

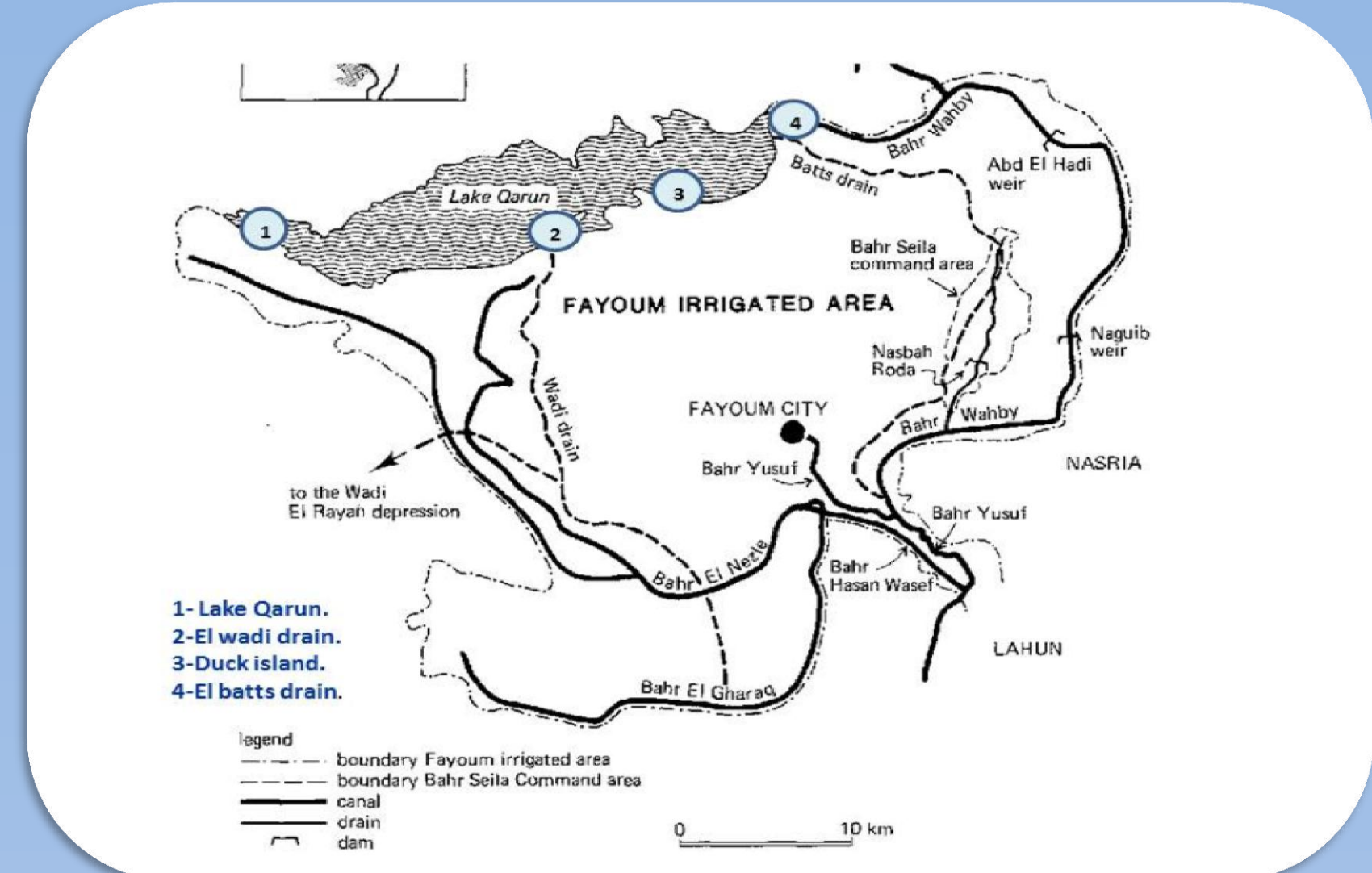
# Metal pollution and parasites in fish used for human consumption from different water localities in Fayoum Governorate (Egypt)

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## Introduction

Heavy metal pollution and parasites of fish might be very important from human health point of view, as the fish is often one of the major food sources in many regions on the earth. Fish serves as intermediate host for various human related parasites (e.g. trematodes) and similar to other aquatic organism could accumulate pollutants like heavy metals from the local environment. Therefore, its consumption may lead to outbreak of parasitic infections and cause intoxications with severe health problems among fishermen and local human population. The pollution with heavy metals in the environment is mostly a result from natural geogenic disposition such as erosion, but the industrial and communal wastes especially in developing countries are considered as the major source.

The aim of the study was to assess the risk of water associated/ food born diseases, which might emerge after consumption of fish. Therefore, Nile tilapia (*Tilapia zilli*) and common sole (*Solea* sp.) were on the focus of the investigation, as these fish species are commonly used as food source in Fayoum Governorate.

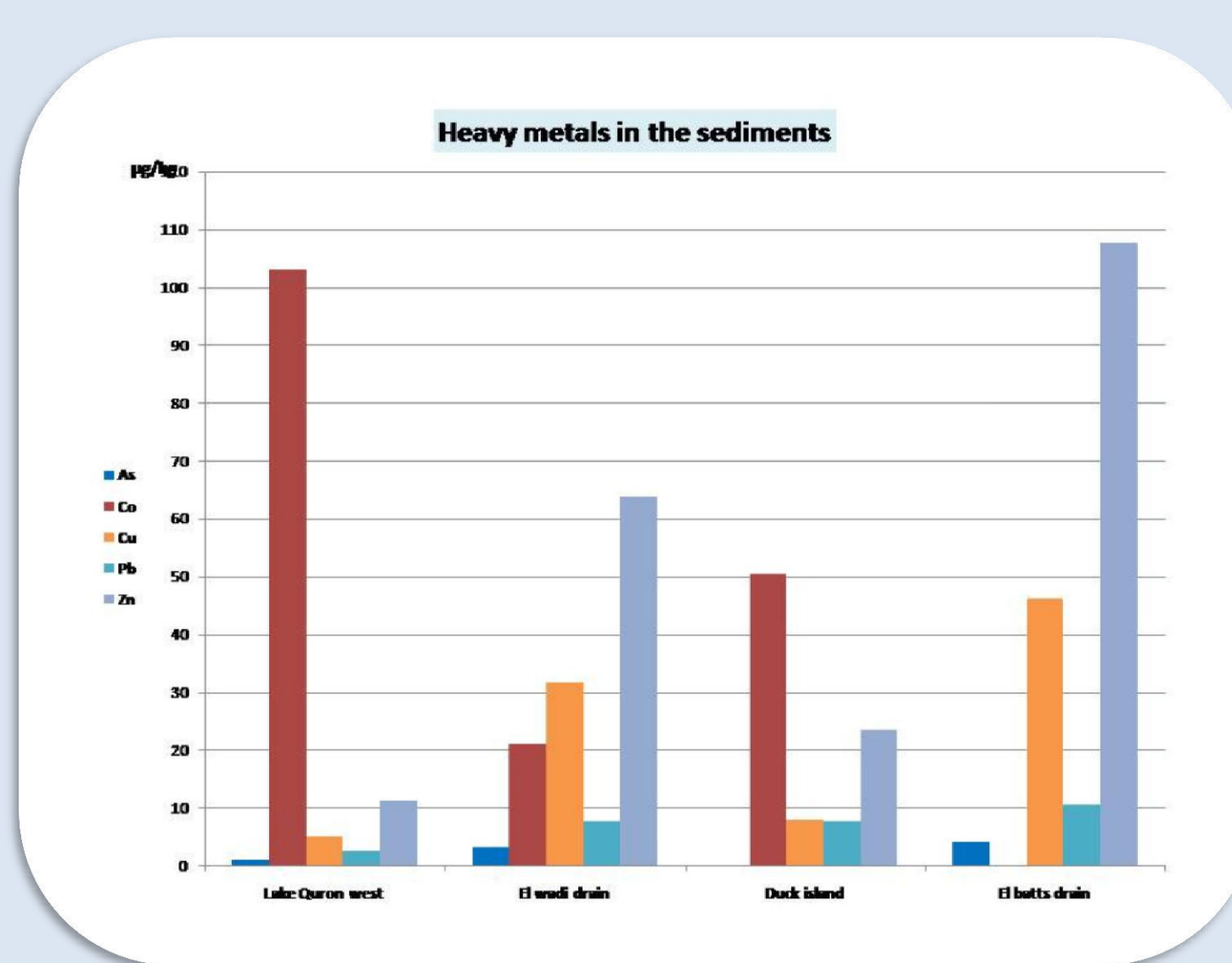
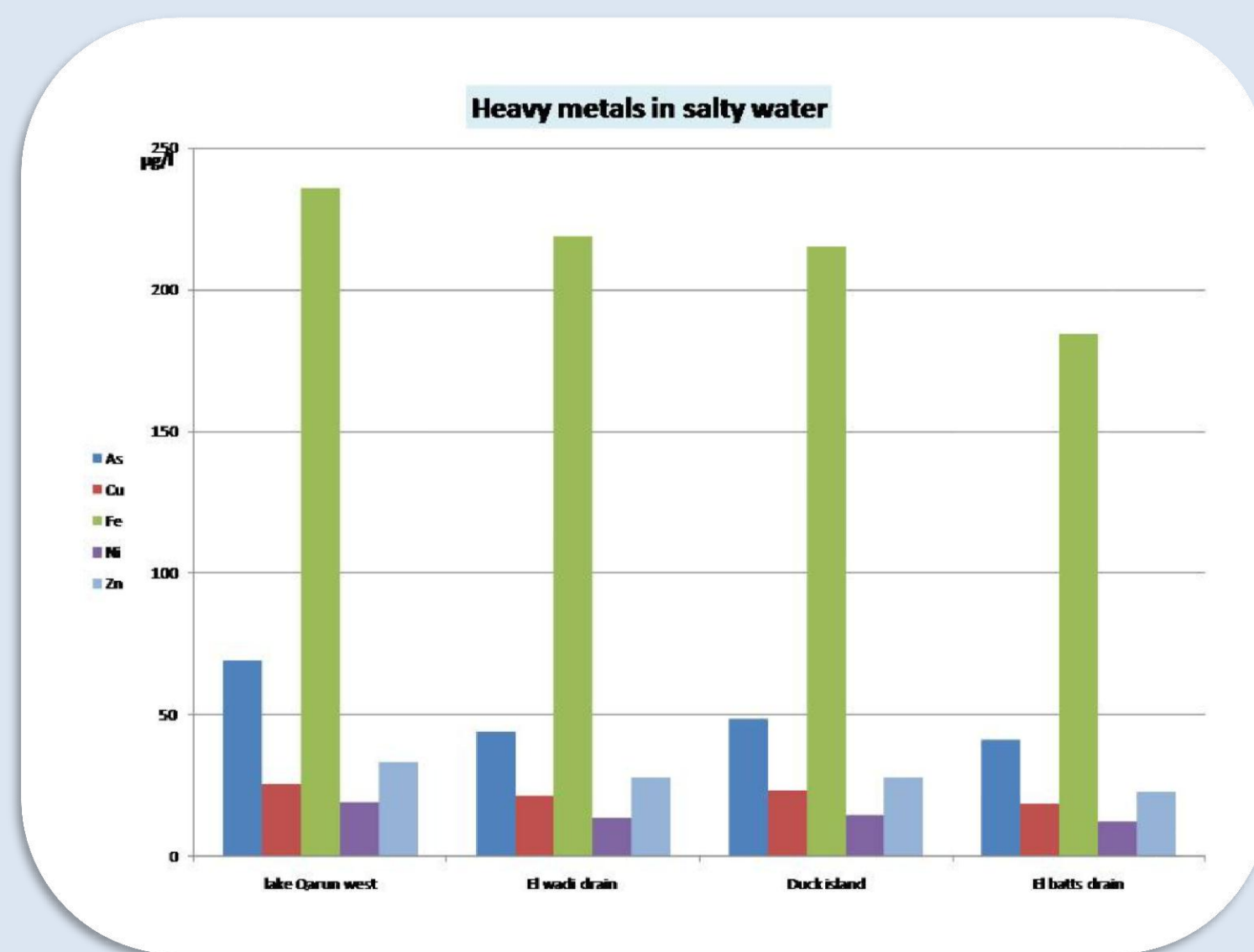


## Methods

- Sampling of Nile tilapia, common sole, water and sediment samples at four sites in Lake Qarun
- Fish parasitological investigation – dissection and investigation on metacercaria with the help of optical microscopes
- Molecular identification of metacercaria – DNA sequencing
- Element analyses – microwave digestion (for fish muscle), inductively coupled plasma mass spectrometry (for fish muscle, water), X-ray Fluorescence Spectrometer (for sediments)

## Results

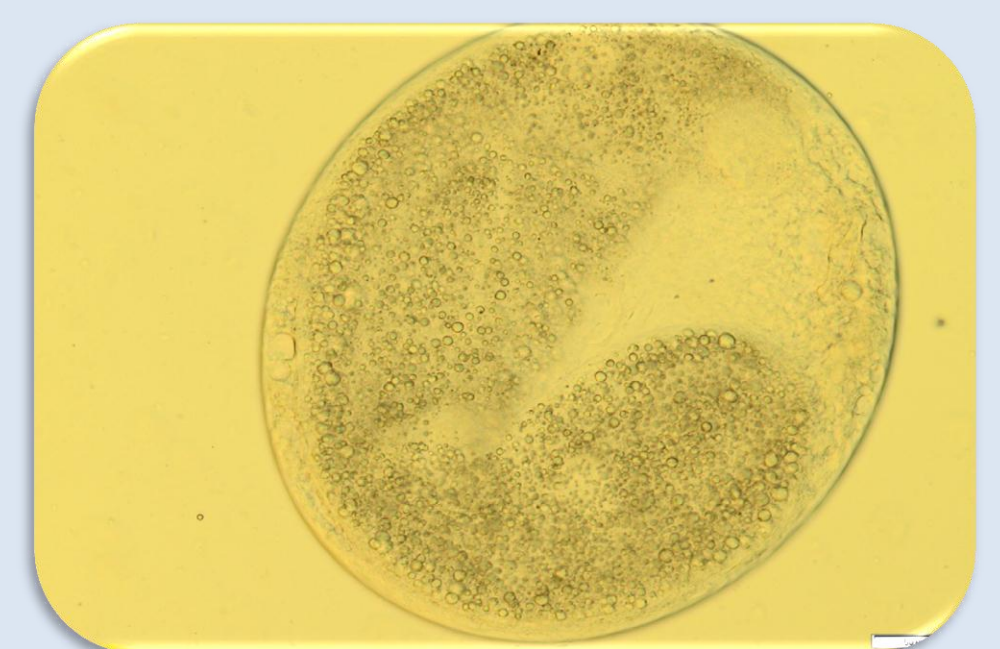
- 70% of the fish are infected with metacercaria in different tissues in the followed order: muscles > gills > intestine > heart > kidney > eyes > gonads > spleen=swim bladder > liver
- The closest match for the sequences of PCR was:
  - *Haplorchis taichui* 18S ribosomal RNA gene, partial sequence; it is closely related to *Heterophyes heterophyes* (Platyhelminthes, Trematoda).
  - *Posthodiplostomum minimum* (Platyhelminthes, Trematoda).
- El wadi and El batts drains showed the highest contamination with heavy metals higher than Lake Qarun and Duck Island. A higher ability to accumulate heavy metals was observed for *Tilapia zilli* compared to *Solea* sp.
- The abundance of metals in the lake water and the two main drains following the order: Fe>As>Zn>Cu>Ni>Co>Pb. El wadi and El batts drain sediment samples have been higher contaminated with Zn, Cu and Ni than Lake Qarun and Duck Island (salty water) and vice versa with Co
- The contamination with Arsenic of fish and biological samples of Lake Qarun West and Duck Island was higher than from the two main drains.



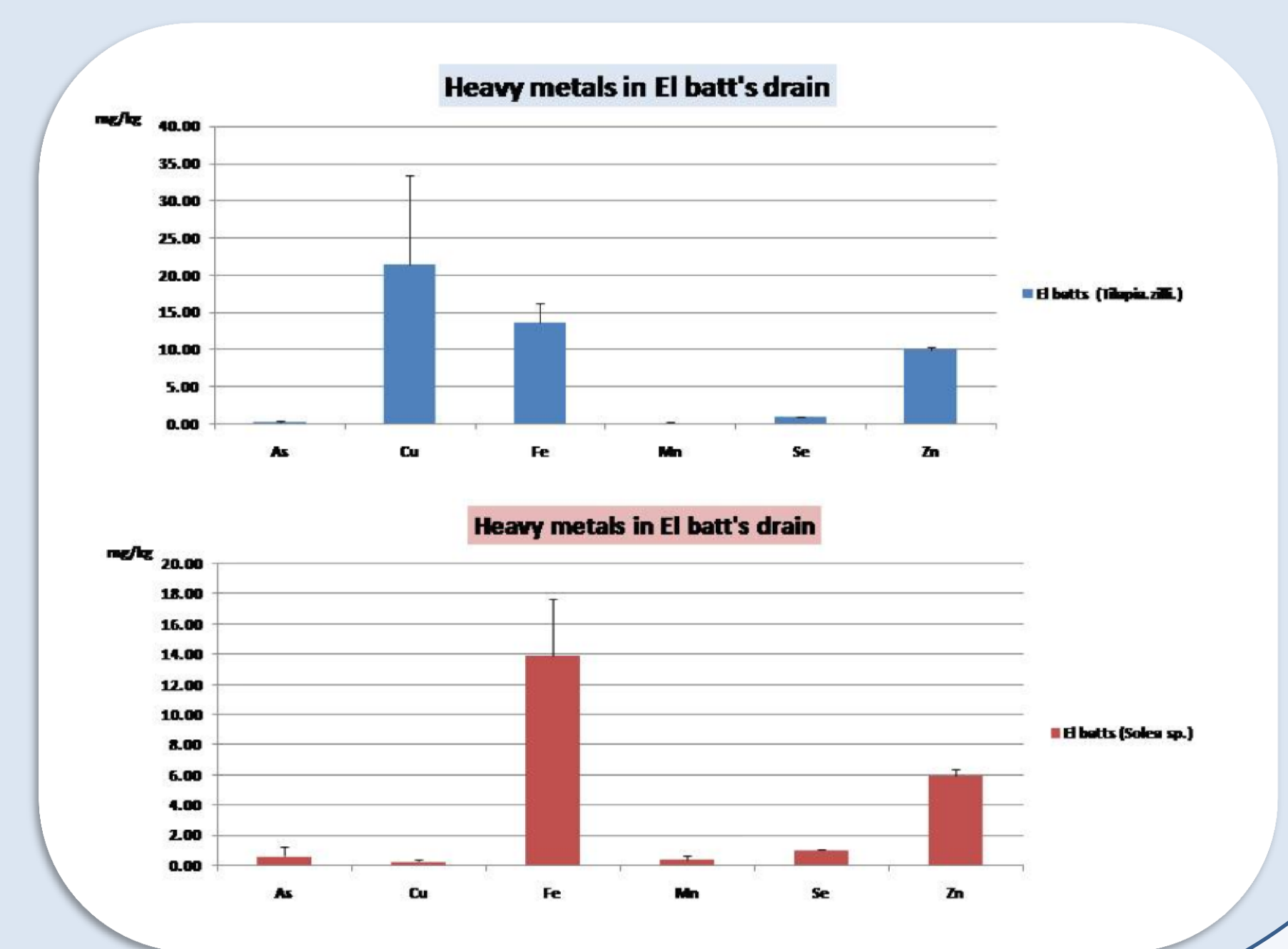
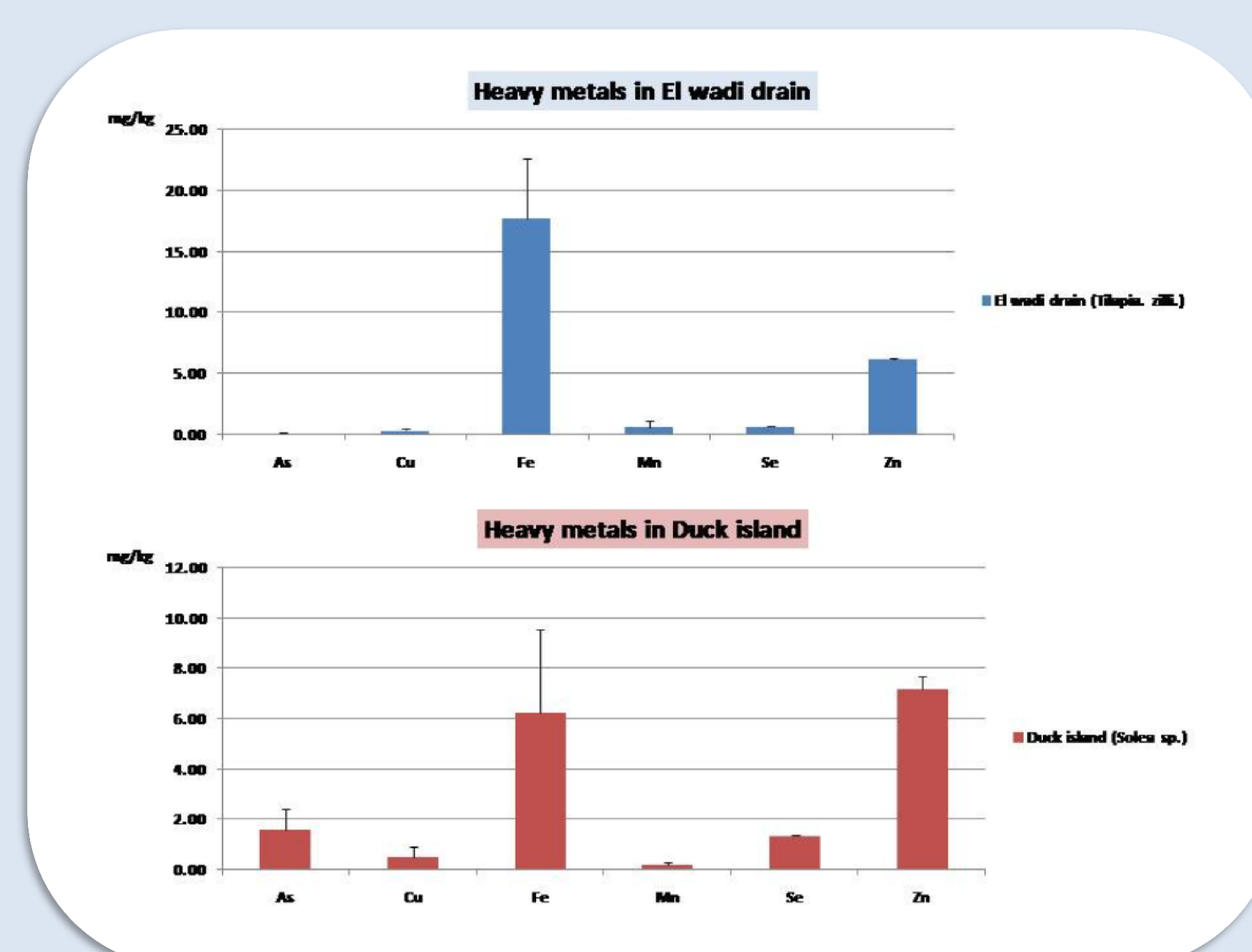
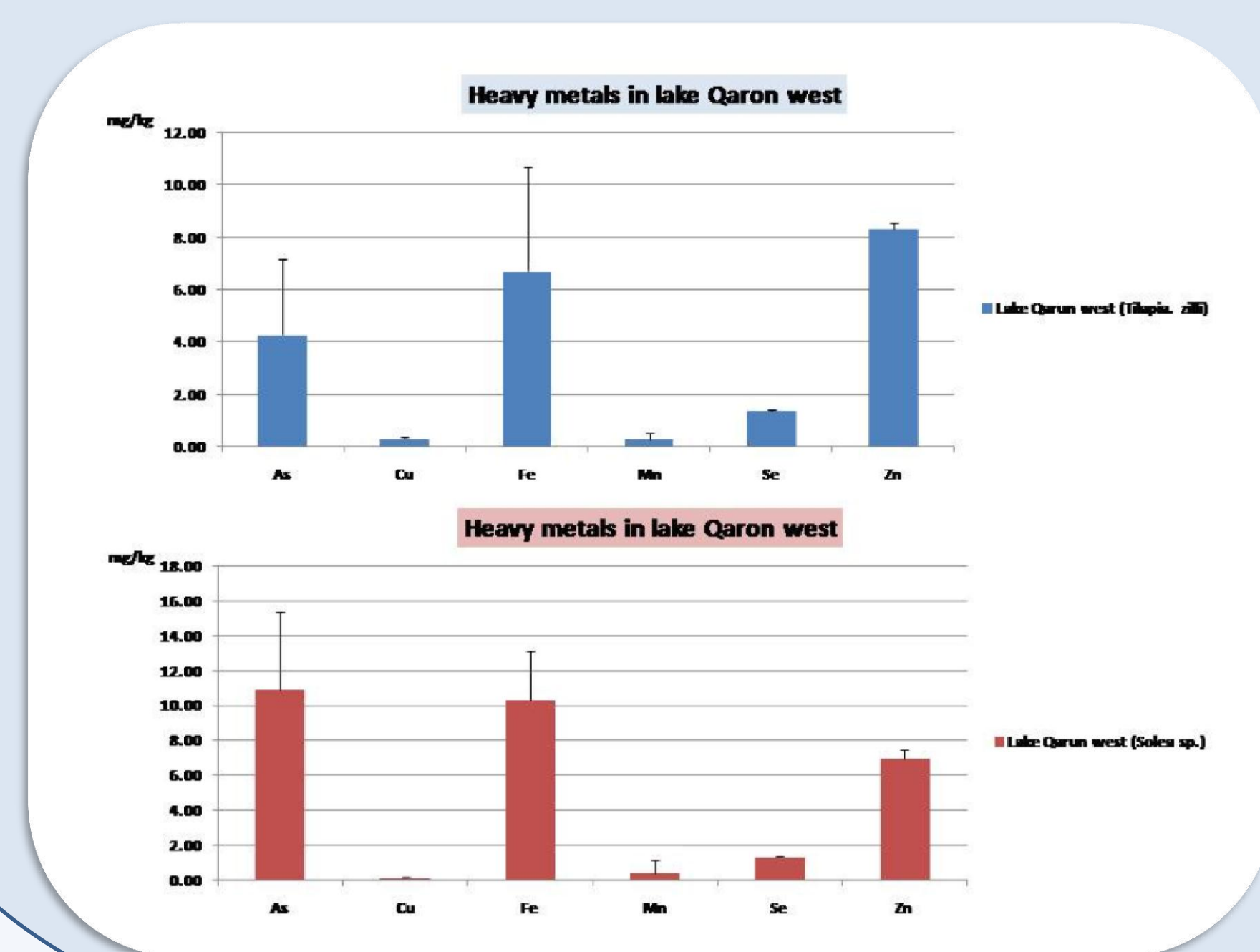
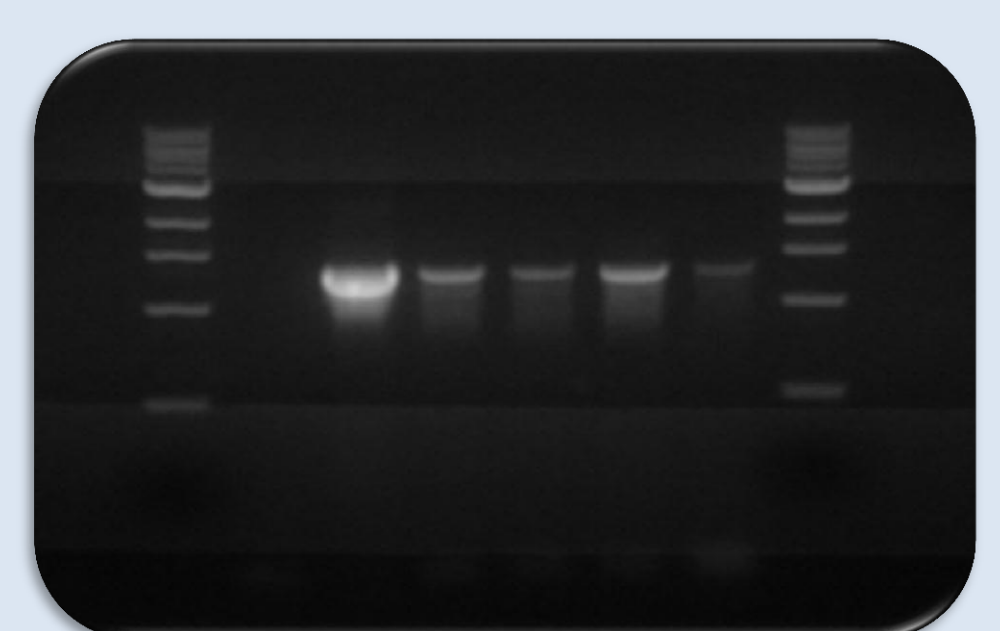
Bioconcentration factor of the fish muscles in respect to the water [C(muscle)] / [C(water)].						
	Lake Qarun west		El wadi drain		Duck Island	
	<i>Tilapia zilli</i>	<i>Solea</i> sp.	<i>Tilapia zilli</i>	<i>Solea</i> sp.	<i>Tilapia zilli</i>	<i>Solea</i> sp.
As	0.062	0.158	0.002	0.032	0.007	0.015
Co	0.013	0.009	0.026	0.008	0.028	0.036
Cu	0.012	0.006	0.017	0.022	1.132	0.015
Fe	0.105	0.195	0.089	0.040	0.089	0.094
Ni	0.002	0.002	0.003	0.001	1.487	0.003
Pb	0.015	0.073	0.021	0.011	0.042	0.014
Zn	0.250	0.209	0.219	0.250	0.435	0.250

Bioconcentration factor of the fish muscles in respect to the sediment [C(muscle)] / [C(sediment)]. (N.D. = Not detected)						
	Lake Qarun west		El wadi drain		Duck Island	
	<i>Tilapia zilli</i>	<i>Solea</i> sp.	<i>Tilapia zilli</i>	<i>Solea</i> sp.	<i>Tilapia zilli</i>	<i>Solea</i> sp.
As	4.67	12.15	0.03	N.D.	0.07	0.16
Co	N.D.	N.D.	N.D.	0.00	N.D.	N.D.
Cu	0.07	0.03	0.01	0.06	0.47	0.01
Ni	0.01	0.01	N.D.	N.D.	0.39	N.D.
Pb	N.D.	N.D.	N.D.	N.D.	N.D.	N.D.
Zn	0.74	0.62	0.10	0.31	0.09	0.06

Metacercaria found in *Tilapia zilli*

Example for molecular results



## Conclusion and Outlook

Parasites and pollution with heavy metals seem to influence the fish population in Lake Qarun to a to a large extent. The investigated fish species *Tilapia zilli* and *Solea* sp. from lake Qarun are common edible fish for the local community. As both factors are related to human health we conclude that there is a considerable risk to get infected e.g. via ingestion of infective encysted metacercaria (EMC) or through bioaccumulation of toxic substances, especially Arsenic, after regular consumption of fish from Lake Qarun. Further investigation and educational advertisement to the local people need to be carried out.

## References

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