The Greek alphabet represents vowels fully and consistently (phonological transparency), whereas the Semitic alphabet only partially represents them (phonological opaqueness). Phonological identification seems to be restricted to phonologically transparent writing (although it is not an obligatory process), whereas context-dependent processes have to be used to identify phonologically opaque words[6]. But phonological processing skills (like those of speech) are left-hemisphere lateralized. Thus the phonological reading of the Greeks probably induced a strong left-hemisphere involvement in reading and thus favoured the use of rightward eye scans and rightward writing. The evidence of ancient bidirectional writing suggests that this might have occurred gradually, with some shared hemisphere involvement in the archaic period, producing the coexistence of both writing directions together with unreversed mirror and reversed engrams.

This conjecture concerns only early leftward readers; therefore the existence of left-hemisphere literacy in modern leftward scripts such as Hebrew and Arabic does not necessarily conflict with it. Religions can fix writing because they forbid any form of alteration of sacred works (both the Torah and the Koran contain injunctions against changing them).

John R. Skoyles
Department of Psychology,
University College London,
Gower Street,
London WC1E 6BT, UK

1. Smetacek, V. *Nature* **354**, 118–119 (1991).
2. Pollatsek, A. *et al. Brain Lang.* **14**, 174–180 (1981).
3. Tankle, R. & Heilman, K. M. *Brain Lang.* **17**, 124 (1982).
4. Noble, J. *Brain Res.* **10**, 127–151 (1968).
5. Sava, D. *et al. Neuropsychologia* **26**, 201–211 (1988).
6. Skoyles, J. R. *J. social biol. Struct.* **13**, 321 (1990).

A disappearing speciation event?

SIR — Coyne points out[1] that there is still controversy as to whether two genetically distinct, geographical forms of a species (referred to here as races) are more likely to speciate when they are in contact or when they are in isolation. Races in contact may be considered less likely to speciate because the continuing flow of genes between them inevitably lessens the possibility of genetic divergence. But if the races making contact produce unfit hybrids then selection may be expected to favour alleles that reduce interracial matings and hence hasten speciation, according to the much-discussed 'reinforcement' model of Dobzhansky. Although there are theoretical grounds for believing that reinforcement is not a widespread process[1,2], the circumstances at a well-known contact between two chromosomal races of house mice (*Mus musculus domesticus*) in northern Italy[3] may be particularly favourable for this mode of speciation (see ref. 2). In this case, the races making contact have small populations and produce a single type of unfit hybrid.

The 'tobacco mouse' or Poschiavo race ($2n = 26$) geographically overlaps the Upper Valtellina race ($2n = 24$) along the valley of the river Adda near Tirano[3,4]. The interracial hybrids have a complex heterozygous karyotype characterized by formation of a chain-of-five configuration at prophase I of meiosis, and hence would be expected to be predisposed to meiotic abnormalities and infertility[5].

Until recently, only one site was known to contain both races. From 1978 to 1983, Capanna and Corti[3,4] found 90 specimens of the Poschiavo race and 60 of the Upper Valtellina race, but no hybrids, in the small village of Migiondo. The two races were found in large numbers in the same building[3] and laboratory studies of mice from this site indicated genetic and behavioural differences between the races and an inability to interbreed in captivity[1]. We believe that the Upper Valtellina and Poschiavo races may have speciated very recently in Migiondo by the reinforcement process.

Over the past three years we have sampled the whole area of contact between the Upper Valtellina and Poschiavo races in great detail (214 animals, 39 sites; manuscript in preparation). In small samples from two villages, Sondalo and Sommacologna, we find both Upper Valtellina and Poschiavo race individuals and hybrids. We have also been able to cross mice from the two races in captivity and demonstrated that the hybrids do indeed suffer meiotic abnormalities, although they are usually not sterile (manuscript in preparation). However, among 37 mice from Migiondo, all were of the Poschiavo race.

There are numerous examples where different chromosomal races of house mice intermate successfully in the wild and in captivity[5]; the failure of the races in Migiondo to do so is, to our knowledge, unique. Therefore, we believe that the successful interbreeding of the Poschiavo and Upper Valtellina races demonstrated in our field and laboratory studies is the normal situation when these races come into contact in the wild. Presumably, therefore, when these races came together in the relatively isolated village of Migiondo, probably within the past few hundred years[3,4], hybrids were initially produced. If so, the lack of hybridization noted by Capanna and Corti[3] would, of the alternative explanations available[4], be most reasonably ascribed to the reinforcement process. It is of further interest that one of the new species apparently became extinct thereafter, perhaps the most common fate for new species arising in small populations.

Heidi C. Hauffe
Jeremy B. Searle
Department of Zoology,
University of Oxford,
South Parks Road,
Oxford OX1 3PS, UK

1. Coyne, J. A. *Nature* **355**, 511–515 (1992).
2. Butlin, R. in *Speciation and its Consequences* (eds Otte, D. & Endler, J.) 158–179 (Sinauer, Sunderland, Massachusetts, 1989).
3. Capanna, E. & Corti, M. *Mammalia* **46**, 107–109 (1982).
4. Mainardi, D. *et al.* in *Variability and Behavioral Evolution* 111–139 (Accademia Nazionale dei Lincei, Q. No. 259, Rome, 1986).
5. Gropp, A., Winking, H. & Redi, C. in *Genetic Control of Gamete Production and Function* (eds Crosignani, P. G. & Rubin, B. L.) 115–134 (Grune and Stratton, New York, 1982).

New dimension for Mendeleev

SIR — The article "New dimension for Mendeleev" by John Maddox (*Nature* **356**, 13; 1992) about a suggestion of a third dimension for the periodic table by Leland C. Allen contains the statement that "the extra dimension may be half a century too late". In fact, essentially the same suggestion was made by me in 1939 in the first edition of my book *The Nature of the Chemical Bond* (Cornell University Press). A conventional two-dimensional periodic table is shown on page 54 (of the 3rd edition, 1960) and the third dimension is shown on page 94 by a figure showing the periods of the table with the elements indicated on the horizontal axis at their electronegativity values. The conventional table is useful in indicating the values of the elements and providing a basis for correlating other properties and the second table has additional usefulness, as was discussed in 1939 and later in my book.

Instead of the electronegativity, Allen uses a closely related quantity, the configuration energy, which is the first ionization energy of the neutral atom to the mean energy of the spectroscopic states based on the excited configuration. I had stated that the electronegativity is the energy of attraction of the atom in a stable compound for an outer electron; and then in 1934 Robert S. Mulliken expressed it as the mean of the first ionization energy and the electron affinity of the neutral atom. Allen's configuration energy ignores the electron affinity and introduces a special way of evaluating the first ionization energy. All these scales have essentially the same rational basis.

Maddox says that Allen is said to be