Poeciliid Research

Shoaling: Possible benefits for poeciliids exhibiting social behavior

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Key Words: communication, mating opportunities, predator avoidance, Poeciliidae, social bonding.

Shoaling. Shoaling refers to a social behavior observed in fish where individuals of the same species group together, often in close proximity, and move in a coordinated manner. This behavior is distinct from schooling, which involves a more organized and synchronized swimming pattern. In a shoal, fish swim in the same general direction, but there is not as much precision in their movements compared to schooling. The key features of shoaling include the aspects presented below.

Social bonding. Shoaling is a social behavior that serves various purposes, including protection from predators, increased foraging efficiency, and improved chances of finding mates (Franks et al 2018).

Predator avoidance. One of the primary benefits of shoaling is enhanced protection against predators. By grouping together, fish can create confusion and make it more challenging for predators to single out and capture an individual (Franks et al 2018; Paijmans et al 2020).

Foraging advantages. Shoaling can improve the efficiency of foraging (Paijmans et al 2020). As the group moves through the water, individual fish can capitalize on the movements of others to locate food more effectively. This collective foraging behavior can be advantageous, especially when searching for dispersed food sources.

Communication and information transfer. Fish in a shoal often communicate with each other through visual signals, body movements, and sometimes even chemical cues. This communication helps in coordinating group movements, locating resources, and conveying information about potential threats (Pitcher 1979).

Mating opportunities. Shoaling can also facilitate the process of finding mates. In some fish species, the formation of shoals is linked to reproductive activities, and individuals within the shoal may engage in courtship displays or mate selection (Houde 1997).

Schooling. While the terms "shoaling" and "schooling" are sometimes used interchangeably, they refer to different levels of social organization. Schooling involves a more synchronized and coordinated movement, often characterized by individuals swimming in tight formation, maintaining equal distances from each other, and responding rapidly to changes in direction. Shoaling, on the other hand, encompasses a

broader range of social behaviors, where fish group together without the same level of coordination seen in schooling.

Shoaling in Poeciliid fish. The family Poeciliidae includes various species of fish, and shoaling behavior has been observed and studied in several of them (Petrescu-Mag 2007a). Poeciliids are known for their live-bearing reproductive strategy and are often kept in aquariums due to their vibrant colors and interesting behaviors (Petrescu-Mag 2008; Bourne & Sammons 2008; Bourne & Watson 2009). Some well-known poeciliid species that exhibit shoaling behavior include: guppies, endlers, sailfin mollies, etc.

Guppies, Poecilia reticulata Peters, 1859. Guppies (Figure 1) are perhaps the most widely studied poeciliid species, and their shoaling behavior is a subject of considerable research (Li et al 2022). They form shoals in their natural habitats, and the social dynamics within guppy shoals have been investigated in relation to mate choice, predator avoidance, and other behaviors.

Figure 1. Domesticated guppies (*Poecilia reticulata* Peters, 1859).

Endler's livebearers, Poecilia wingei Poeser, Kempkes & Isbrücker, 2005. Endler's livebearer, often considered a close relative of the guppy, is another poeciliid species known for its colorful appearance (Păpuc et al 2022). Like guppies, Endler's livebearers exhibit shoaling behavior, and their social interactions have been studied in both laboratory and natural settings (Petrescu-Mag 2007b).

Sailfin mollies Poecilia latipinna (Lesueur, 1821). Sailfin mollies are another popular poeciliid species in the aquarium trade. They are known to form shoals, and their social behavior has been investigated to understand group dynamics, mating preferences, and responses to environmental factors (Witte & Ryan 2002).

Platy Xiphophorus maculatus (Günther, 1866). Platies are part of the Poeciliidae family and are often kept in aquariums. While they may not exhibit the same level of intricate shoaling behavior as some other species (Earley 2006), platies are known to form loose groups, especially in the presence of suitable hiding places and vegetation.

Swordtail Xiphophorus hellerii Heckel, 1848. Swordtails, like platies, are members of the Poeciliidae family. While they may not form tight shoals, they do exhibit social behaviors, including interactions related to mating and territory (Earley 2006).

Conclusions. Shoaling refers to a social behavior observed in fish where individuals of the same species group together, often in close proximity, and move in a coordinated manner. This behavior is distinct from schooling, which involves a more organized and synchronized swimming pattern. The family Poeciliidae includes various species of fish, and shoaling behavior has been observed and studied in several of them. The extent and complexity of shoaling behavior can vary among individual species within the Poeciliidae family. Researchers often study these behaviors to gain insights into social structures, communication, predator avoidance, and other aspects of the ecological and behavioral ecology of these fish.

Conflict of Interest. The author declares that there is no conflict of interest.

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Received: 16 September 2023. Accepted: 30 October 2023. Published online: 22 November 2023.

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How to cite this article:
Păpuc T., 2023 Shoaling: Possible benefits for poeciliids exhibiting social behavior. Poec Res 13(1):22-24.