In the closing paragraph of our *Science* paper and elsewhere in the text and notes, we summarize our view of the limitations of this research and express the hope that, because of these new dangers of nuclear war, "the scientific issues raised (here) will be vigorously and critically examined". Many members of the scientific community, ourselves included, are now engaged in such an examination.

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JOHN MADDOX REPLIES — My objective, in the first brief reference to this work and in the second reference, was to remind readers, either of the original works or of *Nature*, that these calculations are uncertain. Plainly I should have made more of the smoke and less of the dust, but the conclusion remains — that the assumptions on which these calculations are based, and the computational techniques themselves, are respectively (but necessarily) so uncertain and imprecise that it would be folly to regard them as more than suggestive, but interesting and even valuable (as I said) on that account.

Uncertainty about the scale on which nuclear war might be waged is probably unavoidable, and I have no complaint at the scenario used; it serves the purpose. The uncertainty about the quantities of smoke generated, the height to which smoke would be carried, the local meteorological effects with which its generation would be attended and the rate at which particles would aggregate and be washed out cannot be processes that could affect the quantity of smoke available for redistribution over the surface of the Earth by one or more orders of magnitude.

Even the climatic modelling is susceptible to sources of error not yet taken account of. The essence of the nuclear winter is a global temperature inversion: how stable is this against lateral variations? The point has not to my knowledge been tested. And there has been no investigation of the likelihood that such an inversion would be formed, by the diffusion of carbon particles over the surface of the Earth, without provoking the vertical movements in the atmosphere whose effect might well be to inhibit the temperature inversion altogether. I acknowledge, of course, that this is a difficult and, for the time being, an intractable problem; the authors have followed other modellers in solving the easy problems first. On such a matter, certain to stir the public imagination, it seems to me improper that the results of calculations should be published even in sober language without a warning to all potential readers of the pitfalls there must be. This is doubly unfortunate when, as on this occasion, a purportedly scientific publication is so fully amplified by popular articles, first in *Parade*, most recently in *Scientific American*.

I do not believe that the authors are politically motivated, except in the most general sense that they believe they may help to save the world. But I think it disingenuous of them to overlook the ways in which their conclusions may be used by politicians in other causes, often of a political character. □

Amino acid transport systems

SIR — We are concerned about the problem of making simple and unambiguous reference to well-characterized amino acid transport systems, and we indicate here how we aim to minimize unnecessary further complexities in our use of abbreviations for such systems.

Where a new transport system appears to be simply a variant of a known system, we plan to recognize this close relation with a terminology such as A1, A2, ..., reserving previously unused Roman letters only for more distinctly different systems. In this way we hope to avoid exaggerating complexity. We hope also to avoid evoking any single amino acid where it may be misleading because the system later turns out not to be approximately specific for that amino acid.

For systems for basic amino acids in general, where the mediator appears to accept these amino acids only in a cationic form, we plan to use the symbol y^+, the positive charge indicating the apparent selectivity for the cationic form. (This symbol omits an initial letter L earlier included in Ly^+ (ref. 1), whereby a single amino acid was too strongly evoked.) Conversely, for systems for dicarboxylic amino acids where these appear to be accepted only in their anionic form, we plan to use the symbol x^-. The plus and minus signs do not merely emphasize the requirement that the amino acid substrates have a positively or a negatively charged side chain; they also allow for the possibility that systems will later be found that specifically recognize and require the uncharged side chain group $-COOH$ or $-NH_2$. We plan then to add a single subscript letter such as A, G, or C (for example, x_A) where it seems desirable to indicate that one of these anionic systems is rather specific for aspartate or glutamate, or includes cystine among its substrates. An important Na^+-independent system for anionic amino acids, x_{-C}, does indeed include cystine and glutamate among its substrates. When a transport system x^- and y^+ is Na^+-dependent, we propose to indicate it by making x and y capital letters, X^- and Y^+. Specification as to the cell type or organelle under consideration will generally be needed when referring to a particular system, especially for a system apparently peculiar to one or a few tissues.

The terminology x, y may be seen as part of a scheme x, y, z, in which z stands for 'zwitterionic'. This leaves the as yet unassigned letter z for one or all systems for zwitterionic amino acids. The letter N is preempted for another meaning[2].

We do not necessarily mean to complicate matters by these ideas, by changing nonconforming abbreviations which may be regarded as already well established, even the capital L in the classical system[3], although a lower case l (as in l3, l4, ...) will seem appropriate for new similar Na^+-independent systems. We think it is important that a transport system should be characterized in detail before a code is designated for it. The various designations need even then to be regarded as provisional, as the homogeneity of a given component of transport is itself a provisional conclusion, and two components may turn out to be less similar than was at first supposed.

We invite colleagues who come to participate in identifying such transport systems to join us in a general effort for reasonable simplicity.

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