Asymmetry and polymorphism of hybrid male sterility

ASSIGN BUSTER

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Critical Review: Asymmetry and Polymorphism of Hybrid Male Sterility During the Early Stages of Speciation in House Mice

In this study, the researchers sought to determine the genetic cause of male sterility in house mice when there was interbreeding among different but related species. The researchers took two breeds of two species of house mice, *musculus* and *domesticus* , and cross-bred wild-type with classic inbred type, from the laboratory, and wild-type with wild-type. They then conducted several generations of directional and reciprocal crosses and compared body weight, testis weight, motility and sperm count. These data were analyzed to determine sterility in the male offspring of the F_1 generations.

The researchers crossed same species but different breed mice as a control for the expected F_1 offspring fertility. They then did eight crosses of the different breeds varying the maternal and paternal parentage. After all crosses were complete they let the mice grow to maturity at approximately 60 days. The researchers weighed the mice, they then dissected them to get the weight of the testes and used histology to examine the seminiferous tubules and spermatogenesis to determine sterility.

The results of their study showed a decrease in fertility of the hybrid mice except for when a *domesticus* female was mated with a *musculus* male. In those two crosses, the hybrids showed similar or increased body weight, testes weight, motility, and sperm count when *musculus* ^{PWK} was the paternal mate regardless of which breed of *domesticus* was used. In the

other six crosses, the F_1 offspring all had decreased testes weight, decreased sperm count, and no motile sperm.

The researchers then crossed the F_1 males of the intrabred *domesticus* $^{LEWES\ x\ WSB}$ with the *musculus* ^{PWK} female and the F_1 males of the intrabred *musculus* $^{PWK\ x\ CZECH}$ with the *domesticus* ^{LEWES} . Comparing the two, the researchers noted when the female *domesticus* ^{LEWES} was mated with the male *musculus* with only half the genes coming from *musculus* ^{PWK} the F_1 males still showed an increase in testes weight and sperm count over the *musculus* ^{PWK} female from the first cross.

Their results showed that there is a combination of genetic factors at play and that the *musculus* X chromosome has a large effect on the fertility of the F_1 generations. The results varied in some crosses indicating that other loci were involved in the interference of spermatogenesis. However, they were unable to determine exactly which genes were epistatic on male reproductive growth and fertility. They did use their finding to infer polymorphism on autosomal traits when combined with some X, Y traits in certain breed crossings.

The researchers acknowledge that this study was fixed on male sterility and did not take into account female sterility or decreases in immune function that could also lead to reproductive isolation. The conclusions drawn by the researchers is valuable for further research into the genetic makeup of which genes are interacting or epistatic on the fertility of hybrid species. Scientists

could take the study deeper in an effort to isolate the genes involved and determine which are responsible for speciation in the wild.

Overall, this was an excellent article, the authors explained the data clearly and used previous research to back up their hypothesis. The authors broke down each aspect of X-linked, Haldane’s rule, D-M incompatibility, and polymorphism as it pertained to their results showing how their study supported previous results and could lead to future explanations of speciation.

Reference

Good, J., Handel, M., & Nachman, M. (2007). Asymmetry And Polymorphism Of Hybrid Male Sterility During The Early Stages Of Speciation In House Mice. *Evolution, 62* (1), 50-65. doi: 10. 1111/j. 1558-5646. 2007. 00257. x