A boy for every girl? Not even close

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In a perfect world, for every boy there would of course be a girl, but a new study shows that actual sex ratios can sometimes sway very far from that ideal. In fact, the male-to-female ratio of one tropical butterfly has shifted rapidly over time and space, driven by a parasite that specifically kills males of the species, reveals a report published online on September 10th in *Current Biology*.

"We were surprised at the speed with which change in sex ratio could occur," said Emily Hornett of the University of Liverpool. "Between 1886 and 1894 in Fiji, the male-killing bacterium rose from 50 percent to over 90 percent frequency, changing the sex ratio from 2:1 to 10:1."

The researchers made their discovery by applying modern tools to aging museum collections of the butterfly known as Hypolimnas bolina. Between the 1870s and 1930s, these insects' highly variable female wing color pattern led traveling entomologists to intensively collect them. Many specimens were later deposited in museums along with detailed field notes.

The researchers examined the variation in the butterflies' sex ratios and their infection with the male-killing Wolbachia bacterium by assaying museum specimens, inferring from that what historical populations must have been like. Comparison of contemporary and museum samples revealed profound change in four of five populations examined, the researchers report.

Two populations became extremely female-biased as the male-killing

bacterium spread. One population evolved from extremely female-biased to a sex ratio near 50:50 after the infection lost its male-killing activity. The final population fluctuated widely in sex ratio, along with changes in the frequency of the male-killer.

These findings give new insight into the reproductive ecology of the butterflies. More importantly, they show how scientists can literally watch evolution in action by comparing museum specimens to contemporary populations, highlighting the incredible value of such collections as "silent witnesses" to such change.

"Evolution can be observed by comparing fossil and current species, or inferred from variation between extant species placed on a phylogeny," the researchers wrote. "However, it is rare to directly observe evolution over short time periods. Traditionally, direct observation of evolution has required records over time from long-term study populations. Resurrection ecology, where viable propagule stages of known age are retrieved from sediment cores and compared to current specimens, represents a new technique with which to observe evolution directly. However, both of these approaches are obviously limited to the few species for which this type of data or sample is available.

"We predict that the increasing availability of methods that make DNA from museum specimens accessible will lead to an escalating use of such collections to answer evolutionary questions. With the advent of high-throughput DNA sequencing, the worth of museum collections to future generations of evolutionary biologists is invaluable and inestimable."

Source: Cell Press (news : web)

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