What use is "euxeny"?

SIR—Rasmont is not the first person to feel uncomfortable about using the term 'altruism' in the context of animal behaviour, even if he is the first to suggest the neologism "euxeny" as an alternative¹. The problem with his suggestion is that many will interpret his term as meaning that biological insights into the evolution of cooperation are simply not relevant to 'real', human altruism.

In practice, the problem hinges on the definition of the latter, not the former. In animal behaviour we have every justification for ignoring motives and defining altruism purely in terms of its objective consequences as any act which enhances the reproductive success of the recipient at a cost to that of the altruist. There are good reasons for thinking that there are three—and almost certainly only three—types of altruistic behaviour: kin altruism, where the sacrifice of the actor benefits copies of the gene for altruism in the recipient to an extent greater than the cost to itself²; reciprocal altruism, where the actor's sacrifice for the benefit of the recipient is reciprocated by the recipient³; and induced altruism, where an actor performs an altruistic act through error, deceit or coercion^{4,5}. Examples of the latter would be birds who raise the offspring of cuckoos, believing them to be their own. On the objective definition of altruism above, they must be seen as acting altruistically because they have incurred a considerable cost to their own reproductive success and enhanced that of the cuckoo.

As Rasmont implies, what makes 'real', human altruism controversial is the belief that it is not motivated by any kind of self-interest. Of course, neither is it in the case of the apparently odd, residual category of

induced altruism. The birds who raise cuckoos have absolutely no self-interest in doing so. Nevertheless, they have been deceived, and so we seem to have to conclude that it is our consciousness of acting without self-interest which defines 'true', human altruism.

But the fact that politicians routinely claim to act in the public interest, rather than in their own self-interest, is not a reason why voters should be expected to believe them. On the contrary, Anna Freud's classic psychoanalytic study of the motives involved in human altruism concluded that "It remains an open question whether there is such a thing as a genuinely altruistic relation to one's fellow men, in which the gratification of one's own instinct plays no part at all . . .". To separate "euxeny" from human altruism, as proposed by Rasmont, would really make it too easy for the politicians, and my guess is that if behavioural scientists were not human beings themselves they would have long since realized that attempts to defend subjective definitions of human altruism are completely futile. Perhaps this is because there is a little of the politician in all of us.

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Past climate at Mono Lake

SIR—Enzel *et al.* have reported¹ that some time between 4,000 and 3,840 calendar years BP and some time between 522 and 313 cal BP (all dates are radiocarbon dates calibrated by dendrochronology), a substantial body of water covered the now-desiccated Silver Lake Playa in the Mojave Desert. Mono Lake, 380 km to the north, is by contrast a perennial body of saline-alkaline water which can provide a palaeoclimatic record covering a wide range of conditions, from the wettest to the driest².

The artificial recession of Mono Lake in recent decades has made accessible previously drowned evidence of past lake-level fluctuations.

At least four generations of Late Holocene fluctuation curve for Mono Lake.

tree and shrub stumps that grew during former low stands lie rooted on newly exposed shore lands. Dozens of research pits have been dug at locations that would, under natural conditions, have been under 10 m of water. Three airfall tephra from nearby volcanoes and a float-line

of pumice blocks from a sub-lacustrine volcanic eruption have made it possible to reconstruct lake margins at the time of eruptions.

Most importantly, the drop in lake level has forced the three largest tributary streams to incise their deltas to depths of up to 10 metres. The walls of these cuts, each more than 1,000 metres long, show alternating sequences of transgressive and regressive deltaic sediments replete with plant detritus and interspersed with tephra of known age. Individual transgressive and regressive units can often be traced directly to a strand line that marks their terminal elevation. This evidence, combined with twenty-six radiocarbon dates, provides a direct and high-resolution record of the late Holocene fluctuations of the level of Mono Lake³.

In addition to its prominent peaks at approximately 3,770 and approximately 300 cal BP, which appear to correspond to the hydric episodes at Silver Lake Playa, in the late Holocene, Mono Lake underwent five other decades-long transgressions. Analyses using Vorster's hydrological model⁴ indicate that the effective inflow to the Mono Lake groundwater basin required to explain the highest of these transgressions was in excess of 134 per cent of the modern (1937–79) average value. Not apparent from the Silver Lake record are prolonged periods when the climate was dryer than it is now, represented at Mono Lake by recessions and low stands, the most extreme of which occurred in response to decades-long effective inflows averaging less than 68 per cent of the modern value.

Corroboration can be found in the Bristlecone pine tree-ring record not only for the Silver Lake stands¹, but also for the late Holocene fluctuations of Mono Lake². Even more intriguing is the apparent correspondence between the Mono curve and the record of DeVries-type solar variations^{4,5}. This suggests that decades to century-scale climatic changes such as those reflected in the fluctuations of Mono Lake and other lakes of the western Great Basin may be related to such solar events as the Maunder, Spörer, Wolf and mediaeval sunspot minima, and the mediaeval and Roman sunspot maxima^{2,3}.

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