



## Opening for Master or Bachelor Thesis in the Behavioral Ecology and Evolution of Fish with a possibility for a student assistant position in zebrafish husbandry

Department of Integrative Fisheries Management, Humboldt-Universität zu Berlin ([www.ifishman.de](http://www.ifishman.de)) and Leibniz Institute of Freshwater Ecology and Inland Fisheries (IGB), Berlin, Germany ([www.igb-berlin.de/](http://www.igb-berlin.de/))

July 25, 2023

**Project:** Evolution of cognition in response to size-selection in fish, using zebrafish as a model

### What do we do?

We use zebrafish (*Danio rerio*) as a model system that have been selected for five generations for body-size simulating harvesting patterns commonly observed in fisheries (for details, see Uusi-Heikkilä et al. 2015). Now we ask whether there has been an evolutionary response in individual and collective cognition, and what this means for survival against natural predation and fisheries.

### The project

This project is part of the excellence cluster Science of Intelligence ([www.scienceofintelligence.de/](http://www.scienceofintelligence.de/)) based at Technical University of Berlin. The project is run by the IFishMan group ([www.ifishman.de](http://www.ifishman.de)) headed by Professor Robert Arlinghaus at Humboldt-Universität zu Berlin ([www.hu-berlin.de](http://www.hu-berlin.de)) in close collaboration with Leibniz Institute of Freshwater Ecology and Inland Fisheries ([www.igb-berlin.de](http://www.igb-berlin.de)). Additionally, we collaborate with Professor Pawel Romanczuk at HU Berlin (<http://lab.romanczuk.de/>) as this project is run by a pair of post-docs, an organismal biologist and a theoretical modeller. The organismal work on which the thesis project is embedded will be closely supervised by the postdoc Dr. Tamal Roy (for representative publications, see Roy & Arlinghaus 2022; Roy et al. 2021; Roy et al. 2023; Sbragaglia et al. 2022) at IGB Berlin.

### Main approach

We are interested in testing possible divergence in cognitive behavior of zebrafish as a result of evolutionary adaptation to different types of size-selection at individual and group levels, and examine the underlying neuronal basis of individual abilities by studying the neuroanatomy of zebrafish brains. The student will ideally perform a range of behavioural assays testing various cognitive abilities that can be pinpointed to different brain regions. The work load will be commensurate to a masters or bachelor thesis and will be planned in detail with the student. The main work will happen in a wet lab at IGB in Berlin-Köpenick, but depending on interest the student may also spend time in the Czech Republic in Prague with collaborators.

### What we are looking for?

We are looking for students of biology, ecology, fisheries or related fields with a strong interest and motivation in understanding the connection between brain and cognitive

behaviour. The work resonates with study programs in organismal biology, neurobiology and behavioural ecology. We are open to applications by students with Czech nationality and/or residence in Prague to conduct the intended neurobiological assays. These assays will be conducted in the facility of Professor Pavel Němec in Department of Zoology at Charles University in Prague

(<https://web.natur.cuni.cz/zoologie/biodiversity/index.php?page=nemec>). Depending on student interest and flexibility, there is the possibility to spend some time in Prague.

If the student is enrolled in a different program than at the Faculty of Life Sciences at Humboldt-Universität zu Berlin (where Robert Arlinghaus is affiliated), we most likely will need to find a primary supervisor in the student's home institution with Professor Robert Arlinghaus as your second supervisor. Most study programs allow that flexibility. Therefore, applications by external students are encouraged.

### What you can expect?

The student will be involved in all lab activities of the IFishMan group and of IGB Berlin situated in Friedrichshagen in Köpenick, Berlin. Previous student research in IFishMan has resulted in (lead) authorship in international publications, and the student will receive intensive support for building his/her scientific career, e.g. through attendance of conferences and individual mentorship. The project is a part of the Science of Intelligence cluster located in TU Berlin and is also affiliated with Humboldt Universität zu Berlin. All of this gives excellent networking and career development opportunities to the students. If the student is enrolled at a German university, we can possibly find student assistant money to support some of your work financially.

Interested students shall send their CV and a one-page letter of motivation to the Robert Arlinghaus and Tamal Roy in copy. We will fill the position at our earliest convenience.

Contact information:

Prof. Dr. Robert Arlinghaus

[Robert.Arlinghaus@igb-berlin.de](mailto:Robert.Arlinghaus@igb-berlin.de)

Dr. Tamal Roy

[Tamal.Roy@igb-berlin.de](mailto:Tamal.Roy@igb-berlin.de)

For more details, see here:

<https://www.ifishman.de/en/vacancies/job-advertisement/1175-bachelor-thesis-master-thesis-oder-study-projects-in-fishery-science/>

For information on the project, see:

[https://www.scienceofintelligence.de/research/researchprojects/project\\_52/](https://www.scienceofintelligence.de/research/researchprojects/project_52/)

### References

- Roy, T., & Arlinghaus, R. (2022). Size-selective mortality fosters ontogenetic changes in collective risk-taking behaviour in zebrafish, *Danio rerio*. *Oecologia*, 200, 89-106.  
<https://doi.org/https://doi.org/10.1007/s00442-022-05256-y>
- Roy, T., Fromm, K., Sbragaglia, V., Bierbach, D., & Arlinghaus, R. (2021). Size Selective Harvesting Does Not Result in Reproductive Isolation among Experimental Lines of Zebrafish, *Danio rerio*: Implications for Managing Harvest-Induced Evolution. *Biology (Basel)*, 10(2).  
<https://doi.org/https://doi.org/10.3390/biology10020113>
- Roy, T., Rohr, T., & Arlinghaus, R. (2023). Size-selective harvesting impacts learning and decision-making in zebrafish, *Danio rerio*. *Behavioral Ecology*, 34(4), 682-694.  
<https://doi.org/10.1093/beheco/arad037>
- Sbragaglia, V., Roy, T., Thörnqvist, P.-O., López-Olmeda, J. F., Winberg, S., & Arlinghaus, R. (2022). Evolutionary implications of size-selective mortality on the ontogenetic development of

shoal cohesion: a neurochemical approach using a zebrafish, *Danio rerio*, harvest selection experiment. *Behavioral Ecology and Sociobiology*, 76(12), 154.

<https://doi.org/https://doi.org/10.1007/s00265-022-03258-7>

Uusi-Heikkilä, S., Whiteley, A. R., Kuparinen, A., Matsumura, S., Venturelli, P. A., Wolter, C., Slate, J., Primmer, C. R., Meinelt, T., Killen, S. S., Bierbach, D., Polverino, G., Ludwig, A., & Arlinghaus, R. (2015). The evolutionary legacy of size-selective harvesting extends from genes to populations. *Evol Appl*, 8(6), 597-620. <https://doi.org/10.1111/eva.12268>