which reflects experience, and that male barn swallows feed nestlings as much as or more than females[5]. Therefore, differences among males in ability to give care should influence female mating decisions. Møller now offers nonsignificant differences in offspring tarsus length and body weight among treatments as evidence against the hypothesis that tail length and symmetry affect foraging ability. This test fails to address the possibility that females use male tail feathers to predict parenting ability, and that differences in male parental care between treatments influence number, rather than size, of young fledged. To exclude nongenetic benefits to choosy females, unmanipulated tail feather length and symmetry must not correlate with male ability to provision and fledge young.

Møller's new results also contain several inconsistencies. Of particular concern are the small standard errors reported for premating period and egg-laying date in each treatment compared with two earlier experiments on barn swallows[8,9] that replicate the two asymmetry controls in which Møller[1] shortened or elongated tail feathers but did not alter their symmetry. For example, the pre-mating period for the shortened asymmetry control has a standard error only 7% of that reported previously[8], despite similar sample sizes. Further, the two asymmetry controls do not contain sufficient unexplained variation to account for the effects of the treatments where both length and asymmetry were altered.

Møller states that all males within each treatment, including those with shortened tails and experimentally enhanced asymmetry, mate[1]. This is at odds with his earlier 3-year study in which 33% of males with short tails failed to mate[7]. If females discriminate against asymmetric, short-tailed males, then more of the extreme experimental males should go unmated than unmanipulated males.

The experimental treatments altering tail feather asymmetry and length explain nearly all the variation in premating period and egg-laying date. With such small errors within and large differences between treatments, we question how Møller could have assigned males at random to treatments as he states. The sample sizes he reports are not consistent with simultaneously assigning males to treatments in octets. If males were assigned to groups in order of arrival, then this could account for the low variation and contribute to differences between treatments.

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MØLLER REPLIES — Balmford and Thomas suggest that ornamental symmetry may have evolved and been maintained primarily under natural selection. This may not be particularly likely because the primary reason for the increased level of asymmetry and the pattern of asymmetry in secondary sexual characters is obviously sexual selection. They suggest that asymmetry may have a substantial direct fitness effect on females by affecting male food provisioning. Contrary to what one perhaps should expect, the most preferred males feed their nestlings less than the least preferred males[10]. In other words, females work harder if they have acquired a preferred male. This was also the case in the asymmetry experiment (A.P.M., manuscript submitted), and there is no net effect on offspring size because females compensate for their mates. The relationship between female parental care and male ornament size is a direct causal relationship as demonstrated by a tail manipulation experiment performed after mate acquisition (de Lope and Møller, manuscript submitted).

Balmford and Thomas also suggest that the effects of the experiment may have arisen due to male combat rather than female choice. I dismissed this possibility[1] although I gave no data for reasons of brevity. There is clearly no effect on male fighting. The frequency of fights is very high, and the sampling periods are of a sufficient duration as determined by repeatability and consistency analyses. The outcome of male fights was not considered because males almost always win (in more than 99% of cases) when fighting within their own territory due to site related dominance.

Borgia and Wilkinson suggest that females may have chosen males with symmetric and long tails for the direct fitness benefits. Males do provide a lot of parental care, but this cannot be the reason for female mate preferences. Females mated to preferred males provide relatively more, not relatively less care[10]. There is a direct (negative) causal relationship between parental care and male ornament size because a tail length experiment performed after mate acquisition demonstrated that females mated to males which suddenly had elongated tails provided relatively more parental care (de Lope and Møller, manuscript submitted).

Borgia and Wilkinson further suggest that the standard errors are only 7% of those reported from a previous experiment, but the previously reported data contained standard deviations, not standard errors. They also claim that the two treatments that retained natural asymmetry did not show greater unexplained variation than the treatments where both length and asymmetry were changed. This is not the case because these explained 3 and 7% less of the variance. A larger fraction of males could not be unmated because there is a large between-year variation in the percentage unmated males which ranges from 2 to 25%, on average 12.5% (ref. 11). The percentage unmated males in 1991 was in fact very low, only 2%.

Finally, the sample sizes are claimed not to be consistent with simultaneous assignment of males to octets. A total of 12 complete octets were created since octet number 13 was only partly filled because no more unmated birds were available. Four birds were never resighted again after release. Males were not assigned to treatment groups in order of arrival since arrival date was unrelated to treatment ($F = 0.16$, d.f. = 7, 86, $P = 0.99$).

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Confusion of kingdoms

SIR — Field biologists are not the intended audience for most of the advertising appearing in *Nature*, but the illustrations occasionally draw our attention. Not always with the desired effect, however. In your 21 May 1992 issue, below a photograph of several gorgonians, we learn that "To produce the highest quality agarose, it is essential to begin with the best seaweed. . .".

Marine invertebrates comprise or dominate more than ¾ of the 30-plus phyla of multicellular animals currently extant; J. Mann in News and Views (*Nature* **358**, 540; 1992) outlines their considerable importance in natural products research. Yet how many biologists can identify these creatures to phylum or even kingdom? Not enough apparently.

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