Toxic spill caught Spain off guard

Sir — The toxic spill by the mining company Boliden into the Guadiamar River and the Doñana Natural Park last April highlighted the lack of co-ordination between Spain's central and regional administrations, and their incapacity to deal efficiently with major environmental hazards. This disastrous event has once more stressed the necessity for more well-trained scientists, engineers and managers in Spain who could deal with such hazards.

The lack of trust and cooperation between the seven institutions involved in the prevention and treatment of the spill has made it painfully obvious that Spain must modernise its institutional framework for the management of water, mines and natural resources.

The Association for the Advancement of Science and Technology in Spain (AACTE), and most Spanish citizens, were shocked by the inability of official bodies to tackle the public health and environmental issues, which were worsened by their conspicuous efforts to minimize the political consequences.

One of the few positive actions was by César Nombela, president of the Spanish National Research Council (CSIC), who created a 'commission of national experts' to provide guidelines for the treatment of the toxic spill and the monitoring of its effects. But the commission includes at least 17 members. Many are academics without much experience of detoxification, ecotoxicology and monitoring of soils, rivers and ecosystems following mine spills. The AACTE strongly suggests that the commission should be made smaller and incorporate international engineers and scientists with relevant expertise.

We urge the commission to produce a report evaluating the impact of the spill. This would include an overview of the processes following soil and groundwater pollution; effects on public health; future use of affected soils and rivers; and damage to ecosystems. Such a report would be an invaluable step towards designing detoxification and management strategies. The report should be made public to keep Spanish citizens informed and allow evaluation by the international scientific community.

We congratulate the Andalusian Environmental Council and the CSIC for setting up a monitoring programme for water and aerosols, and for allowing access to it through the Internet. The programme should be extended to soils, groundwater, river sediments, and flora and fauna. Results should be made public. This would prevent the current wave of public distrust and the occurrence of potential frauds.

The institutions involved in the management of the area should resolve the lack of a structured decision-making system both inside and outside the Doñana Natural and National Parks. This effort must go hand-in-hand with public information, to prevent mistakes hidden behind a wall of institutional obscurity. We ask for rigorous problem analysis, professional implementation of solutions and transparent decision-making.

Many politicians still seem to be unaware of the complexity of the problem. The effects of the spill will persist for decades and require long-term action. The government must seek advice from the world's best specialists so that we can begin to learn from such calamities.

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Wacky, weird and scientifically illiterate

Sir — I am surprised at your response to my comments on science and pseudo-science in the *Independent* newspaper ("How not to respond to *The X-Files*", *Nature* **394,** 815; 1998). Part of the point of my piece was to warn against the too easy condemnation of popular fantasies like *The X-Files* as anti-scientific. It is heavy-handed and patronizing to try to police such stuff too thoroughly on behalf of the ideal of scientific rigour.

But to suggest, as you do, that, because science proceeds from the known to the unknown by means of a series of hypotheses, it is therefore "more like *The X-Files* than some detractors recognize" is poppycock. Science does proceed from the known to the unknown by the testing of hypotheses; but Mulder and Scully do not; rather, they parody this process in scenes whose only apparent purpose (other than to entertain) is to obfuscate and to mystify.

Where science strives to illuminate, *The X-Files* strives to darken. Even this I don't much mind; if people enjoy obscurity, let them have obscurity. But what I do find rather irritating about the particular brand of obscurity presented in *The X-Files* is that it regularly evokes scientific concepts to help the plot, with absolutely no glimmer of understanding of what these concepts are supposed to mean. There is a scientific illiteracy in many of the scripts; and this is irritating, because there is no reason why even the wackiest and weirdest plots cannot exploit science cleverly and elegantly, rather than ignorantly and clumsily.

To complain about the clumsy use of science in drama is not, I think, to patronize anyone; but to suppose that the interaction of Mulder and Scully is "as scientific as you please", and that its popularity suggests "that the public clearly has more of a feeling for the spirit of scientific enquiry than some give it credit for", is fanciful in the extreme. There is plenty of evidence to suggest that the public is fascinated by genuine science; but the popularity of *The X-Files* must, I fear, be put down to causes other than this.

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Water, water, every weekend

Sir — Randall Cerveny and Robert Balling's report on the raininess of weekends shows that there is nothing new under the Sun — at least not on this topic (*Nature* **394,** 561–563; 1998). The same not-so-sunny conclusion was reported by David M. Schultz of the National Oceanic and Atmospheric Administration/National Severe Storms Laboratory in Norman, Oklahoma, in the *Annals of Improbable Research* (March/April 1998).

Schultz used daily weather observation records archived by the National Climatic Data Center for Atmospheric Research. A stickler for completeness, Schultz examined 40 years' worth of data, thus making his project strictly biblical in scope.

The Schultz report will be archived on our website (http://www.improbable.com) when last weekend's flooding subsides enough for us to re-enter our building.

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