ity Biomedical Research Support Program of NIH.

JAMES D. HAWKINS
Department of Psychology,
San Jose State University,
San Jose, California 95192, USA

1. Beardmore, J. A. & Karimi-Booshehri, F. *Nature* **303**, 522–524 (1983).
2. Herrnstein, R. J. *IQ in the Meritocracy* (Atlantic-Little, Brown, Boston, 1973).
3. Jensen, A. R. *Educability and Group Differences* (Harper & Row, New York, 1973).
4. Hawkins, J. D. in *Contributions to Behavior-Genetic Analysis: The Mouse as a Prototype* (eds Lindzey, G. & Thiessen, D. D.) 139–159 (Appleton-Century-Crofts, New York, 1970).
5. Siegel, S. *Nonparametric Statistics for the Behavioral Sciences* (McGraw-Hill, New York, 1956).
6. Grüneberg, H. *The Genetics of the Mouse* (Cambridge University Press, 1943).
7. Hawkins, J. D. in *Behavioral Genetics: Method and Research* (eds Manosevitz, M., Lindzey, G. & Thiessen, D. D.) 502–506 (Appleton-Century-Crofts, New York, 1969).

THE conclusion of a recent paper[1], that a pleiotropic effect of ABO alleles or linked genes can influence occupational type, seems to be premature. The authors assume that occupational classes are homogenous from an ethno-historical point of view, assortative mating among social classes is not significant, the ABO distribution of donors is similar to that found in the general population, selection on the ABO system is not differently operating in social classes and finally, that the occupation as a variable is the most representative one that defines the stratification of a society.

In Chile, as the authors mention, there is a clear socio-ethno-genetic cline which originated at the Spanish Conquest in 1541 [2,5]. The highest socioeconomic strata of urban areas have gene frequencies for ABO, Rh and other genetic markers similar to those found in Europe, the lowest ones have gene frequencies similar to those expected for a half European–Chilean Aboriginal admixture; middle classes have intermediate values[6]. This cline is present independently of the last two or three generations of European inmigrations[7,8]. Thus the problem is to explain why such a cline has persisted for 17 generations. Aboriginal people disappeared a few generations after the Spanish Conquest. Even 20% socioeconomic random mating should have cut down these gene differences but a strong socioeconomic assortative mating was found in the population of Santiago[9]. This seems to be the explanation for the stability of the socio-genetic cline. There is no reason to assume that a similar mechanism is not operating in England. Since geographical population heterogeneity (like that found also in Chile) due to invasion, settlement and migration is accepted by the authors, it would be necessary to demonstrate that ethnic heterogeneity and assortative mating among occupational classes cannot explain the observed ABO heterogeneity, before accepting the authors' hypothesis.

Blood donors may not represent either the social or the genetic structure of their populations of origin. This could not only be due to higher requirements for O and Rh^- blood groups as the authors assume. If the relationship between ABO and diseases is accepted, and donors are relatives or friends of patients that need transfusions, the ABO distribution of donors may differ from that of the whole population. The authors do not describe the system to call for blood donors. Relatives of patients would increase distortions due to the ABO–disease relationships, colleagues or co-workers of patients would yield a distribution similar to that of the patient social class. These two types of calling donors or other ones, may be differently distributed in occupational classes, thus leading to different ABO distributions among them. We could not use the donors ABO distribution in the high socioeconomic classes because it was different from the mother–infant distribution in a study on socio-economic assortative mating[9]. Moreover, ABO-associated diseases might interact with social classes in an unpredictable way. Furthermore, natural selection operating on the ABO system[10] may differ among social classes, not necessarily at present, but along the history of these classes.

Table 1 of ref. 1 shows that in class I, A migrant donors are less frequent than A native donors (z for proportions[8] = 2.14, $P<0.017$ in south-west England; $z=1.2$, $P<0.11$ in Yorkshire; $z=2.25$, $P<0.013$ in both places together); thus non-A migrant donors are fitter than non-A native donors to be found in class I. This suggests rather a socio-genetic interaction and not a simple gene action on work abilities.

Even accepting that a genetic action associated with ABO system influences the probability of reaching a determined social class, it is not possible to conclude that this gene action is related to skilled/creative or skilled/repetitive occupations. Several other social variables may influence the occupational class an individuals belongs to, such as culture, power, prestige, income and life-style, the latter being rather properties of class and conditioning individual occupation or social mobility. If so, the ABO–occupational class relationship may be true, but only as a circumstantial association.

CARLOS Y. VALENZUELA
Departamento de Biología
Celular Genética,
Facultad de Medicina,
Universidad de Chile,
Casilla 6556,
Santiago 7,Chile

1. Beardmore, J. A. & Karimi-Booshehri, F. *Nature* **303**, 522–524 (1983).
2. Pinto-Cisternas, J. *et al. Hum. Hered.* **21**, 431–439 (1971).
3. Rothhammer, F. *Rev. Med. Chile* **101**, 247–251 (1973).
4. Palomino, H. *Rev. Med. Chile* **104**, 371–374 (1976).
5. Rothhammer, F. & Cruz-Coke, R. *Curso Básico de Genética Humana* (Editorial Universitaria, Santiago, Chile, 1977).
6. Workman, P. L. in *Methods and Theories of Anthropological Genetics* (eds Crawford, M. H. & Workman, P. L.) 117–150 (University of New Mexico Press, Alberquerque, 1973).
7. Costa, R. thesis, Univ. Chile (1966).
8. Valenzuela, C. Y. & Harb, Z. *Am. J. hum. Genet.* **34**, 925–936 (1982).
9. Valenzuela, C. Y. & Harb. Z. *Soc. Biol.* **24**, 225–233 (1977).
10. Mourant, A. E. *Ann. hum. Biol.* **9**, 575–577 (1982).

BEARDMORE and Karimi-Booshehri[1] conclude that "The only apparently reasonable explanation" for the distribution of the I^A allele is that it "confers on those who possess it... abilities significant in determining socio-economic class" (pleiotrophy and linkage being gratuitous qualifiers). No less disingenuously, they assert that "social mobility in the United Kingdom has been, for some generations, a factor which would tend to homogenize initially different gene pools". The question is for how many more generations did social immobility increase the heterogeneity of gene pools? An order of magnitude more than "some"? And how quickly would Karimi-Booshehri and Beardmore expect that heterogeneity to disappear? Figuratively overnight? Apparently.

People who inherit wealth do not start at the starting-line with the rest of the runners, nor do their children or their children's children. It is reasonable to speculate that the present distribution of the I^A allele is one time-frame taken from a gradual sequence of allelic desegregation—the remnant of centuries of tradition during which the mere possession of wealth and social class was enough to ensure the maintenance of same—even in the face of a conspicuous lack of ability, genetic or otherwise.

JOHN HARTUNG
Department of Anesthesiology,
State University of New York,
Downstate Medical Center,
Brooklyn, New York 10009, USA

1. Beardmore, J. A. & Karimi-Booshehri, F. *Nature* **303**, 522–524 (1983).

BEARDMORE AND KARIMI-BOOSHEHRI REPLY—Mascie-Taylor and McManus's interesting findings on a sample of mothers fail to confirm ours. They consider a number of possible reasons for this. However, they do not take age into account. As the majority of children are born to mothers in their twenties or early thirties there is massive over-representation of younger cohorts in their sample. Thus, quite apart from the omission of non-breeders, their sample could not be said to be representative of the female segment of the population in a social sense.

A second important difference in sample compositions between the two