

An evolutionary approach to homosexual behavior in Poeciliid fishes

^{1,2,3}I. Valentin Petrescu-Mag

¹ SC Bioflux SRL, Cluj-Napoca, Romania; ² Department of Environment and Plant Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, Cluj-Napoca, Romania; ³ University of Oradea, Oradea, Romania.
Corresponding author: I. V. Petrescu-Mag, zoobiomag2004@yahoo.com

Abstract. The paper is an opinion. It is known that mate choice in vertebrates is based on certain morpho-physiological criteria that translate into health and vigor of a potential mate. This is the typical preference, specific to most individuals, which provides the individual and most of his descendants with the best reproductive fitness. However, there are individuals with an atypical preference, which is often variable, for instance: the preference of a male for masculine females, preference of a female for effeminate males, preference of a normal individual for hermaphrodites, preference for individuals belonging to other species, homosexual preference, etc. These individuals which express abnormal behavior have a reduced reproductive fitness and produce fewer offspring under normal circumstances. At a first view, like other atypical preferences, homosexual behavior does not give the individual any selective advantage, but it is detrimental because it does not bring a greater number of descendants. Then we ask why this detrimental behavior does not disappear by natural selection. Homosexual behavior should be seen as an atypical preference of the individual for choosing a mating partner. Surprisingly, from time to time atypical preferences might be decisive factors in species survival and evolution.

Key Words: homosexual behavior, Poeciliids, evolution, fitness, survival.

Mate choice is one of the primary mechanisms under which evolution can occur. It is characterized by a selective response by animals to particular stimuli which can be observed as behavior (Bateson et al 1985; Guevara-Fiore & Endler 2018).

It is known that mate choice in vertebrate species is based on certain morpho-physiological criteria that translate into health and vigor of a potential mate (Brooks & Endler 2001; Jayasooriya et al 2002). This is the typical preference, specific to most individuals, which provides the individual and most of his descendants with the best reproductive fitness (Houde 1997).

However, there are individuals (less frequent) with an atypical preference, which is often variable, for instance: the preference of a male for masculine females, preference of a female for effeminate males, preference of a normal individual for hermaphrodites, preference for individuals belonging to other species, etc. These individuals which express abnormal behavior have a reduced reproductive fitness and produce fewer offspring under normal conditions.

If the variability of preference in mate choice has been explained in many papers (Endler & Houde 1995; Graber et al 2015; Auld et al 2017), extreme (atypical) preferences have not been convincingly explained.

Homosexual behavior has been observed in many vertebrates, including guppy males (*Poecilia reticulata*) (Field & Waite 2004) (see Figure 1). It apparently does not give the individual any selective advantage, but it is detrimental because it does not bring a greater number of descendants. Then we ask why this detrimental behavior does not disappear by natural selection.



Figure 1. Homosexual behavior observed in guppy (www.flickr.com/photos/orkomedix/).

In my opinion, homosexual behavior should be seen as an atypical preference of the individual for choosing a mating partner. Why does not the atypical preference disappear? Because, surprisingly, from time to time it plays an important role in species survival and evolution.

In the case of reproductive isolation (captive individuals) on the islands or after the partial drying of the waters where the animals live, the animals would be doomed if all the individuals would have elevated preferences for a potential mate. In such situations of numerical decrease of the population, decisive in the perpetuation of the species become those individuals willing to make compromises in choosing the partner. Populations with variable preferences and individuals with variable preference may be those who will succeed interspecific hybridization with related species (see casual interspecific mating presented in: Valero et al 2009; Bias 2013; Franchini et al 2018) or mating with atypical conspecific individuals that can be more adapted to the newest conditions.

The role of interspecific hybridization in speciation has been demonstrated or discussed in Poeciliids (Păsărin & Petrescu-Mag 2011; Oroian 2015; Franchini et al 2018), but also in other vertebrates, including hominids (Ackermann et al 2016).

Thus, atypical preference plays an important role in the production of interspecific hybrids and introgressions, which in turn are important in species evolution. This is why the atypical preference for mating partner does not disappear from the population.

To confirm my hypothesis, it would be interesting to observe in guppy fish whether males with pronounced homosexual tendencies are the same who will accept atypical females belonging to different species. Such a study could demonstrate that the typical preference ensures the prosperity of the population in optimal environmental conditions, while atypical preference is only the way to survival and perpetuation of those individuals facing spatial isolation and numerical decrease.

References

Ackermann R. R., Mackay A., Arnold M. L., 2016 The hybrid origin of “modern” humans. *Evolutionary Biology* 43(1): 1-11.

- Auld H. L., Ramnarine I. W., Godin J. G. J., 2017 Male mate choice in the Trinidadian guppy is influenced by the phenotype of audience sexual rivals. *Behavioral Ecology* 28(2):362-372.
- Bateson P. P. G., 1985 *Mate choice*. Cambridge University Press.
- Bias A. S., 2013 A search for origins of iridescence in modern domestic guppies; if and when did introgression occur? *Poec Res* 3(1):22-39.
- Brooks R., Endler J. A., 2001 Direct and indirect sexual selection and quantitative genetics of male traits in guppies (*Poecilia reticulata*). *Evolution* 55(5):1002-1015.
- Endler J. A., Houde A. E., 1995 Geographic variation in female preferences for male traits in *Poecilia reticulata*. *Evolution* 49(3):456-468.
- Field K. L., Waite T. A., 2004 Absence of female conspecifics induces homosexual behaviour in male guppies. *Animal Behaviour* 68(6):1381-1389.
- Franchini P., Jones J. C., Xiong P., Kneitz S., Gompert Z., Warren W. C., Walter R. B., Meyer A., Schartl M., 2018 Long-term experimental hybridisation results in the evolution of a new sex chromosome in swordtail fish. *Nature Communications* 9(1):5136.
- Graber R. E., Senagolage M., Ross E., Houde A. E., Hughes K. A., 2015 Mate preference for novel phenotypes: a fresh face matters. *Ethology* 121(1):17-25.
- Guevara-Fiore P., Endler J. A., 2018 Female receptivity affects subsequent mating effort and mate choice in male guppies. *Animal Behaviour* 140:73-79.
- Houde A., 1997 *Sex, color, and mate choice in guppies*. Princeton University Press, 224 pp.
- Jayasooriya A. P., Weisinger R. S., Weisinger H. S., Mathai M. L., Sinclair A. J., 2002 Attraction to orange: sexiness, not gluttony. *Science* 296(5569):847-848.
- Oroian I. G., 2015 Sexual selection: driving force of speciation in fish. *AAAL Bioflux* 8(6):1035-1037.
- Pășărin B., Petrescu-Mag I. V., 2011 What we expect from Poeciliids for the future in terms of evolution. *Poec Res* 1(1):24-26.
- Valero A., Magurran A. E., Garcia C. M., 2009 Guppy males distinguish between familiar and unfamiliar females of a distantly related species. *Animal Behaviour* 78(2):441-445.
- *** www.flickr.com/photos/orkomedix/ [Last view: 12.30.2018]

Received: 09 September 2018. Accepted: 12 November 2018. Published online: 09 December 2018.

Author:

I. Valentin Petrescu-Mag, SC Bioflux SRL Cluj-Napoca, 54 Ceahlau Street, 400488 Cluj-Napoca, Romania; Department of Environment and Plant Protection, Faculty of Agriculture, University of Agricultural Sciences and Veterinary Medicine, 3-5 Calea Mănăştur Street, 400372 Cluj-Napoca, Romania; University of Oradea, 1 Universitatii Street, 410087 Oradea, Romania, e-mail: zoobiomag2004@yahoo.com

This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

How to cite this article:

Petrescu-Mag I. V., 2018 An evolutionary approach to homosexual behavior in Poeciliid fishes. *Poec Res* 8(1):24-26.