brains contain a similar network of the song-producing neurons, termed the song generator.

If both sexes contain the basic anatomical equipment to produce song, what allows the male to sing while the female remains silent? To answer this question, Clyne and Miesenbock subtly modified the fru gene so that expression of the gene could be artificially turned on in females’ neurons with a flash of light, and listened for song. The team filmed flies and showed that by switching on selected neurons they were able to trigger singing in females. However, the flash of light needed to be brighter than that required to activate the males’ song generator. And when the duo listened to the songs of males and females they found that the females sang out of tune. It appears that, in terms of courtship song, males remain the showy experts.

The authors suggest that differences in the males’ and females’ abilities to vibrate their wings and sing may be explained by one of two scenarios. Either, (1) very subtle differences in brain anatomy ensure male behavior remains exclusively male (and female behavior remains exclusively female), or (2) the critical on–off switch in key subsets of neurons are set in opposite configurations within the two sexes (male song-generator neurons are switched ‘on’ by FruM, while the generator is turned ‘off’ in females). Still, it is remarkable that a principally male behavior can even be elicited from females. By simply modifying a single gene’s expression within a subset of neurons, scientists are able to evoke an unnatural behavior. Deeper insight into the behavioral differences between the sexes (in flies) will be revealed when the downstream genes that are regulated by Fru are uncovered.

GETTING TO THE HEART OF EXERCISE

Cardiovascular disease is unlikely to be a concern for the many amazing athletes at this year’s summer Olympics. This is because exercise capacity is related to heart function, and a strong healthy heart is important for pumping blood around the body during exercise. Being a good athlete and having a strong heart depends a lot on genetics, which can contribute half of the variation seen in human exercise capacity. Some other animal species have also evolved the ability to perform astounding feats of athleticism, often with very little training. However, in humans or animals from the wild it can be very difficult to separate the genetic basis for exercise capacity, heart function and cardiovascular disease from the effects of training and environment. Anja Bye and colleagues from the Norwegian University of Science and Technology therefore decided to examine this topic in rats artificially selected for exercise capacity-dependent differences in cardiac gene expression.

The results of this study suggest that there is a switch in gene expression between athletes and couch potatoes, from a pattern supporting lipid metabolism and heart muscle contractility to one that indicates an unhealthy heart. The authors have shown that many complex molecular changes contribute to the evolution of athleticism, and have generated novel hypotheses about the links between exercise capacity and heart disease. Although many unanswered questions remain, Bye and colleagues have brought us one step closer to understanding just how much heart it takes to get to the podium!