tolerated by many individuals, this does not remove these from the ambit of our theory. Indeed, a tentative connection between commitment to symbiotic microbes and sexual selection is indicated in a variety of disparate taxa from anelgesid mites to ruminant ungulates⁸.

We also join Cox in hoping that the 'phylogenetic relationship' found by Read and Harvey⁹ ('association' in their terms) will be followed up. Its slant is consistent in the studies carried out and suggests to us the following possibilities in accord with our thesis: first, parasites bring high sexual selection, and this, through stringent mate choice, encourages speciation⁹⁻¹¹; second, non-conforming trends (costly sexual selection with no payoff to descendants' health, or no sexual selection when parasites are damaging) reduce species survival.

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Armenian earthquakes

SIR—A recent report¹ on the 1988 Armenian earthquake raises important issues concerning earthquake hazard and tectonic deformation rate in this region. The figure shows part of its fault scarp, indicating what seems to be an older Holocene scarp sub-parallel to it. Assuming that the local soil formed near the end of the Pleistocene glaciation (~10,000 years ago,) the estimated recurrence interval of major earthquakes on this fault is about 5,000 years or more, and the 2-m Holocene throw implies an average slip rate of ~0.2 mm yr⁻¹ or less. The 1988 earthquake occurred on one of a set of parallel reverse faults with ESE strike, some of which had been identified previously^{2,3}, that take up shortening across Armenia and the adjacent Soviet Transcaucasian republics. The largest known historical earthquake in what is now Soviet Transcaucasia occurred in 1668 near Shemakha⁴⁻⁶, now in

The view looking WNW from latitude 40°49.9' N longitude 44°13.1' E showing, highlighted by shallow snowdrifts, the 1988 fault scarp at ~1,900-m elevation, ~500 m east of its highest point, and the suggested older scarp up to 10-m farther north to its right, both with ~1-m reverse throw. Both scarps can be followed along strike for ~500 m in soil that is probably late glacial or early post-glacial (~10,000-yr old), given the presence of moraine deposits and glacial cirques at similar elevation nearby. The arid climate and the absence of local soil disturbance by agriculture (in contrast with lower elevations) favour scarp preservation. The abrupt 1988 scarp has been trenched, but the trench stops ~2-m short of the other, more rounded, scarp. It is hoped that this trench will be extended northward and radiocarbon dating of samples from it will provide quantitative constraint on the Holocene slip history suggested for this fault. Both scarps probably merge into the same active reverse fault at a few tens of metres depth, which dips NNE (to the right) at ~60°. The photograph was taken in February 1989. The sketch shows an interpretation, with chevron markers indicating the hanging walls of both scarps which are uplifted relative to the footwalls.

Soviet Azerbaijan. The ~50-km WNW-ESE extent of severe damage, more than in 1988 indicates M_s (surface-wave magnitude) ≈ 7 . Including the 1988 event ($M_s = 6.7$) only five Transcaucasian earthquakes in the past 1,200 years, or so, are known⁶ to have caused damage equivalent to $M_s 6.5-7$ (ref. 6). Co-seismic slip rate on other individual faults must, therefore also be very low, and the shortening rate across Transcaucasia can be no more than a few millimetres a year⁷. Nonetheless, it seems prudent to base regional earthquake hazard planning on the assumption that an earthquake with $M_s \geq 7$ may occur on any of these faults, with a probable recurrence interval for such events on any individual fault of many thousands of years. Furthermore, the suggested low

regional deformation rate means that many geomorphological features such as river terraces identified¹ in Armenia and believed to be related to active faulting are probably far too old to be radiocarbon dated.

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