# Reading Guide 1

# Jenkin's "swamping" argument

This week's discussion is about the "swamping" argument of Fleeming Jenkin [1867] and the reaction to it by Darwin [1872, pp. 71–72], [Davis, 1871], and Fisher [1930]. Jenkin was among the most influential of Darwin's 19th-century critics. His 1867 review made five arguments, several of which will concern us in this course. His "swamping" argument held that natural selection cannot cause a rare variant to spread, because the rare variant would be swamped by backcrossing with the common type. You will find this argument on pp. 6–11 of the version of Jenkin's review I have posted on the website. (In the library or on the web, you may encounter other versions with different page numbers.)

Jenkin also expresses views on race that are shocking to modern readers but were not unusual in 19th-century Britain. We can talk about this issue in class, but it is not our focus. Instead, we will organize our discussion around the following questions.

1. What was Jenkin's argument?
2. What did he assume about the mechanism of heredity?
3. What was Jenkin's error, as pointed out by Davis?
4. When Darwin summarized Jenkin's argument, he made two mistakes. Can you spot them.

R.A. Fisher was an influential contributor to modern evolutionary theory. He wrote during the first half of the 20th century, as scientists were figuring out the implications of Mendelian inheritance. In the new Mendelian theory, hereditary material is *particulate*. The older *blending* theory assumed that the hereditary material of parent and offspring blended in the offspring, like paint.

Fisher is famous for many things. Among them is the concept of *variance*, which is one of many ways to measure variation. The assigned chapter discusses variance, so let me tell you why it's important.

Variance is the mean squared deviation from the mean. It is uniquely useful because you can decompose it. For example, variation in stature is partly environmental and partly genetic. If you use the variance as a measure of this variation, then you can talk about the genetic and environmental components of variance. The sum of these components equals the total variance in stature, so it makes sense to say that some fraction of the variance is genetic and the rest is environmental. It would make no sense to say this with a different measure of variation, such as the standard deviation.

As you read Fisher's chapter, try to figure out:

5. Under blending inheritance, why is half the variance destroyed each generation?

6. What happens to the variance under Mendelian inheritance?

In case anyone is interested, here are a couple of more recent articles that discuss Jenkin's swamping argument: [Morris, 1994, Bulmer, 2004].

## Bibliography


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A. S. Davis. The "North British Review" and the Origin of Species. *Nature*, 5(113):161, 1871.

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