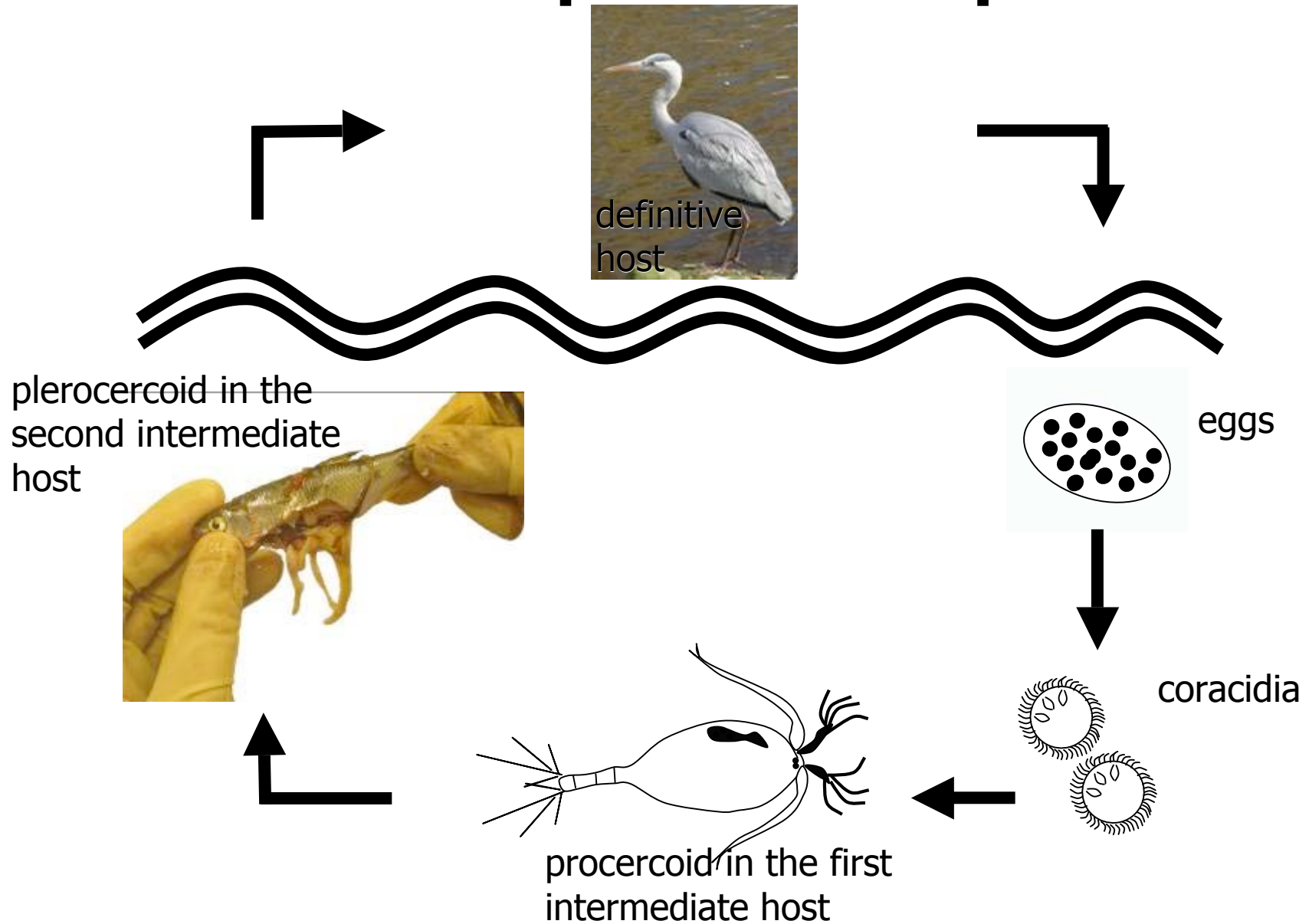
Bernd Sures

Zoology I, Department of Ecology and Parasitology, University of Karlsruhe, Kornblumenstr.13, D-76128 Karlsruhe, Germany

Physiological effects of parasites on their hosts

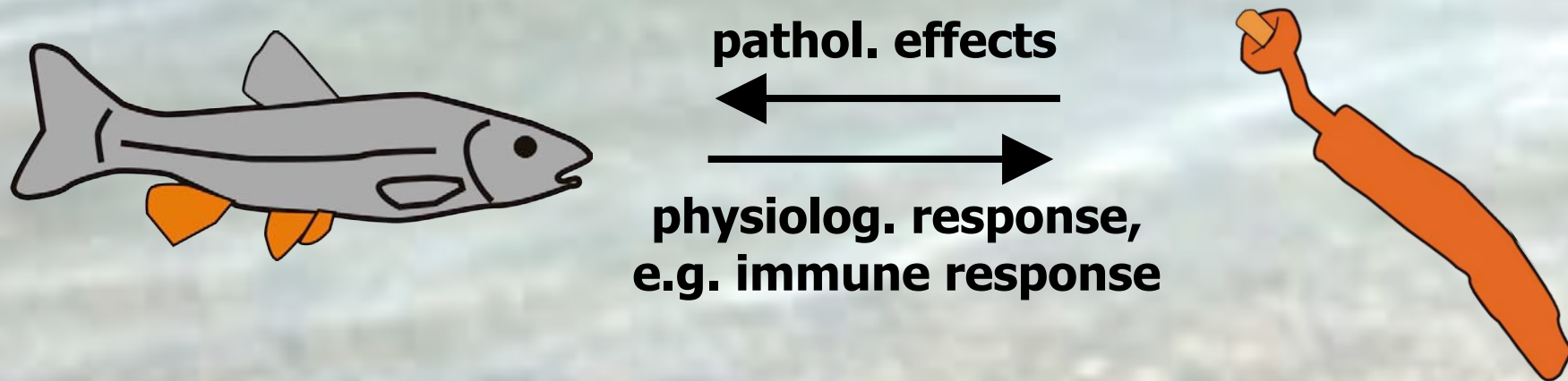


Endocrine disruption due to parasites?

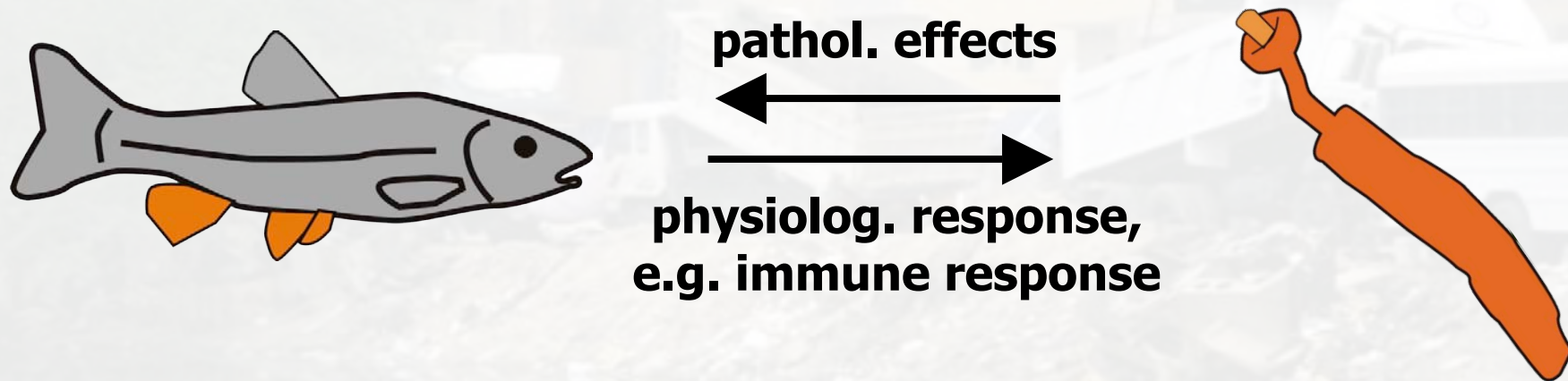


Host-parasite interactions

Classical view, uncontaminated environment



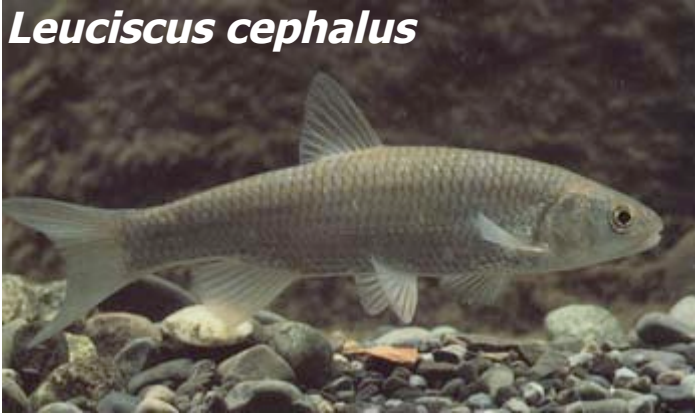
Host-parasite interactions -contaminated environment-



Parasites as metal sinks

Parasites as pollutant sinks: acanthocephala

Leuciscus cephalus



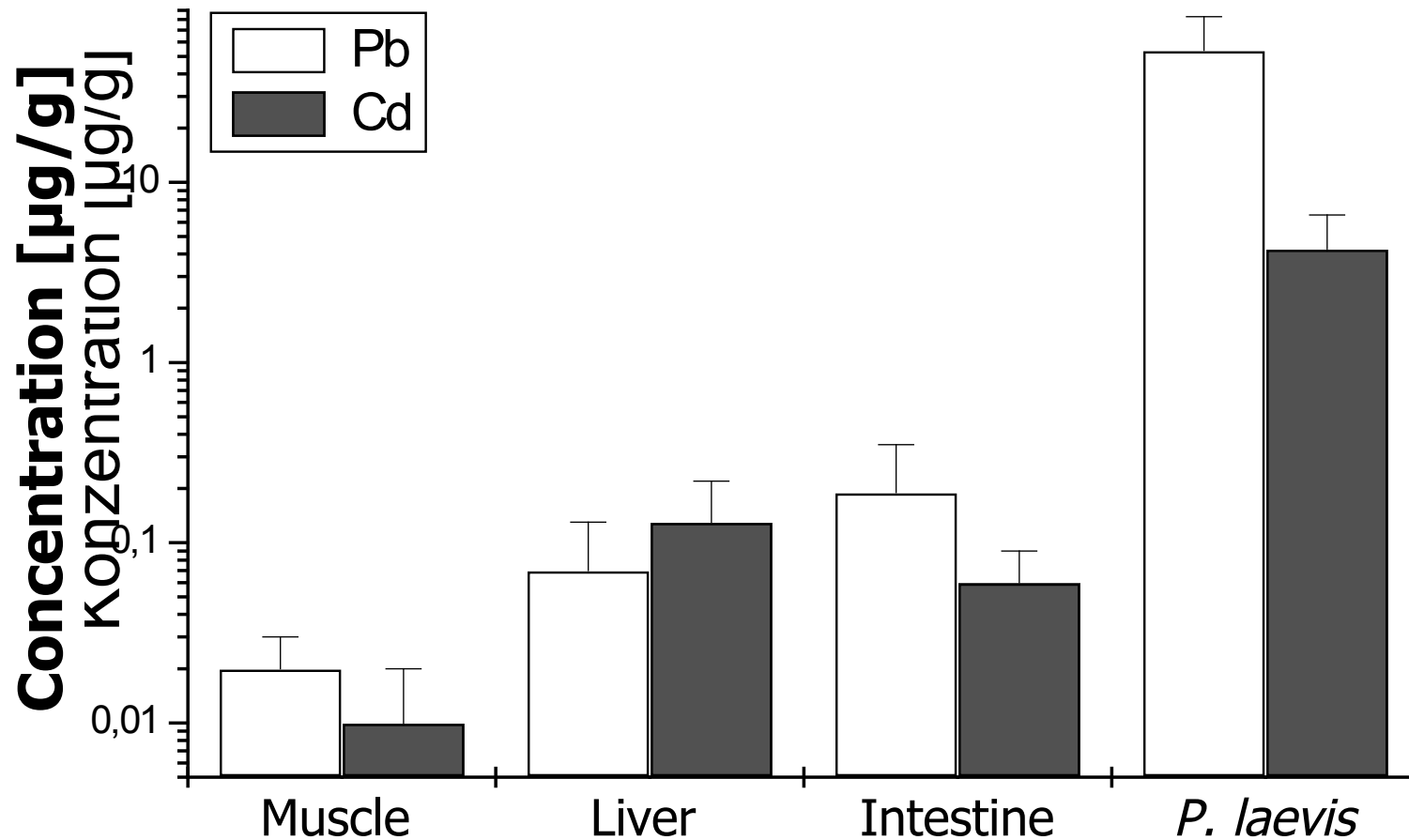
Pomphorhynchus laevis



Pomphorhynchus laevis

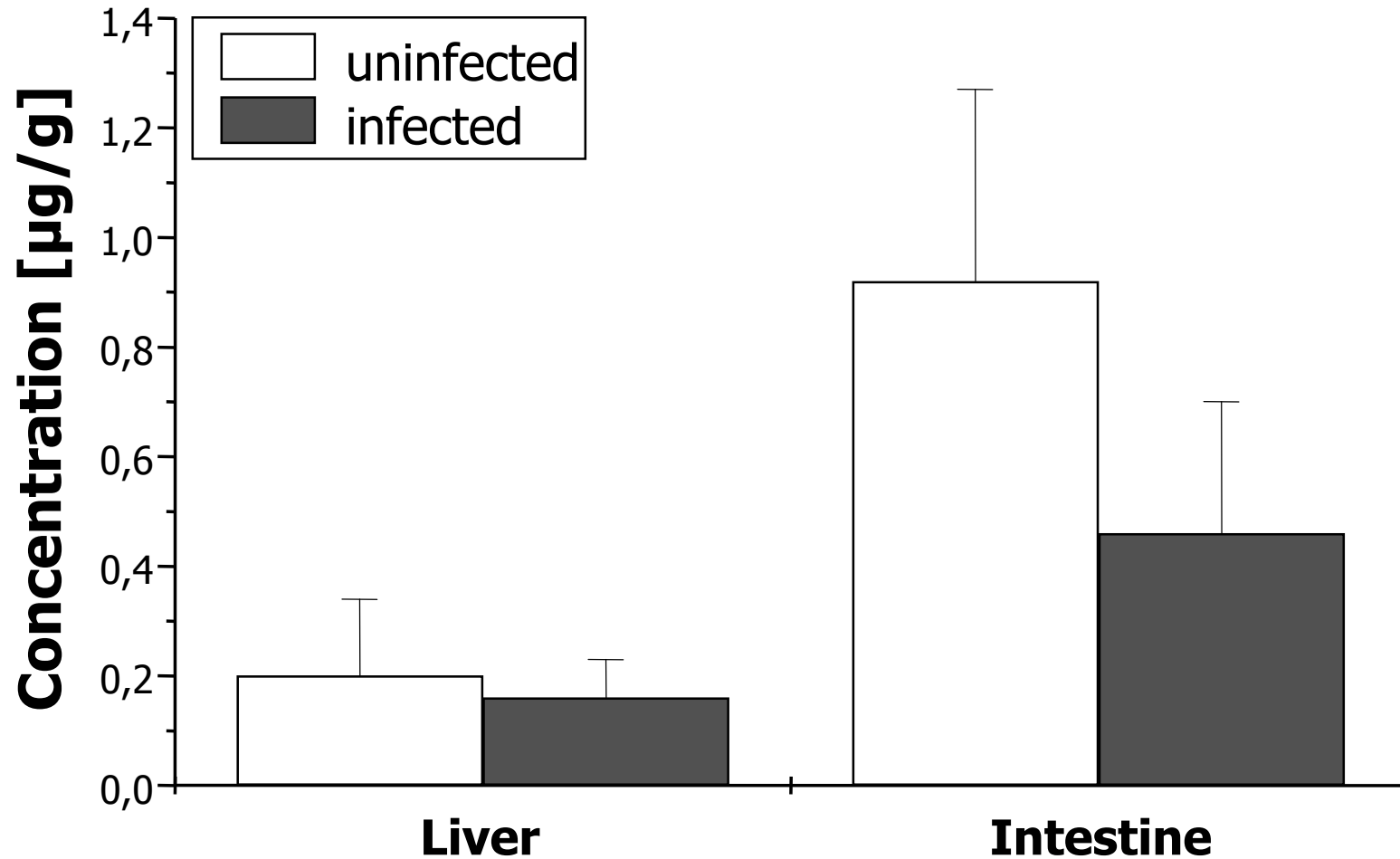


Heavy metals in different tissues of chub and in *Pomphorhynchus laevis*

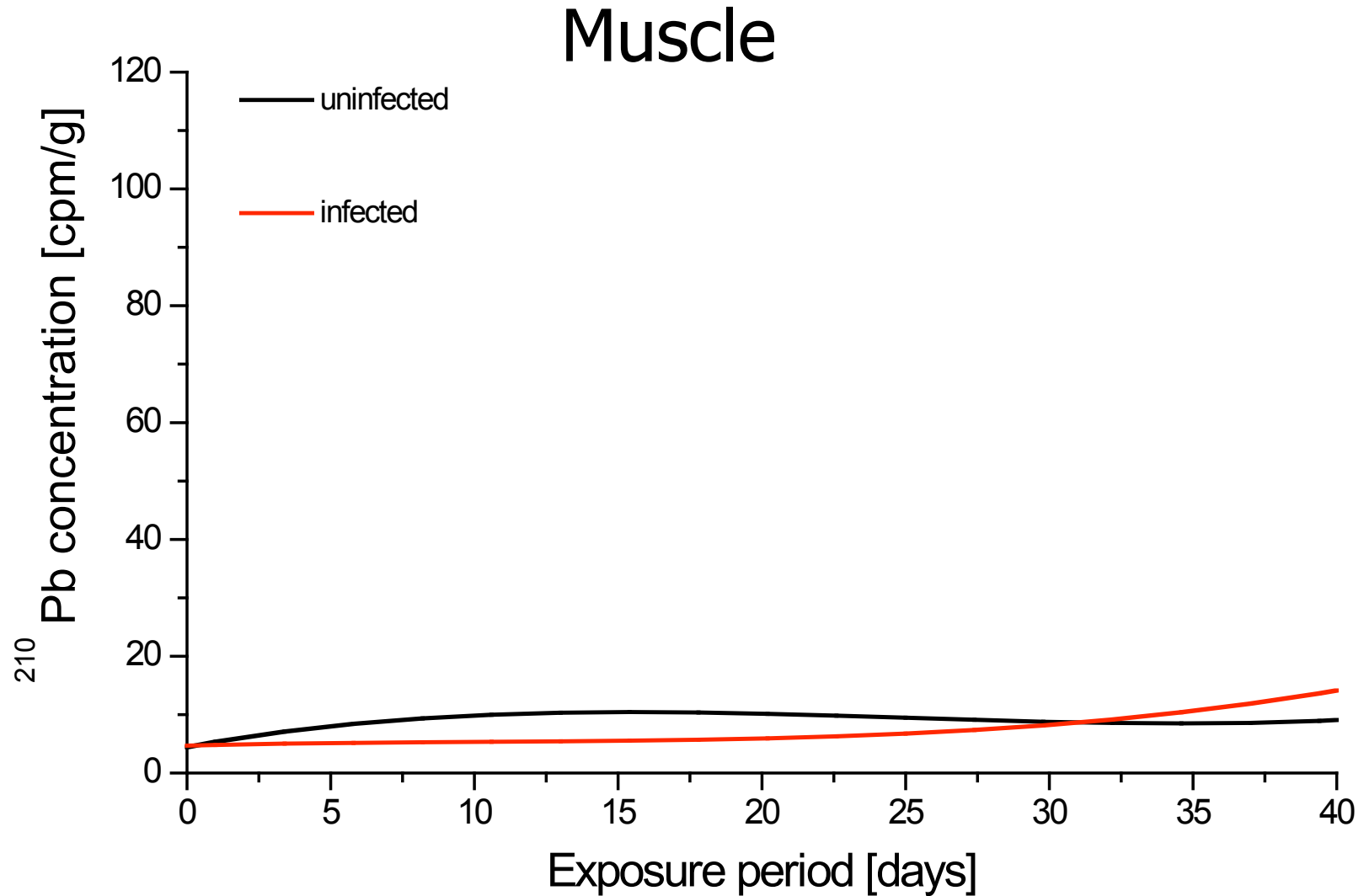


Sures *et al.* Journal of Parasitology (1994); Sures & Taraschewski, Parasitology Research (1995)

Lead concentrations ($\mu\text{g/g}$) in liver and intestine of infected and uninfected chub



^{210}Pb levels in infected and uninfected chub



Parasites as pollutant sinks

parasites are able to reduce pollutant levels in their hosts

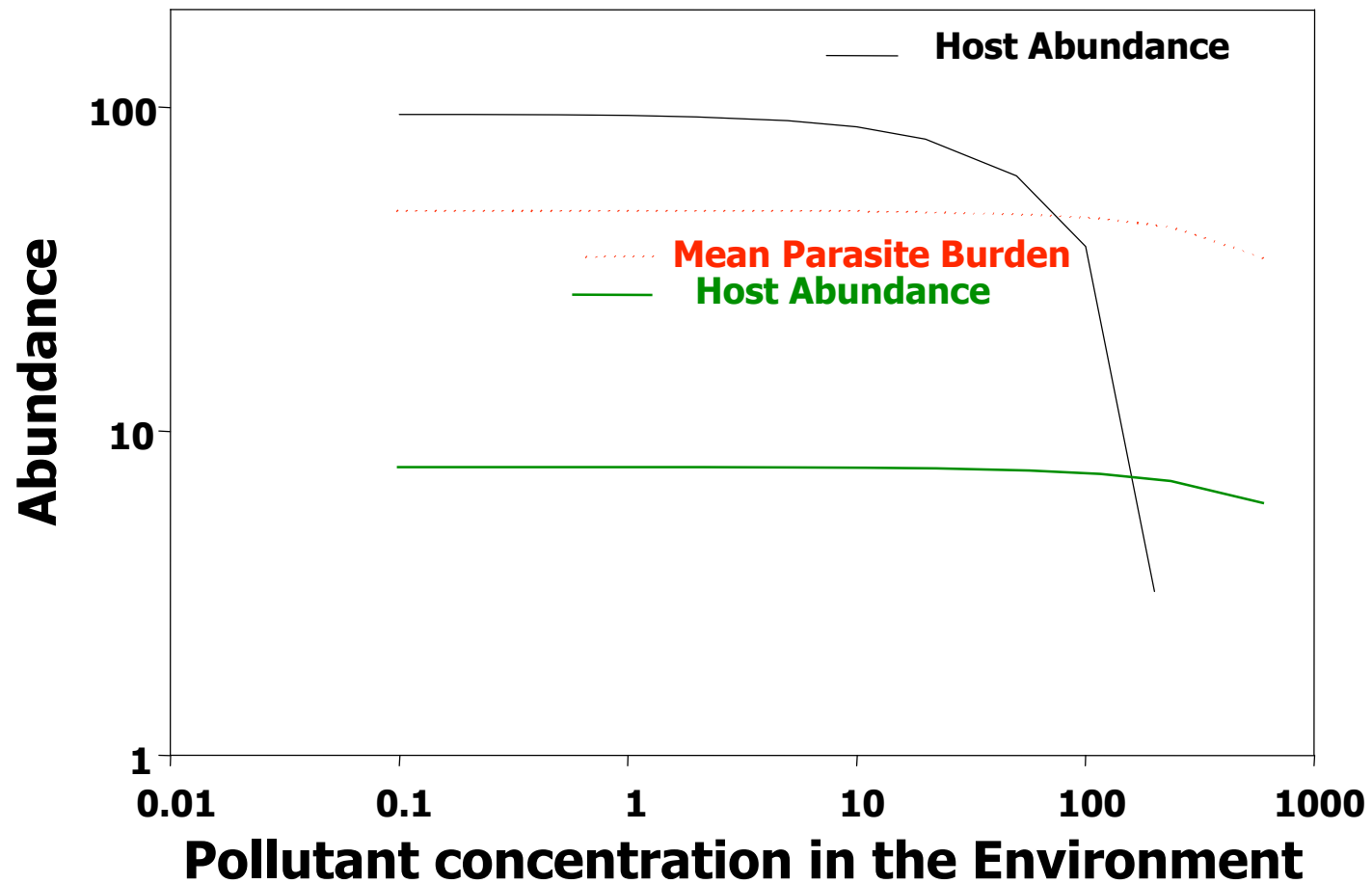
the degree of pollutant reduction in host tissues depends on pollution type as well as on host and parasite species

are parasites beneficial to their host when they reduce pollutant concentrations in their hosts?

can we use parasites as bioindicators for heavy metals?

Are parasites beneficial to their hosts?

Hosts and pollutants



Parasites as indicators of traffic related pollution



Exposure studies

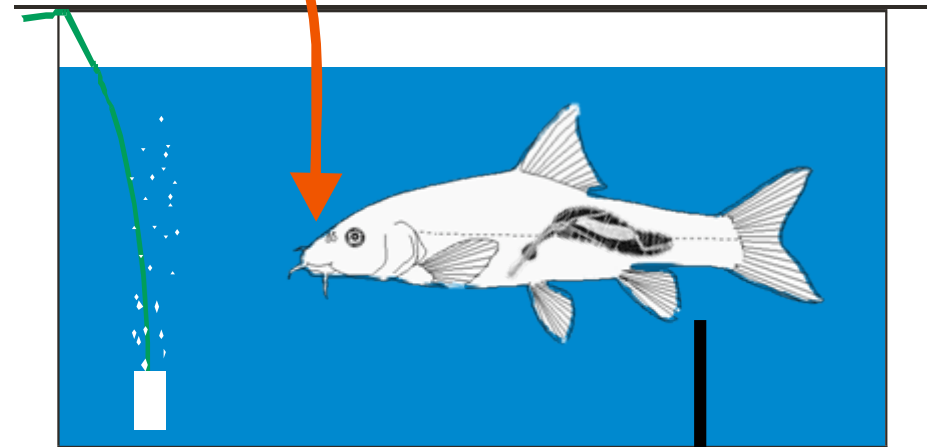


Catalytic converter material

Pt

Rh

Pd



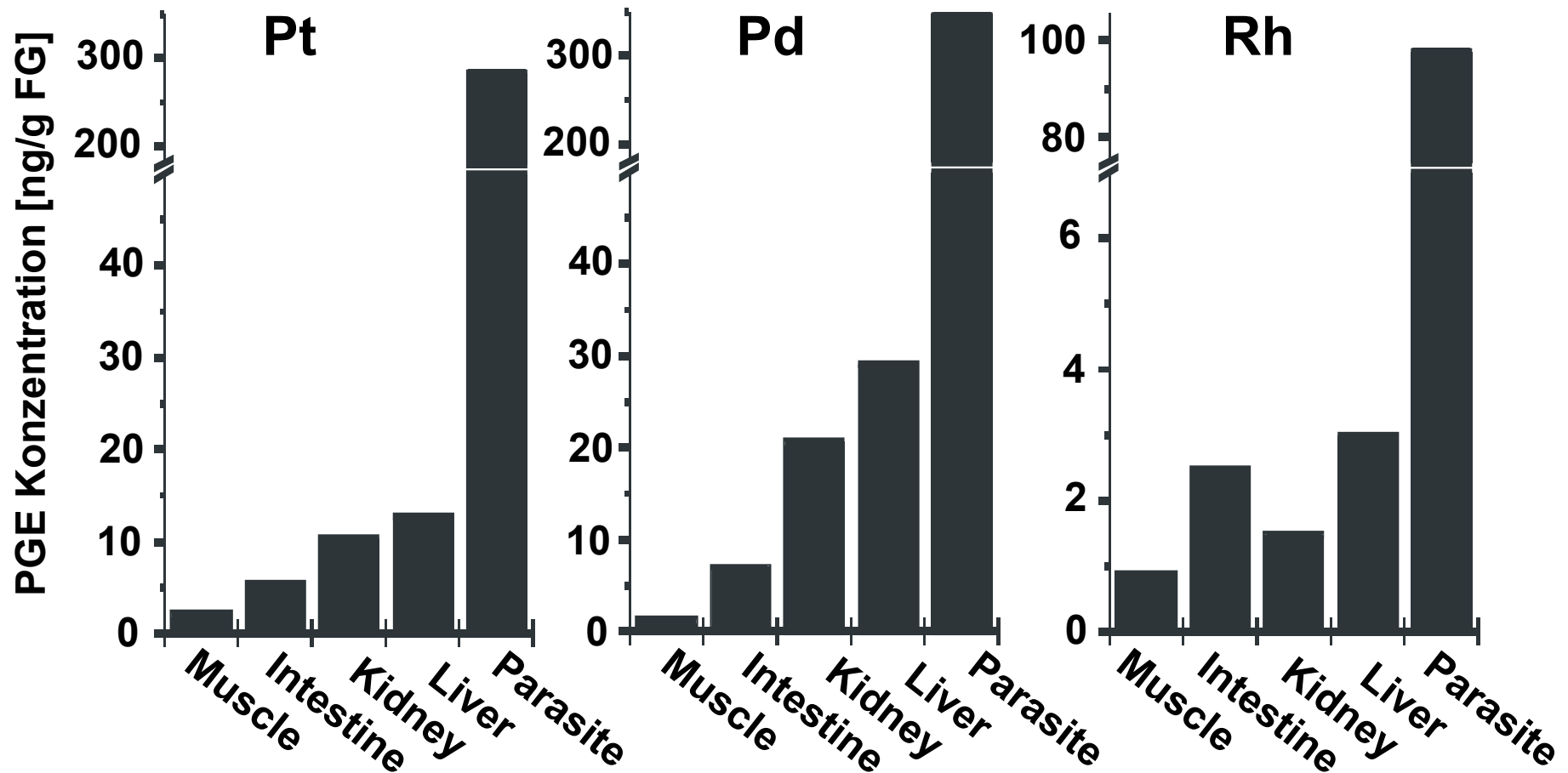
4 or 6 weeks

Muscle, Liver, Kidney, Intestine, Parasite



Metal analyses

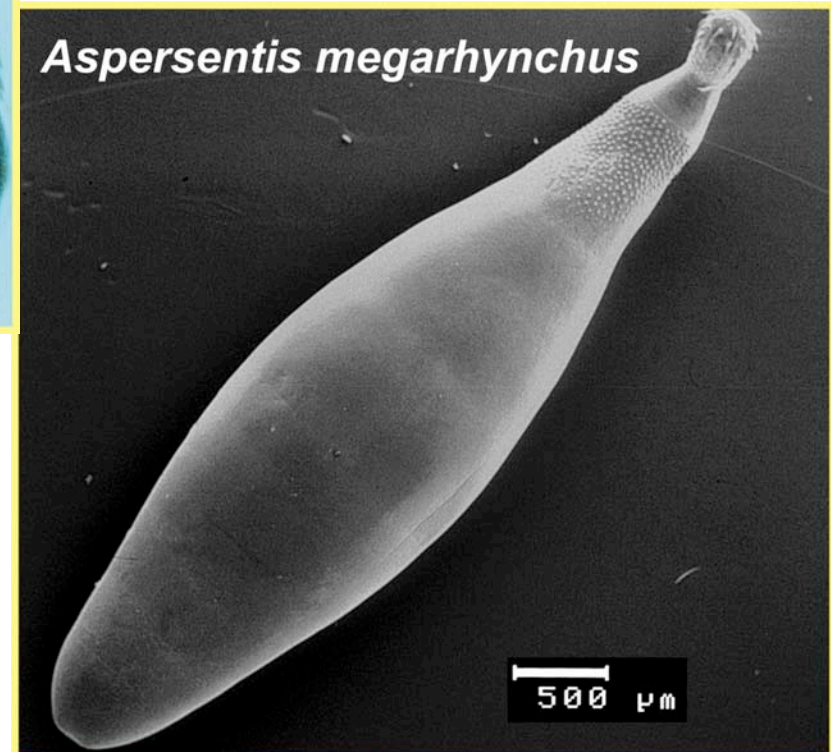
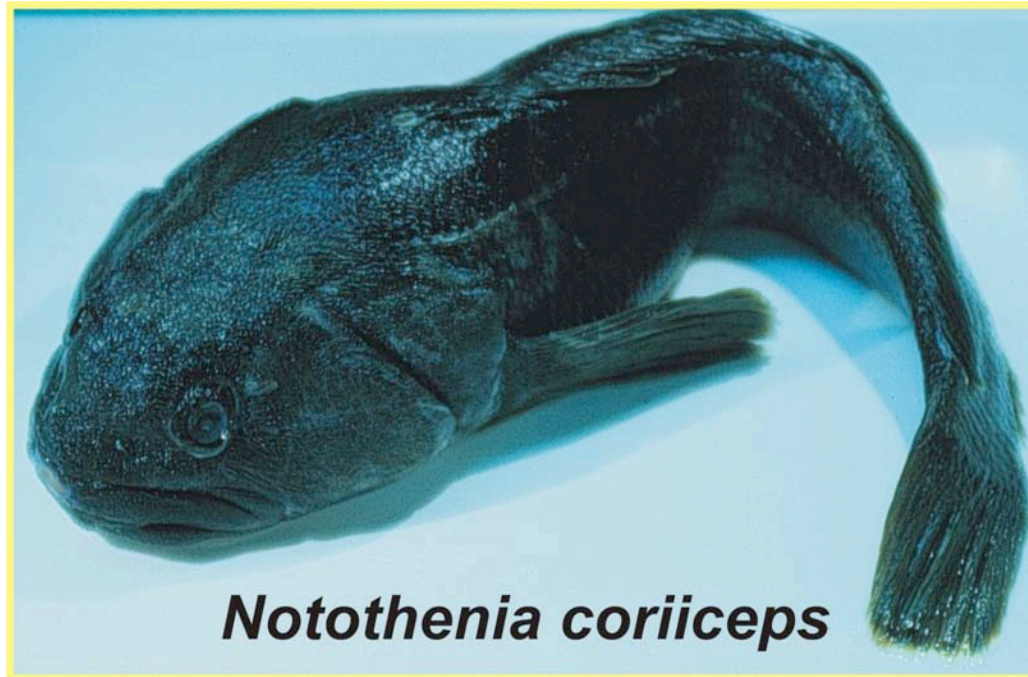
Metal accumulation in *B. barbuis* and *P. laevis*



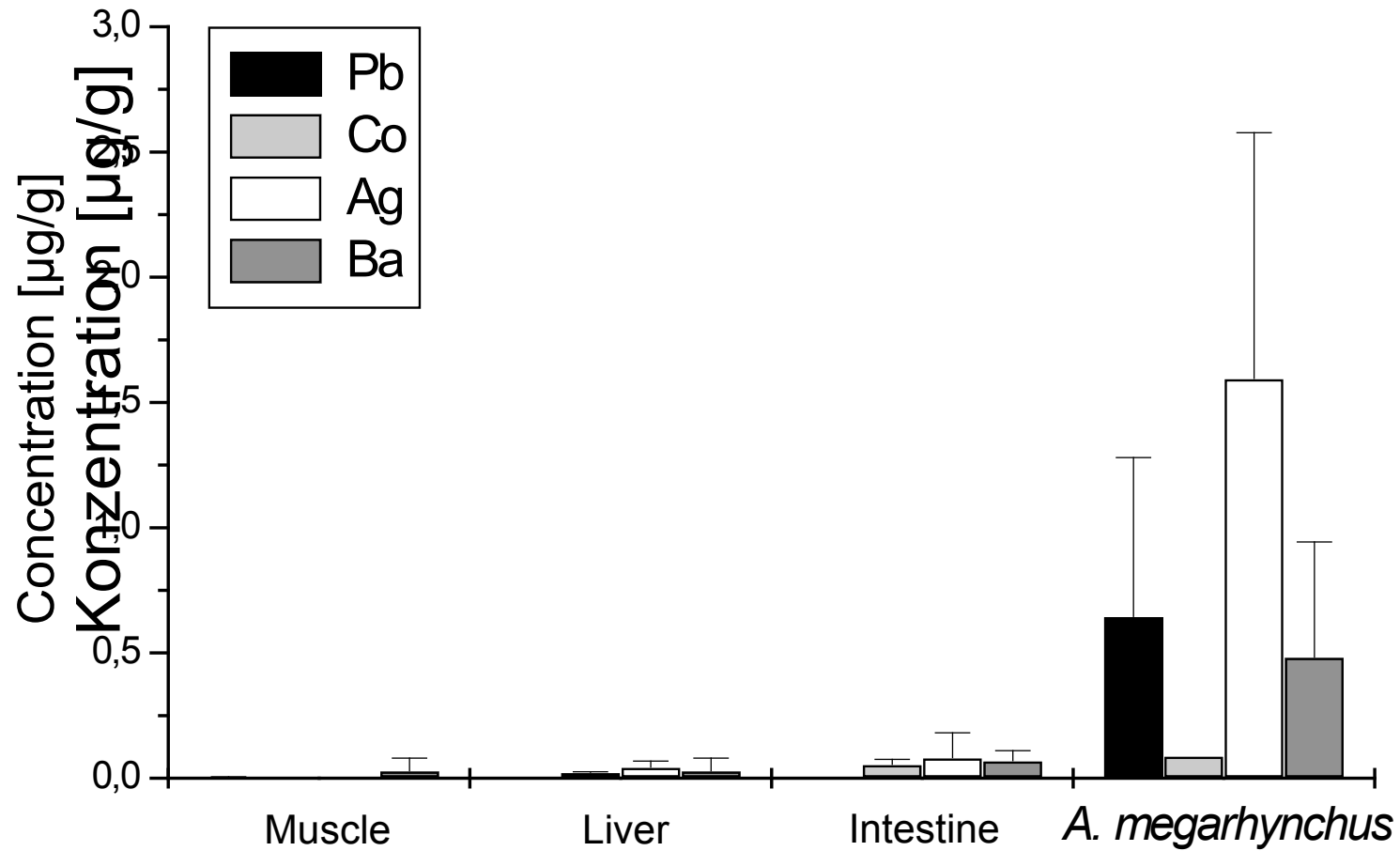
Remote area: Antarctica



Host – parasite system



Element levels in *Notothenia coriiceps* and *Aspersentis megarhynchus* from the Antarctic



Parasites as pollutant sinks

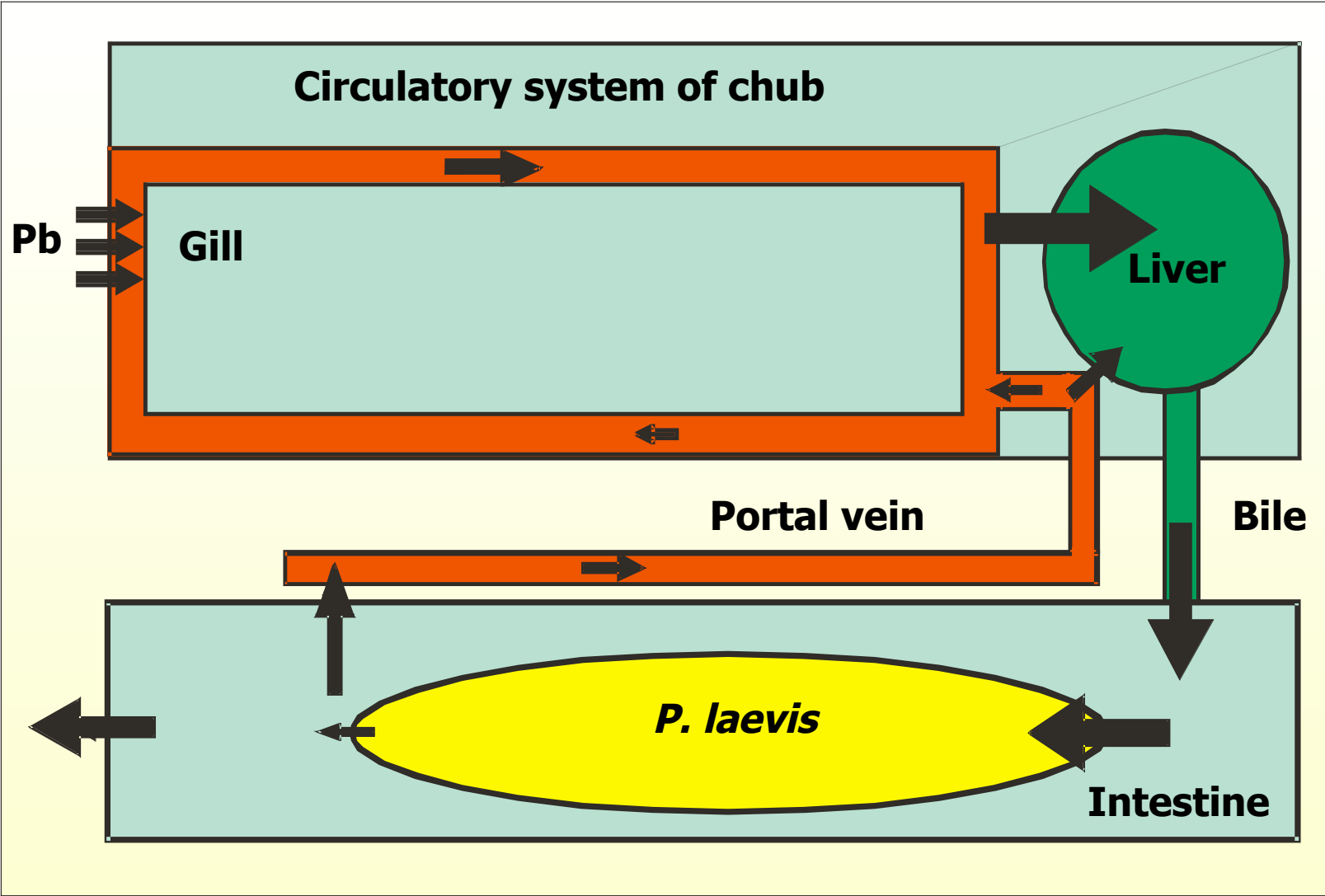
parasites might be beneficial to their hosts if the latter face environmental pollution

due to their metal accumulation capacity parasites may be used as accumulation bioindicators

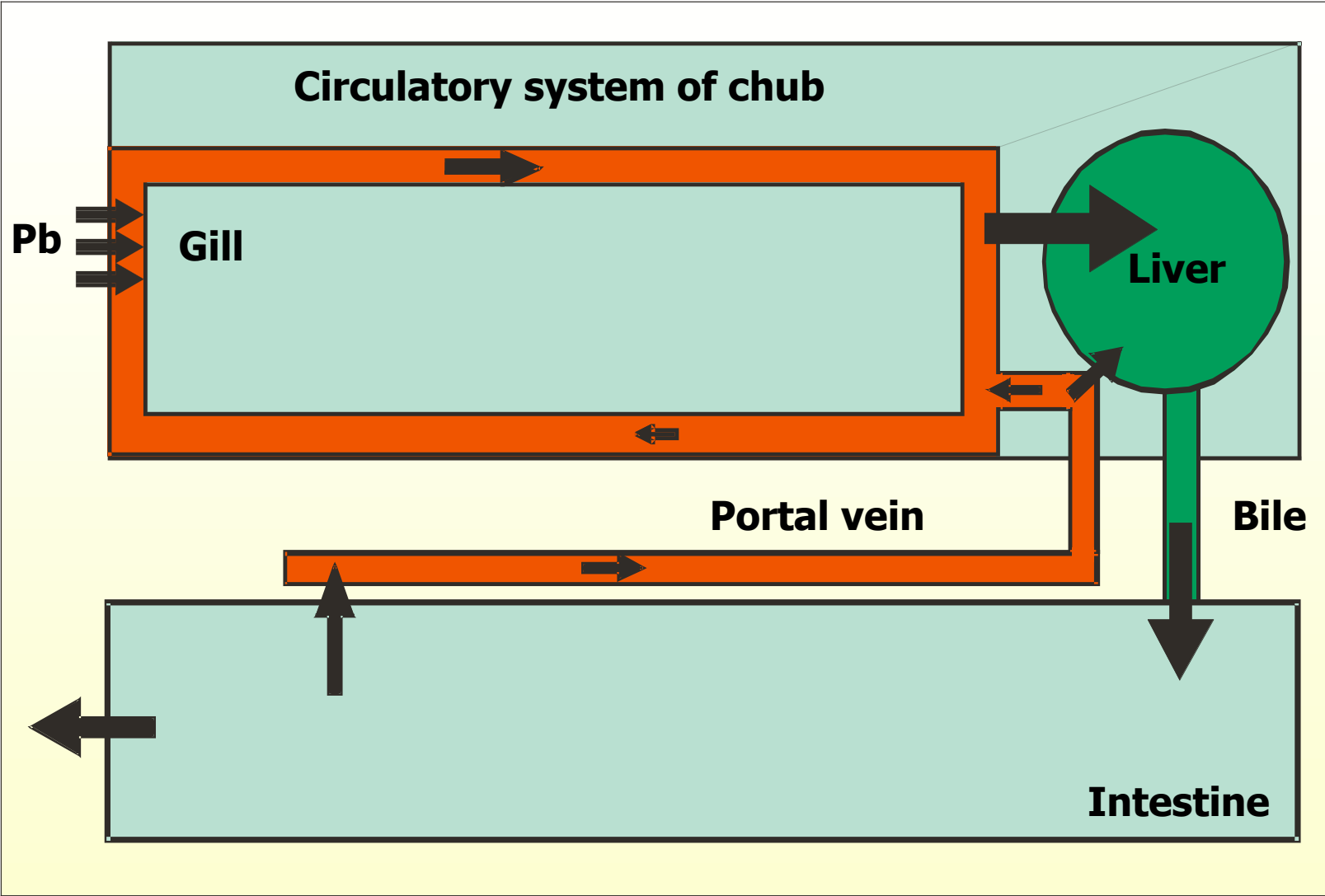


Thank you

Lead uptake by *Pomphorhynchus laevis*



Lead uptake by *Pomphorhynchus laevis*



Non endemic animals in Europa

