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Inter-species hybridization among molly (*Poecilia* Sp.) species

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Abstract
Hybrids in aquarium fish are usually recognized by their shape (developed fin and body shapes) and development of colour variants. Goldfish, koi, guppy, mollies and platy families have been selectively used to develop beautiful forms of hybrids by fish breeders. Inheritance of background body colour in molly, *Poecilia* is not well documented despite being an economically important aquarium fish. The present study was carried out by using three species of mollies, *Poecilia latipinna*, *P. velifera* and *P. sphenops*. A total of seven breeding crosses which consisted of four parental species cross and three hybrid crosses were successfully initiated. In molly hybrids, *Poecilia*, females were more colourful than males. Males had short dorsal sailfin with emarginated caudal fin (F_1 and F_2). Among the species crosses, *P. latipinna* (broad sailfin black male molly) and *P. sphenops* (short finned white female molly) crossing developed colourful hybrids with good phenotypic traits. Thus by use of selective species, having specific features following hybridization, hybrid varieties can be of much significant value for general suitability in commercial aquarium fish trade practices.

Keywords: hybridization, mollies, *Poecilia latipinna*, *P. velifera* and *P. sphenops*, hybrid

1. Introduction
The aesthetic beauty of some fish has resulted in very great importance to some species of fish as an ornamental fish. Over 2500 species of fish are involved in global ornamental fish industry, of which over 60% are of freshwater origin. It has been estimated that about 30 freshwater fish species dominate global market, such as live bearers, neon tetra, angel fish, gold fish, zebra danio and discus. The guppy and neon tetra species alone represent more than 25% of the market by volume and more than 14% by value (Dey, 2016) [2]. This is one of them a livebearer, mollies belongs to poeciliid fish that bear youngs through internal fertilization (Basolo, 2006) [1]. Specimen of *Poecilia sphenops*, *Poecilia velifera* and *Poecilia latipinna* commonly known as 'black molly', 'white molly' and 'black sailfin molly'.
Concurrently, studies on inter-species hybridization among mollies on selective breeding, F_1 hybrids and F_2 hybrids were also undertaken. Hybridization between species of *Poecilia* genus is more widespread and extensive hybrid strains exist among aqua breeder and traders. The use of interspecific hybrids in aquarium fish production has been not well reported and examined. In view of *Poecilia* genus, consisting of more than eight species, hybridization among selected species to generate colourful strains along with viable and stable hybrid fishes was the classical approach of this work. The genetics of molly species by documenting the phenotypic appearance of the hybrids by inter-specific crossing and development of new hybrid was the measure approach during this study. The present study therefore was undertaken with an attempt to obtain the knowledge on the mating preference, extent of fertility and viability, hybrid speciation and identification of morphological and meristic characters.

Materials and Methods
In all total 40 nos. of mollies were used in the present study Three different species of molly, (Black, White and Sailfin *Poecilia* species originating from Central and North-Eastern South America, required for the experiments were obtained from ornamental fish traders of Ratnagiri and Mumbai during the months from April 2016 to March 2017. Collected live fishes ranged from 4.0 – 5.0 cm. Before setup of the experiment, the water parameters, such as temperature and pH were measured by using mercury thermometer and pH meter respectively. The estimation of dissolved oxygen (Winkler's method), carbon dioxide and hardness (EDTA method) were carried out following the standard methods (APHA, 1992) [3]. for maintaining the water quality of aquarium tank. The parental fishes were separated according to gender and kept in the aerated aquarium tank (2'×1'×1') for 4 months prior to breeding trials. The brooders were alternately fed with frozen bloodworm and pelleted feed. The water temperature was maintained in a range of 24 to 28ºC by an electric operated aquarium heater throughout the experiments.
A total of seven breeding crosses which consisted of four parental species cross and three hybrid crosses were carried out as listed in Table 1. The first generation of hybrids (F_1) were created between matured black male sailfin molly, *P. latipinna* and female black short fin molly, *P. sphenops* with the other three pairs of black male sailfin molly, *P. latipinna* and female white short fin molly, *P. sphenops*, greenish male sailfin molly, *P. velifera* and female black short fin molly, *P. sphenops*, orange male sailfin molly, *P. velifera* and female black short fin molly, *P. sphenops* respectively. The young ones were reared to adult stage for 70-80 days. Specially developed characters were marked on the basis of colouration, shape, development of morphometric and meristic characters etc. Breeding between male and female of F_1 generation was done on the basis of developed new special characters within them. These cross 1,2,3,4 pairs were carried out breeding between cross 1 pair in recessive male and recessive female. Likewise cross 2 and cross 3 pairs in recessive male and recessive female in breeding between them respectively. These cross species were attempted F_2-1,

F_2-2, F_2-3 for F_2 generation. These were generated for F_2 hybrids which screened for original and special characters developed within them.

Results and Discussion

Two parental species cross were generated by crossing between a male and female, *P. latipinna* (black male sailfin molly) and *P. sphenops* (black female short fin molly) with other three pairs respectively (Table no.1). These pair of crosses were produced to F_1 hybrids which denoted by cross 1, cross 2, cross 3 and cross 4. All seven hybrids breeding trials (cross 1 to cross 4 and F_1-1 to F_2-3) successfully produced offsprings with an exception of a cross 4 pair to production of F_2 hybrids (F_2-4), in which as the orange sailfin male molly (*P. velifera*) was the species already developed earlier by hybridization. Therefore, only F_1 generation hybrids were produced. Our results on molly fish were found to be similar to those observed by Majumdar *et al*., (1997) [4]. in tilapia species which showed lighter colouration (pink) was complete dominance over black and was not sex linked. In order to further confirm black and white as a recessive characters, three crosses (F_2-1, F_2-2 and F_2-3) were attempted (Table 1). Collectively, results of these F_2-1, F_2-2 and F_2-3 hybrids showed segregation on their colouration of original parental and F_1 hybrids with expected 1:1 ratio and confirm their no. of offspring, new hybrids number and characters like original parents through parental to F_1 hybrids and F_1 hybrids to F_2 hybrids likewise (in Table 2). The presence of two colour variants observed in each pair of F_1 hybrids and F_2 hybrids in this study further proved that the present study provides an insight for the use of interspecific hybridization techniques to generate new hybrids of molly fish with developed the special morphometric as well as meristic characters and its body colouration. In four matured parental pairs of inter-species hybridization experiments, we were found some kinds of changes in its morphometric and meristic characters in the body of hybrids from one generation to next generation.

Table 1: Crosses, male: female offsprings (F_1) and hybrid symbol

Crosses		Male : Female number used for breeding		No. of male and female offsprings developed after breeding		Hybrid symbol
Female	**Male**	**Female**	**Male**	**Female**	**Male**	
P. sphenops (Black)	*P. latipinna* (Black)	1	1	14	6	cross 1
P. sphenops (Black)	*P. latipinna* (Black)	1	1	9	6	
P. sphenops (White)	*P latipinna* (Black)	1	1	18	12	cross 2
P. sphenops (White)	*P latipinna* (Black)	1	1	15	5	
P. sphenops (White)	*P. velifera* (Greenish)	1	1	17	8	cross 3
P. sphenops (White)	*P. velifera* (Greenish)	1	1	11	4	
P. sphenops (Black)	*P. velifera* (Orange)	1	1	8	3	cross 4
Cross 1: Female X Male	F_1 Hybrid	1	1	15	10	F_2-1
		1	1	11	9	F_2-2
		1	1	15	5	F_2-3
Cross 2: Female X Male		Not conducted for F_2				----
Cross 3: Female X Male						
Cross 4: Female X Male						

Table 2: Crosses, New hybrid developed in F_1 and F_2 offsprings

		Parents to F_1 hybrids			F_1 to F_2 hybrids			
Crosses		**No. of off springs**	**New Hybrid number**	**Characters like original parents (Number)**	**No. of offspring (Number)**	**New Hybrid number**	**Characters like original parents (Number)**	**Original characters like F_1 hybrids (Number)**
Female	**Male**							
P. sphenops (Black)	*P. latipinna* (Black)	20	4	16	25	10	5	10
P. sphenops (Black)	*P. latipinna* (Black)	15	5	10				
P. sphenops (White)	*P latipinna* (Black)	30	5	25	20	7	2	11
P. sphenops (White)	*P latipinna* (Black)	20	10	10				
P. sphenops (White)	*P. velifera* (Greenish)	25	7	18	20	5	6	9
P. sphenops (White)	*P. velifera* (Greenish)	15	4	11				
P. sphenops (Black)	*P. velifera* (Orange)	11	8	3	Not conducted for F_2			

This study provides as insight into the mode of colour inheritance in one of the most economically important traits with the help of its various characters (i.e. morphometric and meristic) in aquarium fish of which research on it had not been available in the last few decades as specially as in molly fishes, *Poecilia*.

Upon careful observation, interestingly, the background body colour and some characters seems to exhibits various

degree of shade in both F_1 and F_2 generation as cross 1-4 and F_2-1 to F_2-3 respectively as following as (Fig 1, 2, 3, 4) with its changes in its morphometric and meristic characters in the body of hybrids (Table 3,4,5,6) respectively.

Conclusion

The precise characterization of colour in this study seems to be impossible as colour variants were strongly differentiated on special characters (i.e. morphological and meristic). henotypic appearance has reflected the difference by fish ybridization whereas in meristic traits (such as dorsal fin rays, shape of caudal and dorsal fin) and morphometric characters (such as shape of head, shape of caudal peduncle and body colour) were found to be dissimilar for F_1 and F_2 hybrids (Fig 1,2,3,4). Our study showed that sexual crosses seemed to exhibit dilution in the body colour of various molly species, *Poecilia*. Thus by use of selective species, having specific features by hybridization, hybrid varieties can be of much significant value for general suitability in commercial aquarium fish trade practices.

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References

1. Basolo AL. Genetic linkage and colour polymorphism in the Southern Platy fish (*Xiphophorus maculatus)*: A model system for studies of colour pattern evolution. Zebrafish. 2006; 3:65-83.
2. Dey VK. The Global trade in Ornamental fish. Infofish. *Ornamental fish*. 2016; 4:52-56.
3. APHA. Standard methods for examination of water and waste. 18th edition, American Public health Association, Washington D.C, 1992.
4. Mujumdar KC, Nasaruddin K, Ravinder K. Pink body colour in Tilapia show single gene inheritance. *Aqua. Res*. 1997; 28:581-589.