

RSPCA AWERB Sheet: Enrichment for Laboratory Zebrafish

References

1. Stevens, C.H., Reed, B.T., and Hawkins, P. (2021). Enrichment for Laboratory Zebrafish—A Review of the Evidence and the Challenges. *Animals* 11, 698.
2. Engeszer, R.E., Patterson, L.B., Rao, A.A., and Parichy, D.M. (2007). Zebrafish in The Wild: A Review of Natural History And New Notes from The Field. *Zebrafish* 4, 21–40.
3. Spence, R. (2011). Zebrafish Ecology and Behaviour. In *Zebrafish Models in Neurobehavioral Research*, A. V. Kalueff and J. M. Cachat, eds. (Totowa, NJ: Humana Press), pp. 1–46.
4. Arunachalam, M., Raja, M., Vijayakumar, C., Malaiammal, P., and Mayden, R.L. (2013). Natural history of zebrafish (*Danio rerio*) in India. *Zebrafish* 10, 1–14.
5. Parichy, D.M. (2015). Advancing biology through a deeper understanding of zebrafish ecology and evolution. *eLife* 4, e05635.
6. Kistler, C., Hegglin, D., Würbel, H., and König, B. (2011). Preference for structured environment in zebrafish (*Danio rerio*) and checker barbs (*Puntius oligolepis*). *Appl. Anim. Behav. Sci.* 135, 318–327.
7. Schroeder, P., Jones, S., Young, I.S., and Sneddon, L.U. (2014). What do zebrafish want? Impact of social grouping, dominance and gender on preference for enrichment. *Lab. Anim.* 48, 328–337.
8. DePasquale, C., Fettrow, S., Sturgill, J., and Braithwaite, V.A. (2019). The impact of flow and physical enrichment on preferences in zebrafish. *Appl. Anim. Behav. Sci.* 215, 77–81.
9. Lavery, M., Braithwaite, V., Miller, N., and Mason, G. (2019). Identifying enriched housing conditions for zebrafish (*Danio rerio*) that vary along a scale of preference. In *Proceedings of the 53rd Congress of the ISAE: Animals Lives Worth Living*, Newberry, RC and Braastad, BO, ed. (Wageningen Academic Publishers), p. 388.
10. Tan, S.L.T., Handasyde, K.A., Rault, J.-L., and Mendl, M. (2020). Insensitivity to reward shifts in zebrafish (*Danio rerio*) and implications for assessing affective states. *Anim. Cogn.* 23, 87–100.
11. Spence, R., Magurran, A.E., and Smith, C. (2011). Spatial cognition in zebrafish: the role of strain and rearing environment. *Anim. Cogn.* 14, 607–612.
12. Manuel, R., Gorissen, M., Stokkermans, M., Zethof, J., Ebbesson, L.O.E., van de Vis, H., Flik, G., and van den Bos, R. (2015). The effects of environmental enrichment and age-related differences on inhibitory avoidance in zebrafish (*Danio rerio* Hamilton). *Zebrafish* 12, 152–165.
13. DePasquale, C., Neuberger, T., Hirrlinger, A.M., and Braithwaite, V.A. (2016). The influence of complex and threatening environments in early life on brain size and behaviour. *Proc. Royal Soc. B* 283, 20152564.

14. Roy, T., and Bhat, A. (2016). Learning and memory in juvenile zebrafish: What makes the difference--population or rearing environment? *Ethology* 122, 308–318.
15. Wafer, L.N., Jensen, V.B., Whitney, J.C., Gomez, T.H., Flores, R., and Goodwin, B.S. (2016). Effects of Environmental Enrichment on the Fertility and Fecundity of Zebrafish (*Danio rerio*). *J. Am. Assoc. Lab. Anim. Sci.* 55, 291–294.
16. Marcon, M., Mocelin, R., Benvenuti, R., Costa, T., Herrmann, A.P., de Oliveira, D.L., Koakoski, G., Barcellos, L.J.G., and Piato, A. (2018). Environmental enrichment modulates the response to chronic stress in zebrafish. *J. Exp. Biol.* 221, jeb176735.
17. Sykes, D.J., Suriyampola, P.S., and Martins, E.P. (2018). Recent experience impacts social behavior in a novel context by adult zebrafish (*Danio rerio*). *PLOS One* 13, e0204994.
18. Woodward, M.A., Winder, L.A., and Watt, P.J. (2019). Enrichment Increases Aggression in Zebrafish. *Fishes* 4, 22.
19. Bhat, A., Greulich, M.M., and Martins, E.P. (2015). Behavioral plasticity in response to environmental manipulation among zebrafish (*Danio rerio*) populations. *PLOS One* 10, e0125097.
20. Basquill, S.P., and Grant, J.W.A. (1998). An increase in habitat complexity reduces aggression and monopolization of food by zebra fish (*Danio rerio*). *Can. J. Zool.* 76, 770–772.
21. Hamilton, I.M., and Dill, L.M. (2002). Monopolization of food by zebrafish (*Danio rerio*) increases in risky habitats. *Can. J. Zool.* 80, 2164–2169.
22. Carfagnini, A.G., Rodd, F.H., Jeffers, K.B., and Bruce, A.E.E. (2009). The effects of habitat complexity on aggression and fecundity in zebrafish (*Danio rerio*). *Environ. Biol. Fishes* 86, 403–409.
23. Keck, V.A., Edgerton, D.S., Hajizadeh, S., Swift, L.L., Dupont, W.D., Lawrence, C., and Boyd, K.L. (2015). Effects of Habitat Complexity on Pair-Housed Zebrafish. *J. Am. Assoc. Lab. Anim. Sci.* 54, 378–383.
24. Suriyampola, P.S., Shelton, D.S., Shukla, R., Roy, T., Bhat, A., and Martins, E.P. (2016). Zebrafish Social Behavior in the Wild. *Zebrafish* 13, 1–8.
25. Collymore, C., Tolwani, R.J., and Rasmussen, S. (2015). The Behavioral Effects of Single Housing and Environmental Enrichment on Adult Zebrafish (*Danio rerio*). *J. Am. Assoc. Lab. Anim. Sci.* 54, 280–285.
26. Giacomini, A.C.V.V., Abreu, M.S., Zanandrea, R., Saibt, N., Friedrich, M.T., Koakoski, G., Gusso, D., Piato, A.L., and Barcellos, L.J.G. (2016). Environmental and Pharmacological Manipulations Blunt the Stress Response of Zebrafish in a Similar Manner. *Sci. Rep.* 6, 28986.
27. Harper, C., and Lawrence, C. (2010). *The Laboratory Zebrafish* (Boca Raton, Florida: CRC Press).

28. Barcellos, H.H.A., Koakoski, G., Chaulet, F., Kirsten, K.S., Kreutz, L.C., Kalueff, A.V., and Barcellos, L.J.G. (2018). The effects of auditory enrichment on zebrafish behavior and physiology. *PeerJ* 6, e5162.
29. Marchetto, L., Barcellos, L.J.G., Koakoski, G., Soares, S.M., Pompermaier, A., Maffi, V.C., Costa, R., da Silva, C.G., Zorzi, N.R., Demin, K.A., et al. (2021). Auditory environmental enrichment prevents anxiety-like behavior, but not cortisol responses, evoked by 24-h social isolation in zebrafish. *Behav. Brain Res.* 404, 113169.

RSPCA Animals in Science Department
September 2021