

particular animal species. Highly specialized as most of us are, we are not likely to see the whole picture and yet we take such outraged stands—as many doubtless will to this letter.

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Evolution or Not

King and Jukes ("Non-Darwinian evolution," 16 May, p. 788) state that one thing the editor (natural selection) does *not* do is to remove changes which it is unable to perceive. If these changes cannot be perceived at the organismal level, are we dealing with evolution at all?

Evolution implies directed change. There is not and never has been, in neo-Darwinian thought, any quibble about the fact that change must come from random mutation at the molecular level. King and Jukes, in our opinion, are not discussing evolution at all as we define it, but the perpetuation of neutral mutations through random drift. Even here they admit that selection has played a part by eliminating lethal mutations. We do not regard perpetuation of neutral mutations as being evolution per se, but merely the pool from which evolution can occur, given a directed push by natural selection.

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It is perfectly true that the molecular changes that we discussed are not evolution in the usual Darwinian sense, which is precisely why we used the term "non-Darwinian evolution." However, we see no advantage in considering nonadaptive characteristics as being outside the province of evolution, particularly since it is usually quite impossible to determine whether a given molecular change has been due to drift or selection. We believe that all heritable genetic changes which become stable species characteristics are included, or should be included, in the concept of evolution.

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