

S1 Materials; Slide Specimen Photos

The Cellular Expression and Genetics of Purple Body (*Pb*) in *Poecilia reticulata*, and its Interactions with Asian Blau (*Ab*) and Blond (*bb*) under Reflected and Transmitted Light

Alan S. Bias and Richard D. Squire

Materials

Strain ID, Breeding Strain, Description & Source

D. Bias Panda Moscow. Based on breeder results this strain produces no Purple Body phenotypes; i.e. is a pure bred "green with orange spots" strain. The phenotypic expression is the product of several primary genes in co-expression (*Ymw*, *XSsb* and/or *YSsb*, *pp*). Y-linked Moscow (*Mw*) produces blue iridophore anterior shoulder coloration, and autosomal recessive Pink (*p*, Luckmann 1990) produces light, often translucent white leucophore posterior peduncle coloration. In co-expression pattern is light anterior and dark posterior. Moscow (*Mo*) and Pink (*pi*) were described in the scientific literature (Kempkes 2007), although breeders had described both of them before that in hobbyist publications. **Note:** "*Mo*" is an earlier symbol for Mosaic (*Mo*, Khoo and Phang 1999) and therefore Kempkes' use of *Mo* for Moscow is invalid. We use the "*Mw*" symbol for Moscow following the usage by Shaddock (2010a, 2010b). Kempkes' use of *pi* for pink is also invalid since Luckmann used *p* for pink in an earlier publication. In like fashion, the previous use of "*pk*" for pink by this senior author (following the usage by Shaddock, 2010a, 2010b [5]) is also invalid. Sex-linked X and/or Y-linked Snakeskin body pattern (*Ssb* - Phang, et. al 1989) can be present in this strain. Stock maintained by Alan S. Bias, Lewisburg, WV, USA.

E. Bias Vienna Lower Swordtail (*Ls*). The Purple Gene has been maintained in a percentage of both males and females in homozygous & heterozygous fashion for over 60 generations. Homozygous Purple Body fish do not express the all-purple phenotype of the Roebuck Purple Delta. All males have green coloration as well. The lower sword gene (*Ls*) is Y linked in this strain, though crossing over to the X is periodic, resulting in X and/or Y-linked *Ls* co-expression. It can be difficult to distinguish between homozygous and heterozygous *Pb* fish by phenotype alone. Stock maintained by Alan S. Bias, Lewisburg, WV, USA.

F. Magoschitz Vienna Emerald Green Double sword (*Ds*). Based on breeder conversation and breeding results, this strain does not produce any Purple Body fish; i.e. is a pure bred "green with orange spots" strain. The double sword gene (*Ds*) may be X and/or Y linked depending upon the strain. Stock courtesy of Hermann Ernst Magoschitz, Schwarzenbruck, Bavaria, Germany.

L. Feral Pingtung (*P. reticulata* Pingtung, Taiwan BG-2016). A feral population collected by Carl Groenewegen and Alan S. Bias 3.22.2016, Pingtung County, Taiwan. GPS collection coordinates: 22°36'41.0"N+120°35'56.9"E. A high percentage of population is homozygous for *Pb*, and all others appeared heterozygous *Pb*. Males express a high degree of orange ornament spotting in broken series and also same patterns connected in linear extensions. A small percentage of males express dorsal coloration and / or

caudal ornaments. Females are color and / or tail neutral. All collected fish were wild-type grey body, though blond (*b*) has been produced in captive reared offspring.

M. Feral Kelly Warm Springs (*P. reticulata* Kelly Warm Springs, ID TC-2016). A feral population collected by Thomas Coggins, Sept., 2016, Kelly Warms Spring, Teton County, Idaho, USA. A high percentage of the population is heterozygous or homozygous for *Pb*, others appeared to be non-*Pb*. Males express a high degree of orange ornaments in the body and yellow in the caudal fin. A percentage of males express dorsal coloration and / or caudal ornaments. Females are color and / or tail neutral. All collected fish were wild-type grey body, though blond (*b*) has been produced in captive reared offspring.

O. Ginga Rubra (*P. reticulata* wingei [*Cumana* ´ *Guppy*] x *P. reticulata*). Blond hybrid variant strain. Line-bred multi generations and generally fixed to type. Expresses unique peduncle pattern in the form of Zebrinus (*Ze*, Winge 1928) with color pigment overlaying structural iridophore barring. Both *Pb* and non-*Pb* present in study population. Known for increased reflective qualities of structural color and co-expression of color pigment types.

ID Number, *Pb* or non-*Pb*, Color / Strain, Genotype



2 non-*Pb* [Reticulata Female] (grey E) *pb/pb*.



2 *Pb* [Top] male (grey E x F) *Pb/pb* and 2 non-*Pb* [Lower] male (grey E x F) *pb/pb*. Note: The lower male rear ornament spot is orange.



3 non-Pb male (grey E x F) *pb/pb*.



3 Pb [Reticulata Female] (blond E) *Pb/-*.



4 non-Pb Ab male (grey E) *pb/pb Ab/ab*.



5 Pb Ab male (grey E) *Pb/Pb Ab/ab*.



5 non-Pb male (blond) *pb/pb*.



6 non-Pb male (grey E x F) *pb/pb*.



6 Pb male (grey E x F) *Pb/pb*.



7 non-Pb male (grey E x F) *pb/pb*.



7 Pb male (blond) *Pb/pb*.



8 Pb male (grey E) *Pb/pb*.



9 Pb male (grey E x F) *Pb/pb*. Note: dried sample photo with constricted pigments, see 2 Pb for accurate color comparison.



13 Pb male (grey E) *Pb/Pb*.



14 non-Pb male (grey E x F) *pb/pb*.



15 Pb male (grey L - Pingtung) *Pb/pb*.



16 non-Pb male (grey M - Kelly) *pb/pb*.



17 Pb (grey E, litter mate – not actual male) *Pb/pb*.



24 non-Pb (grey) *pb/pb*.



25 non-Pb (McWhite) *pb/pb*.



28 non-Pb (blond Ginga) *pb/pb*.



29 Pb (blond Ginga) *Pb/pb*.

References

- Goodrich H. B., Josephson N. D., Trinkaus J. P., Slate J. M., 1944 The cellular expression and genetics of two new genes in *Lebistes reticulatus*. *Genetics* 29(6):584-592.
- Kempkes M., 2007 New colour genes in the guppy, *Poecilia reticulata* (Peters, 1859). *Bulletin of Fish Biology* 9(1/2):93-97.
- Khoo G., Lim T. M., Chan W. K., Phang V. P. E., 1999 Genetic basis of the variegated tail pattern in the guppy, *Poecilia reticulata*. *Zoological Science* 16(3):431-437.
- Luckmann H., 1990 Die Grundfarbe des Pink-Guppys. *DGLZ-Rundschau* 17:4-8. Deutsche Gesellschaft für Lebengebärende Zahnkarpfen e.V., Editor; 1990. Available at: <https://dglz.de/index.php/FileDownload/217-DGLZ-2-1990-pdf/>. Accessed: February, 2017.
- Phang V. P. E., Ng L. N., Fernando A. A., 1989 Inheritance of the snakeskin color pattern in the guppy, *Poecilia reticulata*. *Journal of Heredity* 80(5):393-399.
- Shaddock P., 2010a The theory and practice of guppy breeding. Second edition. First Choice Books, Canada, 193 pp.
- Shaddock P., 2010b Guppy color bible. First edition. First Choice Books, Canada, 192 pp.