

Patenting of human genes

SIR — It is encouraging to see you continuing a vigorous debate on the merits or otherwise of patenting human genes¹⁻³. It is difficult to say anything new about this, but I do feel that the public involvement that is integral to the search for human disease genes deserves continuing emphasis. It is only possible to localize these genes to chromosomal regions and assess the significance of mutations (as with *BRCA1*) with the involvement of large numbers of patients and their families. They have usually participated, not because of any immediate expectation of personal benefit, but to assist others in the future.

Academic institutions and charitable research organizations act as public agents in a parallel situation. Concern is aroused not just from frustrated ambition or jealousy because (as you aptly put it) these groups have been "pipped at the winning-post"¹, but because the winning-post would not even have been in sight without the genuine and mutual collaboration of research groups worldwide: first in finding the general region where the gene must be, then narrowing it down to a manageable size for a specific gene search and rapidly and openly publishing the results⁴⁻⁶. (My opinion does not result from sour grapes — I have not been involved in the search for *BRCA1*.)

You report a view that the isolation of *BRCA1* heralds a major success in "a new era in terms of the power of industrial support"². This will ring hollow to those scientists in other laboratories (about seven worldwide, according to your News and Views article³) who have the gene in their freezers and who would anyhow have isolated it within weeks or months. It is suggested by a participant that the public and charitable institutions cannot provide the resources needed to pursue the "common genes"², yet only two weeks earlier you published ground-breaking research originating from some of those very institutions, identifying genes involved in insulin-dependent diabetes^{7,8}. Neither can it be claimed that the discoveries of the new medical genetics are not being utilized in the public interest. There is a nationwide coverage of molecular genetics laboratories associated with the regional clinical genetics centres in the United Kingdom, to which there is public access through the National Health Service; there are similar developments in many other countries, where those involved are trying to find appropriately responsible and responsive ways of using the new genetical knowledge.

Until now, work has proceeded as a large-scale, collaborative exercise involving the general public with some notion of general benefit. It is not clear that those

who have participated would be happy for their diverse contributions to be used by others for commercial gain. This leaves aside deeper issues such as ownership, the technological imperative, and whether or how commercial activities affecting very personal aspects of family health could be monitored and directed both democratically and effectively. Of course there should be much more extensive public engagement, education and debate of the issues, but the existing model of open academic research with free access and use of information has not failed us yet.

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Rwandan refugees

SIR — The exodus of refugees from Rwanda is a human tragedy that has dominated the global scene in the past year. Political, tribal, and/or military conflicts appear to be the triggers for this mass migration. What has not been discussed as a potential underlying causal mechanism is the growth in the human population of this country, and concomitant pressures on resources, primarily arable land and potable water. Are these refugees from war and military oppression in fact environmental refugees? Is overpopulation, beyond the carrying capacity of the region, with resultant environmental decline, in fact the cause, and physical aggression merely the symptom, of this calamitous event?

Rwanda is a small country (2.5 million hectares) which, before the recent genocidal slaughter, had the second highest population density in Africa (2,934 people per 1,000 hectares, compared to 272 people per 1,000 hectares in the United States; Table 17.1 in ref. 1). The 1990–95 total fertility rate was the highest in the world, estimated at 8.0; the population grew from 2.12 million in 1950 to 7.24 million in 1990 (Tables 16.2 and 16.1 in ref. 1). However, at the same time as the population was growing rapidly, the index of food production on a per capita basis dropped from 98 (1979–80) to 76 (1988–

90) (chapter 18 and Table 18.1 in ref. 1).

Migration by human beings "is a last resort when conditions at home become so poor that life itself is in imminent danger"². Increased populations of humans and livestock, coupled with periods of drought, have in recent decades led to land degradation, famine and subsequent large-scale migrations in Africa². It has been predicted that declines in environmental habitability, due to a variety of factors including increased population pressures on resources, will cause more and more mass migrations in years to come². Are we, however, actually seeing the future now in Rwanda? Will the predicted waves of environmental refugees fleeing their homes in fact appear to be refugees from war or political oppression? As competition for scarce and diminishing food and water resources as a result of increased population becomes critical, conflict, persecution and resulting exodus may be the future global pattern.

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Penn's law

SIR — I am reporting you to the SPCFA (Society for the Prevention of Cruelty to Figurative Animals) for your abuse of "the Sherlock Holmes dog that failed to bark" in the leading article "Big Bang gone quiet" (*Nature* **372**, 304; 1994). If you read *Silver Blaze* again, you will discover that your figure of speech is inappropriate.

Holmes was led by the dog's silence to a conclusive deduction based on the assumption that the dog knew something. You deduce three possible explanations for the cosmologists' silence, none of which is conclusive or even exclusive of the others. As to the silence itself, it may be due to the fact that the cosmologists know at least less than the dog did, if anything at all.

I am on the verge of proposing a natural law according to which almost all rhetorical references to works of literature are made by people who have never read the works to which they refer (for example, "Catch-22", "Orwellian", and others too numerous to list).

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